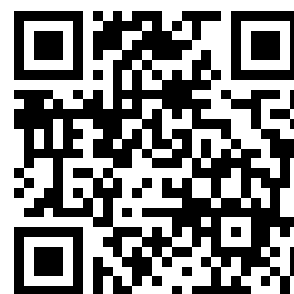

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AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

BUFFALO
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OCTOBER, 1914

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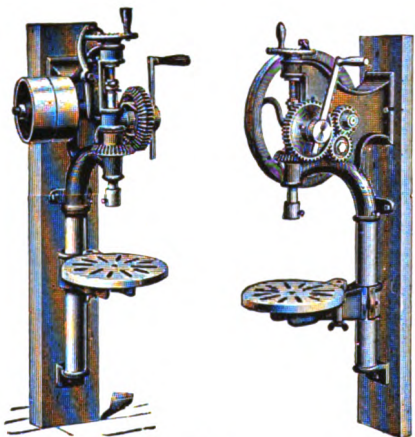
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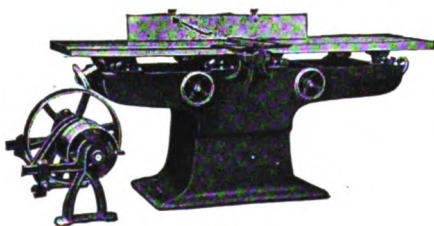
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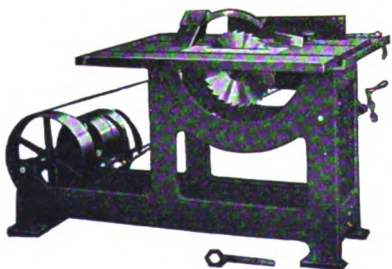


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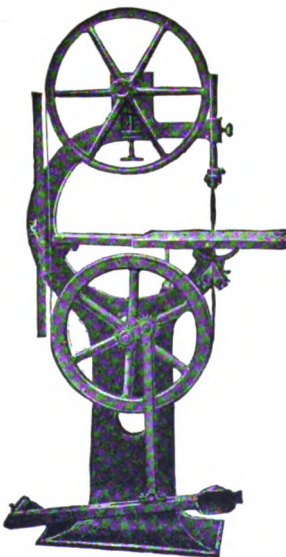
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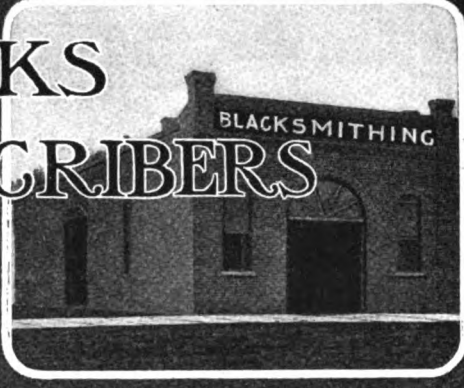


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To help us:—First, turn to the Index to Volume 13 in the September number and read the items carefully. After you have read them all, give us the names of those articles that you liked best during the year. We want to know which ten articles were of most interest and value to you. Of course, there were more than ten articles that were valuable to you, but we want to know the names of ten that hold highest place in your estimation.

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Our Fourteenth Year

This fourteenth year of THE AMERICAN BLACKSMITH finds the craft on the upgrade. It finds the craft with new life, new business methods, new ideals. This, our fourteenth birthday, finds the craft looking toward a rising sun, toward the dawning of a new day—a day of better appreciation for the smith, a day of better profits, a day of modern methods in the smith shop.

In this, the first issue of the fourteenth volume, we have made some changes that we believe will improve the usefulness of "Our Journal"—changes which we believe will be heartily welcomed by "Our Folks."

We have given Benton a regular job;—instead of smoking up the Editor's good cigars, he will have charge of a column of his own, where he will dish up and pass out such extracts from his recipe book as will be of help to "Our Folks." This new departure will, of course, do away with the talks "Around Our Forge Fire," and in the latter department's place will be found an entirely new feature by an authority on horse matters who writes under the nom-de-plume, "The Bison." Here you will find interesting bits of horse news from track, stable and paddock and the world at large.

In this number you will also find the introductory article of a brand new series by E. St. Elmo Lewis who has written so many excellent articles on business systems, cost-keeping and allied matters. This new series will consist of nine articles on "Efficient Cost-Keeping." In these articles Mr. Lewis will discuss the various systems of paying wages; the perpetual inventory; labor costs; forms used in cost systems and similar subjects.

Other departments will be unusually well represented. Dr. Jack Seiter, our authority on shoeing and horse anatomy, is expected back shortly. A recent operation for the removal of a piece of steel in Dr. Seiter's arm has made it impossible for him to continue with his articles, but we expect very shortly to again be favored by him.

Mr. Hillick will continue with his articles on auto-repainting, and Mr. Swartz with his excellent helps on auto-repairing is one of our regular family of contributors.

This is, of course, but a suggestion of what the fourteenth volume will offer you. Other announcements will be made from time to time. Suffice it to say that Volume 14 promises to out-do all others in the amount of its sound, practical information.

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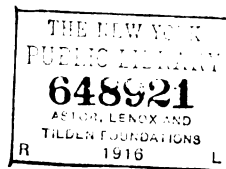
THE NEW HELPER



Contracted Feet

The Causes of Contraction and How to Treat It

J. A. CARROLL



CONTRACTED heels is perhaps one of the most common and frequent diseases of the horse's foot with which the shoer has to contend. The trouble may simply be apparent in the heels as indicated, or it may affect the entire foot, when the foot is usually called hoof-bound.

Contracted heels, or contraction in any part of the foot, may lead to almost any of the diseases to which the hoof is liable. Corns, cracks and thrush are usually the result of contraction in some form; so it is most important that contraction of the foot in any degree, no matter how slight, should be arrested as quickly as possible, and the foot put into healthy shape and kept so.

Causes

The causes of contraction are numerous, and while shoeing is pointed out as the most frequent cause, there are other matters which predispose toward a contracted condition of the foot. Lack of exercise is a very common cause of contraction, especially in these days when the saddle animal often finds itself neglected for its rival—the automobile. It may be mentioned in this connection that, while both driving and riding horses have suffered somewhat from neglect, due to the popularity of the motors, there is considerable talk current, and it seems well-founded, too, that the stylish driver and rider are again coming back. In all large cities, many persons in fashionable sets are being pointed out as returning to their first love—the horse. One prominent man calling several eastern cities “home,” and who owns a most palatial residence in one of them, is using his motors for business and semi-social occasions, but has already re-equipped his stables with a restricted line of both drivers and riders. He says the horse, if the right kind, is more exclusive; and what the ultra-fashionable world and the exclusive social set are seeking

today is something distinctly different and decidedly unattainable by the majority. The very popularity of the automobile, it would therefore appear, is bringing the noble horse again into his own—an animal of refinement and not merely a beast of burden.

But this is beside the subject—interesting as this matter is to every lover of horses. To return to the causes of contraction—beside lack of exercise—faulty shoeing and hard, dry stable floors must be included. Rasping the foot wall, paring the frog, opening the heels and cutting the bars are all faults in the shoeing process that are prone to cause contraction of the hoof. Then, too, must be mentioned, high calks, especially at the heels, and the practice of using nails too far back or too near the heels. It would seem, however, that enough had been said during the past few years to preclude the possibility of any shoer raising the horse's foot too far from the ground with calks. “Keep the frog close to the ground” has been the cry for

so long that it would seem every shoer would know his lesson by this time. This is far from being the case, however.

The Treatment

When a case of contraction comes in for treatment, it is well to bear in mind, first of all, that a rapid recovery is not to be expected nor should it be attempted. In the case of a foot where the frog has been shrunk and squeezed up into the foot until this normally prominent member has all but disappeared, the frog is likely to be driven still farther into the foot if the shoer is too ambitious in effecting a cure. Frog pressure is, of course, desirable and necessary, but if applied in too great abundance it will operate against rather than for a cure.

First in the course of treatment must be the softening of the horn. This may be accomplished by the use of the soaking tub, foot packs, or poultices of linseed meal and the use of damp sawdust in the stall. The hoof ointments on the market are generally good and should be

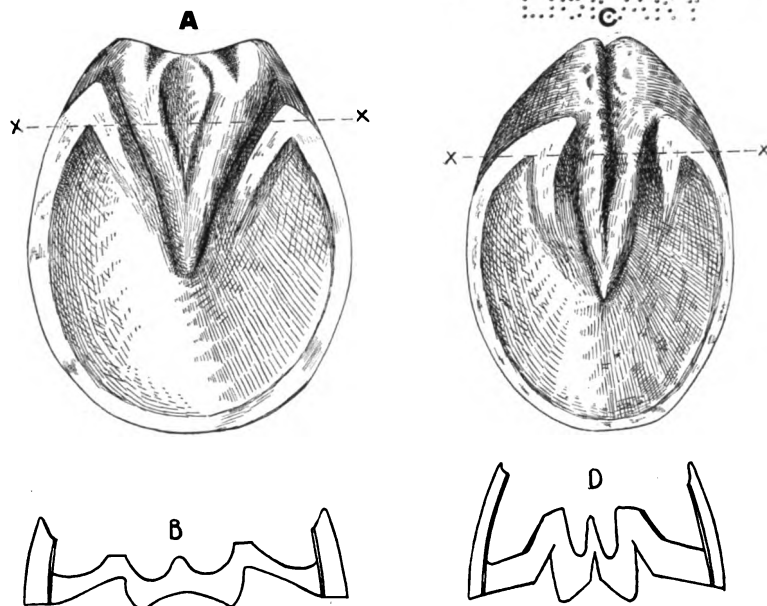


FIG. 1.—SHOWING A NORMAL HOOF AND ALSO A CONTRACTED HOOF WITH SECTIONAL DIAGRAMS OF EACH



applied to both wall and sole. This treatment will tend to keep the horn and foot moist, and prevent its further drying out, which is the direct cause of the contracted condition.

After the hoof has been thoroughly softened, the foot is prepared in the usual way, except that the heels are lowered slightly at each successive shoeing and a bar-shoe without any calks and as thin as practicable is used. The frog should not be touched, nor should the bars be opened. There should, however, an effort be made to gradually increase the pressure on the frog and heels, and in this way to encourage the healthy growth of the frog and a spreading of the heels.

To assist in the spreading of the heels and if the animal is not worked hard, the wall may be rasped away at the heels until a very thin layer of horn covers the soft under tissues. This rasping may be done for a distance of two to three inches from the heel, and from the coronet the amount of horn rasped away should diminish gradually to the bottom of the foot, so that the wall will be of normal thickness at the bottom.

A good hoof ointment used in connection with this treatment will assist greatly in promoting a growth of healthy horn and in keeping the hoof soft and flexible, so that the frog can grow and expand as normally intended.

If the animal under treatment can be spared from work a more rapid recovery will be secured by turning it into pasture, though it is not advisable to remove the shoes at first, especially if the contraction is far advanced.

In the use of the bar shoe do not forget the warning already expressed against endeavoring to secure proper frog pressure too quickly. Endeavor to increase the frog pressure gradually and slowly; using a leather pad and a hoof packing of some kind to assist in retaining the natural moisture of the foot and to promote the flexibility of the horn.

The accompanying engraving shows at A, Fig. 1, (Page 3) a sound foot with a sectional view of the same foot from x to x at B. It will be noted how the wall allows for growth and expansion of the frog and how easily the frog can here perform its function as a cushion for the foot.

At C, Fig. 1, is shown a contracted foot with a cross section of it at D. In Fig. 2, at A, is represented the rasping of the wall—heavily at the junction of the heel and coronet and gradually less so toward the toe and bottom of the foot. B, Fig. 2, represents a common bar shoe which should be fitted full all around.



The Horseshoer

Why the Horseshoer Should Study Horse Anatomy*

T. J. KEAN, M.D., V.M.D.

Unless the average horseshoer is encouraged in his efforts to acquire knowledge and the way pointed out for him, he is not very apt to master the finer details of his art, but is in danger of dropping into a routine that never leads to good results. The one branch of knowledge most conducive to good results is anatomy. It is an undeniable fact, that the horseshoer who is to successfully solve the problems of his business must have knowledge of anatomy. Of course, in a study as vast as the one under consideration, there must be parts not necessary for the horseshoer to study. On the other hand, the idea seems to exist that if the horseshoer understands the hoof and its contents, with the bones, ligaments and tendons below the knee and hock, he will have about as much anatomy as he can well handle. In this we err I think more seriously than do the men who insist on the greater course. Certainly, if the student intends to work among slow moving horses only, possibly the

shorter, simpler course may serve the purpose. But for the man who hopes to advance himself and to take his place in the front rank of his profession, anatomy from the knee and hock down is not enough. The shoeing of track, road and the better classes of coach horses, presents problems that tax the wisest. Here is where a full knowledge of the organs of locomotion, at least, comes into play. Horses vary greatly in their relative conformation, and unless one is able to accurately diagnose each case, one is very likely to drop into practices that produce anything but good results.

Anatomy of the horse, for the horseshoer, is simply knowledge of the different parts of the horse, but not necessarily of the finer details of the nerves, organs and vessels that the veterinarian is compelled to know so accurately. Our studies should lead rather to a knowledge of the organs of locomotion. These would include the bones, joints, ligaments, tendons and muscles. Anatomy for the horseshoer also includes physiology of movement and, outside of the knowledge of the hoof which all should learn perfectly, it is this we need most and what we should strive for in our studies. To know how to change the motion of

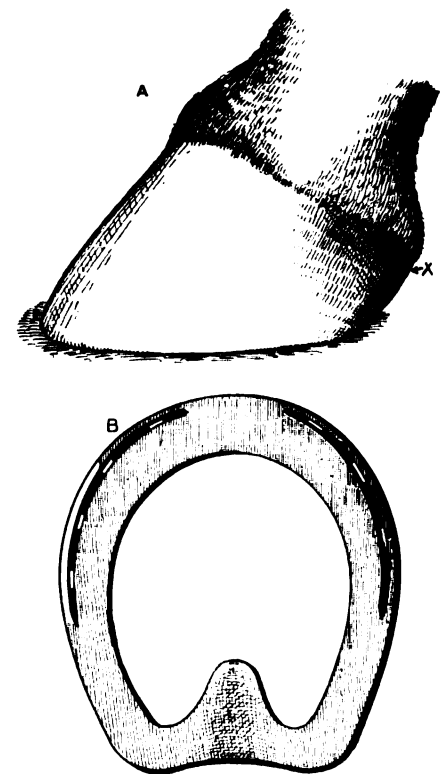


FIG. 2—HOW THE WALL IS RASPED AT THE HEEL

*This article by Dr. Kean was originally published in a previous issue of THE AMERICAN BLACKSMITH. It is republished in response to several queries on the subject.



a foot and leg, to prevent interfering, for instance, and to make such changes positively, and without experimenting, we must know enough about the motion of the leg so as to know why the horse strikes and just what to do to swing the foot clear. To the man whose hands have been educated and whose eyes have been trained, the knowledge of anatomy is of the greatest assistance. It enables him to see what would otherwise be obscure, and assists him in reasoning on what he does see. It makes him observing. You will find that every successful horse-shoer (I don't mean successful from the point of view of dollars and cents) has learned to interpret the movements he sees the horse make. He may not be able to put what he sees into words, or to explain what he sees to anyone else, but is perfectly clear to himself. In many books you will find pictured and described shoe after shoe for the cure of every trouble we meet with, but nothing of value about the cause of these troubles. Apparently the men making the shoes are unable to explain causes. They have attacked the problem at the wrong end; the curative shoes they advise coming after a series of experiments conducted more or less in the dark. I have no doubt that every shoe as described and advocated, served the purpose for which it was created. But I am unwilling to admit that success was due to any property inherent in the shoes themselves, because they vary and differ so radically in shape, weight, width of web and in the position, shape, and size of calks. Some are the direct opposite of others made for the same purpose, and any one apparently serves the purpose for which it was designed as fully and completely as any other. Success cannot, therefore, be due to these peculiarities of shape, weight, calks, etc. Successful results with these shoes come, not because of them, but in spite of them, and are due to the other parts of the work. It is my belief that if the makers of these different shoes got together and demonstrated their work on the living foot, they would agree in every essential part of the work, no matter how radically they might differ about the shoe itself. This must be the case, if each meets with success. Anatomy and physi-

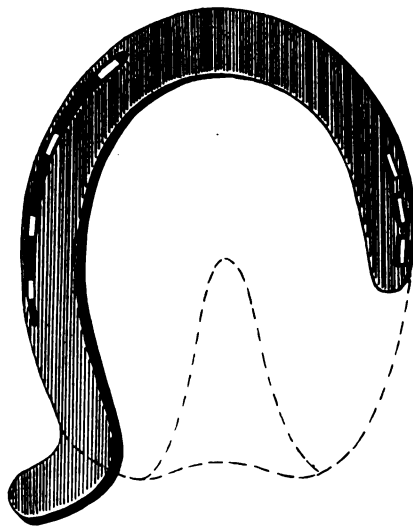
ology of motion teach us of what these essentials consist. It would also put them in position to teach others. We will find, some bright day, that horseshoeing is a science, because the observed phenomena are known to rest on well-defined laws or principles that must and do really exist.

The Use of a Three-Quarter Shoe in Treating Interfering

B. W. PERRY

That there is no iron-bound rule for shoeing any animal that is "off" his gait is proven again by a case recently treated. The animal seemed to answer successfully to treatment that pointed to exactly the reverse in experience. It just shows that the shoer cannot always foretell the effect of any one shoe on any one horse, even though he considers all points in the gait, anatomy and form of the foot.

The horse in the case is a very fine animal, practically perfect in every particular except that he is knock-kneed behind, or as some call it—"Cow-hocked." The animal had



HOW THE THREE-QUARTER SHOE IS FITTED

worn boots for a long time, and while he would go at times without striking he was never entirely free from hitting himself.

Several methods of fitting were tried with little or no success. Various shoes that had been successful in what appeared to be similar cases were tried but to no avail. Finally, after running through the list of all

the shoes that were likely to prove successful, a three-quarter shoe was picked out.

A pair were accordingly turned—the outer branch being shaped as on an ordinary shoe while the inner branch was tapered away to nothing—as shown in the engraving. The shoes were then fitted to the feet, and the edges of the feet where not

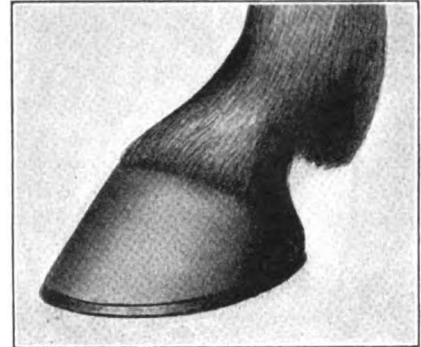


FIG. 1.—THE HEELS OF THE FRONT FEET WERE VERY LOW

protected by the shoe were carefully rasped and rounded so as to preclude any possibility of the horn cracking or chipping off.

Since the application of these shoes the animal hasn't interfered at all. The feet of, course, need careful attention, both by the horse owner and shoer, so as to prevent any great damage by splitting horn, but the feet are getting stronger and into better shape at each shoeing and, most important of all, the animal goes clear.

How a Bad Case of Over-Reaching Was Cured

E. W. P.

The subject of this article is a fine five-year-old mare, as pretty a buggy horse as I ever saw. The owner says that when he first got her she traveled clear and perfectly, but that two months ago she began to go short in front, to change and "mix" in her gait. After a while she began to stumble, then to tear the front shoes off with the toes of her hind ones, and lately she began to step on the heels and quarters of the front feet, lacerating them badly. When she came to my shop she was wearing quarter boots and shoes with tapered heels for "grabbing." One of the first things I noticed after removing the boots was that the heels of the front feet were very low, (see Fig. 1),



in fact that she had no heels. The hair of the coronet was touching the heels of the shoe. On picking up the foot I observed that the sole was flat, with an abnormally developed frog; in short it was evident that the mare had been affected with a



FIG. 2.—USE A LIGHT BUT WIDE-WEBBED BAR SHOE

mild attack of laminitis. At this time no abnormal growth of wall, so characteristic of the laminitic foot, appeared. She had been shod so often that the bulk of the wall had been rasped away. In this condition the owner said that she was utterly useless as a buggy animal; because she could not go at a walk without over-reaching.

In this case, laminitic feet was the primary cause, and indifferent, unscientific shoeing the secondary cause. The owner says that she was shod with plain shoes with heels when he bought her, in which shoes she travelled splendidly. This does not alter the fact that she has laminitic feet. Probably she had not long returned from a rest in the pasture, in which case the hoofs being expanded by the cool, moist earth, and free from pain, the locomotion of all four limbs was balanced, and, as the owner says, "She travelled splendidly." But when the mare had done a couple of months' fast driving on our hard roads, the hoofs got dry and began to shrink, the low heels began to suffer from the concussion imposed upon them by the high heel calks, the feet got dry and tender, and, the owner says, "She began to stumble and 'mix' in her gait." Presently the feet are so sore that she does not pick them up quick enough to get them out of the way of the hind ones. The front feet are "out of time"

with the hind ones, and she begins to strike the front shoes off with the toes of the hind ones. The horse-shoer, finding that he cannot keep a shoe with calks on (she knocks them off as fast as they are put on), shoes her with a plain shoe with tapered heels. These she cannot get off, but lowering the heels puts too much tension on the flexor tendons, which by causing pain in the legs as well as in the feet, increases the trouble by making her step right up on her quarters.

In this case the front feet must move quicker; must be made to move in unison with the hind feet, or the over-reaching cannot be cured. Since you cannot quicken the motion in front unless you relieve the pain in the feet and legs, the principal factor in the cure is to get the soreness out of the feet and the flexor tendons.

A couple of months' rest on a nice soft pasture, (without shoes), would accomplish the desired result; the cool, moist earth would relax the shrunken hoof, while the heels (being relieved of the unnatural weight placed upon them by wearing high-heeled shoes) would begin to grow up to the proper angle, thereby relieving the flexor tendon of undue tension. But if the animal is again put to the same work unscientifically shod, the same abnormal conditions will return. So we assist the curative forces of nature by artificial means; and by removing the cause as far as possible prevent the recurrence of the trouble. To accomplish this end we remove the shoes and poultice the feet with hot bran mash for a few days. If

the animal has been highly fed, a cooling diet of bran mash with a teaspoonful of nitrate of potash in each feed will greatly help to relieve the sore feet. The feet being ready to shoe, use a light but wide-webbed bar shoe (Fig. 2), punch holes around

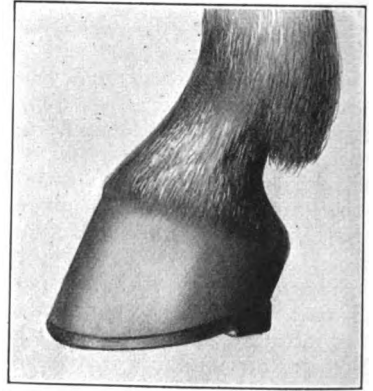


FIG. 3.—THE FOOT IS THEN PROPERLY SHOD

the toe and fit the shoe so as to relieve the heels of weight. Now to restore the normal angle of the foot and pastern, we must raise the heels. To do this, weld a steel slug on each heel, roll the toe of the shoe at the "breaking-over point," as shown by the wear of the old shoes at the toe, and apply the shoe with a leather pad, tar and oakum; nail the toe and leave the heel nails out. Of course, this mare can strike a bar shoe off as easily as a plain shoe if she reaches it, but the point is, that being scientifically shod, the sore feet and tendons relieved, she gets the front feet out of the way of the hind



THE SUBSTANTIAL LOOKING SHOP OF MR. F. H. STREIBICH IN ILLINOIS



ones; hence, the over-reaching is cured.

The Horse and the Automobile

H. N. POPE

A great many people are predicting the passing of the horse and the horse-drawn vehicle, but to my mind the man is still unborn who will see that day. And should this prediction come to pass, it does not alter the case a great deal, because the fact remains that the automobile is here and here to stay. Now if the smith is to lose the work which the horse required him to do it seems but natural to suppose that the work

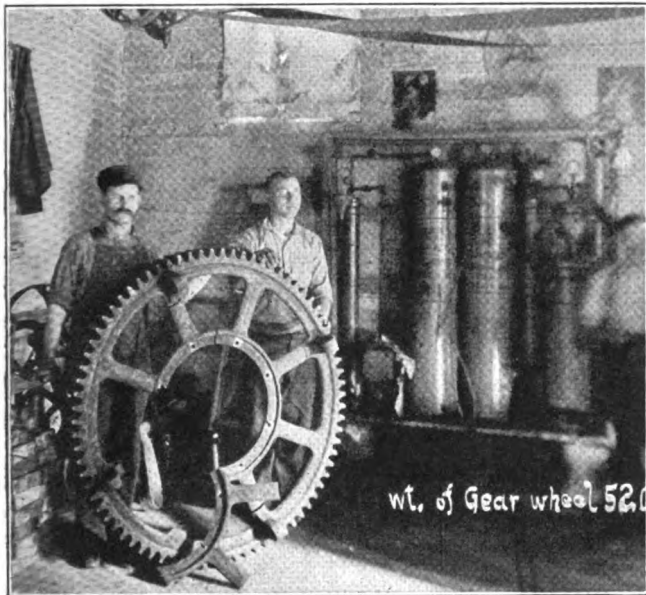
proper form. I know one man who spent three weeks in the factory just to get an insight into the work, and he afterward realized that it was time well spent. Now, Mr. Smith, whoever or wherever you are, it is up to yourself whether you get the work or not, and even though some other fellow starts he has to fall back on the smith to make or weld some part that he is unable to do.

An Illinois Shop and a Big Welding Job

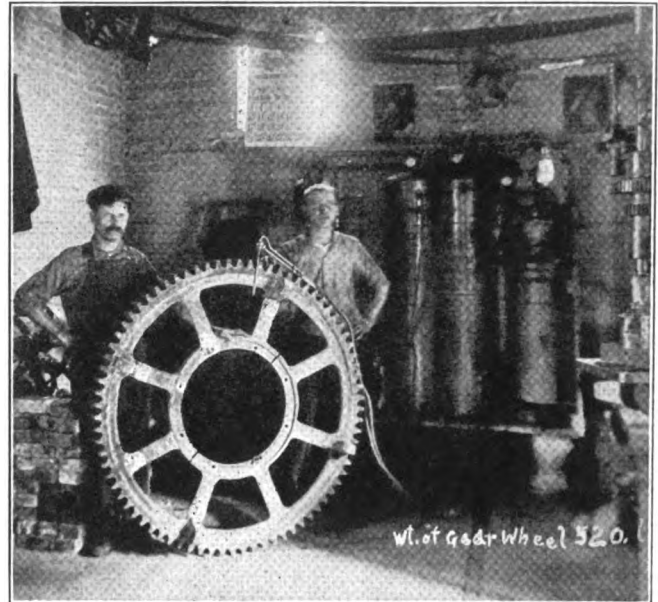
The accompanying engravings show an exterior view of the shop of Mr. F. H. Streibich of Illinois, and also

after." This gear is from a gasoline tractor and was broken in a number of places, as shown in the engraving showing the gear wheel before repairing. This wheel weighed 520 pounds, and was apparently repaired with ease by means of the oxy-acetylene flame. Mr. Streibich's oxy-acetylene plant is shown in the background in the interior view of his shop.

Describing his equipment, Mr. Streibich says: "We have two forges, both equipped with Buffalo Electric Blowers; we have a 50-pound Little Giant power hammer; a punch and shear; a power drill; an Ideal lawn mower sharpener; and, last but not least, a Shemmel welding machine.



THE GEAR WHEEL AS IT CAME INTO THE SHOP OF MR. STREIBICH



THE SAME WHEEL AS IT APPEARED WHEN READY FOR DELIVERY

of the machine that has supplanted the animal must necessarily devolve upon the smith to a great extent. Therefore, it is up to the smith to equip himself for the work which he will be expected to do and also to see that he gets his share of this work. A part of the shop should be fitted up for automobile repairing and the proper tools on hand. Have a well ventilated pit, so that it will be easy to get under a car and work to advantage. Also have a stock of automobile parts for the convenience of any kind of a job that comes along. Give the work your personal attention. If necessary, go to a reliable dealer and get instructions on how to run a car and also how to take the car apart and put together again in

two interior views which show particularly some of the work they do in this shop.

Mr. Streibich's shop building is an excellent one of brick with plenty of windows on the working floor to admit light. This shop building is of a type which can be profitably copied by a great many craftsmen, and is a style of structure that is a credit to the craft. It will also be noted that Mr. Streibich is a firm believer in advertising his own business rather than the business of some patent-medicine maker or some tobacco manufacturer. This is another matter that will bear liberal imitation by other members of the craft.

In the other engravings Mr. Streibich shows a little (?) job "before and

Besides these we have, of course, a complete assortment of small tools and a Fairbanks-Morse four-horsepower gas engine and a four-horsepower electric motor. The engine and motor are so arranged that either can be used. We have been in business here since 1869 and have seen many shops come and go."

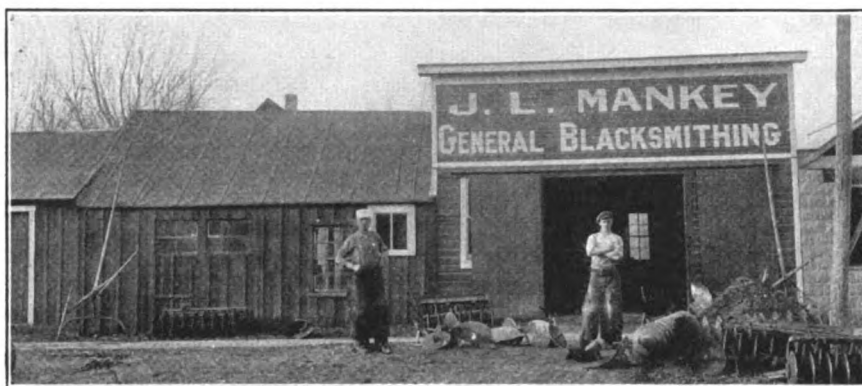
Welding Compounds and Welding

P. V. BURGESS

While in conversation with a brother blacksmith recently (one of the old school) the subject of welding came up. The old timer said: "Give me twenty-mule-team borax and I can weld anything that



any other man can weld." This is one of the faults of a great many, especially of the older men, of the trade. They are unwilling to give up the old methods and adopt some of the more modern usages followed by the younger men. They seem to be prejudiced against experimenting a little for an easier way. I think that one of the greatest improvements of recent years in our craft is the making of the modern welding compounds. I can well remember what a difficult job it used to be to weld a buggy spring with borax. Now I weld them with as little concern as any job I have to do. The following is my method:



THE GENERAL SHOP OF MR. J. L. MANKEY GETTING IOWA FARM TOOLS INTO SHAPE

Just scarf in the usual way, then place in fire, lap up, sprinkle a little Boraxette on laps, and turn blast slowly until it begins to melt. Then put on a good welding compound and continue blast until all is melted together; turn over in fire, cover with coke and take heat in usual way; being careful not to heat too quickly and to burn the tip ends. Weld in the usual way, and if you have a good helper to strike for you you can finish with one heat. Take an old spring and try it and you will be surprised how easy it is.

To weld a broken sickle, treat in the same way; putting an old rivet in the hole nearest weld to prevent fire from enlarging the hole.

To weld on a set of short-arm axles, cut off the old axle, allowing one half inch for take-up in weld, then scarf as short as you can. Take your hot chisel and cut four or five notches crosswise of the scarf, both on axle and stub. Allow these cut places to stand up $\frac{1}{4}$ inch high. Then place in fire and treat with Boraxette and welding compound, same

as spring. The object in cutting the notches on the scarfs is to prevent the weld from slipping apart when struck with sledge. Remember to heat slowly.

The most common fault in welding is due to heating too quickly. The points will get scorched before the heat spreads back into the body of the axle; then when you try to stick them the points will fly to pieces and the center is not hot enough to weld. Take plenty of time to heat and you cannot fail.

When next you are toeing some shoes, try some Vulcan toe calk welding compound, and see if it doesn't weld easier at a lower heat

hand, try to find out where he is not making as much as he should, in order that he may remedy the oversight. In the first place, then, determine to find out what it has cost you to produce and to sell. That will open your eyes to losses and perhaps unnamed profits. In the second place, decide that you will put in a system to find out what your future product will cost you.

Get at the costs; don't flinch or fumble, but go after and get the whole truth about yourself and your business.

You may have some pet method of handling tools, of checking work, of charging, of doing any one of a number of things; you think it is efficient and profitable. It may not be. Be prepared to see it possibly thrown on the rubbish heap.

Teach your men to see the new ideas in the same way. Employees are never glad to see changes. They don't know what they mean; and being ignorant of the purpose they generally imagine they mean the worst results to themselves.

Consider the man, and bring to bear upon him all your ability which has for its aim and purpose the inculcation of the right ideals of work, faith in the business, and enthusiasm for its prosperity.

High Speed Steel Fever

A man told a story which shows the value of this man-knowledge so essential to the success of a cost-keeping system:

"The management of a large machine works came down with the high-speed steel fever.

"This particular management tried high-speed steel and found that its costs could be reduced at least seventy per cent. That meant almost a revolution in prices and competitive conditions. An elaborate cost system was worked out, the new steels applied everywhere, and several contracts taken on terms that would have meant bankruptcy under the old scheme of things.

"And before those contracts were completed the works did face bankruptcy.

"For the new cost system wouldn't operate itself. Workmen had not been taught to temper the new steels—a delicate process. No provision had been made for grinding tools to exact angles in a special department. There was an insufficient supply of

and finish up smoother than sand. The same general principle applies to all welding, and I claim that for lap welding, Climax has no equal, but it is better to use a little Boraxette first to make it stick to lap.

Putting In a Cost System Efficiently

By E. ST. ELMO LEWIS

of Burroughs Adding Machine Company—President of the Detroit Executives' Club

Begin a system with yourself.

A cost system must be honest with itself.

Decide that you are going to be honest with yourself.

The proper cost system registers the will of the proprietor. It goes only as far as he will go. Some managers don't want to know too much about their business. The average man approaches a cost system from the wrong angle. He doesn't want to find that he has not been making as much money as he should, because that reflects on his ability as a manager. He should, on the other



tools for the new conditions, leading to losses of time. Worst of all, employees were suspicious of the whole innovation, because it had not been clearly explained to them and they feared it was meant to put them at some disadvantage. The cost system was only a theory at that point. It had never been adjusted to the human equation, and it took more than a year of patient work among the men in different departments before such adjustment was brought about; making the theory fact."

Tell the Men

Managers frequently go at this phase of the question in a way that leads to needless loss. At the bottom, every American workman is of the right stuff. That is not sentiment or patriotism; it is a plain statement of experiences.

When you throw aside your "general managership" and get down on the floor and talk to these men as man to man, you can generally get them into line with almost any plan of betterment.

Contented men give a better result than mere men.

Enthusiastic men give a better result than merely contented men.

Men with pride in their work, with enthusiasm in their blood and loyalty in their hearts can whip the world.

That sounds like sentiment. So it is, but the stuff that rules the world certainly has a place in ruling a business.

When you get down to the men, show them that you trust them; tell them what you expect them to do, and that the system of costs is simply to protect them and you and yours. You wish to place responsibility where it belongs, and will pay for it in proportion to its value. Most of them will try to deserve responsibility, and you'll find it pays to get rid of the others.

The general advantages of any cost system are:

First—To reduce the costs.

Second—To increase production.

Third—To introduce machines to do work hitherto done by hand.

Fourth—To equalize the output in each department.

Not one of these things can be handled with accuracy and safety unless you have a cost system.

The important thing to remember is that a cost system will not tell you what your costs *should be*. It

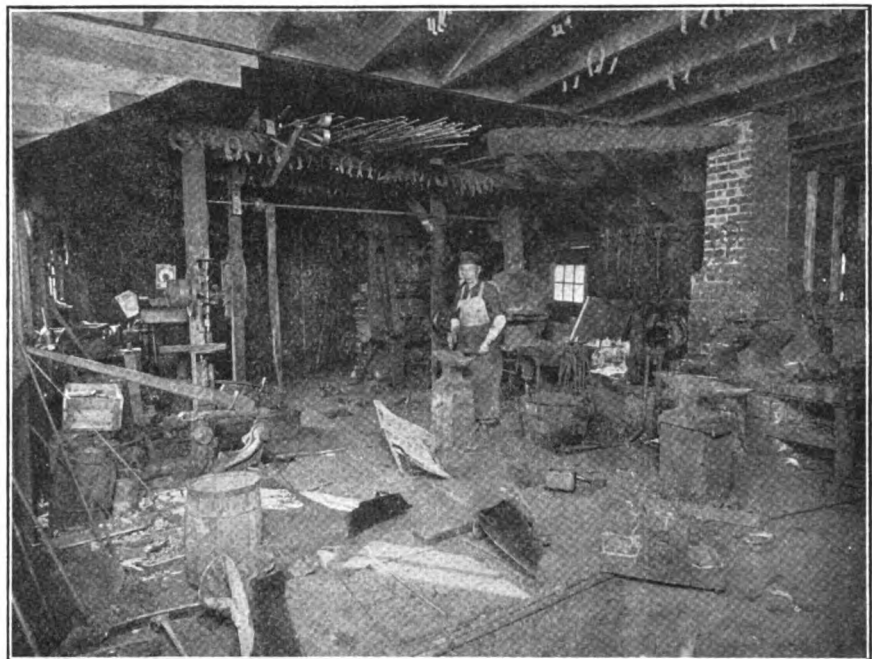
will simply tell you what your costs *are*. To determine if your management is efficient, you must have standards of efficiency by which to judge the results of management. You must analyze all conditions in order to know whether you are producing goods at the lowest cost consistent with the quality you wish to maintain.

Three Kinds of Costs

There are three kinds of costs: First, estimated costs; second, absolute costs; third, efficiency costs.

labor, the real amount of material, the real proportion of burden put into any piece of work. The ideal set before any cost-keeper dealing with absolute costs is: "Get the absolute facts and figures about the various activities of the business." Approximations, guesswork, estimates and speculations of any kind are barred; and in their place is an ever-present single minded desire to be absolutely accurate.

It must be realized that the value of the right system lies in the



THE INTERIOR OF MR. MANKEY'S IOWA SHOP SHOWS THAT HE HAS PLENTY OF HUSTLE

The process of estimating costs leads at best to self-deception. It argues a decision to install a cost system that shall give you a knowledge of what the items of your product actually cost you to produce, and then side-stepping in favor of introducing guesswork as a more pleasant and less apparent expense.

It is a compromise that inevitably hurts more than it helps. It is not a system, in any of its crude and imperfect parts. It is just a process of recording human guesswork, and has no more right to be called a system than a process of keeping books by which you guess at the amount of the items you enter to your debit, and speculate as to how much your customers should pay you.

The system by which absolute costs are obtained is an honest attempt to get at the real amount of

difference between average and maximum efficiency, between what is done by men who are left largely to their own devices or the uncertain moods and ebbing and flowing energies of foremen, and men who feel the constant spur of working up to definite standards fixed by scientific analysis.

The business man who thinks up to such a standard realizes that nothing *happens* in this world; that success or failure does not come as a result of good or evil fortune. Back of them is a cause. Back of all success there is a good and sufficient reason.

Profits will take care of themselves when you have taken care of the losses.

Applying the Principles

First, chart all the various departments of the business; under each



department write exactly what the department does; arrange each of these departments in the sequence of the work as it is done or as the product comes through.

Then take each operation in each department, analyze it carefully, make a time study of the work and write a schedule of standard instructions for handling it.

Arrange your cost system so the records will follow the sequence of operations.

Any shop not properly departmentized may have a working chart arranged without in any way interfering with the actual conduct of the work until the system has been fixed. The simple principle of departmentizing is: a department should handle the same class of operations.

Third—show location in plant and the condition of work on each piece of unfinished jobs.

Fourth—show the amount of productive and non-productive labor, and for what the non-productive labor is used.

Fifth—show the amount of productive and non-productive labor and materials, and give stage of development by departments.

Sixth—show total output, average monthly output, busy time and idle time on each unit of output, for day, week or month.

Seventh—show cost, by the hour, of operating each class of machines and by departments.

Eighth—show relative overhead and direct labor cost by the hour or by the unit, in each department.

the proportion of costs a job unit of production should be charged with, is the function of cost-accounting.

The actual work done—the visible work—the grinding, cutting, punching, shaping, heating, polishing, etc., are too commonly figured as the only cost chargeable against the job. In fact, these items comprehend but a small per cent only of the true cost.

(To be continued)

A Discussion on the Practice of Wetting Forge Coal

JAMES CRAN

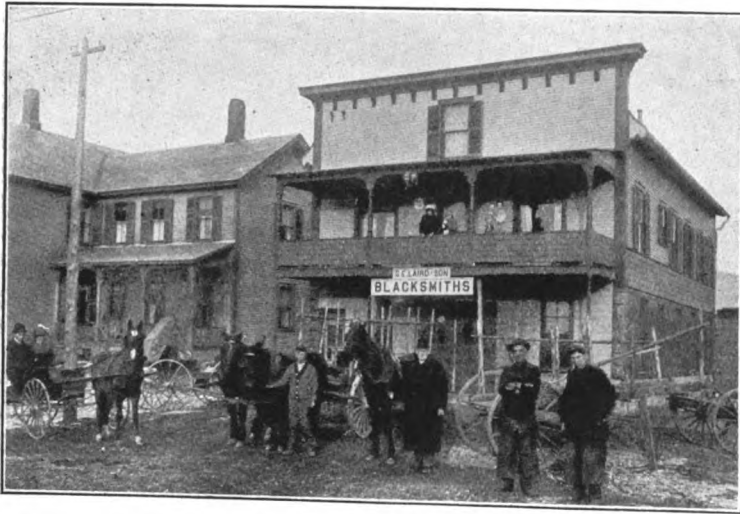
“Why I Wet Coal on the Forge”

Mr. L. R. Swartz's article, under the above heading, which appeared in the July number of THE AMERICAN BLACKSMITH was very interesting, particularly as it throws an entirely new light upon the practice of wetting coal for the forge fire and, according to his theory, is beneficial in generating heat.

Before discussing the article any further I would like to ask Mr. Swartz how much coal energy is used to separate the hydrogen and oxygen contained in a pint of water and how much heat can be had from the two-thirds of a pint of hydrogen after it has been separated from the oxygen.

I wish to say to Mr. Swartz and all others interested in the subject that I never have been able to separate the two elements contained in water by mixing the coal with water and trying to burn it. All I have been able to get was vapor which condensed and returned to water the minute it struck something cold. Wet coal on the forge is a source of annoyance; from the fact that the oxygen contained in the water has the same effect upon the metal being heated as an excessive amount of air has when it comes in direct contact with it; the result being heavy oxidization or scale which is always objectionable in any kind of forging. This has caused a great many shops where steam was used as an atomizer for oil fires to discontinue it and install compressed air in its place.

Another thing which is new to me is it being hydrogen that causes the explosion when the blast is turned on to a smothered fire. I have always been under the impression that it



THE VERMONT SHOP OF G. E. LAIRD & SON IS WELL EQUIPPED WITH POWER TOOLS AND MACHINES

Metalwork should not be mixed up with woodwork.

For instance, take a general shop. This is divided into woodworking, horseshoeing, painting, smithing and office departments. Each of these departments has its own expense; covering direct labor, direct material and general indirect expense.

Any shop cost system should do several things; some of course, under certain circumstances, being much more important than others. Among the important things it should do are:

First—ascertain the cost of each unit of each line of the work done.

Second—record the amount of time spent on each operation or each order.

Ninth—show whether each operation is increasing or decreasing in cost and, in its final analysis, whether you are making goods at a profit or a loss.

It should be understood from the start that cost-keeping is not a fad. Be convinced that it is a prime necessity to financial success. Business—almost any kind of a business—is but a guess without it; it requires study and judgment and steady application of correct principles.

From the time material is bought until it is fashioned by the workman into the finished product, the shop owner is at an expense that never ceases. To ascertain accurately



was coal gas that caused the explosion; and I believe I am right, from the fact that these explosions sometimes occur on my forge and I do not use water with my coal.

One thing I am sure of and that is, that if a blacksmith wants to put his fire out he uses water and also if he wants to check the fire from breaking out at some particular point. I am still from Missouri as far as heat being generated from water goes.

The chances are that if there was an apparatus like the one described by Mr. Swartz at hand to separate the two elements contained in water, that intense heat could be generated from the hydrogen, but, unfortunately for the blacksmith, forges with these appliances or attachments have not been built, and I would advise all those who wish to get the maximum amount of heat out of their coal to use as little water as possible until we get the benefit of Mr. Swartz's experiments.

"Water on Coal"

In the June number of **THE AMERICAN BLACKSMITH** the writer noticed a letter on this subject from Mr. C. W. Calf. Oh, excuse me, I have made a mistake—it was Metcalf!

Evidently, Mr. Metcalf did not read all of the article upon coal, written by the undersigned, which appeared in the March number of **THE AMERICAN BLACKSMITH**; or if he did he surely did not understand it. To make it a little more plain, it may be explained that water in all cases only tends to retard combustion and its only use around a forge fire is to keep the fire under control. That is to say, if the fire breaks through where it is not wanted, water is used to check it, but it serves no other purpose than to help to keep the greatest amount of heat where it is most wanted. In a packed fire, the coal used to build it has of necessity to be dampened just enough to make it adhesive and stick together until coking has commenced. Outside of that, water on a fire is absolutely useless. But we do not expect a very high standard of intelligence from anyone who will brag of working ten hours for the magnificent pecuniary recompense of \$3.00. Surely the standard of wages has depreciated in the State of California in the last ten years.

About that time, when the writer was employed in the State mentioned, carriage ironer's helpers were getting from \$2.50 to \$3.00; but if conditions were known, the chances are that the Golden State still pays men according to their ability.

Getting back to the question of coal, it would be real interesting to know what becomes of the sulphur and other impurities it contains after it has been washed. Probably it would be a paying proposition to go into the coal laundrying business; the chances are that the by-products could be disposed of to advantage.

Mr. Metcalf says he has been thirty-three years at the anvil and is still learning. Of course he is joking. But then, there is always the danger of some of our readers believing what he says.

A General Shop of Kansas with Power Equipment

W. H. BUSCHMANN

The accompanying engraving shows an interior view of my shop. This is a two-fire shop, run with gas-engine power. My equipment consists of a gas engine, a trip hammer,

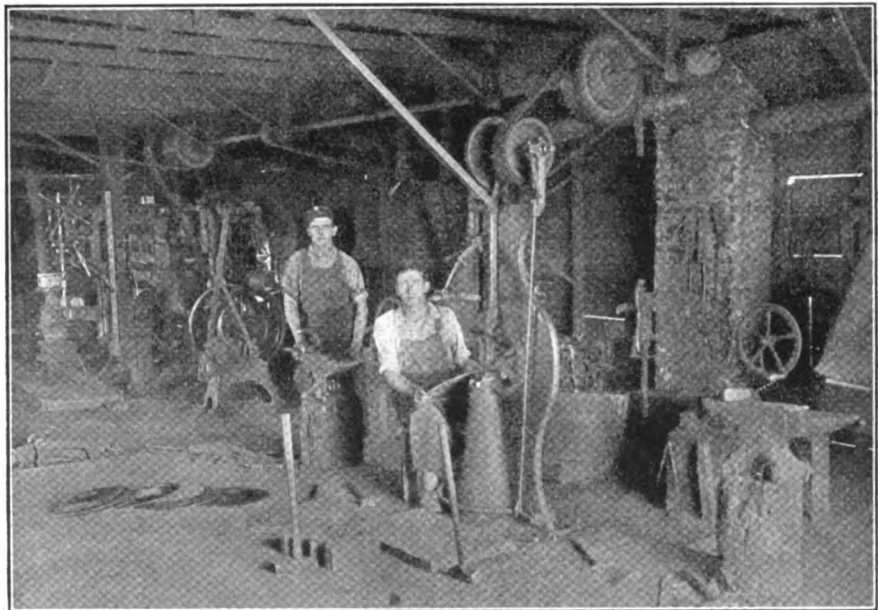
Missouri—he has been with me two years and is a good man at the business.

We do lots of plow, lister and disc work, as we are in the wheat and corn belt of this State. We both enjoy "Our Journal" very much, and consider it the best blacksmith paper printed. Every blacksmith should boost for "Our Journal" and help push the craft along to better things.

An Artistic Ash Tray

BERT HILLYER

The accompanying engraving on the next page shows some hand-forged work I have recently done on an ash tray for a friend who wanted something on the mission style and, if possible, to make it look hundreds of years old by leaving all hammer marks and dents in it that I possibly could. This style did not appeal to me, but he claimed that there are more admirers of this kind of work than of the smooth, fancy kind. So I tried to please him. The simple straight lines made it easy to design—the legs of the tray serving as match



TWO KANSAS HUSTLERS—MR. W. H. BUSCHMANN AND ASSISTANT IN THEIR POWER SHOP

a power blower, a power drill, an emery stand, a power saw and a full line of small tools. I do woodwork, horseshoeing and general smithing and machine repairing. In the picture I am at the hammer sharpening discs. The man at the anvil is from

boxes; the long, hollow parts for burnt matches, and the bowl in the center for the cigar ashes. The leaves under the rose are for scraping the ashes from the end of the cigar. After the tray was finished it was coated with a thin coat of



light oil, applied with a small brush so as not to fill the veins in the leaves. It was then heated evenly until the oil dried hard. This prevents the metal from rusting, and the natural color of the iron is retained.

In describing the piece it should have been said that the stem with the threeleaves on top was made to represent a broken twig, and that they had been partly broken down, but I don't think this helped to improve the appearance of the piece, unless for the odd look which it gave.

Thoughts On Timely Topics

By THORNTON

Caustic Censure and Cheery Comment

A CLEAN SHOP is much to be desired, but how much more important is clean shop help! It's not so very long ago that the average brand of smith shop help thought it was necessary to cuss like the chauffeur

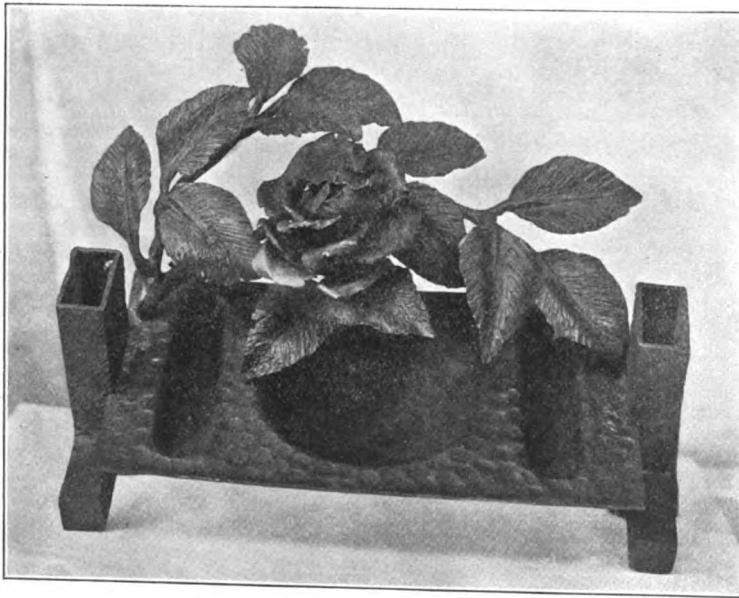
working for you and then have a shop that is in keeping with clean help. Let the help that drips at the mouth with profanity and fine-cut, and that feels the constant need of a booze bucket as a shop companion, go to the next shop for employment. Keep your shop clean—it pays in the end. I've never yet heard one customer complain on account of the absence of profanity, tobacco juice and booze at Thornton's.

SPEAKING OF BOOZE, reminds me—during the past month I have met just exactly a half dozen smiths who have tied the can to the booze pail. As one smith said, while looking about our shop: "My boys can drink if they want to, but not in the shop nor during working hours"; and every one of those men finds it pays and they all appeared to be doing a good business, too. One of these smiths on a visit from quite a distant point said: "The chronic booze hoister can't do the work, stand the

er—not for religious or sentimental reasons but for pure business reasons—which simply means profits.

THE GOOD OLD HORSE, properly broken, is still without an equal to go courting with. All of which remark is occasioned by a recent happening in front of our home. A chap came bowling along the other night with a Model T run-about and a girl. In his efforts to act as chauffeur and loving swain he lost control of his Ford and ran head-on into a telegraph pole. Luckily, no one was hurt; though how a very serious result was prevented is still a mystery. The pole was broken and the radiator of the car was somewhat bent, but otherwise—well we are still in favor of a good, well-broken horse. It will take a better man than the writer to be able to keep one foot on a brake pedal, one on the clutch and try to steer one o' them there buzz-wagons with one hand, to say nothing of watching the road and the speed indicator. We'll still choose a well-trained driving horse to help us in our courting. A horse that knows you, and that you know will find his way home along the right road, is the greatest assistant a young chap can have in his courting days; and isn't this another good and important reason for promoting and encouraging the breeding and use of horses?

IF I WERE A HORSE and were treated the way some horses are treated I would commit premeditated and intentional murder every time I went to the smith shop. The way in which some so-called shoers go at a horse's foot would lead one to believe that the hoof was made of cast iron, and that it was warranted not to crack, chip or peel under the hardest usage. And when you hear about shoemen fitting a number six double E tango pump on a woman with a number nine pedal extremity, just remember that all the champion shoe fitters are not working in ladies shoe parlors. Some are working at horseshoeing; and when you see one of these near-experts fit a number five shoe with a Cuban heel and an English toe on a foot that calls for a number ten open-heeled hoof protector you'll wonder why the beast doesn't add another name to the list of the day's casualties. All of which is intended as a preachment on the subject of fitting the foot properly



AN EXAMPLE OF MR. HILLYER'S WORK AT THE ANVIL—AN ARTISTIC PIECE, WELL WROUGHT

of a four-mule-power canalboat, to pad out both cheeks with various brands of fine-cut and plug, and to guzzle booze like a sailor on shore leave. We're glad to say, however, that times have changed and are still changing for the better. Smith shops are getting more habitable for the gentler sex; and it means much for the trade. Have a clean lot of boys

strain, nor work as steadily as the chap who drinks water. Of course, I cannot keep my men from drinking out of working hours, but I don't keep any chap very long who has to lay off every little while to get over a Sunday 'booze party.'" And let me tell you, Mr. Reader, there are lots of smiths all over the country ruling against the time-honored shop growl-

with the proper shoe. On the other hand, there is no excuse for burdening any animal with several extra pounds of surplus hardware.



Not only has harness racing attracted a larger attendance in all parts of the country this season than has been noted in several years past, but it has also provided its patrons with racing of an unusual sort—racing which has been characterized by several record-breaking performances; probably the most startling of which, so far, being those of the four-year-old pacer, William, that is generally regarded as the logical successor to Dan Patch (1:55½), in the pacing world. This colt's greatest performance was at Grand Rapids, Mich., where he defeated a field of older horses; pacing his three heats in 2:00½, 2:00 and 2:02½. The colt not only crowned himself as champion four-year-old pacer, but his second heat was the fastest second heat ever paced in a race, and the three heats are the fastest ever paced; displacing the three heats Independence Boy paced in a race at Columbus, Ohio, in 1911, when he paced in 2:02¾, 2:01¾ and 2:02. William is a free-legged pacer, sired by Abe J. (2:10), a stallion of Wilkes breeding. His dam is Lizzie C. (2:20½), by Jaywood, a son of Nutwood, and his second dam was the old-time pacing mare, Kitty Van (2:13¾), by Pennypacker. This phenomenal pacing colt appears to have every qualification necessary in a high class performer, and the best judges believe that he will, if permitted, pace to a record of 1:58 or better this year as a four-year-old; and that, with another year's age, he will crown himself champion of his gait.

Among the trotters, the wonderful colt, Peter Volo (that placed the world's record for two-year-olds at 2:04½ last season) holds the center of the stage. As a rule, phenomenal two-year-olds have not been sensational three-year-olds, but Peter Volo seems to be an exception to the rule. In his first race of the year (a futurity event) he reeled off three heats in 2:04¾, 2:05¾ and 2:06¾, which are not only the fastest three heats ever trotted by a three-year-old, but also the fastest ever trotted by a stallion of any age; the previous record in this respect being 2:07½, 2:08 and 2:02: made by the present champion stallion, The Harvester (2:01), at Fort Erie, Ont., in 1910. Peter Volo's first heat in 2:04¾ also equals the fastest heat ever trotted in a race by a four-year-old trotter; set by Colorado E. in 1910. From now on, this great three-year-old's appearances will be watched with interest, for his trainer, Thos.

W. Murphy, has stated that he will be greatly surprised if the colt does not hold the world's record for stallions of any age when the season closes. If he accomplishes this he will, of course, have to trot a mile faster than 2:01, and that will make him the most wonderful trotter the world has known.

Another sensational performance is that of the trotting mare Linda Wrona, by Mc-Adams (2:18¾), in taking a record of 2:05½ in her first race—a world's record; and still another is that of the three-year-old pacing filly, Anna Bradford, by Todd Mac (2:07¾), in equaling the world's record of 2:05¼ for pacing fillies of her age, in the first race in which she ever started.

With these record-breaking performances and a new list of 2:10 trotters, numbering twenty-three, and the Grand Circuit series of races covering but a period of four weeks, it appears now that the present season will furnish a larger number of new world's records than has marked any season during the past decade.

Manufacturers of vehicles and harness do their utmost to lighten the burden of the horse; being ever alert to note and adopt any improvement that will result in lightening draft, or in any other way making the horse's task easier. There are some things, however, which many teamsters fail to do that nullify the efforts of the makers of vehicles and harness to surround the horse with the best possible conditions. No matter how light-running a wagon may be, the teamster can add to his horse's burden by failing to take note of the size and shape of the wagon bed and wheels, and thus improperly balance his load; and the same result comes from failure to keep the axles clean and well greased; also if, in addition to neglect in these respects, a teamster uses an ill-fitting collar or harness that chafes the horse anywhere, the efficiency of his horse is greatly reduced. In the same way, efficiency is decreased if the teamster fails to furnish his horses with enough feed or the right kind of feed. The teamster who gets his horses to do the maximum amount of work and at the same time conserves their powers in the greatest possible degree is the one who does not need to have these suggestions made to him—the one who always brings in his horses in good shape at night, despite the hard tasks they have performed, but performed under the most favorable conditions that a careful, painstaking, observing teamster could surround them with.

One of the ailments which give the men who have charge of the big carting stables a lot of trouble is the shoe-boil, or tumor of the elbow, which frequently becomes chronic and ends the horse's usefulness. The average horseman will tell you, if asked, that a shoe boil is caused by the pressure of the shoe against the elbow while the horse is lying down. As a matter of fact, it is extremely doubtful if a horse would lie in a position that would give him so much pain and discomfort as he would be subjected to if enough pressure were exerted on the elbow to cause a shoe boil; for the boil, from the very first, is so sore that a horse will flinch with pain from even the pressure of a man's hand. When a horse is lying down and the foot apparently resting against the elbow, one can quickly determine that there is not sufficient pressure to cause the horse pain, much less injure the structure beneath the skin sufficiently to cause the violent inflammation characteristic of these ulnar tumors. Besides,

horses have been known to develop shoe boils when turned loose at pasture, wearing no shoes. A close observer has suggested the most reasonable theory yet advanced as to the real cause of the so-called shoe boil. Convinced that only a violent blow to the elbow would cause a tumor to develop there suddenly, he gave much time and study to horses in their resting hours, to see if he could not solve what was, to him, a mystery. He at last noted that when a horse attempts to arise from a recumbent position he extends the front feet, flexing the knees, thus forming an arch, with the feet and elbows resting on the ground. Then when he exerts himself to assume a standing position he strikes his elbows on the ground with such force and under such a weight that it results in an injury to the part; such injury being generally called a shoe boil. Some horses under observation have shown acute pain and lameness soon after having subjected the elbow to a blow in this manner, and other cases when horses invariably struck the elbow to the ground or stable floor when arising have developed chronic tumor. The prevention seems to lie in a liberal coating of straw or shavings for bedding for stabled horses, in order that a cushion may be present to lessen the violence of contact between the horse's elbow and the stable floor.

It has been pointed out recently that, whereas there were 2,758,000 mules in the United States ten years ago, there are now 4,449,000, a gain of more than sixty per cent in ten years. This has led to the prediction that, while the horse has weathered the assault of the automobile and the auto-truck, the great menace to his future now is the mule.

It is claimed that the early maturity and remarkable longevity of the mule, his comparative freedom from disease and the rarity with which a mule is found with unsound legs, make him a more economical proposition on the farm than the horse. It is stated that the man who uses mules will have to renew his work team only once where the user of horses will have to do so twice. Instances are mentioned where farmers have worked their teams of mules for twenty years without finding it necessary to pay out a cent for the services of a veterinary. It is also claimed that only two thirds of the feed necessary to keep a horse will be sufficient for a mule doing the same amount of work; also that, having much harder hoofs than a horse, the mule being used on the farm need not be shod for more than a brief part of the year. But admitting the justness of all these claims, what then? Without horses there would be no mules. All over the South and Southwest, where the greater part of the mules in this country are raised, their breeders are using the best mares they can possibly get to raise the mules from. Sound and full-blood draft mares are used to produce the big, heavy mule for city use. For the lighter weight mules, both trotting bred and thoroughbred mares are used; and the supply of such mares hardly suffices to fill the demand. Let the mule supply increase. The long-eared hybrids not only relieve the horse of a lot of drudgery, but the greater the demand for them, the more mares horse breeders will have to raise to stock the farms where mule-breeding is made a specialty. That it pays owners of good mares to use them for mule-breeding, the prices good mules sell for are sufficient proof. Not long ago a Kentucky firm sold a big pair for \$1,000; and it is said that a contractor working on the Ashokan reservoir contract near New York, has one hundred teams of mules at work which cost him upwards of \$600 each.



Deciding The War

W. O. B.

Our friend Thomas Tardy, the smith down the street, has got a new hobby he rides with both feet. He'll tack on a shoe or weld up a bar, but while he is working he's deciding the war. He talks of the Kaiser, the Czar and the King, and each will receive his particular fling. He talks about "war strength," "blockades" and such like, till clients with work just take to the pike. He tells of the navies and how they will fight, while owners of horses are seen in dead fight for shops where the smith is not given to talk but just turns out work with never a balk.

And so Talking Tommy will rant and will roar, neglecting his business to decide the big war. He'll tell of how England, with navy so grand, will scour the seas, and then half the land. And while you are waiting to get a repair, he'll tell how the English will fight in the air. He'll tell you "The Flower of England can fight—from London to Berlin they'll go in a night." And while he's deciding the war for the king, Tom Tardy lets customers go, by the string.

And then he will take up sides with the Czar, while customers come from near and from far, only to find that poor Tom—it's a shame—is still talking war and can't fix a hame. He says that the Russians are good fighting men and that, while the Japs outfought them by ten, they'll push through to Berlin if given the chance and no one prevents help coming from France.

"The Germans," Tom says, as a customer waits—"are good at that stunt of stealing town gates." And then while horses are waiting for shoes Tom tells of sea battles and brave sailor crews. He talks of the "War Lords with iron-bound fist," while his business just fades away like a mist. Yet Tommy continues to rant and to roar and to let business slide just to settle the war.

Now the moral of this tale is soon and oft told—if you're wanting new business and seek to clinch old—just cut out the war talk, the gossip and bull, stick strictly to business and your purse will be full. When gossips and loungers come 'long with their talk, say "business is pressing," and tell them to walk. You can't make your money decidin' the war, but work, plug and hustle, bring cart wheels galore.



Heats, Sparks, Welds

Did you ever come across a self-made man who wasn't proud of the job?

Ever notice how hard it is to correct a man who is talking about something of which he knows little or nothing?

Thornton says: "Y' don't need the services of a prophet to tell you that business is going to be good when crops are good."

It's hard to lose business when a man has made a study of his trade and has put forth every effort to satisfy his customers—in fact, it is almost impossible.

Are your Pink Buffaloes working? Better get a new supply while you're thinking about it. Let us hear from you, so we can send you a herd. Write right now.

There are enough and plenty of people who are willing to "pump the fire," but there are mighty few willing to "start it." Start something and then—keep it going.

Do your customers know the advantages of rubber pads? Some shoers we know are suggesting the use of rubber pads and are incidentally adding extra profit to their pockets.

A torpedo-boat destroyer that has a record of 36 knots an hour (about 41½ miles) is said to be the Novik belonging to Russia. "That's going some," says the office boy.

An automobile firm in England has recently brought out a new varnish called "lumino-aluminum" paint. The glow of this varnish is said to be visible for a distance of two miles on a dark night.

Si Clone says: "When a helper starts in business on his own hook, and shoes for less than he formerly received for his labor alone, it's time somebody looked into the mental fitness of the aforesaid former helper."

Better bind Volume 13 now—before you lose some of the numbers. Some issues are very scarce—in fact, we cannot supply several numbers of this year. Ask the Subscriber's Service about binders. We've got two styles—both good.

A good collector looks to the future as well as to the past. You don't want the bill you are collecting to be the last transaction with a good customer. Don't forget the future. If he pays with reasonable promptness you'll want more of his business.

'Tis said that one tenth of all the automobiles in the United States are registered in New England, though the population of these States is only one sixteenth of that of the whole country. There is said to be one automobile to every fifty-five inhabitants in New England.

Ever hear of a man sliding into anything that was really worth while? Of course you have, but they are exceptions. You want the rule, not the exception. And the rule is—work intelligently, persistently and practically. Ask any successful man. It's not a secret—simply plain common sense.

This starts Volume 14 with a rush. Let us know what you think of the changes and the new departments. Let us know if "Benton's Recipe Book" and "Bison's Notes" are in line with your ideas or not. This is Your Journal, you know—let us hear from you with either a brickbat or a bouquet.

We're in favor of organization—have organized some ourselves. But what's the good of an organization or an association that does nothing but talk? Is your organization doing things? Is it alive? Or does it simply discuss conditions and then quit? Let us know. We can put some real life into your organization if it needs it. Ask us about it.

Every reader should be a contributor. At least once a year there is certainly something that occurs in every reader's experience that is worth passing on to his brothers. A literary style is not necessary—

nor is fine draftsmanship a requirement. What we want is the story of how. Just tell us the story completely, thoroughly and without frills—we'll do the rest. Tell us now.

"Guess I know what my costs are, all right," said Tom, when we asked him if he was reading up on cost-keeping these days. "I don't need any smart aleck editors' tell me how t' keep track o' things. I guess I know," continued our friend, and when we remarked: "I know you guess"—we had to dodge a hammer, two horseshoes and a pair of tongs and to get into a zone of safety before we could breathe easily.

When you get to looking on the dark side of the trade—when your pessimistic bump gets to working over time, just sit back and think. Think hard and long. Look back ten or twenty years—think of the progress in the past five years—think of what has been done. And then, with this schedule of past performance to guide you, chart your course for the future. With this as your guide, get busy, stay busy and work for what you know is coming. And with your determination, with your ability, with your honest striving, can you help but be right up in the lead every step of the way?

A Service

Not Merely a Publication

THE AMERICAN BLACKSMITH is not merely a trade paper published monthly—it is a service for the individual smith. Our mission is to help—not merely at the forge, but at the desk as well. We believe that the well-balanced smith is the one who is 50% mechanic and 50% business man. And this service is individual, not general. It is for you, Mr. Reader—to solve your problems—to help your business—to push for your success. Service is our watchword. Ask how we can serve

Y O U .

A forger of cannon was William Denning, and in the old Presbyterian cemetery at Newville, Pa., where his body is laid to rest, the Keystone State erected a fitting monument, surmounted by one of Denning's wrought-iron cannon. The inscription on the monument reads: "Erected by the State of Pennsylvania in memory of William Denning, the patriotic blacksmith and forger of wrought-iron cannon during the Revolutionary War. Born, 1737—Died, 1830." The monument is a massive structure of granite, capped with an exact reproduction of the cannon made by Denning. Beneath the cannon is a depression in which is carved a figure representing a forge. This is a most fitting tribute to one who helped win independence for the United States.

These price-cutting hints, notes, talks and paragraphs are not merely to fill space. They are meant to be followed. The moral behind every sentence is "Don't cut." When a customer says the other fellow is willing to do work for a certain price that is lower than yours, ask the other smith; don't take the customer's word for it. Remember, some people have been known to twist the truth in attempting to get their work done cheaply. Don't take work at any old price so long as you get it. Isn't it far better to sit idle for an entire day than to do fifty dollars' worth of work at a ten-dollar loss? How long can a man remain in business if he devotes all of his time selling shoes at two dollars a pair that cost him two-fifty? Don't do the same in your business. Get a fair price—know your costs and then you'll know what you should charge to make a profit. "Don't Cut."

Our Honor Roll

The High Cost of Living

Bolster up your finances and the drain on your pocketbook by taking advantage of these long-time rates. Save money on your subscription account by subscribing for a long-term and then you'll not feel the pinch of present high prices. You cannot save money easier or quicker.

Another batch join the ranks this month—and if you're not "up front" you're cut off. Get up in the 1924 Class—it's easy. If your subscription expires this month—October—send in a ten-year order and save half your money. No more trouble—no more bother—no more annoyance—and your name will be "right up in front."

Table with 4 columns: U. S. and Mexico, Canada, Other Countries, and Subscription rates for 2, 3, 4, 5, and 10 years.

Send your order and remittance now—today. Don't wait until you forget all about it. You'll never regret it. Our subscription insurance saves you money. The sooner you begin saving the more you save. There is no time better than NOW.

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Large table listing names and subscription dates, organized into two columns: NAME and Subscription Paid to.

Safety Tools in the Smith Shop

At the present day, when so much attention is being paid to the prevention of accidents in the great majority of industries, the smith shop seems sadly neglected in this regard. While the safety engineer has equipped machine shop, foundry and wood working shop with safety devices and appliances of all kinds, he appears to have overlooked the smith shop. And, surely, one cannot say that accidents are unknown or even rare in the smithy. How often we read of the flying bit of white-hot metal and the resulting burn or the more serious loss of an eye.

Of course, there will ever be accidents that cannot be foreseen and thus prevented, as witness the accident told of elsewhere in this number. But there is no reason why some of the accidents in the smith shop cannot be prevented. There is no reason why safety tools cannot be applied to smith shop work to prevent accidents.

And to show that smith shop accidents are really preventable, Mr. Bert Hillyer—who needs no introduction to most readers—is going to write a series of articles describing "Safety Tools for the Smith Shop." The tools described by Mr. Hillyer have been made and tried out by him right in his own shop. He says: "They are especially good when working with a green helper who is likely to strike the hardest blow last."

The first article of Mr. Hillyer's series will appear next month.

An Under-Fed Fire

L. R. SWARTZ

Once in making a pair of 5-inch drilling jars, the fuel over the tuyere became consumed before I could raise the proper heat for welding. I anticipated some such trouble and made the fire about 10 inches deep, and laid aside a supply of coke and partly coked coal which I broke to about the size of hickory nuts.

The fire was well packed with wet coal, and when I saw the fuel giving out I reduced the blast and punched about a 2½-inch hole clear through into the fire just over the tuyere. Through this hole I was able to push the coke and charred coal into the fire; covering the hole with wet coal

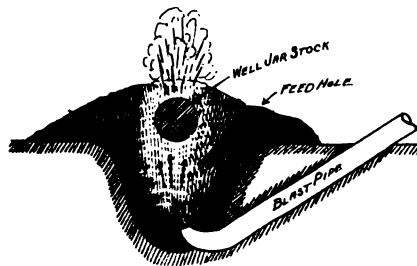
to retain the blast. By this means, I was able to keep the blast from cutting through the fire against the stock to be welded, and made a good job of the welding.

This fire was built beside the well-drilling machine, in the ground, so as to save lifting the heavy stock—those jars weigh 325 pounds, and the drill bits weigh 180 pounds each. My brother and I made those jars in three hours without any other help.

Meeting the Requirements of a Fire Insurance Policy

ELTON J. BUCKLEY

I have written considerable during the course of these articles about insurance law, and the practical questions which arise under it in the course of actual business. I think sometimes I may be writing too much about it, although I know of no other subject which is of more importance; no other phase of self-protection as to which it is more vital that a business man should clearly know his legal duties. I have been in hopes that by devoting special attention to the subject I might be the means of somebody paying more attention first to conditions of his policy, and second to complying with



THE FIRE WAS FED FROM BELOW

those conditions if he has a fire. I am speaking exclusively of fire insurance now, particularly insurance on stock, fixtures and personal property in and around a business house. Policies on such property as that always contain more conditions than any other, and probably seven times out of ten they are the policies on which business men slip up and have to go into court, with most of the chances against them.

As I have previously explained, all the large fire insurance companies, and nearly all the small ones, use what is termed a uniform policy; to put it simpler, they all use the same form of policy. I want to say something in this article about one provision in this policy which was at the bottom of a case that has just been decided by the highest court of the State in which it occurred. Since it is based upon a provision of a policy which is in use in all the States, it has the same relevancy in one State as in another.

The provision I refer to is this:

If fire occurs, the insured shall give immediate notice of any loss thereby in writing to this company, protect the property from further damage, forthwith separate the damaged and undamaged personal property, put it in the best possible order, make a complete inventory of the same, stating the quantity and cost of each article and the amount claimed thereon, and within sixty days after the fire, unless such time is extended in writing by this company, shall render a statement to this company, signed and sworn to by the said insured, stating the knowledge and belief of the insured as to the time and origin of the fire, in the interest of the insured and of all others in the property, the cash value of each item thereof and the amount of loss thereon.

This policy is always used for insurance on a stock of merchandise, and it was used in the case I am referring to. It will be noted that here are several specific things, all of them particular and some of them difficult, which a man must do before he can collect upon his policy. Nobody can carry these things in his mind against the time of fire. I always advise my own clients to sit down the very day they take an insurance policy, and go slowly and carefully over it, noting down in writing the things they must do, as to the care of their goods, etc., before a fire, and as to filing and collecting the claim after a fire. This schedule of duties should be kept accessible and should be followed step by step when the need arises.

Considering now the case I have referred to, the plaintiffs were a firm of merchants who had been unable to collect from an insurance company the amount of their insurance on stock and fixtures. The company said they had not complied with the provision above reproduced. The facts were as follows:—

Within sixty days after the fire the merchants rendered statements to the insurance company, signed and sworn to by them, stating their knowledge and belief as to the time and origin of the fire, the interest of themselves and others in the property, the cash value thereof and the amount of loss thereon. These proofs of loss were received by the various companies March 10th, and remained in their possession. The fire occurred February 7th, so that the proofs were made and received within the required sixty days. Prior to the time of furnishing the proofs of loss the insurance company sent special adjusters to the scene of the fire for the purpose of inspecting the goods and making reports as to the amount of the loss. The merchants complied with all requests of the adjusters for information relating to the quantity and cost of the goods on hand at the time of the fire so far as they could furnish the same from their own knowledge or could obtain such information from others who had sold them goods within a reasonable time prior to the loss. They were asked to furnish duplicate invoices of all purchases made by them from January 1st to the date of the fire, and they made an effort to comply with this request of the adjusters.

Thus the situation remained until April 24th, forty-five days after the proofs of loss were furnished, when the company wrote the merchants that their proofs of loss were rejected because of failure to comply with the conditions, stipulations and requirements of the insurance contract. In the letter it was pointed out that the clause of the policy above quoted required the insured to furnish a complete inventory of the property, stating the quantity and cost of each article and the amount claimed thereon, and that the proofs submitted were insufficient to meet these requirements. The insurance company's position was highly technical, and not very generous, but it is quite typical of the attitude of insurance companies whenever they see that the carelessness of some insured person gives them a loophole of escape.

The lower court before which the case was tried gave judgement for the plaintiffs for the full amount of their policy. The insurance company appealed, but lost again. The judges of the appeal court went thoroughly into the meaning and requirements of the provision above reproduced, and then explained what the law would consider full compliance. The words of the court on this point afford exceedingly valuable information to every business man who carries insurance on his stock and fixtures. I reproduce them in part here:—

The single question remaining for consideration here is whether under all the circumstances the right



of the insured to recover for his loss is defeated because he failed to furnish an inventory stating the quantity and cost of each article of damaged merchandise on hand at the time of the fire and the amount claimed thereon. In this connection it should be observed that this provision of the policy has reference to the duty of the insured after the fire. It is his duty to protect the property from further damage, to separate the damaged from the undamaged merchandise, to put it in the best possible order, and then make a complete inventory of the same, that is, the damaged property remaining. In the very nature of things it could not be that the parties to the insurance contract intended this inventory to contain an itemized statement of each article of merchandise in the store at the time of the fire, because many of the articles were destroyed by the fire, and no one could with accuracy make an inventory of every article destroyed. The intention of the parties must necessarily govern in the construction of all contracts and it will never be presumed that persons occupying a contractual relation intend that an impossible thing shall be done. It is a general rule that a policy of insurance should be construed most strongly against the insurance company, and in all cases of doubt the contract is to be interpreted in favor of the insured. Where the insured acts in good faith and discloses such information as the insurance company requests, the contract should be liberally construed in aid of the indemnity which was in contemplation of the parties who made it. It is certainly not necessary in every case to report all the items in detail which constitute the loss. It may be entirely out of the power of the assured to do so. His books and papers may have been destroyed by the fire. But every person assured must be presumed to know enough to be able to remember some particulars, or to give a description, if it do not descend to details of the different kinds and value of the articles. In the present case the insured did remember many of the particulars and did make a general inventory of the damaged goods after the fire. In addition he furnished the adjusters upon request much information as to invoices and purchases prior to the fire. Under all the circumstances of the present case we are of opinion that the right of the insured to recover the amount of his loss was not defeated by his failure to submit with his proofs of loss an inventory containing an itemized statement of each article in his store where the fire occurred, with the exact cost and quantity. This is especially true in view of the fact that no objection was made to the sufficiency of the proofs until forty-five days after the same had been in the possession of the appellant. An insurance company which retains proofs of loss without objection for over a month will be presumed to have waived defects.

(Copyright by Elton J. Buckley.)

History and Development of the Anvil—2

JAMES CRAN

For many years, piling or building up was the only known process of making anvils, and it was not until Peter Wright, an anvil manufacturer of Dudley, England (at one time a workman at the Mousehole Forge), conceived the idea, and patented it in England, of making anvils in two pieces. This happened about the middle of the last century and proved an epoch in anvilmaking. Under the new process of making anvils, a great

deal of the fame and business that had for so long centered around the Mousehole Forge was diverted to the works of Peter Wright, and the result was that the Peter Wright anvil became the most popular in the market and is still well known in all quarters of the world.

together at the waist. This is done by jumping. The two pieces are heated in an open fire; when the welding temperature has been reached the two pieces are placed as near as possible in alignment under a steam hammer and a few blows join them solidly. The steam hammer is then

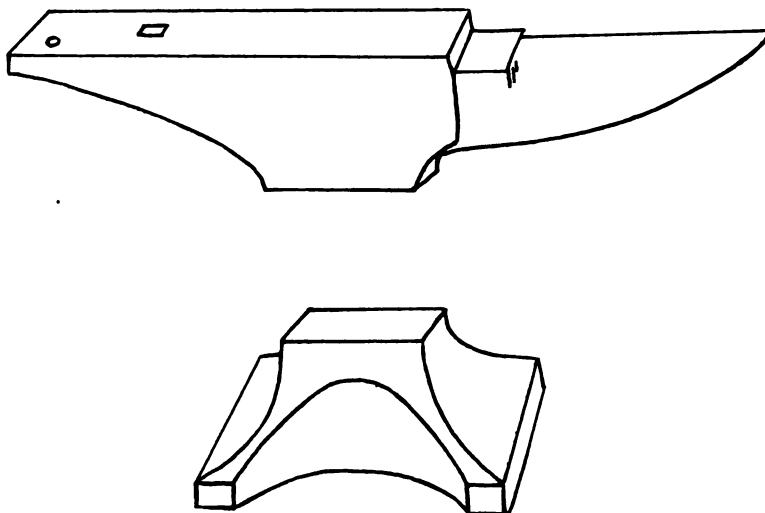


FIG. 3—THE TWO PIECES ARE THEN WELDED AT THE WAIST

The Peter Wright process, which is almost invariably used in the manufacture of anvils, may be described as follows: The base or bottom part is formed by piling up scrap iron and welding it into a solid mass. While still hot it is placed in a die and blocked to shape; the power used being steam. The whole of the upper part, including the horn and tail, are forged in one piece from scrap iron, the greater part of the shaping being done at the same heat at which the scrap is welded. Next the steel face is welded on, the hardie and pritchel holes punched, the tail or heel squared and the horn finished to shape. The two pieces, base and upper part, are then of about the shape shown in Fig. 3 and are ready to be welded

used as a vise to hold the anvil while the rough burs around the edge of the weld are hammered in. The anvil is then thrown on the floor where it can easily be turned in any position or direction and finished, as far as forging goes, with hand tools.

For a long time the steel faces of anvils, even under the Peter Wright process, were welded on in sections of about 6 inches in length. Thus it will be seen that usually two and sometimes three pieces of steel were required for an anvil face. Now, the whole face, regardless of size, is welded on in one piece; this is an American innovation and will be referred to later.

A sketch of a standard pattern Peter Wright anvil is shown in Fig. 4; a glance shows that it differs in several details from the Mousehole anvil. The face is longer and narrower and the corners of the base or feet are shaped differently.

There is still another English anvil, namely, Wilkeyson's, that ought to be mentioned, but as it is practically the same as the Peter Wright anvil and manufactured by the same process it is needless to go into details.

Up to 1886 these three English concerns mentioned did practically the whole of the anvil business of the world, and kept large forces of

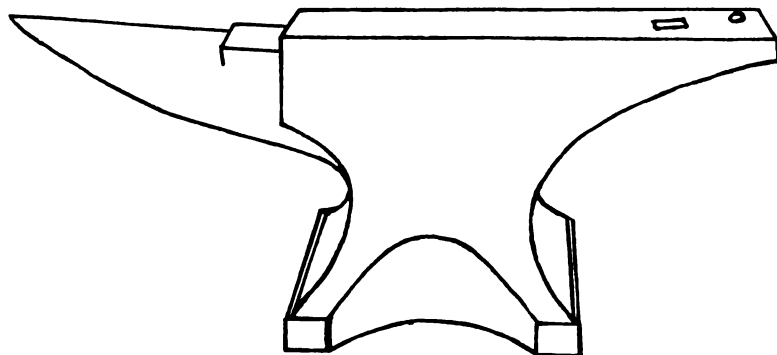


FIG. 4—THE STANDARD PETER WRIGHT PATTERN DIFFERS FROM THE MOUSEHOLE

anvilsmiths, helpers and finishers employed.

In the late fifties or early sixties of the last century there came to New York an Englishman by the name of James Case, a smith who had been in the employ of Peter Wright at Dudley, England. For several years Case was employed at the Novelty Iron Works, "Allen Stillman" Dry Dock, New York. On their going out of business, Mr. Case started in for himself, as a repairer and maker of vises and anvils, on East 15th St., New York. In 1864 he got out his first batch of two-piece American wrought anvils—a half dozen all told. Mr. Case might have done a prosperous business and made himself independent, but it is said that, with him, religious fervor took the place of business and he, (with the golden opportunities of a virgin field) failed, and died poor.

was the ingrown American prejudice against home products. Even now this prejudice in many respects remains as a survival of the times when it was thought that anything really worth having had to come from abroad. It is, however, gradually dying a natural death, and everything American, with the exception of sons-in-law, is becoming good enough for Americans.

From the very beginning, the Hay-Budden Mfg. Co. demonstrated the fact that they could make anvils as well, if not in some respects better, than the old-established anvilmakers of England. Needless to say, their process of manufacture is essentially that of Peter Wright, but with some improvements, one of which is the welding on of the steel faces, regardless of size, in one piece. Some years ago they still further improved their anvils by making the whole top, from

ferent groups of anvils shown in this article.

It may be interesting to note here the range in anvil sizes regularly made. The standard patterns range in weight from 10 lbs. to 900 lbs. The following figures give an idea of their sizes: A 10-lb. anvil has a face 6 by 2 inches, the horn is 3½ inches long, 4 inches high, and has a base 4 by 3½ inches. A 900-lb. anvil has a face 28 by 8 inches, the horn is 19 inches long, 18 inches high, and has a base 19 by 16 inches. The more common sizes, however, range in weight from 100 lbs. to 400 lbs. Fig. 6 shows the comparative sizes of the 10-lb. and also the 900-lb. anvil.

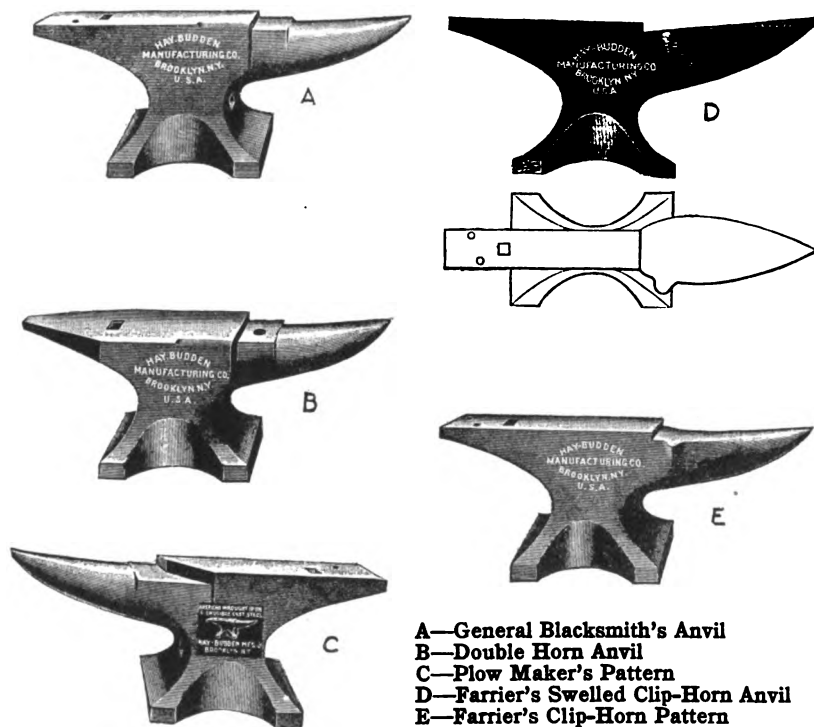
Welding Malleable Castings with the Oxy-Acetylene Torch

Iron Age

While the process of autogenous welding is being used so successfully in all the metal trades, many unsuccessful attempts have been made to weld malleable cast iron; and to those who have experienced disappointment, an explanation of why their efforts failed, with an outline of a method by which these castings can be mended, should be of benefit.

Malleable castings are first made in the condition of hard, brittle, white cast iron and subsequently made malleable by heat treatment. The heating process which converts white cast iron to malleable iron is called annealing, and effects a chemical change in the structure by decarbonization. This decarbonization is nearly complete at the surface and penetrates in a lessening degree toward the center, giving the outside portion the texture of mild steel while the inner portion may retain, in a more or less degree, the qualities of cast iron. When this metal is remelted the carbon is dispersed, and the entire mass reverts to cast iron.

The smith who is used to welding mild steel and cast iron will recall that they are handled differently. That the method used in welding steel to steel would be useless in welding cast iron, or the methods employed with cast iron would be equally unsuccessful with steel. That is practically what he is trying to do when he undertakes to weld a malleable casting. The material is not



A—General Blacksmith's Anvil
B—Double Horn Anvil
C—Plow Maker's Pattern
D—Farrier's Swelled Clip-Horn Anvil
E—Farrier's Clip-Horn Pattern

SOME OF THE VARIOUS ANVIL PATTERNS MADE BY HAY-BUDDEN CO.

Later, or in 1886, two enterprising young men, namely James Hay and Frederick C. Budden, both blacksmiths (Hay a Scotsman, Budden an Englishman), started in to make anvils, on Front St., Brooklyn. These young men, under the firm name of Hay-Budden Mfg. Co., have done well. Since they commenced to do business in the early days of their anvil-making they were beset with many difficulties, not least of which

the waist up, of one solid piece of high carbon open hearth steel. The advantage of this is at once obvious. Besides improving old methods, and devising new mechanical appliances for the manufacture of anvils, Messrs. Hay & Budden have been able to make many minor improvements on their anvils.

The difference between the standard American anvils and other makes may be noted by comparing the dif-



homogeneous. The bottom portion of the welding being in cast iron, and the top portion in steel, with no definite dividing line between, it is useless to follow the method prescribed for either, and to his trouble is added the difficulty occasioned by the diffusion of the elements in the material melted from the sides of the fracture.

It follows that to successfully mend a malleable casting the process employed must not necessitate the sides of the fracture, that the welding material should fuse at a lower temperature than the casting, and that its adherence, bonding qualities, physical strength and ductility should closely resemble the original casting. After much study and experiment the Vulcan Process Company and their allied interests are having considerable success in mending broken malleable castings, and a description of their methods will undoubtedly be useful to others who are employed in the metal trades.

In preparing the work for mending, the fracture is chipped away in the form of a V-groove with the pointed bottom just coming to the surface on the opposite side, or, if the casting is thick and the opposite side accessible, two grooves are cut with their pointed bottoms meeting in the

and the groove should be quickly filled. It is not advisable to keep the work hot any longer than is necessary, but to make the mend as quickly and at as low a temperature as possible. The behavior of the bronze affords a guide in regulating the temperature. This process cannot be called autogenous welding, but a malleable casting mended in this way is practically as good as one piece. It has about the same tensile strength and ductility as the original, and the process has the advantage of being very quickly performed.

Electroplating: Theory and Practice—4

E. V. S.
Silverplating

The goods are cleansed, polished and made ready for the plating tank as previously described. A preliminary copperplating is best on all goods and necessary on many. The article is then transferred to an alkaline mercury solution, to give it a thin film of mercury. This "quicken- ing" or coating with quicksilver greatly increases the attraction of the goods to the silver solution, and secures a good wearing coat.

The alkaline quickening solution:

fumes inhaled. The goods are left in this bath for a few minutes, then taken out and weighed carefully, without touching them with the fingers, and placed in the silver vat.

The silver solution:

- Chloride of silver..... 1 oz.
- Distilled water..... 1 pt.
- Potassium cyanide (99% pure)..... 1 oz.
- Water..... ½ pt.

(Larger amounts in the same proportion)

Dissolve the chloride in 1 pint of water and, in a separate vessel, the

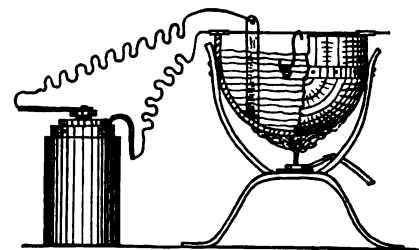


FIG. 17—THE GOLDPLATING OUTFIT IS SIMPLE

cyanide in ½ pint. Add the cyanide gradually to the chloride; stirring carefully as long as a precipitate is formed. When the cyanide curd has settled, pour off the liquid and store in a crock for the recovery of the silver in the solution. Wash the curd with clean water several times and dissolve it in a solution of potassium cyanide; using about one fifth more than actually required. Add distilled water in proportion of 1 gallon to from 1 to 5 ounces of silver, as needed, and filter. Temperature of bath should be about 60° F. This solution must not be exposed to direct sunlight.

When the goods have been a sufficient length of time in the plating tank, and examination shows a frosty coating of dead-white silver, they should be taken out, rinsed, dried in hot sawdust and polished. A wood fiber brush is used for first buffing, and then finish with a soft muslin "dollie" and rouge composition. Do not let the article heat in polishing. Wash out the rouge; using hot, soapy water and a wool rag. Rinse in hot, clear water and dry. Polish lightly with a clean, soft muslin rag. Keep these rags and mops in covered boxes away from dust and grit. The anodes used in silverplating are purchased

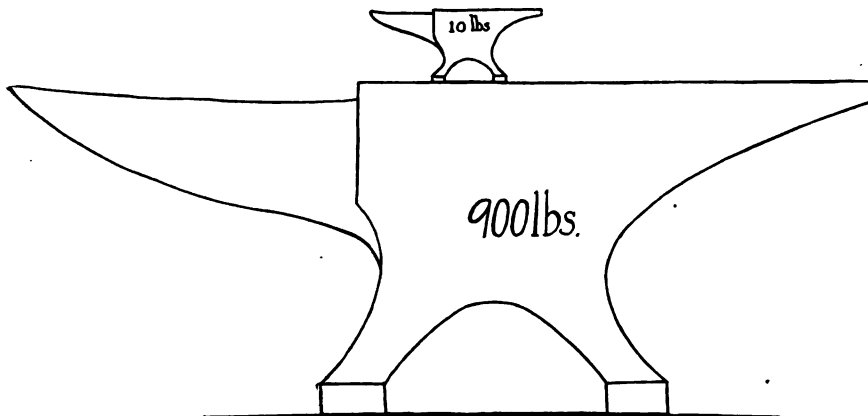


FIG. 6—THE COMPARATIVE SIZES OF A TEN-POUND ANVIL AND A 900-POUND MONSTER

center. The part surrounding the fracture is then heated with an oxy-acetylene torch to a bright red, and sprinkled with Vulcan bronze flux followed by a few drops of Tobin bronze melted from the welding rod. If the bronze remains in a little globule the work is not hot enough, but if it spreads and adheres to the surface, the temperature is right,

Dissolve one ounce of mercury slowly in dilute nitric acid in a stoneware vessel. Add enough strong solution of potassium cyanide to throw down the mercury in the form of black mud, and stir in just enough to dissolve this mud. Dilute with distilled water to make a gallon. Remember: *cyanide is a deadly poison and should not be touched with the naked hands, nor the*



especially for the purpose, as coin silver and standard silver contain other ingredients.

Gold Plating

Goldplating is not done on such a large scale, and the plating outfit occupies no more space than a kitchen table. The arrangement of the apparatus is shown in Fig. 17. An enameled iron vessel (held in a frame that

between its weight now and that before plating is the amount of gold deposited. It is then buffed on a chamois buff (as shown at left, Fig. 18) with special rouge. (There are many varieties of these buffing wheels.) Waste from the scratch brush table should be saved by letting the water settle and carefully dipping off the clean water. Evaporate the

advertisements about electroplating that appear all over the country. Proceed slowly and carefully. Buy reliable goods from reliable firms and feel your way. Purchase as you need equipment and supplies until you know what success you can count on in your locality.

A Useful Welding Device

D. S. SMITH

This device is designed for the use of smiths working alone—without any helper. Its object is to hold the pieces to be welded in the fire and also to hold the pieces while actually making the weld with the hammer.

The frame consists of two pieces of flat steel, about 20 inches long, bent edgeways as shown in the engraving. One piece, with the slot cut in the center, is $1\frac{1}{2}$ inches wide; the other, $1\frac{3}{4}$ inches. On the latter a $\frac{1}{4}$ -inch angle is bent up to support the other piece to better advantage. A thumbscrew and bolt permit of adjustment and to hold the pieces securely and in close contact. An extension, as seen in the side elevation, is made of the same material; having a right angle at the bottom and several holes in the longer portion to correspond with those in the arm as shown.

The wheels should be at least $1\frac{1}{2}$ inch thick, with a groove in the edge, and the hole for fastening placed near the edge, so that it will be mounted "eccentrically." The wheel is held by a bolt and a nut and, if

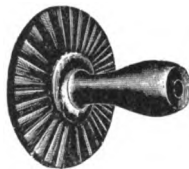


FIG. 18—A CHAMOIS BUFF AND A SCRATCH BRUSH ARE USED IN FINISHING GOLD PLATED WORK

is easily constructed from strap iron), a gas or oil burner, 1 gallon of 24 or 14-karat gold solution, gold anode, some special buffs and gold rouge, are the extra materials necessary.

The articles are suspended on a copper wire in the gold solution which is kept at a temperature ranging from 120° to 180° F., according to the degrees of color wanted. The 120° temperature gives a light brassy color, and above 160° it gives a coppery hue—with gradations between. The anode should be of pure gold and should extend above the solution or a platinum wire (which is expensive) will have to be connected if the anode is immersed. The anode should be taken out of the bath when not in use. For small work, a single cell gives sufficient current. It is advisable to copperplate all articles first; although copper, silver, brass, and various alloys used in making cheap jewelry, take a gold deposit readily. The same rule applies in goldplating as in the others—that the better the polish before plating, the better the result.

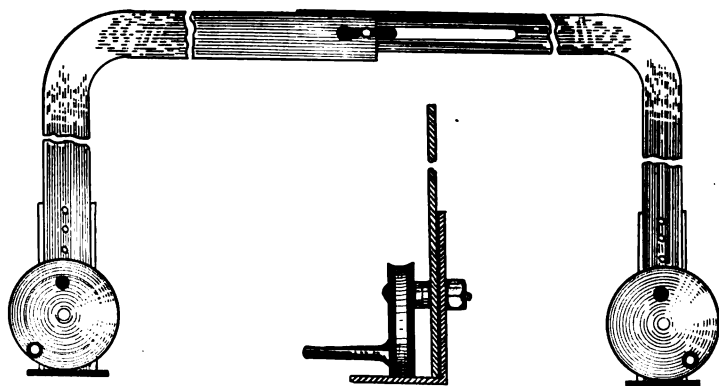
When the goods have received a sufficiently heavy coat which, of course, varies with the style of work, it is taken out and scratch-brushed, (Fig. 18). This scratch brush is made of brass wire or fine crimped iron wire. In this process of brushing, a lubricant is used to prevent the gold from being entirely worked away. Stale beer or a weak solution of soapsuds is used; this is held in a can and allowed to drop slowly on the work. After this operation, the article is weighed and the difference

rest in a smooth porcelain kettle or dish, and send to a chemist or assayer for reduction. The waste on the gold-buffing lathe should also be kept. The plating with gold is naturally costly and, therefore, requires close application and careful handling.

Summary

The whole process hinges upon the proper degree of polishing and, as stated before, there is no set rule for doing this. The writer has successfully nickelplated with only two buffs; but, of course, not on any large scale.

In taking up electroplating, a few absolutely necessary materials can be purchased, and some made, at first; then, when confidence and skill have been gained, more and varied



A HELPER FOR THE SMITH WHO WORKS ALONE IN THE SHOP

types of work can be taken and a greater equipment installed.

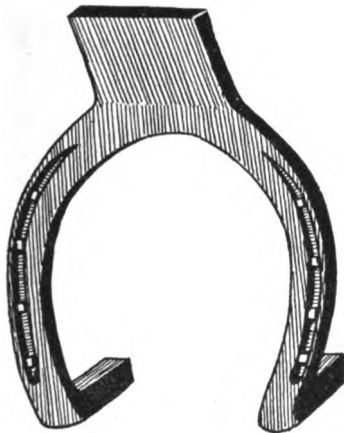
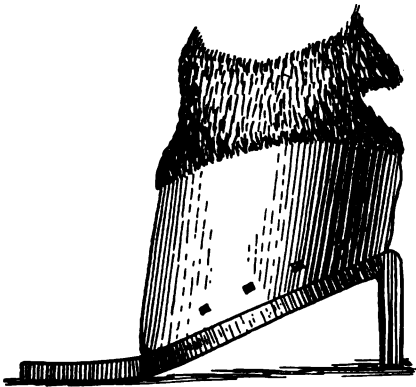
As a final word, let me warn my brothers of the many "get-rich-quick" and "start-you-in-business"

necessary, washers may be interposed, as shown, so that it can grip pieces of various sizes.

A handle (not shown) is best welded on one side and made so that



a wooden grip can be slipped over it. This will absorb the heat, so that the device can be picked from the fire easily and a weld completed. The length of the material to be welded is taken care of by the slot adjustment; the thickness, by the extensions and the eccentric wheel; and the shape, by the grooved wheel and washers. The grooved wheel—which should not be made with too small a circle—will hold round and oval as well as square and triangular material.



HOW W. J. PETTIGREW TREATS CONTRACTED HEELS

I have found this device very satisfactory, and as I work alone it has certainly been of great assistance to me. The article can be firmly clamped in it, then laid in the fire, brought to a heat and welded. Of course, attention must be given to the placing in the fire so as not to put the device in the hot coals, but instead on either side of them; also the handle must be kept outside the range of heat. With these precautions it will be found to be of great service.



Benton's Recipe Book

This column of recipes, hints, formulas, methods and stunts will welcome at any time requests for specific information along its particular line. If you want to know how to make a certain mixture, to obtain a certain result or to do a certain thing that requires a formula or recipe, ask Benton. We cannot promise to furnish anything and everything asked for, but we shall try hard and will use every means at our disposal to furnish what is asked for.

Benton will also welcome letters from readers on the success or failure of any of the formulas and recipes published in this department, and reliable and tried formulas will be gladly welcomed from readers.

To anneal steel upon which the usual procedure is unsuccessful, cover the steel with fire clay and heat to a red. Then allow the steel to cool over night in the forge.

For hoof-bound feet, try this liquid. It is said to work more quickly than the usual pastes or hoof salves. Take a half pint of neat's-foot oil, six ounces of oil of tar, four ounces of turpentine and twelve ounces of oil of thyme. Mix these thoroughly and before applying shake the bottle well. Apply to the hoof at night; painting the top of the hoof all around and for a distance of about one inch down on the horn. This is a good liquid to put up and sell to the horse owner.

For scratches, make an ointment composed of the following: Mutton tallow, 1 lb.; Turpentine, 1 oz.; Verdigris, fine, $\frac{1}{4}$ oz.; Oil of rosin, 2 ozs.; Oil of origanum, $\frac{1}{4}$ oz.; Tincture of iodine, $\frac{1}{4}$ oz. Mix well and apply as needed for scratches to the fetlock. It is also good for cuts, sores and similar affections.

A good welding compound for general use is given as follows: Borax, pulverized, 2 lbs.; Carbonate of iron, 4 ozs.; Nitrate of lead, 1 oz.

Use same as ordinary borax.

For etching on steel, a mixture composed of the following is very good and reliable: Sulphuric acid, 1 oz.; Alum, $\frac{1}{4}$ oz.; Salt, $\frac{1}{2}$ teaspoon; Vinegar, $\frac{1}{4}$ pint; Nitric acid, concentrated, 20 drops.

This solution is excellent for deep etching and also for producing the frosted effects on steel surfaces. Apply same as any other etching fluid.

Labels on iron and steel—in answer to "Stock Keeper," Illinois—are attached in the usual manner with a good glue after

the metal surface where the label is to be attached is first rubbed with the cut half of an onion.

Iron posts are kept from rusting by painting with a liquid Portland Cement. If H. V. M., Ohio, will tell his customer of this stunt he will find that the iron fence posts will last longer.

Soldering aluminum to copper or brass is said to be quite a stunt. For those of "Our Folks" who are inclined to experiment along this line the following is suggested: First tin the aluminum and also the copper or brass and use stearine as a flux. After tinning, wipe parts clean and use a solder composed of $\frac{2}{3}$ tin and $\frac{1}{3}$ lead; using zinc chloride as a flux. If you try this, advise Benton of your success or failure.



Queries—Answers—Notes

Treating Contracted Heel.—In answer to Brother W. W. Abney's inquiry, regarding treatment for contracted heel, I will say that for the past eight years I have shod a mule whose hind feet, when I first began work on him, had gone entirely over. He could not stand up and the owner had tried all kinds of shoes. He asked me to use my own judgment and I did. The mule is doing good work today, but must be kept shod. I used the following method with good results (see engraving).

Begin trimming at the toe and trim down until you can see signs of blood. Trim the heel only enough to level the foot. Then take an extra heavy shoe and a piece of iron or steel (Swedish iron welds the best), $2\frac{1}{2}$ by $\frac{1}{2}$ inch, weld onto the toe $2\frac{1}{2}$ or 3 inches long. Give it a square bend on the angle of the foot and bend at edge of shoe. Put extra holes in shoe, as you cannot nail at the toe, and run the shoe over as far as you can; turning long heels on the shoe. To get the length of the heel, hold up opposite foot and measure the length to the floor.

I believe that by following these instructions, Mr. Abney's animal can be greatly benefited.

W. J. PETTIGREW, North Carolina.

To Relieve Foot Soreness.—I learned of a little stunt recently that will no doubt interest those of your subscribers who do not already know of it. To take the soreness out of a horse's foot, pare it well down, and then pour turpentine on the foot and fire it. When it is nearly all burned off, put a little more on and let it burn. Then use tar and oakum.

FREEMAN BAKER, Iowa.

Gluing Polishing Wheels.—In reply to Mr. F. R. Tomlinson's inquiry in the July issue, I would suggest that he use Lepage's Liquid Glue and No. 60 Grain Emery, and



I am quite sure that he will have good results. Put the polishing wheel on an old buggy spoke, fasten one end in vise so that wheel will turn, then apply the glue with a paddle and, while rolling in the emery, bear on all the weight you can. Allow them to dry twenty-four hours in dry weather, longer in cloudy or wet weather.

P. V. BURGESS, Missouri.

Heat-Resisting Welding Table Top.

Will you please send me the correct formula for making the slab that is fireproof and stands more heat than firebrick?

HERMAN LAMBRECHT, Illinois.

In Reply.—The writer recently had occasion to use a form of this fireproofing in making an electric furnace. Instead of the magnesite or magnesia in the powdered form, as Mr. Waychoff suggests, the writer used the stringy, coarser variety that forms the heat-insulating material around the pipes in steam plants. This was obtained from a steamfitter. Undoubtedly, the powdered form is more expensive; however, if you already have this it may do just as well.

After making a mold—which is nothing more than a shallow box the size of your table top—a layer of this magnesia is evenly laid in. Then a solution of sodium silicate or waterglass is poured over the layer, thoroughly soaking it, and the layer tamped down. These operations are repeated until the required thickness—two or three inches—is built up.

You will notice the solution the writer uses: Silicate of soda or sodium silicate or waterglass as it is commonly known. This is procurable in powder form and is dissolved in water to the consistency of a syrup. Of course, the quantity of the waterglass needed depends upon the size and thickness of the top to be made.

The mass in the mold (it should be about the consistency of putty) is dried as quickly as possible in a warm current of air. After it is fairly dry and stiff it may be taken out of the mold and the under side dried

vouch for the reliability of the method and materials outlined above.

E. V. S., New York.

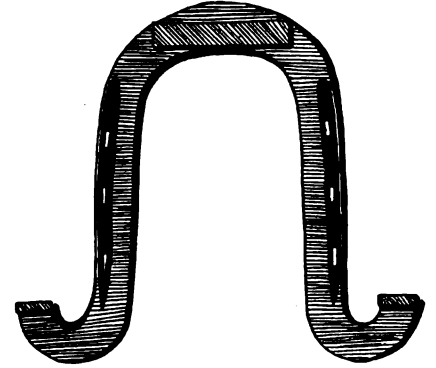
A New Indiana Shop.—The accompanying picture shows my new shoeing shop recently built. It is constructed of Brooklyn shale brick. The shop is 26 by 50 feet. The shoeing floor is 12 by 48 feet. The floor in front of anvil blocks is of Portland cement, 4 by 20 feet long, while the rest of the floor is edge-grain pine. The wall is 9 feet high and plastered with cement. The ceiling on top of joists is first class ship lap, and makes the coolest shop I have ever been in. We run three fires and our specialty is shoeing, but we can do any kind of iron work.

JAMES W. HIDAY, Indiana.

A Peculiar Shoe.—Credit.—A Good Side Line.—I would like to call attention to the engraving shown herewith of a shoe I pulled off a mule's foot which was recently brought to me. (This is an outline of the shoe just as I found it.)

With regard to the credit question, I will relate a little experience I recently had in this line. Among my customers there are four brothers who each own a horse. About two years ago I shod the eldest brother's horse on credit and the charge is against him on my books yet. Shortly after, the youngest brother came along, put up a pitiful tale, and got two shoes put on his horse—his bill is still coming to me. Then No. 3 came in, and not saying that he wants credit he orders work done as though he were prepared to pay for it. I started to put on common shoes, but he wanted "Neverslips." I accordingly put on what he ordered, after which he informed me that I would have to wait until he got his money from the railroad work he had done. I replied: "That don't work at all. Your uncle tried to get a horse shod on that kind of pay and failed so you just leave this cayuse and go and get me \$2.50, then you can have it—also, it will be necessary for you to pay me 25 cents for each feed that I give the horse." He then ordered me to pull the shoes off, but I said:

it." He immediately informed me that he would get that horse right now or somebody would suffer. I took up an old horse rasp and said: "Now, there's the door, and you go." He accepted my invitation. Then the youngest brother came and almost begged for the horse. He had on a good pair of "chaps," and I told him to leave the "chaps" as security and he could get the horse. I got my money about two weeks after that. They have tried to get work done on credit since that time, but I tell them there is



A MULE SHOE PULLED BY MR. W. H. CHAMBERS

"nothing doing." I don't want to be bothered with such customers.

I have just finished tapping my blank nuts and making ready for the harvest run. Then, too, I have just unloaded a ten-horsepower I. H. C. kerosene engine to pull my feed mill. The grinding here comes usually when the shop work is slack, so it fits in very nicely. I have dug a basement under the shop and put in windows, so that we won't have to depend on artificial light. I will have my engine in the basement on a concrete foundation and housed in a clean engine room, 9 by 14 feet. Then it will be out of the way and free from dust and dirt of all kind. I will have a bin in the floor which will hold two or three tons of grain which will run out of the bin into the mill. The feed will be elevated upstairs into bins for bagging. With this arrangement, the mill room will be under the shop-roof and will save me \$250.00 for a building outside. I can dump the grain, start the mill, and bag when I want to, and be doing something else in the meantime. I have dug the basement during my spare time, which would amount to an hour or two a day. I started it in April and finished it in June. I still have my engine foundation to make and elevator to build before everything is complete, but I expect to have this accomplished by July 20th, when harvest work will start with a rush.

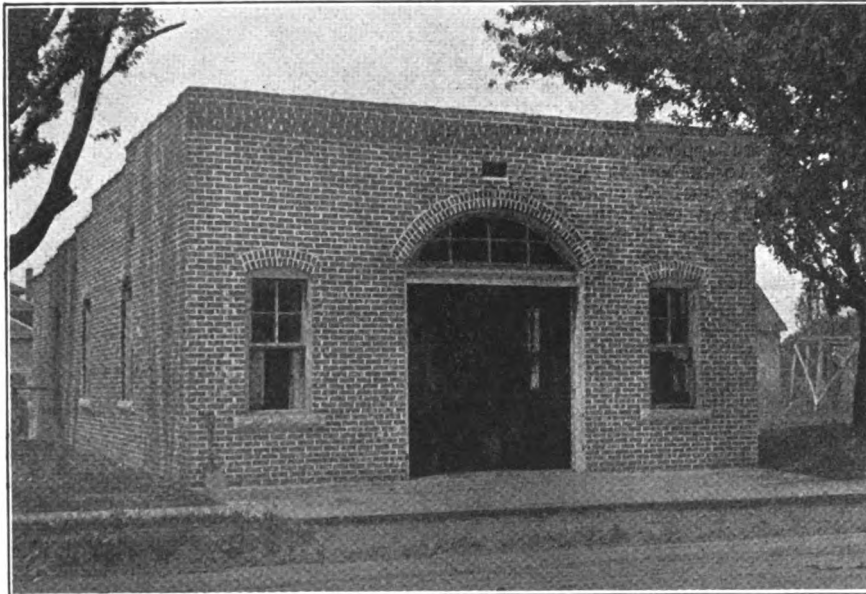
W. H. CHAMBERS, Washington.

Some Pointers on Babbitting.—The operation of babbitting seems to be such a puzzle to so many smiths that the following article will no doubt be of intense interest to a great many of our readers. In this article the matter is discussed quite thoroughly, and many points on babbitting are made clear:

Attention has frequently been directed to the heavy frictional expense incident to the operation of machinery; to the requirements of a good babbitt; to the fact that its wearing qualities are dependent quite as much on its structure and the way it is made and handled as on its composition; and to the properties of many of the ingredients of bearing alloys.

CAUSE OF BEARING TROUBLES

In searching for the cause of bearing troubles, first look into bearing conditions; then determine whether the babbitt is a



THE FINE APPEARING INDIANA SHOP OF MR. JAMES W. HIDAY

more thoroughly. It will be something similar to a light-weight, grayish, rough-surfaced board, and will resist any temperature of heat.

While the writer has not used the magnesium chloride solution of which Mr. Waychoff speaks, he has used and can

"Not much; I could do lots of that if I would." He then started out to hunt the coin, as I supposed, but he must have met his older brother and they both came back to the shop, and the older one inquired why I refused to give his brother his horse. I said: "Simply because he hasn't paid for



lead-based, a semi-tin-based or a tin-based metal, and, finally, break several bars of the metal to ascertain the extent of its hardness and homogeneity. If the metal is suitable for the conditions to be met, then the bearing trouble must be sought in some one or several of the following causes: Excessive bearing pressure, insufficient bearing area, journal too small, shaft out of alignment, bearing warped, metal burned or not properly stirred when applied, bearing too tight or too loose on the sides, presence of abrasive or cutting particles, defective lubricating appliances, inferior lubricants, wick glazed, clogged or having insufficient

One concern changed from a lead-based to an expensive tin-based metal because many of the bearings had cracked and rattled loose. A tougher metal was thought necessary. Accidentally, it was found afterward that the trouble had been caused by using too small a ladle in pouring. These bearings required more than one ladleful and, while they were dipping for sufficient metal to complete the pouring, that already in the bearing would set just enough so that when the balance of the babbitt was poured a seam would form between the two parts. When this bearing was put into service the jar on the journal caused it to crack at the seam. The firm changed back to the lead-based metal, used a ladle large enough for one pouring to a bearing, and the trouble ceased.

TEMPERATURES

Overheating the babbitt makes it brittle. Further, the hot metal tends to shrink as it comes in contact with the colder surface, resulting sometimes in a loose lining which soon cracks under heavy stress or jarring. The temperature at which to pour a metal composed of tin, lead and antimony, and not over 0.5 per cent copper if it is a lead-based metal, not over 2 per cent, if it is semi-tin-based metal, or not over 5 per cent, if it is a tin-based metal, may be determined by inserting a white pine stick. If it is heavily browned or slightly charred, the proper temperature has been reached. Another indication is a yellowish tinge forming on the surface of the metal. Do not wait until a red oxide forms. A metal containing zinc or considerable copper must be heated until it can be poured freely.

The bearing into which hot metal is poured, and also the mandrel, shaft or journal, should be heated to about 200 to 300 degrees F.; otherwise the babbitt is likely to resist its contact with the cold surface, thus causing shrinkage and an imperfect bearing. A shaft or mandrel should be well chalked to insure freedom from grease and dampness. If the shaft has not been heated, the chalking will prevent the formation of blow holes and rough surfaces on the face of the bearing. Shells or bushings should be treated in the same way. Small bearings are best poured vertically and large ones horizontally, with a large gate on top for the metal. Clay is the best material to use where it is desired to keep the metal from running out.

Another frequent source of trouble is that the kettle and the bearing are too far apart; then the metal chills or separates before it is poured. When the bearings cannot be brought close to the pot a portable furnace should be used. Hold the ladle close to the bearings to prevent air bubbles and cooling, and see that there is sufficient vent for the escaping gases.

Babbitt poured into a mold or bearing at a temperature far above its proper melting point is generally coarse grained and makes a poor lining. Rapid cooling produces a fine, even grain.

Sometimes, when getting in a new lot of metal, a purchaser will compare it with some of the old metal on hand by hitting the bars together. Usually the old bar will dent the new, indicating that the new metal is softer and raising a question as to whether the grade and quality are the same as formerly. Undoubtedly, they are, if the metal manufacturer has a reputation for reliability, but the difference is that metal carried in stock for several weeks or months is harder than the same grade when first made.

IRREGULARITIES

Peening the lining of a bearing is of no special value except in the case of shrink-

age, when tightening the metal in place or evening up the surface in the event of some irregularity from pouring. If it is necessary topeen the metal to tighten it, the best way is to take a round-faced hammer and tap the bearing lightly up and down a line parallel to the axis, gradually extending the blows to the right and the left until the metal is tightened in place.

Boxes should be kept snug but should not be keyed down too tightly at the start, at least not until the rough places on the bearing have been worn smooth.

A journal should rest evenly on a bearing. Weight unevenly distributed by a shaft out of alignment is disastrous to the babbitt, and particularly to a lead-based metal. This defect once caused a millwright to change from a cool-running, durable, lead-based anti-friction metal to an expensive tin-based metal, which stood the stress only because of its toughness, whereas it really developed higher friction and greater cost in other directions through lack of its anti-frictional properties.

There is no excuse for a poor bearing (so far as its being a smooth, solid, good fitting casting is concerned) if all dampness and grease are removed, the mandrel or shaft and the back of the bearing are properly warmed, the shaft is wrapped with a thickness equal to the oil space required between the shaft and the bearing surface, if the metal is fluid, its temperature right and it is thoroughly stirred and all oxides removed, if the gate into which the metal is poured is large enough to admit a volume that will reach all parts of the bearing quickly before chilling any one point.

If a bearing warms up when first started, it is usually because of the little uneven projections that are being worn down. By letting the bearing run a few moments, stopping it to cool off and then starting it again, a cool-running bearing usually results; other conditions being all right.

If a metal flakes off, or contains hard and soft spots and is pronounced too soft, it is usually because the metal has been left too long in a highly fluid state without stirring. This allows the metals to separate, and instead of a homogeneous mixture there is a segregation of the lead, tin and antimony, and trouble naturally follows.

GRADES OF BABBITT

Bearing metals should be selected according to the speeds and pressures, the



A HUSTLING TRIO OF MISSISSIPPI AT THE SHOP OF MR. N. DUBOIS

capillary power, oiling rings or chains broken or jammed, cups clogged and, last but not least, negligence.

CARELESSNESS

One of the frequent causes of bearing troubles, aside from poor or defective lubrication, is an imperfect understanding as to the proper handling of the babbitt in melting and applying it to the bearing, or else to that carelessness which often results from familiarity or a long run of successful babbittings. As an illustration, take the brakeman on a railroad train. When he first starts out he is cautious, but with increasing familiarity and good luck he becomes careless, and the unexpected occurs. There are companies which have used a certain grade of babbitt for years with satisfactory results, and then suddenly they have trouble from hot boxes, flaking metal, etc. The metal is blamed, whereas, the trouble was not due to a change in its grade. Either a different man did the babbitting and did not handle the metal right in one or two important details, or the same man had had good results so long that he had gradually dropped one precaution after another until he was getting uneven mixtures, burnt metal or oxides in the bearings; perhaps the lubricant or bearing conditions had been subjected to a similar change in attention.

POURING THE METAL

Proper babbitting conditions require clean pots and ladles. A hot pot or ladle can be quickly cleaned by brushing it with powdered resin and then removing the precipitant. It is always best to melt the babbitt in a pot or kettle and not in a ladle, the latter being too small to insure an even temperature and proper stirring. It is important that the ladle should be large enough to contain more metal than is necessary to fill the bearing. If the bearing is long, be sure that the gate into which the metal is poured is amply large so that enough metal enters at a time to reach the farthest point of the bearing without chilling; otherwise the result will be an imperfect bearing.



THE WASHINGTON GENERAL SHOP OF JOHN BANNACH

size of the bearing and the thickness of the babbitt lining. It is not necessary that a different babbitt be used for each slight variation, but a different grade is preferable where the conditions are radically different. Practically three grades will cover all mechanical conditions; one for general light work, one for medium-speed, heavy-duty work, with now and then an exception, i. e., an extremely heavy load with low speed, a



high speed with a comparatively light load, or a small, thin-shelled bearing built out of all proportion to the load and to the speed. While one or two grades might generally give satisfaction, economy would be better served by selecting a grade best suited to one of these three or to the special conditions. Because a man is getting what he considers good service out of his 16, 20 or 25-cent metal, it is no assurance that for 30c. per pound he might not get double the service or that for 14c. he might not get the same service.

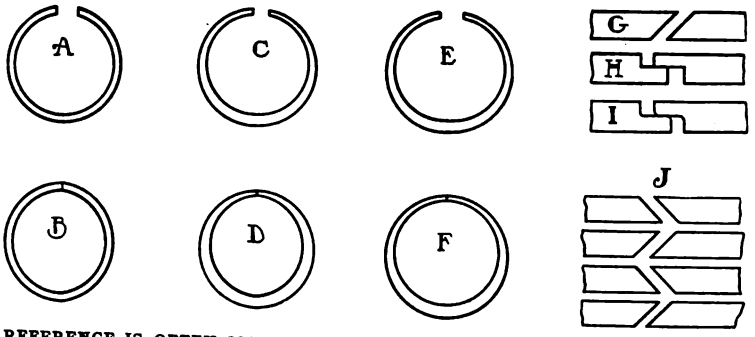
Sometimes the mistake is made, in small, thin bearings, of making too large oil holes and deep grooves in various directions from the oil holes. This skeletonizes and weakens the bushing. These grooves occasionally extend through half the thickness of the lining, and under constant vibration or jar, the bushings crack. The remedy is thicker linings or bushings, or else sufficient tin added to the babbitt to make it tough enough to withstand this condition. Some wash the backing against which the metal is to be poured with the ordinary plumbing soldering solution, so that the babbitt is soldered fast to the box or backing.

If the metal pours sluggishly, the trouble may be looked for either in the temperature being too low or the metal containing too much copper or zinc. The increased use of smeltered or dross products and antimony lead containing impurities in considerable quantities frequently causes this trouble.

Assuming that the metal is right, and of the right materials, then the important features to be observed are that the right grade is selected for the condition to be met; that it is handled properly in babbitting, and that as many as possible of the conditions that tend to destroy the babbitt lining are removed. L. D. ALLEN, in *Power*.

consequently remedied by tightening up the clutch spring. Very often slipping is due to the presence of grease, oil, etc., on the leather, in which case the latter should be well washed with gasoline and slightly roughened with a rasp, and adjusted up a little by the spring. Of course, if the leather is badly worn and fired, there is only one remedy, and that is a new clutch leather. The latter gets badly burned by injudicious driving, such as slipping the clutch continually on the high speed on a hill, instead of changing onto a lower speed.

is turned thicker in the first instance and then turned to a true circle after being closed at the gap, thus giving a full bearing surface all around its circumference. By doing this, however, some manufacturers make it a practice to turn out the inner periphery of the ring eccentric to the outer, in order to equalize the pres-



REFERENCE IS OFTEN MADE TO THE MANNER OF CUTTING PISTON RINGS

A rule to which there should be no exception is: "Never start the engine when the car is standing over gasoline." Frequently when filling the gasoline tank some of the fuel finds its way to the ground, either from over-filling or because of carelessness in pouring into the filler hole or funnel. To start the engine over this overflow is to invite serious trouble, for it is often that sparks are discharged from the muffler when the engine races, and this is especially true if the muffler contains much soot. Occasionally a leak in the gasoline pipe or tank, or maybe a carburettor float chamber in which the seat of the needle valve needs grinding, will permit of the gasoline forming in a puddle when the car is standing in the street. It is important to stop such leaks, and it is better to keep the car in motion than to stand over exposed gasoline, which a match, carelessly thrown in the street, may ignite.

sure at all points of the ring. This is shown by the rings illustrated at C and D.

A ring of the eccentric type is shown at E and F, and costs but slightly more to manufacture than the type previously mentioned. It is turned to a perfectly true circle inside and out with the gap closed; the outer circle being eccentric to the inner. By referring to F, it will be noted that not only are the pressures even on all parts of the ring, but less pressure is required to make it gas-tight. It is held that there is less uneven wear of the cylinder walls, less heat developed and greater efficiency of the motor.

There are several methods used in joining the rings, some of which are illustrated at G, H and I. That at G consists of a diagonal cut across the face. There is a tendency in this type to rotate in the opposite direction to that in which the lower diagonals point, and some make a practice of cutting every other ring in the opposite direction to its neighbor, as shown at J.

The Construction of Piston Rings

Reference is often made to piston rings being cut eccentric and concentric. It is a generally accepted idea that if a ring be turned concentric inside and out, then split, the outward pressure on the cylinder walls, when the ring is closed and in its place, will not radiate from its center, says an exchange. This is demonstrated in the illustration at A and B; showing the ring open and closed respectively. It will be noted that with this design there are three bearing points, one on either side of the split and at the lowest extremity of the circle.

Such a type would not be practical for service in a cylinder, so the ring

Replacing Ball-Bearing On Transmission Shaft

L. R. SWARTZ

In this case, the ball cage, the inner and outer races were smashed, and the shaft slightly injured by the broken pins of the race. To make a solid babbitt pour, would involve the use



The Automobile Repairman

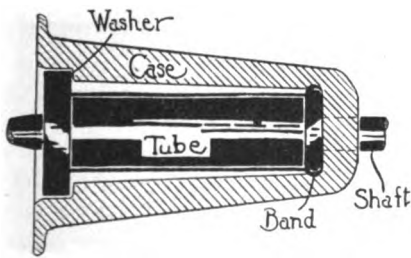
A Cheap Lubricant. For ball or roller bearings a good lubricant can be made cheaply and easily by mixing vaseline of a good quality with light cylinder oil of good quality; the two making a sort of heavy lubricant. To permit the thickened mass to reach all parts of the bearing, it should be heated to reduce its viscosity temporarily. The bearings should then be dipped into it, allowed to remain submerged until the grease has had time to reach all parts, when they can be removed and permitted to cool. If the excess lubricant is wiped off the outside enough will remain in the races to insure adequate lubrication for a long time.

Slipping in a leather-faced cone clutch may be due to want of adjustment, and



of about thirty pounds of metal, which would be an item of too much expense. It is presumed that the repair is to be made without the use of a lathe or power tools. The first step to be taken is to smooth up the shaft and give it a good heavy coat of graphite. If you have no graphite on hand, use "Rising Sun" stove polish, and put on a good thick coat. Or, smoothly wrap the shaft with a thick piece of oiled writing paper or paraffined paper of some thickness. Either one of these precautions must be taken to prevent the babbitt from clinging too tightly to the shaft as it cools.

In order to provide an oilway, shave out a long splint of tough wood a little less than 1/8 inch square, making it tapered, and oil it so it will draw after the babbitt sets. Tie this on shaft with a few turns of string; placing string about where middle of bearing is to be. A babbitt bearing should not be shorter than twice the diameter of the shaft. In this case, the longer you can make the bearing the better, because there is a universal joint on the shaft just in front of the gear case. Forge a heavy washer of 1/2 inch or 3/4 inch tire, that will fit the seat in the case that was made to fit the ball race; leaving the hole large enough to receive a piece of 2-inch pipe or boiler tubing. Slightly taper both the hole in the washer and the end of the tube and then drive tube into washer and bead down like a boiler tube. Now measure for length



THE BALL CAGE AND BOTH RACES WERE SMASHED

of tube, so it will fit in or against forward end of case, and cut it off to proper length. If the tubing does not make a pretty good fit in forward end of case, shrink on a band so as to make it fit. This will give a steady rest for each end of the bearing when in place and also permit a bearing long enough to stand considerable wear.

Put the shaft in place and then press the tubing and washer into place; centering tapered end of shaft

in tubing. The pour can now be made and the splint removed; when cool, fit on tapered end of shaft.

There are several ways of making this repair; depending, of course, upon the appliances and material on hand. Where one has a lathe and balls, a new bearing can be made without a great deal of trouble.

Repairing a Loose Disc on a Friction-Driven Car

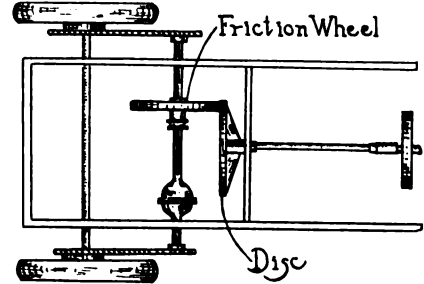
L. R. SWARTZ

The car was a two-passenger run-about. At the rear end of the transmission shaft was fitted a disc to engage a friction wheel which drove a shaft running at right angle to the transmission shaft, and fitted with small sprockets at each end to receive the chains which propelled the car. (See engraving.) This disc had been fastened to transmission shaft by means of a pin running through the hub of the disc and shaft. The disc had become loose; causing both the shaft and disc to wear. Some one, to remedy matters, had pined down the end of the shaft in order to tighten the disc. The experiment had not proven of permanent benefit, because the disc had soon become loose again.

We had quite an argument as to whether I could make the repair without a lathe. I took off the disc and reamed the hole in the center, so as to make a very close drive fit with a piece of Shelby steel tubing that was smaller in the bore than the diameter of the shaft. I then warmed the disc and drove in the tubing; this made a good tight bushing which I reamed with a long fluted reamer just enough to make it true. To turn the shaft, I tightened the bearing on the shaft next to the disc, and set the engine going. By rigging a bar to the string-piece, close to the bearing, I had a rest, and with files I cut down the shaft to fit the bushing in the disc. This was accomplished in less time than would have been required to tear down the car to get the shaft out. It was then a small matter to drill the pinhole through the tubing and fasten the disc to the shaft. When finished, the disc ran true and firmly enough to haul the car as well as ever. This was the shortest way out of the trouble.

Another remedy would have been to take out the shaft and split it part way through with a hack running

lengthwise with the shaft, and weld in enough iron to make the shaft large enough to stand turning down to fit the disc after running; and then both fit for disc and bearing would have to be turned, because the heat of welding would have roughened the



THE DISC HAD BECOME LOOSE—CAUSING CONSIDERABLE WEAR

bearing on shaft close to the disc. One dare not upset a shaft of this kind by driving on the end, because that would make the shaft too short.

In ordinary practice, a bushing shrunk in and reamed to a drive fit to a shaft is about as good as to fit both parts in the solid.

Repainting the Automobile—2

M. C. HILLICK

The One-Coat Color and the One-Coat Varnish Job

Proceed as in the case of the touch-up and varnish job, to wash and clean the car and rub the gloss from the varnish on the bottom of the car. Then touch up and putty all surface fractures and rub them down as described in first article of this series. In case the surface of the car is badly worn, and some flaking and peeling of the color is in evidence (and if the job is still to go with one coat of color and one coat of varnish), instead of rubbing the surface with water and pumicestone, sandpaper it with either No. 0 or No. 1/2; the size of the paper depending somewhat upon the conditions of the surface; but either one of these two sizes will do. Sandpaper both the body surface and the chassis. Touch up and putty all surface cavities, and wherever the color is scaled or flaked off, special treatment will be necessary, as follows: Give these places an extra hard sandpapering, to remove all loose or shaky color. Then coat these patches with a mixture of three parts lead and one part of the



car-body color, and add to the pigment in thinning it for use one part of raw linseed oil to three parts turpentine; using in each pint of this paint twenty drops of drying japan. Then reduce hard drying putty with turpentine to a heavy paste consistency, and with a broad scraping knife plaster a glaze of putty over the parts in question. Work the putty out smooth and level and fill up the parts a little above the surrounding surface. After twenty-four hours, rub this putty glaze down smooth and level with the rest of the surface; using a block of artificial rubbing stone dipped in equal parts of turpentine and raw linseed oil.

The above process should be itemized as "extra work" and so charged for. Usually, on all such jobs, it is necessary to first apply a coat of color and then one of varnish color. Rub this coat lightly with pulverized pumicestone and water, and then

of the old paint and the building up of an entirely new paint fabric. Not much entire burning off or removal of the old paint is done on the automobile except in large cities. The surface is usually fixed up and kept in fair shape as long as the car lasts and this is all that the owner generally cares about.

One job under this head includes the car with the color bleached and off shade, varnish badly worn and some parts of the surface rough and worn away. After cleaning the car, sandpaper it thoroughly all over with No. 1 sandpaper; removing all the loose or shaky paint. Touch up all defective parts with a mixture of lead and color as above described. Putty the cavities with a hard drying putty; all shallow surface fractures or depressions to be putty-glazed; such puttying to be, in due time, rubbed with the artificial rubbing stone and a mixture of oil and

rubbing with trimmer's moss or curled hair. Put any required stripping over this coat, after which apply one coat of clear rubbing varnish; which coat, in due time, should be rubbed with pulverized pumicestone and water. Then wash and clean up and apply one coat of finishing varnish. Treat the chassis, after puttying as above stated, in the following manner: Sandpaper, putty, touch up with chassis color and then apply one coat of varnish color. When this coat is dry, knock off the gloss with curled hair; then stripe and finish.

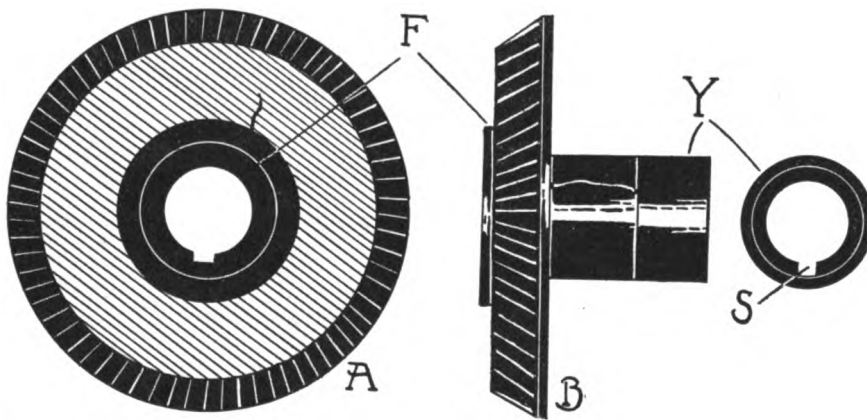
(To be continued)

Repairing Ford Differential Pinion

F. E. SMITH

A Ford car came into our repair shop with one end twisted off a rear axle shaft and the two master pinions cracked from one end to the other of the center part of them, but quite sound on the outside where the teeth were. The axle we had in stock, but the pinions were unprocureable for some weeks, so I had to repair the two old ones as best I could. A, in the engraving, shows the teeth side of the pinion, and B, the boss end. On the teeth side of the pinion there is a flange protruding about $\frac{1}{8}$ of an inch, marked F, upon which I shrunk a band after I had fitted it as near as I could to the same shape as the hollow in the pinion. I then cleaned it off upon the emery grinder, and it was impossible to distinguish it from the original collar.

The other end of the pinion is in the form of a boss which is fitted into a hole the exact size of it. To fit a collar on this end was no easy matter. The inside of the pinion had a slot (S) running right through, to admit a key let into the shaft. I cut a recess round the end of the boss pinion about $\frac{1}{8}$ -inch deep, which brought it down onto the keyway, but no more. I fitted a band (Y); filing a little off the inside edge to allow for riveting the end of the pinion over it, to make sure of it not coming off, and then shrunk it on. After it was cleaned off on the emery wheel it was just as if nothing had been done to this end. The repair was made six months ago, and I happened to have the same car to pieces recently. I found the repairs as sound as ever.



THE MASTER PINIONS WERE CRACKED IN THE CENTER FROM END TO END

clean up and finish. When it is necessary to stripe the body of the car on this class of work, the best way is to touch up the defective parts of the surface with color and then apply one coat of flat color; then stripe, and apply one coat of clear rubbing varnish; this coat, in due time, to be rubbed with water and pulverized pumicestone and finished up in the usual way. This latter process will also prove correct in case two or more colors are used on the body of the car.

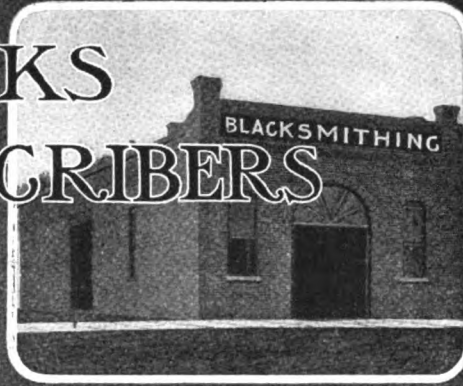
Medium Repainting of the Car

Under this head, various kinds of repainting processes will be necessary in order to meet the varying needs of cars which come to the shop in different conditions of wear, but classified under the head of "medium painting repairs." This class should include everything except the removal

turpentine. Next, touch all such repairs with color, then apply one coat of color on the body. Use japan ground color, and to every four parts of turpentine add one part of raw linseed oil; this mixture to be used in thinning the color. Over this, apply a coat of varnish color. If two or more colors are used on the car body, the respective panels should be treated in the same manner, with the exception that the different colors be confined to the panels designed for them. Where two or more colors are used on the car, the work becomes more difficult and complex and, so far as possible, the small shop painter should confine his work to the use of one color. Over this coat of color on the body apply one coat of varnish color and let dry until the following day. Then take off the gloss, by lightly



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The War

While Tom Tardy is ranting and roaring and wasting a lot of breath, "Decidin' the War," we must keep in mind that a trade paper should know no nationality—it should be non-partisan. Consequently, an attitude of strict neutrality should be maintained and the war should not be a subject for criticism and censure. It is self-evident that no one can forecast the outcome, and discussion would be a fallacy.

It is easily observed, however, that business the world over is affected. We are indeed glad to learn that the present conflict is having a stimulating effect upon at least some industries in this country. Several horseshoe companies announce that part of their plants will operate night and day. These American concerns have the reputation of turning out the best shoes for horses and mules in the world.

In contrast, it is regrettable to learn that the foreign powers now engaged in war can press into service all horses, no matter by whom owned. It would indeed be lamentable if the thoroughbreds now in England, France and Germany should be seized. During the Civil War, the breeding of horses in this country received a serious setback from which it has never totally recovered, inasmuch as the pedigrees were irretrievably lost. Such men as August Belmont, W. K. Vanderbilt, H. B. Duryea and others have valuable race horses quartered in these warring countries, besides owning large stud farms that contain many famous stallions, broodmares, and horses in training.

The best we can do is to live up to President Wilson's proclamation of neutrality and continue an attitude of peaceful waiting.

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Safety First

The number of fires in blacksmiths' shops that have come to our attention from all over the country are rather alarming. Carelessness seems to play an important part, as invariably the fire started from an "unknown origin." So, before leaving the shop, see that the fires are entirely out or properly banked and wetted down. "Safety First" is not a mere play upon words but an insistent reminder of cold, hard facts that are too often disregarded.

The Horseshoeing Contest

Dr. Seiter reports in this issue on the contest recently held at Des Moines, Iowa. Not only has Dr. Seiter presented an excellent detailed description of the contest but he has also given suggestions and recommendations for future contests of this kind; and these suggestions coming from an authority of Dr. Seiter's experience and standing should make for better efficiency in the future.

Dr. Seiter's article is full of sound, practical sense, and every shoer of horses will miss a piece of valuable literature on his chosen trade if he does not read "The Horseshoeing Contest at Des Moines, Iowa." It is something that should be read in the horseshoers' meetings and it should be given the greatest possible publicity. You read it carefully, Mr. Reader, and then

Tell Your Neighbor.

The Feature Article

This month finds a new name in our list of contributors. It is that of Mr. P. P. Fenaux who this month introduces his series of articles on "Bulldozer Dies and Their Making." This new series should be of extreme value to every reader of "Our Journal."

Mr. Fenaux graduated from a French Government Technical School; spent some years in the shops of the Thomson-Houston Company, electrical manufacturers at Paris, France; worked in the shops of several automobile builders and railroads. He came to the United States and was employed as draughtsman, tool designer and tool room foreman with the Burke Electric Co., Erie, Pa.; temporarily as designer with the Williams Tool Co., Erie, Pa.; as tool designer with the Taft Pierce Mfg. Co. Woonsocket, R. I., and The Bresnahan Shoe Mch. Co., Lynn, Mass.; as electrical turbine and tool designer in charge of tool design in the Meter & Instrument Dept. of the General Electric Co., Lynn, Mass. He is now machine designer for The Rivett Lathe & Grinder Co., Boston, Mass.



MARSHALL
TO LINDERS
PUSHER IN
FRANK IMP. NEWS

MOBILIZING THE ARMY OF PEACE

The Association Army is an army of peace. It is organized for the purpose of overcoming fighting, disagreements and the taking of unfair advantages. Its aim is to promote harmony—not discord. It is an army of construction—not destruction. It is organized for promoting business life—not for furthering business death. Are you a member? Join, if you have a regiment in your town, or recruit a regiment of your own if you haven't.



thrown across the shop. This shield is shaped so as to in no way interfere with the cutting and yet it must be effective in stopping the little metal cuttings. The base of the tool is arranged to fit into the hardy hole of the anvil.

This device would also prove of value in the observance of safety in the horseshoeing shop. How many times does the fireman cut small pieces from the heels of shoes and endanger the sight of his fellows by allowing the pieces to fly across the shop. This simple device will prevent the dangerous practice and will cause the small pieces to fall near the anvil.

The Principles Governing the Making of Springs in the Railroad Shop*

F. F. HAEFFLE

We will concede the spring-maker to be a first-class mechanic who has had a wide experience in the handling and treating of spring steel. This experience has educated him so that he can be reasonably sure to know exactly what he is doing and precisely the results he will obtain; provided the spring steel is what it ought to be for this work. If the steel is good, there can be no excuse for bad springs; if the steel is not good, surely the spring-maker cannot make it good by any subtreatment he might undertake. Bad steel, it seems, would place the matter with the steel-maker, while the steel-user appeals for good material.

Competition among steel manufacturers is very close; the gradual introduction of open hearth and Bessemer steel have made it even more so. Competition to keep down costs is a leading factor for poor work. The mechanical department, "from whom good work is expected", want the best material they can get that will answer the purpose, and conditions contrary to present good work will cause one to be placed "between the devil and the deep sea". Therefore, it is suggested, to get results, that all connected make an honest effort; giving care and attention to every detail. This will promote the desired good; any other course doing quite the opposite.

It can be assumed, if the chemistry

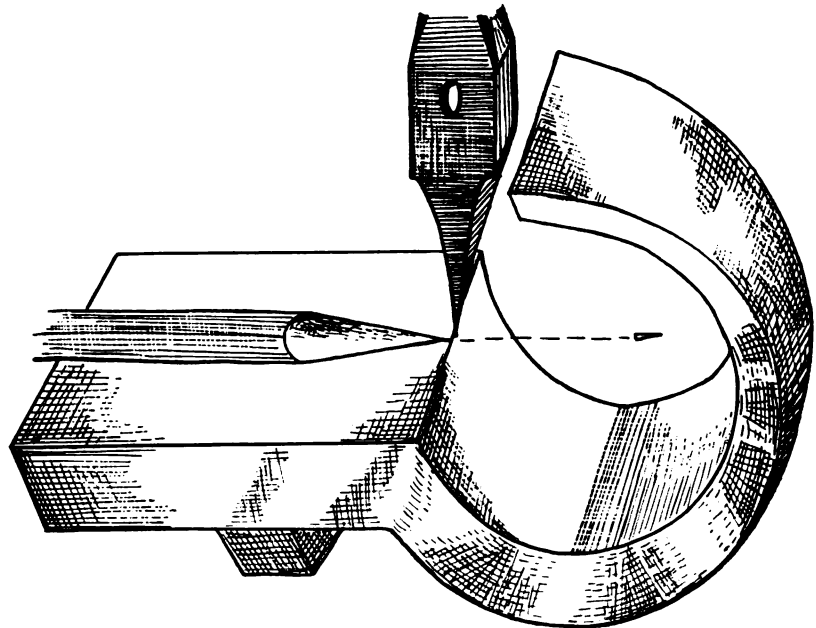
*Address given at International R. R. Master Blacksmiths' Association.

is correct, the physical condition good and the sizes of the steel plate accurate, that the steel-maker's responsibility ceases. Good elasticity is expected. The elasticity of a spring is understood to be the amount which a spring will deflect or bend under a given load without having its form permanently changed. If the bending or depression is so great that the spring will not recover its original form of set after the load has been removed, the strain to which the spring is subjected is understood to have exceeded the limit of its elasticity, and if repeated often will surely break the spring.

The elastic strength of a spring is understood to be the strain it will, or may, bear without being strained beyond the limits of elasticity. The ultimate strength is the strain that will cause the spring to break. The strength depends, of course, upon the physical condition of the material of which the spring is made, and increases according to the number of plates the spring may have, the width, the thickness and, in addition,

bility. In relation to each other, the plates must diminish regularly in their lengths, for the reason that a spring consisting of numbers of plates, and each of equal thickness and width, should be set in a manner so that when they bear the greatest load they will carry it in almost a straight position. The spring operating in this position will display itself as flexible and elastic.

The condition of roadbeds have a great deal to do with the success and life of springs. Flat wheels and low rail joints are very bad factors. Every time the flat wheel revolves, and every time even a perfect wheel strikes a low joint, the tremble caused from that jolt will travel from the wheel base to the spring and its connection. As above stated, when the spring is constructed to ride and operate in almost a straight position in service, this fact will give a flexible and soft riding motion. On the other hand, if the springs are set too high they are too rigid, and the result is a hard, quick, jerky and trembling motion; hence, it can be understood,



SAFETY FIRST HAS BECOME THE SLOGAN IN MANY LINES—WHY NOT FOR SMITHS?

the length to be considered. The shorter the spring may be, of course, would add strength at the expense of losing in elasticity. Again, the longer the spring may be, would cause a reduction in strength but an increase in elasticity.

Again, the design and general proportion of springs have a great deal to do with its appearance and dura-

the greater the set the less flexibility and elasticity.

Furthermore, a well proportioned spring, when loaded and operating in service, will have as near as possible a uniform strength throughout. A spring well banded will cause an equal advantage to all plates contained in the spring and, all conditions being equal, not only its



strength but the amount of deflection from any load will be distributed equally.

The elasticity of a spring is based on the material of which it is made and properly tempered, also the length, width and thickness of plates. The set of the springs holds a controlling influence over the elasticity.

In considering the elasticity of springs and general results that are given in service it is assumed by good mechanical minds, in the construction of elliptical springs, to have two

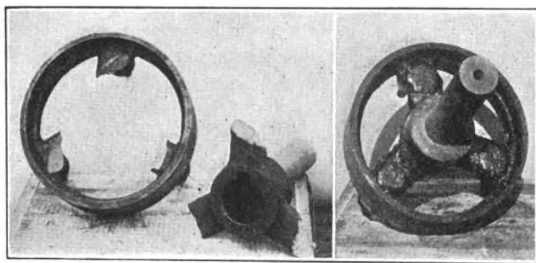


FIG. 1—THE HUB HAS BEEN BROKEN OUT OF THE RIM

FIG. 2—THE PULLEY AGAIN READY FOR USE

different sizes of plates in one spring, say: a portion of the shorter plates to be $\frac{1}{4}$ of an inch in thickness and the longer plates to be $\frac{1}{2}$ an inch in thickness. This has been advocated as good practice. Again, others claim all plates must be of equal dimensions, which practice is right. It would appear that in order to have a uniformity of flexibility from a number of spring plates firmly bound together that it is necessary for each and every plate to be of equal relation to the other in size, thickness and width. This will cause an equal advantage to all plates, and an equal distribution of elasticity can be expected.

The operation of hardening and tempering, although the difference in temperatures necessary to produce the best hardening for the different qualities of carbon is seemingly slight as observed by the heat color. However, they are very important and are best obtained by the experienced eye of a man of good judgment. The hardening and tempering of springs is a comparatively simple matter if the temperer knows the carbon with which he is dealing. To create a better article it would seem, if the spring-maker was informed of the carbon he had to deal with, the results at large would be much better.

In general, tempering must be suited to the carbon; therefore, good sense and good judgment are the best guides. The same laws apply to all grades of steel.

In the construction of springs, the manipulating of all plates from one operation to the next must be within the law of steel. A proper furnace, whereby a uniform and correct heat can be obtained before quenching, is a necessity. Proper heat will remove the uneven strains and make a much better spring plate. This would require a little care, a little time and possibly a small increase in cost; however, the results could not be questioned; provided it increased the life of the spring, reduced the number of breaks and kept the engine in service a longer period.

Another point needs attention. When hardening in oil, the oil should be watched, a little fresh oil should be added every day or so and, finally, when the whole mass has become pretty well burned, it should be thrown out, the tank cleaned and filled with fresh oil; as worn-out oil loses its power and will not harden

nothing that will compare with it for work on all kinds of metals. For welding new work it is being used more extensively every day and for repair work it is without question unequaled from any and every point of view—i. e., cost, adaptability, efficiency and results.

At first recommended for a most limited field of usage, the oxy-acetylene process has so developed and its adaptability has so broadened that its possible uses are almost unlimited. The combination flame is now used for both cutting and welding and on a variety of both repaired and manufactured articles that might be described as ranging from the extremely delicate work in the laboratory to the mammoth welding and cutting jobs in the railroads and shipbuilding shops. It is used on practically any work from the welding or cutting of a hair-like platinum wire to the cutting up of a wrecked battleship or the welding of an ocean greyhound's sternpost.

That it is possible to absolutely control a flame of such extremely high temperature (the oxy-acetylene flame is said to approximate 6300 deg. F.) seems almost unthinkable. Yet the flame of this temperature is not only controlled, but users of the torch become experts in applying the

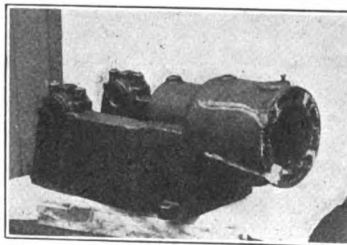


FIG. 3—A BADLY CRACKED GAS ENGINE CYLINDER READY FOR THE SCRAP

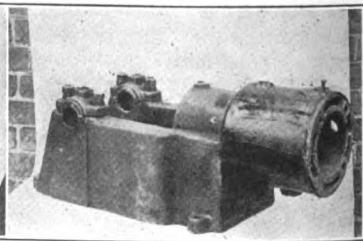


FIG. 4—THE CYLINDER AFTER BEING REPAIRED WITH THE OXY-ACETYLENE TORCH

plate steel as it should be hardened. Good care along these lines will have its telling effect in results.

Welding and Cutting with the Oxy-Acetylene Torch

L. J. ANDERSON

One authority in speaking of the oxy-acetylene process, with reference to its use in welding, says there is

flame, and now do work that was unthought of in the earlier development of the process.

Safety of Apparatus

While the process was in the experimental stage, torches, tanks, generators and practically all apparatus was deficient. Experience and experiments have, however, brought the general run of plants to high



efficiency and to a practically absolutely safe basis in the hands of the intelligent mechanic.

The man intending to install an oxy-acetylene plant today has the option of generating his own gases or of purchasing ready-made gases in tanks. Of course, if a user is not in close proximity to a supply station he will not consider the purchase of his gases in tanks, but will be content to manufacture them in suitable generators. On the other hand, should a ready supply of the gases be available close by, the user will find the ready-to-use tanks extremely convenient; though the cost of the gases will most likely be somewhat in advance of the shop-generated article.

The torches now on the market are extremely efficient and can be had in practically any size, style and type required. Some are made with interchangeable tips for various kinds of work, while a special torch is offered for that of cutting.

The tips of nozzles of all oxy-acetylene torches will in time suffer from the intense heat of the flame; they will also become clogged occasionally by stray bits of melted metal; but if carefully and intelli-

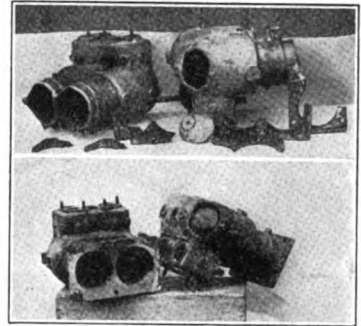
gently used, the torch and tips will last a long time. It is necessary to prevent as much as possible, however, the occurrence of backfires which happen invariably when the torch is held too close to the work. These backfires, naturally, tend to heat the torch unduly and thus to burn the tip.

Precautions

There are certain precautions to be observed in the use of the oxy-acetylene torch, as may naturally be surmised when considering the highly inflammable nature of acetylene and the extremely intense heat of the flame.

For the beginner, it is perhaps most important that he understand thoroughly the apparatus with which he has to work. He should be prepared for any emergency and should know which way to turn all valves and cocks when desiring to shut off the supply of gas. There should be no question in the beginner's mind regarding anything concerning the operation, adjustment and control of his apparatus. Such knowledge makes for efficiency, perfect work and, above all, safety in operation. Another caution to the beginner is

to proceed slowly. Don't hurry—feel your way—be satisfied with learning how to manipulate one metal at a time. When you have succeeded in joining and firmly welding the edges of thin iron and steel sheets or strips, proceed with thicker



FIGS. 5 AND 6—SHOWING HOW WELL BADLY BROKEN MOTORS CAN BE REPAIRED

pieces. After which, experiment with other metals until you are successful in welding practically any thickness and most of the weldable metals.

Let the size of the job determine the size of the tip. A tip that is too small will require more time and more gas than the correctly proportioned one.

Do not disregard the expanding and contracting qualities of the metals you work on. All the skill an operator can command will go for naught if the expansion and contraction of a piece is not taken into consideration. Observe the simple but, nevertheless, inflexible rules that are set forth in the book of instructions; and, finally, remember that preheating tends to lessen the cost of a job. A preheating torch will pay for itself in the saving of acetylene and oxygen. Do not fail to preheat your pieces whenever this is practicable.

Actual Work

The engravings show a number of examples of work actually done with the oxy-acetylene torch. In Fig. 1 (P. 34) is shown a pulley which has been broken—the hub being entirely severed from the rim. In Fig. 2 the repair has been completed; this shows the pulley before the repaired arms or spokes have been trimmed. The repair of large pulleys and flywheels of practically any size is possible in a similar manner and of equal efficiency.



FIG. 7—THE EXTREME PORTABILITY OF THE OXY-ACETYLENE PLANT MAKES FOR REDUCED COST IN PREPARATIONS FOR ACTUAL WORK



In Fig. 3 (P. 34) is shown a badly cracked gas engine—one crack being in the water jacket at the side near the top and a second crack at the side near the bottom. The latter crack includes both the wall of the water jacket and the wall of the cylinder proper. In Fig. 4 the same engine parts are shown repaired. The oxy-acetylene process makes possible the salvage of previously wasted broken articles and at a price that is little or nothing, compared with the cost of new machines and parts.

In the automobile repair field, the oxy-acetylene torch has already played a most important part. In



FIG. 8—HERE A THREE-TON TRUCK FRAME IS BEING WELDED

Fig. 5 (preceding page) is shown two very badly broken motors. As shown here the motors are absolutely worthless except as scrap. With the aid of the oxy-acetylene torch, the flanges are replaced as they were originally, and the hole in the compression head of the cylinder is repaired. Fig. 6 shows the repaired motors—the hole in the cylinder of one repaired ready for replacing the part taken out of the water jacket, and at a cost that is a mere fraction of the price of new cylinders. Should not a motorist be willing and anxious to pay liberally for work of this kind?

In Fig. 7 an operator is shown repairing a broken frame in position on the car, while Figs. 8 and 9 show similar operations. In Fig. 8 the truck shown is a three-ton monster on which the cost of dismantling (in order to make the repair in a forge in the ordinary way) would have

been more than that of the actual repair by means of the oxy-acetylene torch. In Fig. 9 an operator is repairing the frame of a small car, to get at which it was necessary to remove the car body. In both Figs. 8 and 9 it will be noted that the frames just beneath the breaks have been jacked up in order to weld the parts in just the positions they should occupy.

The remaining engraving, Fig. 10, shows an operator in the act of cutting an I-beam. The piece in the engraving is a 40-inch girder. As an example of how rapidly structural pieces can be cut when the torch is in the hands of an expert it may be mentioned that a steel I-beam, measuring $\frac{3}{8}$ inch thick in the web and 5 feet in height, was cut through in twenty-two minutes.

Costs and Savings

The actual saving in the cost of the oxy-acetylene process over previous methods is perhaps best illustrated by an example demonstrated in the railroad shop at Springfield, Mo. The work done was mostly repairing, and included the welding of driving rods, spokes, links, rocker arms, and frames, the patching of boilers and some cutting. It is estimated that, in the period during which the records were kept, something over 200 hours of time were saved over previous methods; the actual money-saving amounting to \$216.00.

In the case of a locomotive driving rod that was cracked, the part was prepared and the weld made in an hour and a half and at a cost of \$5.22.

In a foundry where an oxy-acetylene torch was employed in cutting off the risers from castings the cost was not only reduced to about 1½ cents per square inch but the labor of carrying the castings to a saw was saved.

The modern metal working shop must include an oxy-acetylene welding and cutting plant in its equipment. The general smith, the automobile repairman and the general repairer will find it a labor-saver, a time-saver and a big money-maker.

A man prominent in the manufacturing business predicted to the writer just recently that the next five years would find every smithshop of any importance equipped with an oxy-acetylene plant.

Modern Machines and Appliances and Their Relations to Profit

G. D. CRAIN, JR.

"The average blacksmith, the country over, would not be making a living if it were not for the modern machinery and the modern appliances which increase the amount of work he is able to turn out," said the head of a large Middle Western jobbing house. The statement, he declared, was true all over the territory his house supplied, and he has it from other jobbers that similar conditions exist generally in the districts they supply.

"I am talking about the average shop—the shop which does a general blacksmithing business," continued the jobber. "I don't mean to say that the big city shop which specializes in definite classes of work is described by the assertion I make. Some of them are organized altogether on the machine-work basis, and others are all for hand-work. But I mean the average general shop, where both hand-work and machine-work are done.

"What I say is this—that the average blacksmith does his hand-work at little over cost and, though

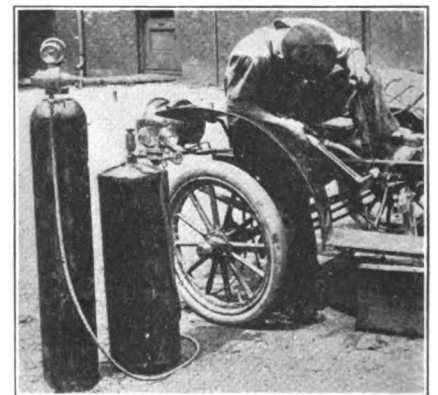


FIG. 9—ANOTHER EXAMPLE OF WELDING BROKEN PARTS IN POSITION

he doesn't know it, depends upon the efficiency of his machinery equipment to make his shop yield him a living net income. I don't mean to say, either, that the patron of the blacksmith shop and the machine shop or the buyer of the product of any other shop is not entitled to some cheapening of the cost of production from the simple fact that a machine is used. The public is entitled to that



advantage, and the owner of the machine must look for his profit to the increase in the units the machine can turn out.

"But this is much too often true—that the blacksmith is making his machine support the whole shop. He would be better off in many cases if he were to refuse to shoe horses at the rates prevailing in many localities and concentrate on the work he can make his modern appliances do for him. The average blacksmith is not a keen business man. He regards the total net returns as indication that he is getting along when, if he stopped to figure, he would find that he was shoeing horses and repairing a good deal of the machinery for his patrons, and doing the other work that in his shop is done by hand, for little more than it costs him, and that he is relying on the work his machinery outfit does to keep him, his shop and his family going.

"Now this is all wrong. Every head of a blacksmith shop ought to correct this state of affairs and correct it an once. Either he asks too much of his machines and his machine equipment or he doesn't get enough out of his hand-work. In either or both cases, that is bad business, and sure, sooner or later, to lead the shop into trouble."

In other words the average blacksmith needs to apply modern bookkeeping methods to his business. It is the fashion in some quarters to scoff at bookkeeping as it is practiced in these days. The blacksmith who lines up with the scoffers is standing in his own light—waiting for the iron to cool before he strikes. Elaborate bookkeeping methods are not necessary and it would be foolish to attempt to apply them to the business, but it is up to the blacksmith who would succeed, to make sure that he is running a profitable business from every standpoint.

Then there is another way to consider the modern machine. If a blacksmith's business is not netting him a living, the chances are that he can reduce his operating costs and add to his profits if he will install some of the marvelously effective machinery and appliances which are on the market today. And this, without raising his prices to his patrons, diverts some part of what he takes in from his outgo to his income. Any dealer or representative of the manu-

facturer or dealer will be glad of the opportunity to show the smith how he can make a new machine save its cost in a given time, and how he can, at the same time, make it add to the net returns from the business. Once with this part of the business on its feet, the smith will be in a position to put up his hand-work to a point where it will yield a profit.

Machines nowadays will do almost everything there is about the wagon-making business except assembling the parts, but there is no machine which will shoe horses, and it is a safe bet that there never will be. Every general blacksmith knows that the cost of his labor, his rents, his supplies, even to the nails, has increased in the last few years, from 50 to 200 per cent, and yet thousands and thousands of shops are shoeing horses at the same rate they used to charge and often at the same price

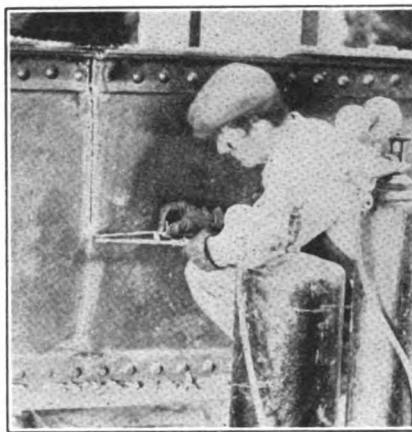


FIG. 10—CUTTING A 40-INCH GIRDER WITH THE OXY-ACETYLENE FLAME

which the smith's father used to charge when the present head of the shop was an apprentice boy. It was a natural error to fall into—or a natural practice to continue—this matter of maintaining the set rate for putting on a set of shoes.

On the other hand, the work which was done with the aid of few, if any, machines, has been easily increased in price, for the reason that each job was figured as an individual bit of work, and the price quoted was according to what the smith thought would be a reasonable allowance for the materials required and the time which would have to be given the work. Then, when the machines came to be more or less generally adopted and began to yield increased profits to the shop, it was a common error—this assumption that business was

good because the net returns on the whole of the business were satisfactory.

Modern machinery is doing the producing, with no help or at best little help from the hand-work, while frequently the hand-work end of the business is a positive drag. The owner of the shop, be it a big or little one, ought to find out "where he is at," with no delay. Maybe his machines are not doing as well by him as they ought to be doing, to say nothing of his hand-work. In any event, he ought to know. No business is a good business if every department is not adding to the total net returns.

It is easy for the smith who is a horseshoer first and last to find out the state of his business. Most of them have done that, and most of them have come to the conclusion that unless they get nearly \$2 a set for shoeing they are not doing well enough—not much better than making journeymen's wages for themselves. That is why the standard price movement is as strong as it is throughout the country. If the man who specializes on horseshoeing, can't make any money on the rate that used to prevail, is there any reason to suppose that the horseshoeing department of the general shop can be giving reasonable returns when the same old rate is charged? That department ought to bear its fair share of the cost of the whole enterprise, and ought to be charged with that before it can be assumed to be returning a profit.

Keeping a record of the expense of this department is not a difficult matter. The labor costs are known, or can be estimated, and the cost of the materials is easy to find. The best practice in establishments on the order of the blacksmith shop is to apportion the overhead expenses according to the outlay for materials and labor. The overhead involves the rental on the building (or taxes), insurance, the lighting charge, and in fact any and all charges that cannot be assigned especially to any one department. If the horseshoeing end of the business cannot show a profit by figuring of this sort, it is not doing the business any good, except as the reputation of the shop for doing good work of the kind may bring more trade to the wagon repair department or the other paying departments of the business.



But it is the machinery end that needs close attention. The shop proprietor ought to know whether the modern appliances he has bought are doing what they should. The only way he can be sure of this is to keep books on them. He has got to make them pay interest on the investment and also pay for the repairs and depreciation that cannot be avoided. He has got to be sure, too, that they are returning a profit over this, and that they are being used enough to pay him for putting them in. He will have to make the machine-working side of the business pay for these particulars, as well as to shoulder its proportion of the general costs of the business.

The chances are, as the head of the jobbing house asserted, that this end of the business is proving profitable. If it were not, the smith would have had to get into some other line; he could not have been making a living

The case of a general smith who employed one man in his shop, in a village not far from the city where the jobber cited before has his headquarters, was referred to by the head of the supply house to illustrate the point he made. Most of the work was done by hand by the master and the journeyman to whom the shop owner had to pay the union scale in order to keep him from taking the next interurban car to the city. The old rate of \$1.25 for shoeing a horse all around had been in effect in the shop for years but, try hard as he could, the smith was not making any more for himself than he was paying to the journeyman. He complained at length to the salesman who called from the jobbing house.

This salesman was a live one, and spent half a day trying to show the smith that if he would put in some of the better machinery, he could increase the amount of work he

counting the wear and tear on the floor of the shop or the time lost in handling the animals, he was making a profit of not more than seven cents on each horse he equipped with an all-around outfit of shoes.

The next step was to show that the other work of the shop was returning a larger profit than the whole shop did before the new machinery was installed, and to prevail upon the smith to announce that hereafter the charge for a set of shoes put on a horse would be \$1.60. The trade complained, of course, and some of it went away, not to return; but the better patrons of the shop, who were themselves business men, recognized the validity of the smith's argument that he was entitled to a living profit on the work he did. The net result was that, though there were not quite so many horses to shoe, those which did come in meant a profit, and the smith and his assistant had more time to put in on the work that did yield a fair margin of profit.

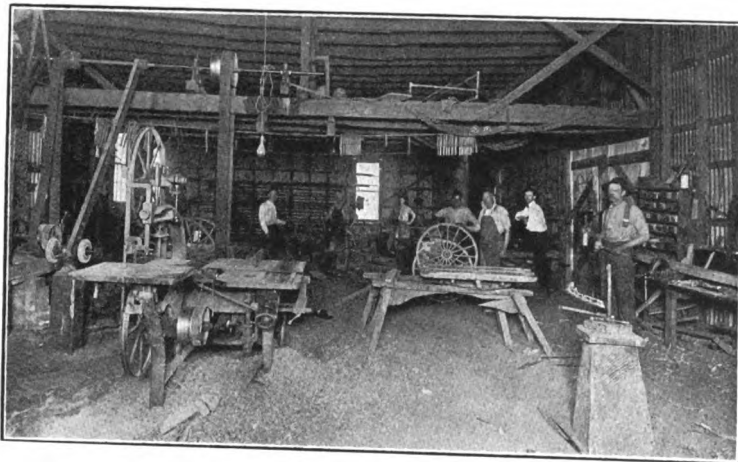
There are similar opportunities in all of the general shops, and the men at the head of them or the man at the head of any shop will find that it will profit him to look into his business, to see that everything he does pays.

Thoughts on Timely Topics

BY THORNTON

Caustic Censure and Cheery Comment

ABOUT IOWA.—I don't usually write anything for the benefit of just a part of the family; in fact, what I say is supposed to be of interest to every hammer-swinger who reads these pages. Well, on second thought, perhaps this will before I am through—but mainly this is addressed to the boys in the Hawkeye State. You Iowa smiths should feel just about as cocky and proud as a woman with a new bonnet at Easter Service. It was the writer's great pleasure to sojourn in the corn-strewn wilds of Iowa for several weeks. There may be other States that, as a whole, have as good-looking farms and farm buildings as Iowa, but, I've seen 'em in Iowa, and their farming plants are certainly tuned to concert pitch. Good soil and industrious farmers have made excellent crops, and Iowa is one of God's garden spots; and



THE SHOP OF JAMES B. SMITH, ARKANSAS, IS WELL EQUIPPED WITH LABOR-SAVING MACHINES

or at least could not have been making a good enough living to be content to stay in the business. But it is up to the proprietor of the average shop, just as much as it is to the head of the great manufacturing businesses, to make sure that he is not shooting into the air. The correct application of good bookkeeping methods is the one thing that will do this. The principle is the same, whether the record be kept in a blank book from a five and ten cent store or whether the smith has enough business to employ an expert who has nothing on his mind but keeping the records of the business.

turned out and make more money without working himself to death. The salesman backed up the assertion with facts and figures, and at length the smith invested in a motor-driven drill and lathe and scrapped the old tire setting machine he had been using; putting in a new one as well as a new forge. The result was what the salesman promised, but the salesman did not neglect the smith after that; continuing to argue with him that he was making a mistake in not raising his price for shoeing. He got cost figures and labor figures and overhead expense figures from the smith, and showed him that, not



all this means that you boys in Iowa—you knights of the hammer and anvil who are located in the Hawkeye State—should cash in liberally on the agricultural prosperity which is very evident in your vicinity. Yes, and you boys should get a bit more friendly with the auto—not that you are not doing some auto-repairing—but there is too much auto work going to the so-called auto expert. The buzz wagons are as plentiful in your State as a certain German delicacy is at Lisbon on sauerkraut day; and they aren't all Model T's either. So, on the whole, you fellows in Iowa—a State first in the production of corn and oats, and first in number of horses, and second only to Texas in number of cattle—should be proud as Lucifer and—make hay while the sun shines.



Bison's Notes

The matches which have marked the closing weeks of the present harness racing season between the pacers, Directum I. and William, have done much to arouse public enthusiasm with regard to harness racing. Back a couple of decades ago even the man who never attended a race meeting had a reading acquaintance with Hal Pointer and Direct; owing to the match races in which those two pacers met. A little later the match races between Joe Patchen and Robert J. and Joe Patchen and John R. Gentry made the names of those horses household words throughout the country. It has needed just such match races as those in which Directum I. and William have contested so stubbornly to renew the interest of the general public in the most characteristically American racing sport. Not since Dan Patch (with an amount of speed that made him outclass all other horses) paced mile after mile below the two-minute mark a few years ago has another pacer appeared that really looked to have a chance to eclipse that horse's wonderful performances, until the four-year-old stallion, William, raced a heat in just two minutes at Cleveland early in the season. He was instantly acclaimed as the greatest pacer of the decade; an opinion which he appeared to support during the next two weeks. Then at Syracuse another star appeared (a grandson of the same Direct that lowered the colors of Hal Pointer

so long ago), a stallion called Directum I., and he not only duplicated William's two-minute mile but he bettered it by pacing the last two heats of a three-heat race in just two minutes each. Public opinion instantly divided as to the merits of the two pacers, and the offer of a \$6,000 purse to be raced by the pair at Grand Rapids, Mich., gave the public an opportunity to see them clash. In this, their initial meeting, over a fast track but on a cold, raw day, marked by a strong wind, William defeated his older rival in three straight heats. The time was on the slower side of two minutes, 2:01 $\frac{3}{4}$, 2:01 $\frac{1}{4}$ and 2:02 $\frac{1}{2}$, but was equal to time a couple of seconds faster under perfect weather conditions. A return match was arranged for the following week at Columbus, Ohio, and here the great pair of pacers were favored with the perfect weather conditions desired, and a new world's race record for a mile and for two miles resulted, when in a furiously-fought race Directum I. reversed the Grand Rapids decisions; defeating William in 1:58 and 2:00. In each mile Directum I. raced in behind William until the three-quarter pole was reached and then, in the race home out-paced him; the last quarter of each mile being paced in 28 seconds. In neither race was there a suspicion of hippodroming. The horses were out to win, and the race they went on each occasion gave the spectators the enjoyment which only such a contest can give to red-blooded persons, and incidentally gave harness racing affairs such a boom in the public mind as they have not had in several years. If more events of this kind could be arranged between the real star performers of each season and carried out with the evident determination of those promoting them, and connected with them, to give the public a genuine contest, as has been the case in the races of these two great pacers, the harness racing interests would be greatly benefited.

It is the general opinion, among horsemen who observed closely the welcome the public extended to the running races in connection with the New York State Fair at Syracuse this year, that it will be the harness horses that will be depended upon to fill the big grandstand at the fair next year. The grandstand has, in the past, paid a big part of the expenses connected with the fair's racing program, for there has never been a day when a good card of harness races was on that the stand was not packed to capacity. On the three days of the fair when the harness horses held sway this year the same big crowd was in the stand, but when the runners held the boards the next three days the stand was never more than two thirds full and sometimes not half full. One of the races, for a purse of \$10,000, had but two starters, and few of the others had more than three; and the fair-going public absolutely refused to fill the big stand to see two or three horses gallop in dashes of which the greater number ranged in length from five and a half to seven furlongs.

While it was but a comparatively short time ago that the Percherons and Clydesdales were practically the only horses of the draft breeds in demand in this country, the Belgians now occupy a most prominent position in the transactions in draft horses. Last year, thirty-one thousand head of Belgian horses were exported from Belgium, and of the registered stallions and mares exported for breeding purposes, a large number of the best ones came to the United States. The enormous weight and power of the Belgians, together with their singularly docile dispositions, their unrivaled feeding and shipping qualities, are fast making them very popular. The Belgian stallion,

Brennus de Velisque, recently changed hands in Brussels for \$13,000 during the recent annual show in that city, and for Indigene de Wisbeq (champion of the show), an offer of \$40,000 was refused. Such prices do not justify taking a very pessimistic view of the future of horse-breeding.

With so many draft horses being bred and so many imported, it is surprising how few are the real topnotchers. The best is what every breeder should have in view, but few of the matings made result in anything approaching what the breeder would like. Some come near to the ideal, but these are few indeed.

During the past few years, double team racing on the harness racing tracks have been seen only at long separated intervals. In the West this season, however, several of the State Fair Associations put a purse on their racing programs for pacing teams; and at the Illinois Fair the pacers, Doctor M. (2:04), and Billy M. (2:06 $\frac{1}{4}$), that have been racing in the regular classes, were hooked together and in a race against three other teams they paced two heats in 2:08 $\frac{3}{4}$ and 2:07 $\frac{1}{4}$; lowering a world's record that has stood for fourteen years, at 2:13, where it was placed by Bobby Hal and Charley B. It is extremely difficult to get trainers of trotters and pacers to look with favor on any but the regulation races to sulky; otherwise, team racing might be made interesting features of the big race meetings.

While the pacing division of the light harness performers have been reducing world's records for race horses of their gait nearly every week since the opening of the season, there have been but two really sensational trotters (those of record breaking calibre) seen this year. These are Etawah, that has reduced the world's four-year-old record to 2:03 $\frac{1}{4}$ and that has also set a new record for a three-heat race, and Peter Volo, the three-year-old colt that has equalled the world's record for trotters of his age and placed a new three-heat record for stallions of any age to his credit, which, however, was later beaten by Etawah. Among the pacers there is a new champion yearling filly, Rose McGee (2:19 $\frac{1}{4}$); a new world's champion three-year-old filly, Anna Bradford (2:00 $\frac{3}{4}$); a new champion four-year-old mare, Clara Mac (2:04 $\frac{3}{4}$); a new champion four-year-old colt, William (2:00); a new champion aged gelding, Frank Bogash, Jr. (1:59 $\frac{1}{4}$), and a new champion holder of a race-record, Directum I. (1:58). The pacers have also set new marks for a three-heat race; for the fastest heat in a race; for a two-heat race; for the fastest second heat in a race; for the fastest third heat in a race; for the fastest sixth heat in a race; for the fastest six-heat race; for the fastest seventh heat in a race, and the fastest mile in a race by a double team. Unless the trotters do something extraordinary after these lines are written, 1914 (on the harness racing turf) will be known as decidedly a "pacing year."

LATER

On October 6th, Lexington, Ky., saw four world's records smashed. It was the second day of the Grand Circuit Meeting, and Peter Volo in winning the fourteen-thousand-dollar Kentucky Futurity for three-year-old trotters set three new marks when he lowered the world's record for his class to 2:03 $\frac{1}{2}$, for at the same time he set a new mark for the fastest third heat for a three-year-old trotter, and also trotted the fastest three-heat race for a trotter (of any sex) of his age.



The Average Man

WALTER G. DOTY

Here is a toast to the average man,
Patiently doing the best that he can;
Working away
For his average pay,
And knowing he's classed as an also-ran.

Faithful and cheerful and brotherly,
Making no boast of his honesty;
Doing the right
As given the light,
With never a taint of the Pharisee.

Helping a neighbor in need of his aid,
Marching light-heartedly, firm, unafraid;
Taking the pain,
The loss and the gain,
The pleasure and sorrow, as part of the trade.

Bearing the musket when need does arise,
Following duty, expecting no prize;
Doing his stunt;
Bearing the brunt;
Upright and looking all men in the eyes.

Claiming no rights save as one of the clan,
Fighting the fights that his leaders began;
Plugging along
With the rest of the throng—
A pretty good scout is the average man.



Heats, Sparks, Welds

Care awaits the careless.
Colder weather—sharper calks.
Pave the road to success with a concrete
reputation, not with good intentions.

What has become of the old-fashioned
man who paid his shoeing bill in potatoes or
onions?

When a man comes along boasting how
strong he is, just ask him if he can break a
bad habit.

Too much of life is spent doing the right
work at the wrong time or the wrong work
at the right time.

Environment affects everybody. Be
cheerful. Even the aviator sometimes has
hard work trying to rise above his surround-
ings.

Good ideas are scarce. Don't let any of
them pass by you without getting their full
worth; and don't forget to send them in
to us.

When you're stuck on some job, look up
the Index of the September issue. Then
if you're still stuck, ask us about it—there's
no charge.

If you seek faithfully you are indeed sure
to find. It may not always be precisely
what you sought, but it will be something
worth while.

The more a man shouts when talking
politics the less confidence we have in him.
Good, sound argument does not need to be
impressed in this way.

Don't skip the advertisements in this
issue. They appeal to men of sense, and
will be found interesting even if there is
nothing just now that you wish to buy.

Because the year is drawing to a close is
no reason why anyone should let go his grip
upon things. Remember there is a new
year just around the bend of the road.

Times have changed, indeed. Some odd
years ago we were saying, "Watch the leak
in the bellows!" and now the warning is,
"Watch the leak in the gasoline tank!"

Winter, with its long evenings, is ap-
proaching. Provide some clean, wholesome
reading for the family. THE AMERICAN
BLACKSMITH can save you money on sub-
scriptions.

It's there, right in plain sight, right where
it's been for fourteen years. We mean the
"Honest Dealings" paragraph in the adver-
tising section. Read it carefully and learn
to appreciate its meaning.

Here is an infallible recipe for keeping the
boy in the shop: Prove to him that there
is money in it. Any boy worth his salt wants
to see substantial results follow his labors;
and when they do not, can he be blamed for
wanting to change his business?

When everyone seems to be mad in the
race for the almighty dollar, how good it is
to get a post card, a letter, or a cheery greet-
ing from a kind, thoughtful friend. A little
unexpected act of kindness when we are
slightly blue gives new life and courage.

With all this talk about oxy-acetylene,
don't forget that every one of us can use
oxygen to our own advantage. It isn't
necessary to "get next to nature" to do it,
but just take a few deep breaths or walk
in the open; it is immensely refreshing.

Remember, it is the getting rid of, and
the using of, waste—waste effort, waste
time and material, the lessening of destruc-
tion and damage, wear and tear, that pro-
duces the great results. There is no magic
in these accomplishments, but steady, per-
sistent effort.

"You couldn't pound it into his head with
a beetle and wedge." No, but if you just
sit down quietly by the boy and speak in a
steady, kindly way, he will take it all in and
be the better man and the better hand for
it afterward. Harsh words do not convince;
they confuse and hurt.

Do you agree with all that is said in the
"Queries, Answers, Notes"? Send in your
views of the matter—we are always glad to
receive them. Is there a formula or a process
you want to know? Ask Benton. Or have
you a good recipe? Give it to Benton and
he will spread it broadcast.

At every piece of work, whether in the
shop or in the home, think of the glory of it
all! The most unhappy man in the world
is the man who has nothing to do. Because
you are busy you ought to be happy. You
will be if you put the very best there is in
you into every blow of the hammer. Try it.

Some men apologize for the way their
house and shop look, by saying: "I've had
so much to do that I could not get at it to
clean things up." Others are just as busy,
but they think in this work of clearing up.
A few minutes at a time, say after dinner
or supper, will put everything in good trim.

Sammy Smiles missed his regular visit
this month, and, my, how we missed him!
He was laid up with sciatica or something
or other, and they sent around some long-
jawed, pasty-faced individual who said
"good morning" with about as much "pep"
as there is in a wilted lettuce-leaf. I really
felt sad for Sammy's customers. There's
some difference in men!

Reward: THE AMERICAN BLACKSMITH
offers a good, substantial reward for a little
effort expended in getting new subscribers.
Canvass the next town—then ask about
our premium offers. Our idea is to get
those who don't understand how much help
a paper like ours would be to them. We be-
lieve that "once a reader always a reader"
applies to our subscribers.

We all know the slick ability of the barber
who isn't content to let you go out with
just a shave or a haircut. He suggests
nearly every imaginable operation until you
feel like a "cheap skate" for not having him
fix you up. This annoying persistence of
our worthy friend is not exactly what we
wish to emulate, but the principle behind
it—that of suggestion—is well worth copy-
ing.

It's not a good thing to push one's self
ahead in the neighborhood so that folks
will say, "He thinks he's some pumpkin,
doesn't he?" Just go on and live 'way up
ahead of everybody, do your work well,
every bit of it, and before you know it you
will be the leader in your community and
the people will be glad to say so and to
reach up hard to get where you are; and
that will do you all good.

Build on reputation; nurse your trade;
make friends of every customer—not
necessarily personal friends, but friends for
your shop. If you promise something in
return for the result of his trading with
you, be sure to fulfill your pledge to the
customer's satisfaction. If you promise
your boy a "licking," be sure he gets it. If
you ever find the "licking" was undeserved,
apologize, make amends—this same thing
holds good in business.

"I've been too busy"—said a prospective
subscriber on the second visit, "—too busy
to read books about anything!" Busy!
Poor deluded mortal! Busy hacking ways
through jungles full of broad, traffic-beaten
roads—if he had known where to look for
them. Busy trying and testing methods that
are commonplace in countless shops—too
busy to get acquainted with the methods
and plans and routine standards other men
have tried out and proven and given to
the world in black and white. Too busy,
indeed!

The war is raging—and blacksmiths are
in demand here. You can scarcely pick up
a daily paper in a large city without noting
the various advertisements for smiths. Em-
ployers are paying larger salaries and de-
mand a higher standard of work than before.
The men who obtain and hold these posi-
tions are of the energetic, up-to-date kind;
eager for new ideas and methods of value.
They do not think their ways of doing in-
capable of improvement. They are always
open to suggestions and are willing to sug-
gest to others when they have learned of
improvement.

When Peter Tumble-down comes to
town to have his horses shod or his repair
work done (if he has any) he invariably
hits the shop of our illustrious friend, Tom.
He and Tom are like peas in a pod—when
they walk out you can't tell 'em apart.
Peter is a farmer, and he leaves his plows
and machinery outdoors all winter; never
repairs his fence nor pays his bills; and does
all manner of shiftless things. Now the
peculiar part of the friendship of these two
backnumbers is that, between themselves,
they are in perfect harmony—a rare oc-
currence in "two of a kind." Peter gets
his work done at Tom's—and doesn't pay
his bills. So Tom, when he runs out of
credit and provisions, gets them from Peter
—and doesn't pay his bills. So you see
they are unknowingly teaching a lesson that
they never dreamed of: co-operation.

Our Honor Roll

Twenty-Five New Names

Mr. I. J. Stites of New Jersey advances into third place again—right up among the leaders. Friend Stites seems to enjoy the distinction of being among those at the top.

That 1924-class continues to grow, and this month twenty-five new names are added to Our Honor List. Better join the crowd while there's plenty of room at the top. The vacancies are being filled rapidly and the tail-enders are being dropped.

Just send along a five-spot for a ten-year period. You'll save money, trouble and annoyance and, if your account expires this month, it will be marked paid up to November, 1924.

Help reduce the high cost of living by taking advantage of our long-time rates.

Table with 4 columns: Subscription Period, U. S. and Mexico, Canada, Other Countries. Shows rates for 2, 3, 4, 5, and 10 years.

Send your order and remittance now—today. Don't wait until you forget all about it. You'll never regret it. Our subscription insurance saves you money. The sooner you begin saving the more you save. There is no time better than NOW.

Subscription list table with columns: NAME, Subscription Paid to, NAME, Subscription Paid to. Lists names and locations with their subscription dates.

Subscription list table with columns: NAME, Subscription Paid to, NAME, Subscription Paid to. Continues the list of subscribers from the previous table.



The Horseshoer

The Horseshoeing Contest at Des Moines, Iowa

DR. JACK SEITER

In order to promote more skillful and intelligent shoeing of draft horses, five prizes were offered for the best shoeing in public competition.

First prize: silver medal and \$25.00; second prize, bronze medal and \$20.00; third prize, diploma and \$15.00; fourth prize, diploma and \$10.00; fifth prize, diploma and \$5.00.

Horses for shoeing were provided by the State Fair management, as were the forges, fuel, anvils and vises. All other tools and material were furnished by the competitors.

Each competitor had to remove two old foreshoes from his horse, dress the feet, make, fit and drive on two new shoes made out of bar iron. Lots were previously drawn for the order in which they proceeded to work.

The style of shoeing was the ordinary cart-horse shoe, without clips or calks of any kind.

Each competitor was allowed one assistant or striker to help him in forging the shoe and to hold the horse.

The maximum time allowed each shoer for the complete operation was one and one half hours; and the judges were asked to allow points for rapidity of execution within that limit.

The following scale of points was used by the judges in making their awards.

Making shoes: 35 points; fitting shoes, 30 points; driving nails, 15 points; general finish, 10 points; time, 10 points.

Total, 100 points.

The judges made notes and observations of the following points, which were to have a bearing on the decisions rendered:

Work at the anvil; hammering and heating (limited heating and liberal hammering give tougher and better wearing shoes); keeping the fire and handling the shoe in the fire; cutting the gutter, with creaser or fuller, so that the nailheads were firm and straight when driven; punching nailholes the right size and angle; paring and leveling the hoof; fitting the shoes without too much burning; driving the nails in the proper place in the hoof; cutting and clinching the nails; finish and neatness, without too much rasping.

This contest was, I believe, the first of the kind ever held in the United States. There have been numerous horseshoe-turning contests but never before a real horseshoeing contest where the contestants were required to strip an animal, dress the feet, make the shoes and drive them on.

Being honored with the appointment of official judge at this contest, and never having acted in that capacity before, I was "at sea" regarding the "modus operandi" of the entire procedure; but after arriving at the "scene of battle" I found that I was not the only "green" hand on the job. In fact, every one connected with the undertaking was looking for advice in regard to the matter. The rules governing the contest were, so I was informed, the same under which events of this character are decided in Scotland. So, after reading said rules over carefully, it was decided not to change them, at least not for the present contest. But I believe we could draw up a set of rules for future contests of this character that would be more up to date, more American-like, as it were, and easier to comprehend. I am and always will be a "sticker" for originality, and I believe we are far enough advanced in our vocation so that we do not have to copy or run second to any nation in the world in shoeing the draft horse; consequently it is up to us to draft our own rules and regulations for future contests of this character. I believe the public will endorse what I say in regard to this matter; at least a large majority of the horseshoers who attended this contest either as contestants or spec-

tators were in favor of drawing up a new set of rules to govern future contests.

Whether this contest was advertised sufficiently or not, I cannot say; but by the lack of entries one would believe the latter to have been the case. Later on I discovered that it was not caused by the horseshoers being unaware of the fact that such a contest was to be held at the Iowa State Fair, but more so by the fact that the horseshoers had a bad attack of "cold feet" or "stage fright" when it came to appearing or performing before the public (some of the contestants even got nervous and disappeared after they had paid their entrance fees; acting the same as a green colt, and refusing to "face the starter"). But after the contest was all over and we became better acquainted with each other you could hear them say: "If I had known just how the thing was going to be run, you bet I would have taken a hand in it myself." From these and other remarks I overheard I actually believe that there will be more entries next year than the management will be able to handle during the week of the fair, or at least enough to entertain the horse-loving public every afternoon during the entire fair.

To say that it was a drawing card would be putting it mildly. The tent in which the contest took place was jammed with people hours before the time and long after it was all over, too. In fact, it was one of the best mediums conceivable to bring the horseshoers and the horse-loving public together; and right in that tent I have seen many a horseshoer come out of his hard shell of envy and prejudice and mix up with the rest of the horny-handed, large-hearted "knights of the anvil". It was the beginning of a re-union of horseshoers whereby they will become better acquainted with one another and the conditions surrounding them and their work. If this affair is kept up year after year (and there is not the least doubt in my mind but that it will be) it will be one of the grandest avenues ever paved for the purpose of bringing together the horseshoers of the United States. It is at such gatherings as this that we learn the true sentiments of the men regarding their chosen work, the conditions of the trade, causes of success and failure; and they have real heart-to-heart talks



among themselves—talks such as we rarely hear among them at their meeting halls. Here in the open where they meet and become friendly with each other they lay aside all troubles and prejudice and unfold themselves as they really are—strong, large-hearted, whole-souled mechanics.

Now as to the contest: It was held in a tent, probably thirty by sixty feet in size, open on three sides (bleachers being built along one side to seat the spectators), and if it had been ten times as large it would have been crowded just the same. It reminded me a good deal of the crowd at a baseball game; they were standing a hundred deep and trying to look over each others' heads in a vain endeavor to see the performance.

There were three forges set up in the middle of this tent—equal distances apart—anvils and vises in place, and fuel handy. As contestants were required to furnish their own tools and material, everything was soon ready.

The first day, three men participated in the contest; they drew positions for forges and were given numbers to correspond with those on the scorecards, their names being unknown to the judges. After the fires were started, the horses were brought in and tied up. They were three yearlings, weighing about twelve hundred apiece, all having been shod before and were supposed to be reasonably docile. The men were asked if they were ready and, answering in the affirmative, the word was given, the shoes were removed, the feet dressed and measurements taken for the new shoes which were made out of inch-by-half iron. The forges were of the small portable varieties—commonly known as riveting forges—and were far too small for this kind of work, but finally the stock was hot enough and actual work of turning out the shoes began. Here again the men ran into a "snag"; the anvils being new, they were covered with some sort of a varnish or paint; no doubt to prevent them from becoming rusty. This varnish became very slippery when the red-hot moulds were laid upon them, and it was with difficulty that the men could keep the stock in place upon the face of the anvils for the helpers to strike upon it; especially was this noticeable when the creaser or fuller was used, also when punching the

holes. This I considered a handicap encountered by the men who worked the first day that the men who worked the second day did not; and I believe that this caused the great difference in the time between the first and second day's work; the time the first day being, 62, 60 and 58 minutes; the second day's time being 44 and 33 minutes; but as time counted only ten points, this did not have much bearing upon the total score.

In turning the shoes I could not help but notice the different methods employed by the several contestants in going about this matter; and as this had a direct bearing on the result of the contest it was really surprising to see how some of the men still held to some antiquated methods of forming the shoe. One of the rules of the contest read: "limited heating and liberal hammering give tougher and better wearing shoes"; consequently there was plenty of pounding and noise. This limited heating and liberal pounding clause is, to my way of looking at it, a joke. That may have been the proper caper in olden days when horseshoe stock was made out of old shoes or old scrap iron; and then it was no doubt necessary to do considerable hammering and pounding to make the mould tough and firm enough to withstand the operation of creasing and punching without "ripping"; but this is not necessary nowadays with our improved methods of rolling iron, and it is rare indeed to find a piece of horseshoe iron that will not stand the process of being made into a shoe.

Another thing against this liberal hammering and limited heating argument is this: most of the pounding is invariably done along the sides of the shoe; but at the toe, where the shoe is worn most, there is very little if any pounding done; so this is one rule that may very well be eliminated.

The shoes were perfectly plain with no clips or calks of any kind; and I could not help but notice that without a single exception they all cut off too much stock; in fact, enough to have turned up heels. Of course, after the shoes were turned this extra stock had to be cut off; and this counted against the contestant, also.

After the shoe was turned and the first trip to the foot was made, credit was given for the neatest fit and also for the least number of times the

shoe had to be tried to the foot before a perfect fit was secured. Each competitor was closely observed, as the nails were driven, as to whether he had to pull any; whether they were driven in line; did the shoe fit the foot nice and flush; did any of the wall project out over the shoe to be rasped off as the finishing touches were given to the foot; were there any grooves filed in under the clinches; was the foot rasped off too much, especially above the nails or clinches. All of the little details counted for or against the contestants; and it was not the time but the workmanship that counted first, last and all the time.

The contestants the first day were:

Ben Van Woolgear, Des Moines, Ia., winner of third prize; time, 62 minutes; Wm. Cameron, Ames, Ia., winner of fourth prize; time, 58 minutes; Wm. Montes, Des Moines, Ia., winner of fifth prize; time, 60 minutes.

The contestants the second day were:

Wm. Campbell, Rock Rapids, Ia., winner of first prize; time, 44 minutes; C. E. Wickland, Marshalltown, Ia., winner of second prize; time, 33 minutes.



STYLE OF SHOE USED AT DES MOINES CONTEST

In judging a contest of this character there are innumerable small details to be kept track of, and it keeps a judge stepping about to keep his eye on the men at work. As my associate judge, Mr. R. B. Ogilvie, was not a horseshoer but a show-horse breeder and judge he said that he could not stand the heat and smoke (it was an exceedingly hot day) in the tent, so he did not stay around much the first day and not at all the



second; leaving the burden of the work upon my shoulders.

Now, for instance, in pulling off the shoe, were the clinches cut or did they just make a bluff at it and then tear the shoe off with a jerk or two, without regard to bruising the sole or breaking some of the foot off? Was the foot dressed properly; was the toe or heel or one side of the foot higher than the other; did the foot set level upon the floor; was the foot true and straight and set under the animal as it should be; did it still set in the proper position after the shoe was applied to the foot; was the shoe long enough, wide enough and still not too wide; did it have the proper bearing surface? All these points had to be taken into consideration, together with the manner in which the contestant went about his work, and handled the tools and material.

One contestant, after removing the shoes of a rather flat-footed animal

they were jogged up and down the road several times in order to note the gaiting action. Did they travel free and easy, were the feet set to the ground level? Naturally, the case referred to above did not travel free and easy; rather, it was on the verge of lameness and, no doubt, if the shoes had been left on for several days the animal would have become lame, but they were removed shortly after and all was well again. Of course, this counted against the contestant; but from an educational standpoint this incident carried considerable weight; for the cause of the soreness was evidently plain enough to be seen by the most inexperienced; and more so after the cause was pointed out and attended to; the cure then being easily self-evident. I believe demonstrations of this character, made in the presence of the public—the horse-owning public—would go a great way toward educating them to better compre-

Now to take a glimpse at the contest from the public standpoint. After the horses were finished, and the work was passed upon, the public was permitted to view the work at close range, and I'll wager that many a farmer, his wife and children, will head right for the horseshoeing tent next year. It really was remarkable to notice the interest taken in this work, the questions asked and (pardon the remark) the ignorance displayed pertaining to the hoof of the horse.

Actually, I met farmers there, owners of any number of horses, who would lead one to believe that they did not know that the hoof of the horse grew, that it was a sensitive structure endowed with the most delicate organism and mechanism imaginable, and that the least deviation from right in working on it not only injures the foot alone but that as the foundation of the whole body it renders the animal absolutely useless until the harm is rectified. In innumerable cases, the injury is permanent, and the poor animal must either be destroyed or, far worse, travel through its miserable existence a lifelong cripple.

One rancher asked me to show him just where it was safe to drive a nail! He said he had to shoe quite a few of his cow-ponies every spring, and that the only way he could tell that the nail did not go into the right place was by the animal letting him know that it was hurt or by seeing the blood! Upon my asking him what he generally did after he drew blood he said; "Oh, I just turn them loose until the next year"; and he laughed! He told me that he sometimes "jimmied"—as he called it—ten or twelve ponies every year by simply driving nails into the sensitive parts of their feet. Now to hear a man, apparently intelligent, tell a tale like that makes one shudder and wonder if we really are living in the year of Our Lord, 1914!

The State of Iowa, in promoting this contest, does so with the object of educating the public and not for the purpose of producing speed marvels. To educate the public and bring it into contact with the operation of protecting the main organ of the horse; the organ that above all we must keep sound and healthy; the organ that without which the most valuable animal is rendered absolutely



A BUSY CORNER IN MR. S. L. BRADSHAW'S GENERAL SHOP OF OKLAHOMA

whose wall had been rasped down far too much (in fact, so much that the sole actually had the appearance of a typical dropped sole), was not satisfied to let it go at that but had to take the rasp and attempt to take some more off the wall and then tried to cut out some of the already too thin sole. Naturally, this counted against him; and again when he applied the shoe he had the most pressure on the sole around the toe—he had failed to concave the bearing surface of the shoe sufficiently so that the bearing would not be on the weakened sole.

After the animals were all finished

hend the responsibility attached to the entire procedure of shoeing the horse.

In making the above remarks I am not criticising the contestants but simply stating the facts that I, as judge of the contest, saw them; and I want to state that if all of the horses in the country were as well shod, with the one exception above mentioned, as those were it certainly would be a Godsend to many a poor old sore-footed and faithful friend of man; and it would be the direct means of saving not only millions of dollars for the horse-owners but also the lives of thousands of horses, yearly.



useless as a working tool for man. "No foot, no horse"; how true an idea, yet how abused it is! The very foundation of the noble animal is cut, rasped, burned and mutilated until the animal is rendered useless and sent to a premature death.

It is wonderful to note the thousands of good young animals that are employed upon the streets of our large cities. They come to town with the best of feet and limbs, full of vim, vigor and vitality, and in a year or two they are advertised for sale as "animals suitable for farmers' use," and are again returned to the country, worn-out, haggard wrecks of their former selves. What has caused this change? Dear reader, you know as well as I do that the majority, the great majority, is caused by bad and indifferent shoeing; not the ignorance of the principles of shoeing, but carelessness—such as excessive cutting, rasping and burning, and ill-fitting

There is no reason why a good sound young animal should not be able to serve its master for at least ten years, instead of only two or three; and I firmly believe this possible if we could avoid the numerous foot troubles that are brought on by inferior or neglectful shoeing.

In connection with contests of this character it would be an excellent idea to give prizes for pathological shoeing; shoeing diseased feet; illustrating the most practical and up-to-date methods of shoeing for corns, side or ring bones, quarter or toe cracks, and all of the foot and limb troubles that horseflesh is heir to and which may then be treated successfully or cured by dressing the feet properly and applying the proper style of shoe for the individual case. Almost all forms of lameness may be aided, mechanically, by a bar shoe or a side calk here or there; oftentimes that is all that is needed to relieve

tions of this class will eventually be held in connection with most of our larger fairs, and should be held in connection with the small county fairs also. Let the local horseshoers get together and hold similar contests; it will bring them together at least once a year; and they could exchange ideas and experiences and thereby add to their store of knowledge; become friendly and enlightened; better mechanics and better men.

A Horseshoe-Turning Feat

LESTER W. SIMS

The accompanying photograph shows a group of shoes, numbering thirteen in all, which have been forged from a straight bar of steel without a weld; the bar measuring 2 feet 24 inches in length and 1½ inch wide by ½-inch in thickness.

The first shoe made was the center one which is a neat and most perfect convex bar shoe. The next shoe is also a light convex bar shoe. On the lower left branch (as made in order) is a "scalloped" hind shoe; this is seen between the center shoe and the bar shoe on lower left branch; the object of the "scalloped" shoe being to make it extremely light for racing; giving it a grip or hold on the turf which leaves the material strong at nailholes to prevent breaking or bending. The opposite or lower right branch is made in precisely the same manner and completes a full set of shoes—the right and left hind shoes and a pair of front bar shoes.

Now you will notice a tiny bar shoe between each of the larger shoes which serves to set them apart in an ornamental as well as a mechanical way. These tiny bar shoes are made by leaving a lug or nub in the material between the larger shoes and are made on a formed punch after the larger ones are completed. The upper left branch consists of a three-quarter side-weight shoe. Note how the weight is distributed; the inside or lighter branch of shoe being next to small shoe makes it deceptive as to where we get the material for outside weight. This is a very difficult shoe to forge and turn. The upper right branch is a convex shoe much used on trotters. These shoes are all neatly made; each one almost as perfect as if it had been made



MR. LESTER W. SIMS' HORSESHOE-TURNING STUNT—THIRTEEN SHOES FROM ONE BAR AND WITHOUT A WELD

shoes, badly-driven nails and a hundred and one other little neglected duties that make the "standards", as it were, by which we designate the "good" from the "bad" mechanic, the careful from the careless mechanic, the man who holds the steady job from the "bum".

If other States would follow in the footsteps of Iowa these contests would eventually become one of the best, grandest and most humane attempts ever promoted by man for the good and welfare of our most noble animal.

the lameness. Things like the above would prove of great interest to the public as well as to the horseshoers and they would produce the effect most sought after—education for the masses.

When shoeing a case of lameness at a place like this it would also be an excellent idea to have a good practical man, well versed in anatomy, to lecture during the procedure; explaining each act of the operation; how it should be done and why it is best to do it so.

I believe that practical demonstra-



separately. These shoes are being exhibited and are attracting a great deal of attention. I have been requested to exhibit them at some of the blacksmiths' and horseshoers' conventions and it has been suggested to send them to the coming Panama Exposition. Well, I dare say that since I have exposed this, someone will be there going me one or two better. However, if I do decide to send something of this nature to the Panama Exposition, the man who beats it will be going some, for I do appreciate the fact that there is hardly a limit to the number as well as the variety of shoes that can be turned from a bar of steel without a weld.

An idea of how these shoes are made from one piece can be gained from the engraving. At A, 1, is shown the first split in the stock. Open out well by stoving over horn of anvil as at B; thus leaving room to get in with hammer. Treat other end the same way as at C and D. Another split is made at E and opened out; making the center bar shoe.

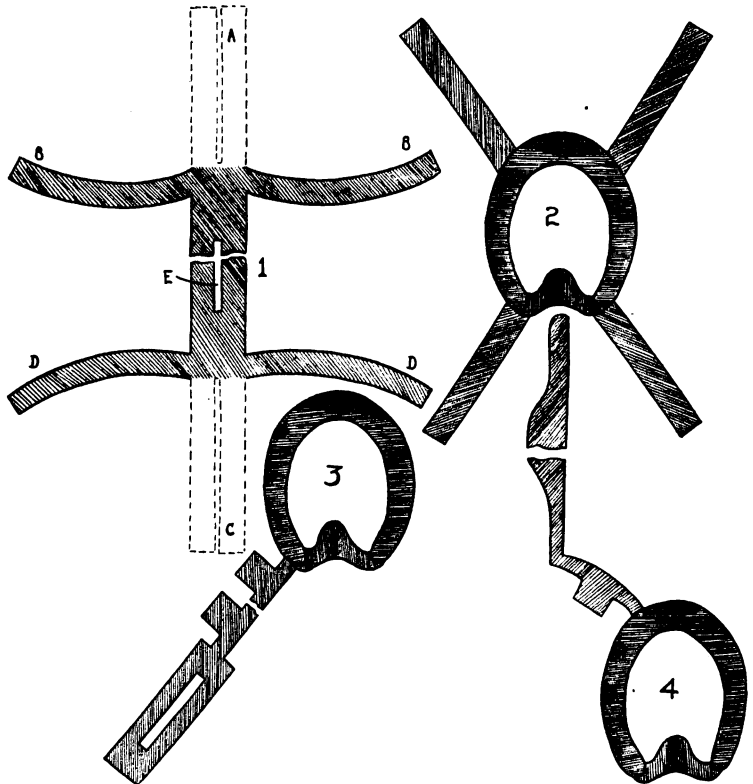
At Fig. 2 in the engraving, the center bar shoe is completed; leaving branches to be made.

Now see Fig. 3, and start off by offsetting nub next to center shoe, then draw out material for "scalped" shoe, at end of which offset another nub. Now split, open out and make the bar shoe on end (lower left branch), heat and by holding end shoe over horn of anvil, drive back, to form toe and "scalped" shoes. Now with shaped punch make small shoes. The right lower branch is made in same manner. Open out a round ring, after working material into proper size, then shape and make bar shoes.

It was our understanding when we bought that the owners of the business—there were two brothers—intended to go West for the health of one of them, and start a business somewhere on the Pacific coast. We were astonished, therefore, to learn from good authority, which we have confirmed, that they have rented another place here and intend to open even a larger business than they had before, on or about August 1st. If they are allowed to open, of course it will make so much more competition for us, and some of our trade will be lost, as they are well known in the town, while we are strangers. I have examined the bill of sale, and it mentioned good will as part of the assets for which the price was paid. Is there no way in which we can stop these people from opening up again?

or property employed in it, in consequence of the general public patronage which it receives from constant or habitual customers, or on account of various factors, such as good location, or good reputation, etc.

A shorter and better definition is "the probability that it will continue to do the business it is doing now." For this, under the name good will, buyers of businesses pay a sum over and above the value of the stock and fixtures, and it is worth it, for a going business, making a profit every year, is surely a different proposition than so much stock and so much fixtures.



HOW MR. SIMS ACCOMPLISHED THIS VERY ODD FORGING

Good Will and What It Means

ELTON J. BUCKLEY

Here is a problem that comes to me from Albany, N. Y. Doubtless it has had a counterpart in the experience of many readers hereof; certainly it is likely to unless watchfulness is exercised:—

Last April, 1914, we purchased from the former owners the business which we are at present conducting in this city. We paid a good round price for the stock and fixtures and a price which I personally considered—though my partner did not—excessive for the good will. There was but a short agreement of sale, and finally a bill of sale.

Does not the term "good will" mean an agreement not to open up again for a certain length of time?

I very much regret that I can say practically nothing which can help these people out of their difficulty, but I can offer their example as a warning to other people who may be about to buy a business.

Except in Ohio and New Jersey, "good will" does not mean any such thing as this correspondent hopes it does. Here is a standard definition of good will:—

The advantage or benefit which is acquired by an establishment, beyond the mere value of the capital, stock, fixtures

The good will of a business passes to the buyer when the business is sold, whether it is expressly mentioned in the bill of sale or not. It would of course be possible to sell a business without selling the good will, but very unusual unless its assets were sold at auction.

But the mere sale of the good will does not carry with it an obligation not to go into business again, except in New Jersey and Ohio. It ought to, and does under the old English rule, which Ohio and New Jersey have adopted. Certainly if I have bought "the probability that a shop



will continue to do the business it is doing now," I have a right to demand of the person who sold it to me that he shall not reduce that probability by re-engaging in the same business and attempting to get the same customers. That is so fair a rule that it seems strange it should not be the general rule. But in all States but the two named a man who sells his business, and with it the good will, may open precisely the same kind of a business next door the very next day. Of course, provided there is no stipulation in the agreement that he shall not enter the business again for a certain period. There should always be such a stipulation, for it constitutes the buyer's only protection against the situation which is now confronting this correspondent.

The man who has sold a business without such a stipulation, even though he has charged for good will, can go even further than merely to open a shop—he can advertise it and can even solicit his old customers for it. Neither in his advertising nor in his solicitations, however, must he represent that it is his old business he is advertising or soliciting for, but that is cold comfort, in most cases.

There is but one thing to do—tie up your seller with an iron-clad stipulation that for a certain time he shall not re-engage in the same business in your neighborhood.

(Copyright, by Elton J. Buckley.)

Forging an Auto-Step

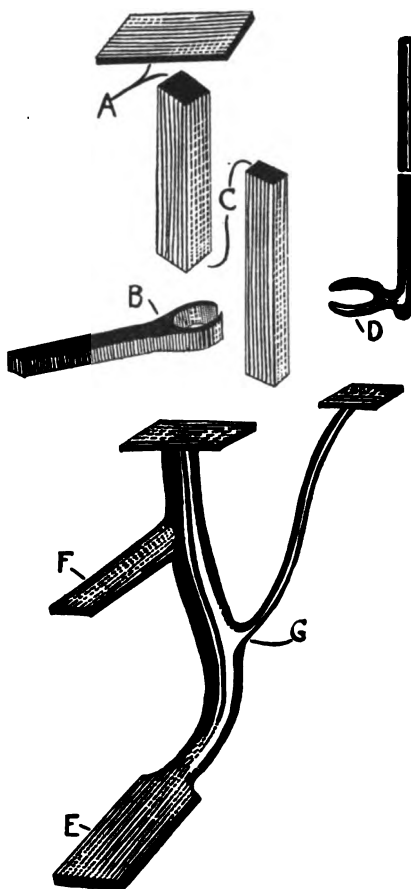
NELS PETERSON

It is not often, perhaps, that a man is called upon to forge a carriage step nowadays, as usually such work can be purchased drop-forged. However, when one undertakes to build to order, to meet the requirements and ideas of the customer, it is well to be prepared and able to turn out any kind of a job called for. Just recently we built an omnibus truck for a transfer company, and among other irons to be forged was a large step for the rear door entrance. The illustration shows a step shank, of which it took two to complete the step. The body having a high clearance it was necessary to weld on an extra support for a second step as shown at F.

EDITOR'S NOTE:—A complete description of the omnibus upon which this work was done will be given in a later number.

To forge the step I took 1¼-inch square iron and drew it down to 1½ inch, or sufficient to have it fit the square hole in the anvil, except for an inch or so at the extreme top end which was heated and hammered out to form a head to which to weld. A piece of 1½ by ½ inch was then welded to this head by dropping the square piece into the hardy hole and placing the 1½ by ½-inch piece

iron was welded on at C, to get the length for the lower step, then swedged down to an oval shape and the end tapered down to form the seat for the lower step pad as shown at E. To complete the forging, a branch brace made of ½-inch round stock was welded on at G. This was first bent and split as at D. This done, it remained but to bend and shape the iron so that it will hang in a proper shape when bolted onto the sill of the body. A good way to determine the proper position of the seats for the step pads is to screw the head of the step upside down with a screw clamp to a straight bar of iron or a face plate if you have one. Then take the square, and measure from the face plate up to the pad, and by sliding the square back and forth it can be easily seen when the step pad is level.



HOW AN AUTOMOBILE STEP WAS MADE

over it at an angle as shown at A. When this was completed, the square part was wedged down to an oval shape. You will notice that it is much easier to draw a square piece down to an oval by hammering down the edges than the flat surface. Next step in the progress of forging was to weld on the support for the second step pad. A piece of ½-inch square was used, which was split at one end as shown at B. The two wings thus formed were drawn out quite thin, then wrapped around the oval part at a point where it was to be welded on (in this case, 8 inches from the top), and welded down solid. This completed, an additional piece of 1½-inch square

More on the History of the Anvil

The history of the anvil in America would be incomplete without mention of the part played by Mr. Mark Fisher. In 1842, Mr. Fisher, after several years of study and experimentation, succeeded in discovering a method of welding steel to cast iron. Realizing the importance of his discovery, Mr. Fisher decided to put it to a test and, in connection with a Mr. Norris, established an anvil factory, under the firm name of Fisher & Norris. In 1872, Mr. Clark Fisher, the son of the founder, became sole proprietor, and since October, 1902, Mrs. Clark Fisher has had entire management.

The works where the "Eagle" anvils (as the Fisher & Norris product is branded) are made is in Trenton, N. J. These are said to be the oldest anvil works in this country. "Eagle" anvils are made of crystallized iron with a face of crucible steel. They are made in all styles, sizes and patterns, from a special minim, weighing a half pound, to big, ponderous anvils of 800 pounds.

This article would also be incomplete without some mention of the development of the anvil in other countries, particularly in Sweden at the Soderfore Bruke Aktiebolog, which works were founded in 1250. This company began experiments, in an endeavor to avoid the tedious and expensive forging of anvil bodies in



1870, and in 1885 they succeeded in producing anvils in one solid piece. They now manufacture anvils in all sizes and patterns. Their product is known in America as the "Paragon" anvil.



Benton's Recipe Book

In conducting this column of recipes, hints, formulas, stunts and methods, remember that your timely aid is solicited. Benton gets hold of a good many stunts, but with your co-operation he can obtain a good many more. When you send in your subscription—or at any time—attach some of your original, unique or short-cut methods. They will find a ready place in this column.

There are only two restrictions which we place upon recipes sent in to be published; they must be good and practical and must not have appeared in this column before. They may be as old as the hills; but as long as they are good and haven't seen light in this page they are welcome. As a further word: we would rather have formulas, recipes, methods, etc., that you have tried and proven yourself rather than those of which you have only heard or seen. Furthermore, if you have tried any of these formulas or recipes let us know and tell us of your experiences. This will help a good many others.

Water bugs seem to be engaging the attention of "J. T.," Massachusetts. Powdered borax sprinkled along their places of egress will prevent them from spreading and will eventually starve them. No cure-all can be given for these insects, as there are so many varieties of the species that what might kill one would not hurt the other kind. There are numerous brands of "roach exterminators" that may be tried with varying success.

Government whitewash is perhaps the most durable kalsomine made. The following recipe is given in answer to a request for a good wearing whitewash:

Slake half a bushel of lime with boiling water, cover for an hour; strain through a fine sieve and stir in a peck of salt dissolved in enough warm water to do the work thoroughly; boil three pounds of rice to a thin porridge and stir in while hot. Soak half a

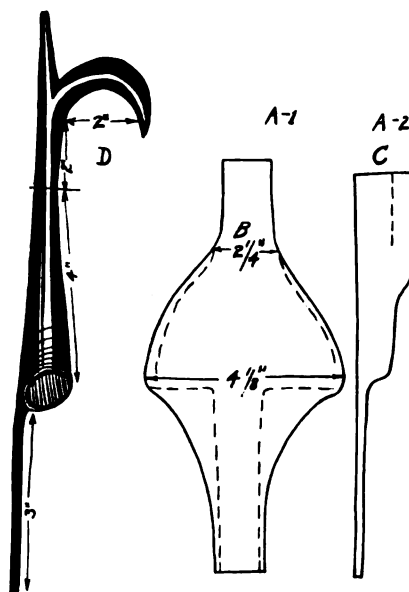
pound of glue in cold water for an hour, then bring to boiling point by setting the vessel in a pot of boiling water over the fire; stir into the lime mixture together with half a pound of Spanish whiting. Now pour into this five gallons of hot water; stir for three minutes, from the bottom; cover to exclude dust, and let it alone for two days. Apply hot when you are ready to use it. A pint of the mixture will cover a square yard of the surface.

Hints on hardening. Only those who have had some experience in hardening a variety of small tools will understand or appreciate thoroughly what is about to be said.

I have experienced, in hardening, says W. McT., of New Jersey, that some water does not take kindly to the hot pieces of steel, but rather stays away from it, as it would from a stick coated with tallow. The result is the tool is not hard. To overcome this add about one third muriatic acid to the water and the result will be surprisingly improved.

Here is something that toolmakers are meeting with every day, *viz.*, small and delicate-shaped tools are to be hardened, and it is a question in the mind of the workman whether to use water or oil to harden in. Water may crack the tool and in oil it may not harden, but suppose he tries oil and it does not harden the first time; the second time of heating and dipping will most surely crack it and the work is spoiled. For such work I have used a mixture of one half water and one half glycerine with best results; this mixture never fails to harden and I have never had a piece spring out of shape or crack when dipped in it.

To temper a twist drill to drill hardened steel. Holes may be drilled in tempered steel, such as circular saws, springs, music wire, etc., by hardening an ordinary twist drill in sulphuric acid. The pure acid should be placed in a saucer or other flat-bottomed vessel to a depth of about $\frac{1}{8}$ inch. The



A BOAT-HOOK IS EASILY FORGED
WHEN YOU KNOW HOW

point of the drill is heated and dipped in the acid to that depth, making the point extremely hard, while the remainder remains soft. If the point should break, re-harden as before, but have a little less acid in the vessel. In this manner the drill may be hardened just enough to drill the steel, but not brittle enough to break when coming through.

To blue steel without heating is often desirable where the temper of the metal must be retained. The following solution may be used with excellent results: Water, 1 quart; hyposulphite of soda, $\frac{1}{2}$ ounce; acetate of lead, $\frac{1}{2}$ ounce. Dissolve the acetate of lead and hyposulphite of soda in the water and then heat to the boiling point. The article to be blued should be thoroughly cleaned and dipped into the hot bath until the color changes to the required tint. It should then be removed, rinsed and dried. A more brilliant result is obtained by coppering steel articles with blue vitriol solution and then dipping. The same process may be used on both brass and copper with success. M. E. C.



Queries— Answers— Notes

A Boat-Hook.—A boy friend of mine asked me to make him a boat-hook the other day. I proceeded as follows: I plated out a piece as shown in A-1 (A-2 is looking at it edgewise). I then cut as per dotted lines, scarfed the edges, rolled it up and welded up at B, then turned back the tong and welded up the socket. This would be done on a mandril suited to the work. Next, split and work up the points at C. If directions are closely followed it will look something like D when finished. The points can be left sharp or a small ball forged on them. If sharp, it is best to weld a steel point in them to prevent them from burring up. These dimensions will make a socket for a $1\frac{3}{8}$ -inch hole.

H. N. POPE, Conn.

Painting Metal Car Bodies.—I notice in the September number, "A. E." answers on painting metal bodies. He is right in saying that a good grade of linseed oil is necessary, but more than this, the priming coat must be made to adapt itself to the metal. A combination of raw linseed oil, elastic finishing varnish, japan gold size, and turpentine, with a stain of mineral brown or even of red lead, will give a primer that will stick to the metal and furnish a foundation for the following coats. Before the primer can be used, however, the body must be cleaned of all mill scale, rust or other corrosive. A sand blast is best to do this work, but in its absence, the best method is to rub the surface down with emery. In large plants they do this by pickling in sulphuric acid, but this costs considerable for only one or two bodies and contains a certain element of danger. The object in doing this is to roughen the surface and give a hold to the paint, as metal permits of no absorption. Therefore, the smaller the amount of paint put over metal surfaces, consistent with the proper color and finish, the better and more lasting will be the work.

H. W. MABIE, New York.



An Australian Power Plant.—The photograph shows how I fixed up my emerystone. The belt goes from an old McCormick binder wheel on ball bearings to a 3-inch grooved pulley keyed onto the shaft of the emerywheel. The emerywheel is 12 inches in diameter by 2 inches thick. The large wheel is an old sulky wheel. The hooks where the chain runs in are about 5 inches from the rim. By sawing out slugs at rear of center wheel it allows about 7 inches for the chain to run on, and the nuts on the back of the wheel prevent the chain from slipping. I can do almost any kind of sharpening with this fixture. With a steady turn of the handle the revolutions are as rapid as can be had from any engine, and I do all classes of work that come along.

G. C. BRITZA, Australia.

Vulcanizer—Steam and Electric.—Mr. Burdell, in the September number, wishes to know which is the better in vulcanizing—steam or electricity. The facts are that vulcanization is not dependent in any way upon



A UNIQUE AUSTRALIAN POWER PLANT

whether the vulcanizer is heated by steam or electricity. The maintenance of the proper vulcanizing temperature of about 260° is essential, and this is obtained in electric and steam vulcanizers by means of thermostats which, in the case of electric vulcanizers, regulate the amount of current flowing and, in the case of the steam vulcanizers, operate a damper which regulates the intensity of the gas or gasoline burner and, consequently, the temperature of the whole apparatus.

Shaler electric vulcanizers have exactly the same capacity as the corresponding steam vulcanizers, and our experience in manufacturing vulcanizers, practically ever since the automobile started, leads us to recommend the electric vulcanizers wherever electric current is accessible; on account of their simplicity, cleanliness, safety and portability.

It is true that there has been some prejudice, among people who were not conversant with the facts, against steam vulcanizers. Possibly this prejudice arose because tire-makers use steam to heat their huge vulcanizers in which dozens of tires may be heated at the same time. However, when a local heat is required, as is the case when mending a tire injury, electric heat is superior.

M. E. FABER, Wisconsin.

Hard Mule Feet.—Combination Woodworkers.—I notice a query in April issue regarding mule feet. While not a shoeing smith myself, I know a chap who cured horses' feet that were so badly cracked and brittle that they had a difficult task to nail the shoes on. The horses were working among cyanide vats, etc., at the mines up on the "Golden Mile." He used yellow axle grease and Stockholm

tar mixed together and dressed their feet every morning with it; also filled in the cracks with this mixture and a piece of waste. It cured all the feet afflicted in this manner. Of course, the two cases are not similar; but a mixture of this kind might soften the mule's feet or hoofs and perhaps give the frogs a chance to grow.

I would like the opinion of some of your readers regarding the combination woodworker for use in a shop; that is, for doing both new and repair work, but mostly repair work. Is too much time lost in making the various alterations and adjustments to make a machine of this kind a paying proposition? To me they appear as being a very handy machine to have, provided too much time is not lost in adjusting for various jobs. Of course, if one was simply doing one class of work, they ought to be just the thing for a shop. Also, the cost would not be so great as a full line of machines to do the various jobs one gets in our line.

I do not doubt that many of your readers are using these machines and, if so, I would like to get their candid opinions concerning them. I thank the brothers in advance for this information.

H. F. THOMPSON, Australia.

Babbitting Wooden Hubs and Broken Boxes.—As I have never seen anything in the paper describing a method of babbitting a wooden hub I thought an item on this subject would prove of interest to some of the readers. I have read of wedges being used to keep the boxes tight, but I don't approve of wedging, because invariably the boxes will work out. When a wheel is brought into my shop with the hub cut out I start and clean all the grease out so that it won't interfere with my babbitting. I then take a piece of 3/8-inch iron rod and bend about 1/2 inch of it L-shape; heat the point and make several 1/4-inch holes inside of the hub so as to hold the babbitt; after this, take the box that is to be used and, with a 1/8-inch drill, drill about eight holes, 1/8-inch deep or according to the thickness of the boxes; two holes on each side of the boxes for holding them securely.

When a wagon or buggy comes in with a broken box I clean all grease out of the hub, then jack the axle up and put the wheel on the spindle, set it in the center of the hub and take newspaper of three plies and wrap around the spindle. I then burn about eight holes inside of the hub so as to hold the babbitt. Of course, yellow clay is used

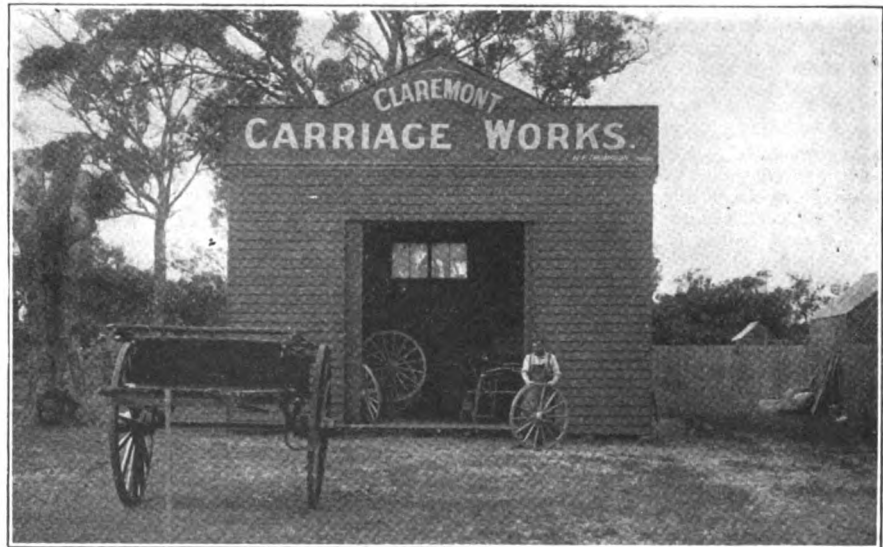
to put around the ends of the spindle to prevent the babbitt from coming out. I find this to be a good solid babbitt boxing instead of metal. In pouring the babbitt into the wheel while on spindle I drill a 3/8-inch hole one inch from spokes on the outside of the hub, which tends to fill the holes up solid with the babbitt. This makes a fine mechanical job, I think.

WM. D. SMITH, Penn.



MR. G. C. BRITZA'S BUSY FORGE IN AUSTRALIA

Figuring the Selling Price.—We have been readers of "Our Journal" a good many years, and now wish to express our views on prices; especially the low prices charged by some of the brothers in the trade at the present time. We cannot understand how a smith can realize any profit when he only charges \$1.50 for shoeing. It certainly costs more than that to shoe a horse with No. 2 shoes, which the following will show: four shoes, 25c., four toes, 5c., nails, 10c., labor, 50c., total, 90c. Other expenses, such as insurance, depreciation in stock, etc., amount to about 68c. on the dollar and, added to 90c., makes a total of \$1.58. Now, where is your money to buy shoes for the next horse? At such prices as these, how can a man expect to provide for a rainy day? Do not take an example from your neighbor smith as to the price you will charge for your work. Just figure out what it will cost you to do a piece of work, place a price and stick to it. Just figure out what it costs to put in a tongue in a farm wagon at these figures: material cost, \$1.40, freight, 25c., labor, 50c., paint, 10c., total, \$2.25. The cost of doing business as before stated, is 68c. on the dollar, which in this case amounts to \$1.36 plus 17c., makes



THIS NEAT LOOKING SHOP IS RUN BY MR. H. F. THOMPSON IN WESTERN AUSTRALIA



\$1.53, added to \$2.25 amounts to \$3.78; and yet some deluded brothers do work of this kind for \$3.50. If you will add 68c. to every dollar's worth of material or every dollar invested in the shop you will secure yourself against loss.

S. J. PEMBERTON, Kansas.



The Automobile Repairman

Splicing Cables. If it becomes necessary to splice a high-tension cable, the wire of each section should be bared sufficiently to permit of making a good twist of the ends. The part is next soldered. As the high-tension current will take the path having the least resistance, the bare wire can be protected by covering it with some form of plastic tire cement, then wrapping the part with friction tape.

Bolts are very often spoiled in driving them out from the parts in which they are located. If they do not start readily one is often tempted to use the hammer upon them, with the result that the ends of the threads are frequently burred over. A stick of hard wood, or still better, vulcanized fiber, used between the hammer and the bolt end will prevent damage of this kind. When neither is available, the nut may in some cases be run out flush with the end of the bolt or even a little beyond it and a blow carefully placed upon it so as not to hurt the threads will probably start the bolt.

Dish or Camber of Front Wheels.—It will be noticed that the wheels do not stand straight; that they are closer at the bottom than at the top, and that they toe in slightly in front. The amount of divergence from vertical is termed the camber and involves a mechanical principle that the nearer to an alignment the center of the spindle bolt and the pivot point of the wheel are when turning, the easier the car will steer.

The proper amount of camber is about 2.125 inches. That is, the bottom of the wheels should be that much closer together than at the top. The measurements should be taken between the edges of the rims, and at diametrically opposite points on the circumference. It is an excellent plan in making this measurement, particularly after an accident, to jack up both front wheels and note if they are true. The correction of the camber is a job for the blacksmith.

The gather of the wheels is to offset the effect of the camber, to make the tires wear more evenly, and also to prevent the wheels wobbling. This is obtained by bringing the extreme forward sections of the wheels closer together by .4375 inch, and the same method is employed as when noting the dish or camber.

You can correct the gather by the tie rod, which is provided with an adjustable yoke. The pin or bolt securing this member to the steering arm is displaced; the lock nut of the yoke loosened, and the yoke rotated to the right to decrease its length or to the left to increase it. Increasing the length of the tie rod brings the front of the wheels closer together, augmenting the gather, while shortening it moves the wheels outward. The bolt retaining the yoke should be securely locked, also the nut clamping the yoke.

Practically every one who attends to the repairs of machines, accumulates a collection of nuts, bolts, screws, etc., and usually these are kept in the drawer of the work bench or in a box. As a result, when a particular sized nut is wanted, the contents of the box are dumped on the bench or floor and a search made for the particular article. Such a method of storing parts makes for a decided loss of time, and many times new material is purchased when it is in stock. In an accompanying illustration is shown a systematic method of storing the materials referred to, the plan being one adopted by a reader of the *Automobile Journal*. A predetermined number of cigar boxes, those holding 50 cigars for example, were obtained, and the covers removed. In the illustration 12 are shown.

A cabinet is made from white wood or other suitable material, it being constructed with partitions to retain the boxes as indicated. To each box is fitted a handle and a label is also pasted on the box. The handles were obtained at a hardware store for a few cents. In arranging the boxes or drawers the owner placed cotter pins in one, lock washers in another, etc. Some of the boxes were sub-divided to retain different sized screws, for example. With each compartment marked, it is obvious that it is a simple matter to locate the material needed and quickly. The cabinet could be made sufficiently large to store the many useful parts and material necessary in the maintenance of the automobile.

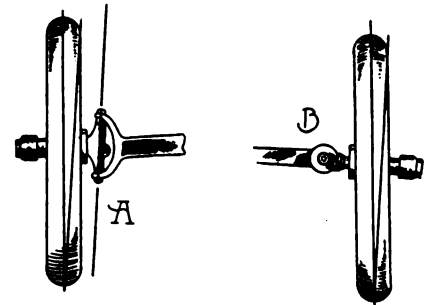
Don't lubricate the magneto bearings too freely. Ball bearings require little oil, but they should on no account be overlooked altogether.

Carbon in Cylinders. Since the agitation of kerosene as a substitute for gasoline as fuel for a combustion engine, carbon deposits in the cylinder have been the cause of a great deal of trouble, and much has been said and written on the subject and the question is as important as ever. To obtain the highest efficiency from fuel—either gasoline or kerosene—the air at the moment of its ignition must be both highly compressed and hot. The hotter it is and the more highly it is compressed, the greater is the power obtained from any particular weight of mixture within reasonable limits. A hot charge, highly compressed, burns more quickly, and the effect is somewhat the same as when using a very hot spark and advanced ignition. Causes of carbon deposit are numerous, and the fit and design of the piston and the piston rings are factors to be considered, and, as a result of this belief, many experts consider that a ring at the bottom of the piston is an improvement, because it tends to check an excessive quantity of oil from passing the upper ring into the piston chamber, and because it undoubtedly helps to steady the piston when running slowly under load. The temperature of the crank case is another factor in the question when the lubrication is by the splash system. In such cases, the oil is heated unnecessarily when the crank case is too hot, and in this condition it is more freely splashed and will also more readily get past the piston rings.

Force feed lubricating systems, in the majority of cases, rely for their supply on what is splashed off of the big ends and crank webs as they revolve, and even if the oil is hot and, therefore, thinner, very little more circulates and is thrown off than when it is comparatively cool. When a force feed lubricating system is properly designed, it is practically impossible for the pistons to be much too liberally supplied. The quality or purity of the oil used is, of course, of vital importance, and even the best possible cylinder oil contains small quantities of bitumen and tarry matter, and these are the first to be attacked by the flame.

An acetylene lamp in good order should light up slowly with a hissing noise, followed by a pure white flame. When it lights quickly with a yellowish flare, it is a sign of a leak.

A very thoughtless habit is that of using the nicely varnished mud guards of automobiles to deposit tools and all sorts of things when executing work on the engines and gears. The front guards are the greatest sufferers, chiefly, perhaps, because the engine gets more tinkering with than any other part of the machinery, and the nice, broad expanse presented so temptingly and conveniently appears to be irresistible. It would be quite worth while making some covers of strong cloth which could be quickly strapped over the guards before repairs on the car are undertaken.



ILLUSTRATING AT "A" THE PITCH AND AT "B" THE GATHER OF AN AUTO AXLE AND WHEEL

Use Care in Jacking Up. From time to time we hear of accidents due to a failure of the jack, while tires or wheels are being changed. Most of these failures are due to slipping of the jack, and the results are sometimes very serious. In the case of a detachable wheel, the car has some distance to topple over, and the resulting shock received by the axle end will almost surely bend it. When jacking up a car a level place should be chosen, and in addition to applying the brakes, the wheels on the ground should be securely blocked. In changing the tire on one of the driving wheels, it is necessary to free the brake, so that the wheel can be turned, and it is at this time that the car is apt to over-ride the jack. With many modern low-built cars it is practically impossible to insert an ordinary jack beneath the front axle, and the springs have to be relied upon, which does not render the operation any safer.

A tantalizing, but not infrequent, cause of puzzling intermittence in the running of a gasoline motor is a floating particle, such as a thin flake of solder which has been detached from the carburetter, or has entered the float chamber from the tank. Carried in the intermittent current of the liquid, it may suddenly become lodged so as to cover the capillary duct to the nozzle, preventing all egress of gasoline. When the motor stops, the gasoline in the float



chamber ceases to be stirred, and the particle finds a new position. When the motor is started again, it is not in the way, but presently it returns and again stops the flow of spirit. Should engine troubles be experienced, the float chamber of the carburetter may therefore be included in the parts to be inspected.

Suggestions For the Care of Tires When Not in Use

L. GREENWALD

Head of Service Department of Firestone Tire and Rubber Company

When a car is to be stored for the season, jack it up, remove the tires from the rims and wash them well with soap and water; being sure to remove all traces of oil or grease. The rims, too, should be sandpapered, to remove all traces of rust accumulation, and painted with liquid graphite.

For the best protection, the tires should be wrapped in clean cloth or paper and laid flat in a cool, dark place. If possible, store tires where they will not be subjected to extremes of heat and cold. A temperature of 40° to 60° is most favorable for avoiding chemical action in the rubber.

All tires are encased in heavy paper at the factory (by a special wrapping machine) to protect them from the deteriorating influence of light until such time as they are ready for use.

A very effective way is to wrap them in strips of muslin or burlap about three inches wide; winding these strips around the tire and having each wrap lap over about one inch.

Inner tubes should be deflated and placed in a box or wrapped in a clean cloth or paper and laid flat in a dark place with no weight resting on them. If they are left in the tubes they should be partially inflated.

Never let the weight of the car rest on the tires when laying up for the winter months. Jack it up and allow the axles to rest on supports. The constant weight on one part of the tire will cause it to flatten at that point; creasing the fabric and greatly weakening it. If the tires are left on the rims they should be thoroughly cleaned and repaired and only enough air pressure left in the tubes to keep them well rounded. This prevents them from wrinkling or cracking.

While the car is not in use is an opportune time to have necessary repairs made on tires. It is the repair

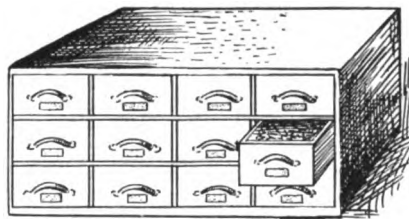
shop's slack season and, as you are in no hurry for the return of the tires, they can devote all the time necessary for your job and do it right.

Examine tires well and repair all cuts in the tread extending through to the fabric.

Repainting the Automobile—3

M. C. HILICK

Under the head of repainting we have the car with the surface too badly worn and shattered to be repaired by any process short of coating up with roughstuff, rubbing down, repainting and revarnishing; these processes to be applied to the body only. After washing and cleaning the car in the manner described in previous issues of THE AMERICAN BLACKSMITH, scour the old paint surface down with No. 1½ sandpaper; at the same time removing all flaking or scaling paint with a steel hook scraper. Then dust off carefully and apply a coat of lead paint mixed as follows: oil ground white lead broken up in one part of linseed oil and two parts of turpentine; the amount of lead in which the oil is ground being



A HANDY ARRANGEMENT FOR SMALL PARTS

estimated at so much per cent and figured in with the one part of oil herein recommended. Add enough refined lampblack to this lead when it reaches the consistency of a heavy paste to make a medium slate-color reduced to a good brushing consistency. The above is for a wood surface. For a metal surface, reduce the lead in the same way except that one part of oil should be added to three parts turpentine. To either of the above mixtures add a tablespoonful of coach japan. If the chassis or running parts are considerably worn, apply a coat of lead mixed by the last-named process. Use an oval bristle brush, and brush the lead on smoothly and freely. This lead will dry in thirty-six hours. Then, with a hard drying putty, putty all cavi-

ties and deep surface fractures. Places that have had the old shelly paint scraped from them should be filled a little above the surrounding surface with this same hard drying putty, applied with a broad non-elastic scraping knife. The following day, again go over the surface and re-putty any parts not entirely filled up and also catch any places that may possibly have been overlooked at the first puttying.

Now, confining our attention to the body, the next day apply two coats of roughstuff. This material can be bought ready-mixed at a price that will hardly pay anyone to buy the filler and other materials and shop-mix it, except for emergency cases. Apply four coats of this roughstuff at the rate of two coats per day. Three days after, under good drying conditions, rub the roughstuff out with artificial rubbing stone and water. This rubbing stone comes in blocks weighing about one pound each and is superior in every way to the natural lava or volcanic stone. Let the surface stand over night after rubbing, then sandpaper lightly with No. 0 sandpaper. Apply one coat of body color, then one coat of varnish color; these two coats going on the same day. For good work, apply one coat of rubbing varnish to which add enough of the color to counteract the discoloring properties of the varnish. When dry, rub this coat with pulverized pumicestone and water, and apply any desired striping and ornamental effects. Let these dry thoroughly and apply a coat of clear rubbing varnish; this coat, when dry, to be rubbed with pulverized pumicestone and water. Wash, clean up and finish with body-finishing varnish. Sandpaper the putty and lead coat on the chassis; bringing everything down clean and smooth. Then apply one coat of color, one coat of varnish color and, for first-class work, stripe on the varnish color and apply one coat of clear rubbing varnish. When dry, rub this coat with pulverized pumicestone and water, clean up and finish with a hard drying chassis or gear-finishing varnish. For a cheaper grade of work, omit in the case of both body and chassis the final coat of clear rubbing varnish.

Medium Repainting of the Car

In addition to the above there is the job which includes a badly cracked surface; one, in fact, which

should be burned off, but for various reasons is elected to be finished over the old cracked paint. This can be only a makeshift at best, but it will often serve readers of THE AMERICAN BLACKSMITH well. Scour the surface with No. 1 sandpaper, then with equal parts of turpentine and elastic finishing varnish freely coat the surface. This will penetrate and restore some measure of life to the old paint. Then mix calcimine (made of gypsum rock) with water; making a portion of this calcimine to a heavy plastering consistency and another portion to a rather heavy brushing consistency; the latter to be brushed on over the surface where the cracks are less severe and the former to be plastered on with a broad half elastic scraping knife over the parts where the cracks are deepest. Let this coat stand over night, then rub down with raw linseed oil

brush. With a broad half elastic scraping knife, held at an angle of about 45°, scrape and press this material into the cracks; leaving little or no surplus material on the surface. Rub down with equal parts of raw linseed oil and turpentine and artificial rubbing stone. Color and finish as already described.

(To be continued)

Replacing Broken Ball Bearings and Races

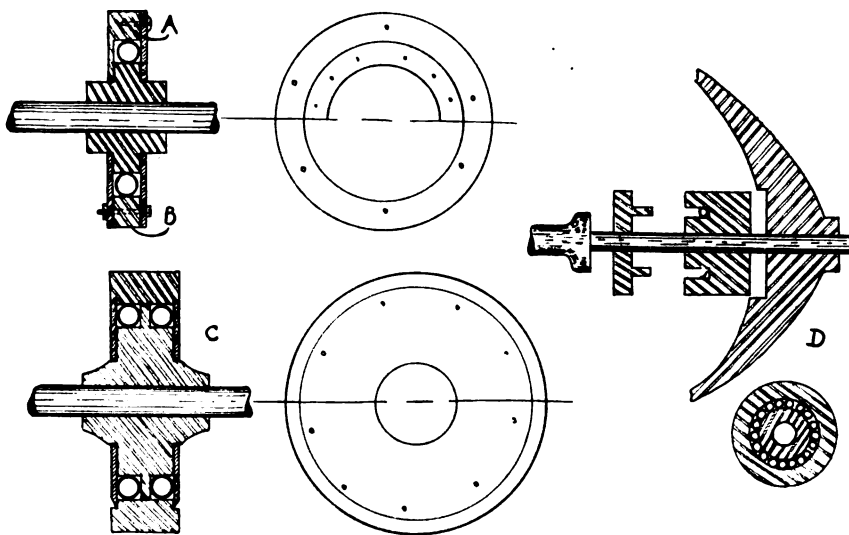
L. R. SWARTZ

In this particular case it is preferable to use balls of a smaller size than in the original bearing, on account of having to provide inner and outer races of sufficient strength from material on hand to stand the service, which, with the facilities of an ordinary shop, will require to be welded up and machined to shape. As regards

on the shaft, with a recess on both sides to receive the retaining washers. Next, machine the outer race to make a close running fit against the bearing seat on the outside, with an inside diameter simply sufficient to allow the balls to be inserted between the inner and outer races.

Where a single course of balls is required, Form A may be used; needing only one washer or retaining plate. But where very small balls are demanded it is best to use two courses of balls, as shown at C, which will require the leaving of a web or partition in the width of the outer race to keep the two courses in place—this is necessary only when there is a great strain to be borne in a limited space. If the space is so limited as not to permit the use of screws or rivets to fasten the retaining plates, as seen at A, the edges of the plates may be beveled and the edges of recess beaded down over the bevel to keep the parts in place, as shown to right of C. Next to the shaft a boss or extension should be made on the inner race so as to cover as great a length of the shaft as possible. All bearing parts, i. e., shaft, balls and race seat, should be brought to as smooth a surface as time and material will permit. Very small holes should be made in retaining plates to admit lubricant to balls—say three to six such holes in each plate small enough to prevent the balls from lodging in the holes. While the retaining plates should fit the recess in the outer race as tightly as possible they should permit a free running fit on the inner race. It is scarcely necessary to say that this job requires careful measurements and a lathe to produce satisfactory results. Under ordinary conditions it is best to bore the hole in the inner race and drive it on a mandril to turn it to shape. The outer race may be made by driving on a mandril and turning down the outside and then centering it in the chuck and turning out the inside and recesses for side plates. An easily-made form to receive end-thrust is shown at D. This form is found generally on friction-driven automobiles.

A bearing made as outlined above will deliver the same service as one of those replaced, and its simplicity of construction is within reach of the facilities of the smith in an ordinarily equipped shop that does repairing.



REPAIRING BROKEN BALL BEARINGS AND RACES WITH THE MATERIAL AT HAND

and artificial rubbing stone. All deep cavities to be filled up with hard drying putty and faced down under the oil and pumicestone. Apply one coat of color, one coat of varnish color, stripe, and for the cheapest work finish on this. For a better job, apply one coat of clear rubbing varnish over the striping; this to be rubbed hard with pulverized pumicestone and water; clean up and finish.

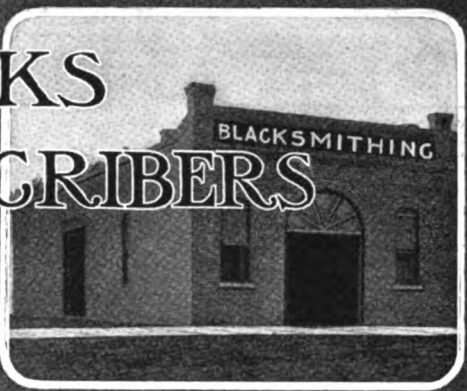
Another cheap way of doing the job is as follows: Apply one coat of turpentine and finishing varnish, equal parts. When dry, face the cracked surface over with hard drying putty reduced to a glazing consistency. Apply with a worn bristle

the shape of the parts there are two forms which may be used as shown in illustration A and B. On account of the greater diameter of the inner race, a greater number of small balls may be inserted so that the strain may be approximately the same as in the old bearing. These inner and outer races should be of good tough steel that will weld easily.

The washers which form the side pieces may be made from saw blade or shovel blade steel or any other grade of steel that will retain the parts in position. Having selected the balls, machine out the inner race in the shape of a ring of sufficient diameter to make a close running fit



TIMELY TALKS WITH OUR SUBSCRIBERS



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The Long Evenings

And now come the long evenings when most men have more time to read, to study and to do hard thinking than ordinarily. It's a good time to brush up on those departments of the trade in which you are lame. The winter evenings present an excellent time for study. Secure one or two books on the subjects you want to understand, and then strengthen yourself. If you do not know what books to get ask Our Subscriber's Service. We can help you decide—can get the book for you and, if necessary, suggest a course of study.

And speaking of books—are you interested in machinists' work? If you are, here's a letter that will interest you. Mr. T. E. Wilson of Missouri writes: "I think that 'Roger's Machinists' Guide' is the best book I have ever read for the beginner; and the practical machinist will also find it a very useful volume of reference. The average smith and machine shop, where all kinds of work is done, requires several of these reference works and they often save time in getting out a job."

Ask the book department about Roger's Machinists' Guide.

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Here is a letter from one of Our Good Folks out in California that tells more in its few sentences than we ourselves could say in columns:

"Dear Sirs:—I received your letter of the 19th, concerning billheads which I ordered from you. I received the billheads on the 28th in first-class shape and am extremely well pleased with the quality and appearance of the work. The price is about one third less than the rate I have been paying.

Again expressing my satisfaction with the work and thanking you for your courtesy, I am,

Yours truly,
JOHN TELFER.

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Go carefully through the advertising section and then tell us what you want in your library. Just write Subscribers' Service and we'll see that you get what you ask for.

Our Campaign for Sane, Sensible Business Methods

Of course, there were scoffers. The old fogies said we could never do it—that we would have trouble getting blacksmiths to even listen to talks on modern business methods. But we're doing it—just read this:—

"I am heartily in sympathy with your efforts to raise the standard of the craft to a business-like profession, so that the members of it will not always be regarded as the "Simple Simon" of old. Let us all have a complete cost system, and then there will be no price-cutting."

J. H. OSZKOFF, Nebraska.

And every day come letters along the same line.

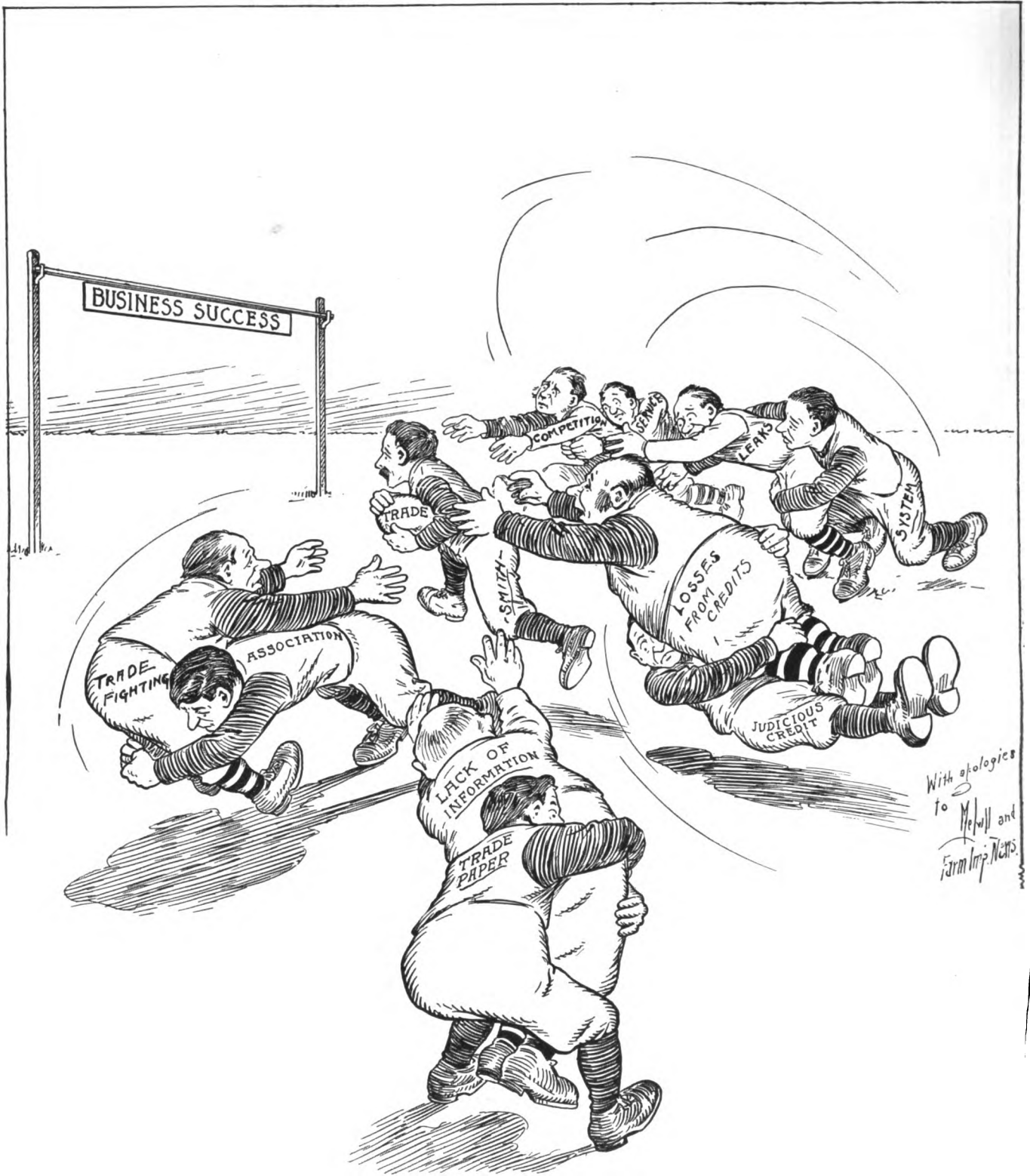
Of course, it was difficult at first to get blacksmiths to use modern methods after fathers and grandfathers and great grandfathers had handed down simple rule-of-thumb methods that seemed to work in the days of low costs.

But in these modern days we need modern ways if we are to keep step with the times, with costs and with expense. The old rule of "fifty cents plus the cost of the material" is not good enough. It has been relegated to the scrap-heap with that honored old friend—the bellows.

We are installing electric blowers these days, and with this modern equipment we must install modern business methods.

There is still good money in smithing, Brother—plenty of it—and a modern business system will get it out for you.

"Tell Your Neighbor!"



With apologies
to
McCall and
Farm Imp. News.

TEAM-WORK WINS

In the battle for the Goal of Business Success, the Smith must cope with sturdy opponents in Competition, Leaks, Trade Fighting, Lack of Information, and Credit Losses and, as on the athletic field, unless the contestant chooses the proper team-mates he has small hope of being the victor. In the game of Business, any one of the opponents named is strong enough to "Down" the Smith, and without the proper "Team" what is to prevent his defeat at the hands of two or three of these sturdy fighters?

Let an Association stop Trade Fighting; a good Trade Paper, handle Lack of Information; let Service take care of Competition; and Judicious Credit hold back Credit Losses; and with System to keep a hand on Leaks, there's not a Smith who cannot carry his Business to Success.

Where Are My Profits?

H. J. BOND

direct some charge and matter was the liability high

THE end of the year—or after you have recovered from the effects of your feasting and friv-
tality over the holidays—you are
ing to sit down some evening, go
for your books or such records as
to keep, and then you're going to
sure and chew your pencil and
ratch your head and, finally, you'll
claim more or less forcibly:
"Where are my profits?"

And the reason I know you are
going to do that and say that is be-
cause I did just the same thing for
years; and I am only an average
smith, and I know the average smith
does it.

And so you'll figure again. You'll
try another method. You'll add and
subtract

and multi-
ply and
divide until
your brain is
in a whirl
and then
you'll say:
"I'm better
with a ham-
mer than I
am with a
pen or pencil. I'm a blacksmith, any-
way."

So you'll go on: Adding the totals
for the year's business; adding up the
bills to get the total amount paid out
for supplies and stock; and then sub-
tracting one from the other to get
at the profit; but somehow the profit
isn't there; and you are very sorely
puzzled.

Where Some Profits Go

The leaks are not the same in all
lines. If you question a grocer you'll
learn that his leaks are forgotten
charges, disputed accounts, mistakes,
dishonest employees, poor collections
and a dozen or more smaller things.

The druggist will tell you that his
profit goes into forgotten charges,
unprofitable lines, and into a number
of channels that are closely parallel
to the grocer's.

Now, have you ever analyzed your
own business to see just where your
profits are going? Do you know at
what point, between the customer's

wallet and your pocket, the cus-
tomer's money is side-tracked, at
least in part? Do you know where
the customer's dollar loses that ten
or fifteen cents on its trip to your
shop?

Where Smith-Shop Profits Go

The trouble with smith-shop prof-
its is that the average smith does
not know how to figure costs.

When the average smith is rushed
he is inclined to charge all he can get
for work upon which there is no regu-
lar price list. When business is slack
he is usually willing to take work at
any price; and right here I may say
that some smiths are willing to take
work at most any time at most any
price.

And when the average smith figures
what he should charge for a certain
job he immediately pictures in his
mind the stock to be used and its
cost—the time it will take to do the
work, and adding anywhere from
fifteen to fifty cents more he has the
price to charge.

For example: take any job you
have done today. How did you arrive
at the cost of that job? Did you add
rent, light, general expenses, depre-
ciation, interest on your investment,
losses, etc? If you did not, you did
not get what you should for your
work. Until you have added these
items to your stock cost, cost of coal
and your time you have not covered
your costs. If you do work for any-
thing less than a sum which will
cover all of these items you are doing
it at a loss.

And that is where smith-shop prof-
its go.

How to Make Prices and Profits

When I figured and puzzled over
a year's figures several years ago I
realized that something was very
wrong in my business. I knew
that unless I solved the mystery I
could not remain in business very
long. I must simply find out what
became of my profits and then, most
important, learn how to insure a prof-
it. I found that I never had a profit—
never got hold of any—never saw it—
never handled it—and all because I
never figured correctly to get it.

So, I started out hammer and tongs
after that profit; and I got it, and
am still getting it.

Here's how I went about it: I got
all my bills, receipts and records to-
gether; then I figured just what my
year's expenditures were for stock;
then I took an inventory of all stock,
fixtures and equipment; after which
I found out what my fixed expenses
were—such as rent or taxes, salaries,
insurance and all other costs usually
called the costs of doing business.
Then I determined what percentage
it cost me to do business; and then
what my interest on my investment
was. Of course, in order to know these
latter figures, I had to know how much
business I did during the year. I had
records on this, so I simply added up
the amounts for each day's business.

And to say that I was surprised is
putting it very mildly. What those
figures taught me was a revelation.
I found that I was barely breaking
even. The profit I figured on was
never earned, simply because I did
not figure in all of my expenses. Of
course, my expenses were there just
the same. The fact that I did not
figure in all of them did not alter
the fact that I incurred them. But,
of course, not figuring on them I

could not
add them to
my selling
price when I
told a cus-
tomer what
a job cost
him; and,
when ex-
pense is not
figured, it
must come
out of some-



WHERE ARE MY PROFITS?

thing; so it comes out of the profit.
It cannot come out of the cost of
stock; so it must come out of the
profit.

Some smiths, when I have ex-
plained my system of actually getting
the profit I figured on, have asked me
why I deliberately figure my costs so
high; "why add in all that interest
on investment, proprietor's salary
and all that stuff, besides adding in



ON THE TRIP TO YOUR SHOP



rent when you own your shop? It only puts your prices up and you lose business to your competitors who charge less for their work."

The Leaky Barrel

I always answer that argument, which to some men may appear sound business (but which really sounds foolish to a business man), by asking the following question: If you had a barrel of gasoline in the shop or out in the shed and was selling the oil to motorists and others at the regular price, you would, of course, figure on selling all the oil that was in that barrel and you would figure on a profit from every gallon,—wouldn't you? Now suppose the barrel leaked at the back end, and a fourth of the barrel's contents ran out into the ground, would the fact that you did not figure on that leak or that you did not know about it still insure your getting the same profit from that barrel of oil?

It's the same in figuring expense in the shop. Proprietor's salary, interest on the investment, and rent, is just as truly an expense as the bills paid for stock, the bills paid for coal, for telephone, for water, for electric light and for everything else that costs money.

And the fact that you don't figure on them does not alter the fact that you pay them.

Personally, I prefer to face all expenses squarely, and even if I did not put prices on my work accordingly, I would want to know where the leak was.

If you are not figuring the right way, try it for the new year and have more money in the bank a year from now.

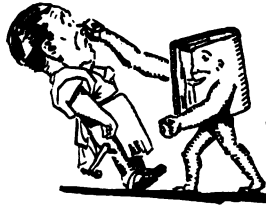
A Simple Stock Record and Perpetual Inventory

L. M. NOLAN

The problem that confronted us and caused us to look up a good system for taking care of stock was just this: Our last inventory of stock and equipment showed that we had on hand duplicate lots of various items of stock. For example: our stock of pads was three times what we expected; simply because we had taken somebody's word for it that we were out of pads, and had ordered some more when two lots of the same kind and size were still on hand; and the same applied to wood stock and other

items; though it did not apply to horseshoe stock. On horseshoes we were keeping a careful record in order to buy closely to our needs and to turn stock as often as possible.

Here is what we did: First, we partitioned off a stock room in one corner at the rear of the shop. Into this we built racks and shelves for our iron and steel stock. Upstairs we arranged racks and shelves for our wood



I WAS SURPRISED

stock. Then we transferred all stock (which had previously been kept where it was most used) to these stock rooms. The stock was carefully arranged; each size, kind and quality being given a place, and that place was then marked.

We then got some common paper tags—some large and some small—and we attached one to each item of stock—that is, to each kind of stock—and marked on the tag the exact quantity of that particular stock on hand. The large tags were used on stocks that are usually needed in large quantity; the smaller ones being used on small stocks. In this way we know just exactly what is on hand, and as each man must mark on the stock tag what he uses or takes out of the stock room we have a perpetual inventory of our stock.

Now, when the salesman for the jobbing house calls, we simply look at the stock tags to see what we need; and as all stock of one kind is kept in one place there is no chance of ordering stuff we don't need.

Thinking Right About Costs is Necessary to Efficiency in Cost-Keeping

By A. M. BURROUGHS

(The second of a series of ten articles to be published on Efficient Cost-Keeping.)

It is a very old but none the less a very wise saying that "No business is greater than the man who runs it." Far outranking the material equipment in importance is the man element. Yet, how vitally important this man element really is, is but little

realized by that type of man who has not progressed beyond the stage where men are merely a payroll.

We have entire business proprietors who own machines, buildings and units of production and are thinking of "their men."

It may as well be said that there are just as many things the matter with business as there are things the matter with a poor manager. The man who thinks in dollars and cents and who gets only a small return for his investment in the productive power of his thing can obtain. If he thinks "no man is worth more than \$2 a day, he will never have a \$5-a-day man working for him. If he thinks "a superintendent can't be worth more than \$50 a week," a \$100-a-week man, of course, will never be found superintending his plant.

There is no doubt that a business is the direct reflection of the mental capacity and power of the man who runs it; and anyone studying cost systems must consider those facts as throwing a side-light on reasons for ineffective systems.

Is the cost system successful? is our question. We can't take the manager's word for that, unless we know that he knows what a successful cost system is.

A cost system is not something that springs from a business like a



I FOUND I NEVER HAD ANY PROFITS!!

wild flower from the ground. It isn't secreted in the book-keeping system as the liver of a human being secretes bile comes from the desire of the man at the head of the business to know the real value of what is being done in his business.

A manager, several years ago, put in a cost system on the same basis on which he would have bought a pound of sugar—for as little as he could get someone to take for it. At the end of two years he found that he had lost a lot of money, because

part, ought not to impose upon him the loss from such injury, particularly when the direct cause of the same is the negligence of some other party. The loss should be charged upon the party guilty of the first and only negligence with reference to the matter; nor will the fact that the horse was uncontrollable some distance before the injury, change or in any way affect the liability of the town having charge of the highway."

These different constructions of the law place upon the corporations or towns maintaining public roads, the responsibility of exercising reasonable diligence to so construct and maintain the highways as to avoid accidents from the shying, starting or backing of horses. They concur, practically, in the opinion that the action of a horse in such cases is an accidental occurrence; that the action of the horse and the neglect of the corporations are the proximate and efficient causes of the accident; and the injury is, therefore, attributable to the latter; and the corporation should be liable on the ground that it failed to perform its duty to the injured party.

The sale in Kentucky (a few days ago) for a big price, of a yearling-own-sister to the phenomenal colt trotter, Peter Volo, that this season placed the world's three-year-old record at 2:03½—has started the men interested in trotting and pacing to discussing the subject of the actual value of an undeveloped youngster by reason of being an own brother or sister to a famous performer.

There have been a few cases where a sensational performer or a great sire and an own brother were of almost equal merit. The only world's record trotter having a really sensational brother or sister was The Abbot, 2:03¼. His own brother, The Abbe, was not only a sensational three-year-old trotter, but later (at the pacing gait) he became a sensational race horse; taking a record of 2:04. On the other hand, the present champion trotter, Uhlan, 1:58½, had an own brother called Indian Hill that ceased his race for speed honors after taking a record of 2:19¼, and in no way did he appear to possess any of his brother's phenomenal powers. Cresceus, 2:02¼ (for a number of years the champion trotting stallion), also had an own brother whose speed was measured by a pacing record of 2:25; and The Harvester, 2:01 (the present stallion champion), has an own brother that discontinued his career on the turf after taking a record of 2:14¼. Palo Alto, 2:08¾ (champion stallion of some two decades back), had two brothers and a sister that took records; but 2:18 was the fastest any of the three trotted. Another stallion champion that had an own brother that failed to approach him in point of speed was Allerton, 2:09¼; his brother taking a record of 2:22¾. Sunol (the daughter of Electioneer that set the world's trotting record at 2:08¼ many years ago) had an own brother that sold for a long price on his relationship to the great mare; but 2:30 is the fastest record he made. Baron Wilkes, 2:18 (one of the most famous sons of George Wilkes), was most successful in the stud; but an own brother, called Paetolus, lived and died without having sired a single standard performer. To the contrary, two of the other great sons of George Wilkes (Alcantara and Aleyone) became noted speed progenitors; and to this day it is a matter of opinion which would have had the longest list of performers had Aleyone lived to be as old as Alcantara.

Those persons who study trotting horse pedigrees and the results of different blood crosses are coming to believe more and more in the wisdom of bringing an own brother or own sister to a great performer or great

producer, because (they say) the inheritance of the trotting-bred horses of today is so much richer than it was two decades ago and represents so much more producing blood that, with equally good physical characteristics and an equally good chance for development, such a youngster is more likely to approach his or her great brother or sister than is one not so related. It is admitted that this is true, in a degree, there is still a great chance to take in bringing a brother or sister to a great performer, for the reason that, as yet, the best-bred trotters have only from four to six generations



MR. FURMAN OF NEBRASKA STARTS HIS SONS EARLY—THE LITTLE CHAP IS FOUR YEARS OLD

of trotting-bred ancestors and, consequently, different traits crop out in the colts produced by the union of the same sire and dam; traits which make one a great performer or great producer and traits which prevent the other from rising above mediocrity.

This has been a world's-record year in the output of 2:10 trotters; no less than sixty-nine having entered the list which horsemen regard as the exclusive circle for trotters. Another particular in which the new 2:10 trotters break a record is in the proportion of baby trotters which it contains; there being two two-year-olds and twelve three-year-olds included in the new list. The list and the large number of those of tender age in it is a striking illustration of the speed improvement the trotting horse breeders are making. These new 2:10 performers and their sires are as follows (the ages of the colt trotters being given in parentheses):

Margaret Drinen, by Peter the Great.....	2:07¼—2:05½
Brighton B., by Mokides.....	2:27¼—2:05½
Linda Wrona, by McAdams.....	2:18¼—2:05½
McCloskey, by Theodosius.....	2:18½—2:06¼
Lassie McGregor, by Jay McGregor.....	2:07¼—2:06¼
Bonington, by Bellini.....	2:13¼—2:06½
Belwin, by McKinney.....	2:11¼—2:06¾
King Clansman, by The Clansman.....	2:13½—2:06¾
Sienna, by Peter the Great.....	2:07¼—2:06¾
Mirthful, by the Star of Patchin.....	2:06¾
The Guide, by Peter the Great.....	2:07¼—2:07¼
Ortolan Axworthy (3), by Axworthy.....	2:15½—2:07½
Fair Virginia, by Zombro.....	2:11—2:07½
Peter Scott, by Peter the Great.....	2:07¼—2:07½

Lucile Spier (3), by Directum Spier.....	2:11¼—2:07¾
Guy Nella, by Guy Axworthy.....	2:08¾—2:07¾
Andral, by Norval.....	2:14¾—2:07¾
Princess Welcome, by Lodal-ler.....	2:19¼—2:07¾
Lee Axworthy (3), by Guy Axworthy.....	2:08¾—2:08
Dean Swift, by Almaden D.....	2:16½—2:08
Bertha Carey, by Zombro.....	2:11—2:08¼
Harry J. S., by Admiral Dewey.....	2:04¾—2:08¼
Hazel Laing, by John A. McKerron.....	2:04½—2:08¼
Honey Healey, by Zombro.....	2:11—2:08¼
The Temptress, by The Exponent.....	2:11¼—2:08¼
Bertha Pointer, by Del Coronado.....	2:09½—2:08½
Miss Rilda, by Peter the Great.....	2:07¼—2:08½
Lucile Bingen (3), by Bingen.....	2:06¼—2:08½
Homestake, by Ozono.....	2:08½
Duchess, (breeding unknown).....	2:08¾
Palmer DeForest, by The DeForest.....	2:22¼—2:08¾
Silk Hat, by Silk Weaver... ..	2:19½—2:09
Alarich, by Direcho.....	2:09
Airdale (3), by Tregantle... ..	2:09¼—2:09
Esperanza, by Carlokina... ..	2:07½—2:09
F. S. Whitney, by F. S. Turner.....	2:09¼
Electric Patch (3), by Dan Patch.....	1:55¼—2:09¼
Forest King, by Jno. A. Fuller.....	2:08¼—2:09¼
Miss Perfection (3), by Gen. Watts.....	2:06¾—2:09¼
Rags, by Del Coronado.....	2:09½—2:09¼
Signal Boy, by Cigarette... ..	2:09¼
The Comet, by Entertainer.....	2:09¼
The Zombro Belle, by Zombro.....	2:11—2:09¼
Peter Pearl, by Peter the Great.....	2:07¼—2:09¼
Wayside, by Rhythmic.....	2:06¾—2:09¼
Trampright (3), by Tramprfast.....	2:12¼—2:09¼
Exall, by Exalted.....	2:07¼—2:09½
Grattan Boy, by Montana Grattan.....	2:09½
Lord Brussels (3), by Axworthy.....	2:15½—2:09½
Laramie Lad, by Master Bo.....	2:09½
Allie Bingen, by Albinger... ..	2:18—2:09¾
Adbell M. (3), by Moko.... ..	2:09¾
Country Tramp, by The Plutocrat.....	2:09¾
Honeymoon, by John A. McKerron.....	2:04½—2:09¾
Native Spirit (2), by Native King.....	2:11¼—2:09¾
Orlettoe, by Ormonde.....	2:08¾—2:09¾
Peter Billikin, by Peter the Great.....	2:07¼—2:09¾
Roya McKinney (3), by McKinney.....	2:11¼—2:09¾
Sunshine, by Chambertin.....	2:14¼—2:09¾
Tommy DeForest, by The DeForest.....	2:22¼—2:09¾
Bondelin (2), by Walnut Hall.....	2:08¾—2:10
Host Peter, by Peter the Great.....	2:07¼—2:10
Fid Davis, by Bingen.....	2:06¼—2:10
Isaac R. T., by Albingen... ..	2:18—2:10
Lady Elmhurst, by Walnut Hall.....	2:08¾—2:10
Virginia Barnette (3), by Moko.....	2:10



Jack, the Time Killer

(With apologies to the Author)

There's a shop to go to in the morning,

But before Jack attempts any work,

He settles the war for an hour or more

In a talk with some other old shirk.

He then glances over the paper,

And sketchily skims through the news,
And says that the dope bears out his fond
hope,

That the Swiss navy is going to lose.

He goes over to Kelly's at noontime,

And sits 'round and puffs a cigar,

While he stoutly contends to a couple of
friends

That this fighting is going too far.

He is back on the job at two-thirty,

And sticks till five thirty-four,
Then he strolls down the street to the bulletin
sheet

And talks war for an hour or more.

At the lodge or the grill in the evening,

He plans out the German campaign,

He tells all the bunch, of his newly-born
hunch

That the plans of the allies are vain.

He sits 'round 'till closing time, ranting

On prices for food, shoes and cotton,

Then he climbs into bed, wearied out and
half dead,

And wonders why business is rotten!



Heats, Sparks, Welds

Did you ever notice that a mule never
kicks when it is pulling?

Some men are accused of having cold feet
when they merely have cool heads.

One of the biggest losses a business man
can experience is to lose his temper.

Only a mint can make money without
advertising. Anyone else who tries it usually
gets into difficulties.

If your profits are directly related to costs,
what relationship are your overhead expenses
to your selling price?

Andrew Carnegie said: "Do more than
your duty—it's the horse that finishes a
neck ahead that wins the race."

Just as the first new implements are sold
to the most progressive farmers, so are the
first sales made by the progressive smiths.

Now is a good time to get a fine start for
next year. Warm up now, and then you'll
be off to a good lead by the first of next
month.

About the worst things a business man
can stock his brain with are angry words.
Forget them as quickly as possible, whether
they are given or taken.

Sow the seeds of a new business with neat
circulards—cultivate with postcard notices—
hill them with personal letters—fertilize
with reputation and then harvest with a
personal call.

How's your stock of Pink Buffaloes?
These little pink squares are working just as
hard as ever for "Our Folks." Keep a
supply on hand; they protect you; they're
free. Ask for a herd—today.

If you don't know what's the matter with
your business, read the business articles in
this number. The chances are, these articles
will hit your problem right on the head;
and knowing the disease, is half the battle in
its cure. Try it.

Do you know that the oxy-acetylene torch
and plant is the best thing that has happened
in the smithing field in years? We're going
to have some articles pretty soon on the
profits and prices for oxy-acetylene work.
Watch for them.

According to some recent figures there
are 1,140,000 automobiles in use in the
United States. The distribution by States
ranges all the way from 133,000 for New
York State to 1,150 for Nevada. Are you
doing automobile work?

Seldom are we called upon to exercise
great virtues, but the smaller ones are in
constant demand—such as patience, kind-
ness, reliability and unselfishness. If we
keep them polished by use, they will be
ready if great occasion arises.

The time to help yourself to the buns is
when the buns are being passed 'round.
The time to do more work is when there's
more work to do. And to be ready when the
work's to be done necessitates having tools,
machines and equipment in constant repair.

What do you think of this oxy-acetylene
welding and cutting proposition? If you
have a plant, let us know what you are doing
with it—the prices you charge and the busi-
ness you get. We wonder if any one of our
good folks is not making money with his
oxy-acetylene plant.

How's this for a shop sign?
Square Dealing

Every customer of this shop is en-
titled to a square deal—which means
good service. And this shop is entitled
to a square deal from every customer,
which means prompt pay.

Last call for the Class of 1924. Get into
line for 1924. Send in a ten-year order—
you'll save half your subscription money—
and get into the 1924 class. Examine the
long-time rates on the opposite page and
then send in your order. But perhaps you
don't care to save some real money.

A metal-spraying process by means of
which it is possible to coat metal, wood,

Here
you see
THE AMERICAN
BLACKSMITH'S
Christmas Tree.
One of the best type, too.
And while, Dear Sir, 'tis
not a fir—yet it was made
"fir" you. 'Tis true, you see
upon this tree no presents rich and
rare; yet please be kind and bear in
mind, in wish the gifts are there.
We wish you all, the short,
tall, young, middle-aged and
gray, the rich, the
poor,
white,
black,
and Moor,
A Merry Christmas Day

True Tales of Our Service Number One

A Pennsylvania smith, after reading
the business articles in "Our Journal,"
wanted a simple system for keeping track
of his accounts. He wanted something
that would work in his own shop and fit
his particular needs. This man worked
with one helper and had very little time
to spend on a big set of books. We sug-
gested a simple system in which one
book did the work of day-book, ledger
and cash-book all in one. The system
worked out fine for him and takes very
little of his time.

paper, cloth, stone, glass, cement and other
substances with lead, zinc, tin, aluminum,
copper, brass, bronze, silver, gold and steel,
has been perfected, and the apparatus for
doing the work has been placed on the
market.

Tom Tardy recently gave a talk before
the Take-Life-Easy Club. A neighbor,
when introducing him to the audience, said:
"I do not have to speak many words to
introduce Tom Tardy, for he is already too
well known." Since then, Tom has been
puzzling his brain trying to make out what
his friend meant.

When you buy a machine, you want the
work that machine will do. When you
buy a blower, you want the blast it will
create. And when you subscribe to a trade
paper, you want the help, the knowledge,
the service, that paper will give you. Just
take THE AMERICAN BLACKSMITH on that
basis; and—tell your neighbor.

If we could have seen Artist Kern in his
studio at work on "The Blacksmith," de-
veloping all the details so true to nature,
portraying the benevolent character and
transcribing the ruggedness and warmth
of the scene, we would be more enthusiastic
about the picture than we are. As it is, we
are ardent enough, and the painting is
admired by all who see it.

A new method of forming gears has re-
cently been perfected, and a Cleveland com-
pany is now producing gears wheels by what
is known as the "molding-generating pro-
cess." By this process the gear blank is
heated to a forging temperature and rolled
in contact with a roller having gear teeth of
the required size. This results in the form-
ing or "molding" of the teeth on the blank.

Better get busy now on that pile of old
scrap, tires, wheels, gears and what-not
that spoil the appearance of the shop and
are a blot on your reputation for up-to-date
business transactions. Clean up that old
stuff now. Of course, snow will cover it soon,
but it will look worse than ever next spring—
and you'll be too busy then.

About a year ago we asked:
"Do your accounts account?"
"Do you know your business as you
should?"

What are your answers now?
Isn't this a good time to start in to make
your books real records—real helpers—real
contributors to your success?

Noticed yet that war talk doesn't capture
much business? The man who bombards
his customers with a lot of rapid-fire con-
versation about the present European crisis
and endeavors to demonstrate which side is
going to be successful, is undermining his
business and laying it liable to capture by
some live competitor who has both eyes
open to business and his mouth closed on
the war talk. War talk in the present crisis,
like political and religious argument, leads
to warm words, disagreements and lost
business. Talk Business, not war.

Our Honor Roll

A Resolution

This time of the year seems to be the accepted time for the preparation of resolutions for adoption at New Year's. The following resolution is accordingly suggested:

RESOLVED: That I will send in my order for a long-period subscription to THE AMERICAN BLACKSMITH—"Our Journal"—before January 1, 1915.

FOR—BE IT KNOWN that by so doing I will—1st, Save Money—2nd, Save Time and Annoyance—3rd, Insure My Subscription and—4th, Help Reduce the High Cost of Living.

TO THIS RESOLUTION and for these reasons I willingly subscribe; setting down my hand and seal this December, 1914.

Let us know where you stand on this resolution. We want every reader of "Our Journal" to get the full advantage of Our Long-Time Rates. Why shouldn't you subscribe at the lowest rate you can possibly get? The money-saving you make is very considerable; why not put that money in your own pocket? We're willing.

Table with 4 columns: U. S. and Mexico, Canada, Other Countries, and Subscription rates for various durations (2 yrs to 10 yrs).

Send your order and remittance now—today. Don't wait until you forget all about it. You'll never regret it. Our subscription insurance saves you money. The sooner you begin saving the more you save. There is no time better than NOW.

Main subscription list table with columns: NAME, Subscription Paid to, and various subscriber names and locations.

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The Horseshoer

Shoeing to Prevent Interfering

PAUL V. BURGESS

Interfering is one of the most common faults as well as one of the worst, especially in saddle horses and roadsters. There are so many things that cause interfering that it would take a volume to cover all the ground; therefore in this article I shall touch only briefly upon a few of the most common causes and the remedy for them.

Defective conformation is the most common cause; meaning by this the shape of the legs and the angle at which they set to the body. If the legs set straight in line both in front and back there is little cause for striking unless the animal be subjected to very severe usage. Sometimes the horse will be forced to strike by having the breeching of the harness too low down and the side straps too tight. Also, if the breechings are low, the horse will strike when going down hill and the vehicle is pushing him. The remedy for this case is simple. Raise the breeching sufficiently high so that there will be no tendency to draw the limbs together, and the evil will stop.

In the case of defective conformation, stand the horse on the floor over a seam in the boards or over a chalk mark. Then stoop down in front of him and observe the feet and limbs as to whether or not the feet set straight in line or whether they have a tendency to toe in or out. If they toe out, lift up the foot in the usual way and, holding it loosely with the hand, bring it back and see if it crosses the line behind the other foot. Then move it back and forth, and you will quickly see why he strikes and also the part of

the foot he strikes with. The best treatment I have ever found for a case of this kind is to weld a toe calk on the inside of the shoe near the front nail-hole. Turn the inside heel calk, $\frac{1}{2}$ inch high, and pound down the outside heel calk to almost nothing. This shoe will give the foot a tendency to roll toward the outside in going over the toe and will make him stride wider. If this does not help him it is a bad case. Then try an inside weight with the foot pared low on the outside. Many times while breaking a colt in he will form the habit of going sideways in the shafts which causes striking, and the shoer gets the blame. The remedy in this case depends solely on the driver. Usually after a month or so he goes straight in the shafts and the cutting stops.

Leg weariness is another common cause, especially in young horses. They will go all right for a few miles, then begin to strike. The remedy for this is very easy; more oats and hay and less hard driving. Still another cause is leaving the shoes on too long. How often have you heard the statement: "He went all right when you first shod him, but shortly after he began to cut himself." But if you tell him he left the shoes on too long he will contradict this and say the shoes have been on only three weeks. If you know this statement is not correct, simply get your books and show him that you are right in your contention. When the hoofs grow out long and the shoes settle into them and the clinches raise, most any decent horse will cut a little. The remedy is a new set of shoes, and don't leave them on so long the next time.

I find in my 24 years' experience as a shoer (several years of which was spent at the race track and breeding farms) that interfering is mostly caused by overdriving, underfeeding, neglect, abuse, and carelessness on the part of the owner, rather than just poor shoeing; and no one can stop it unless he has some intelligent assistance on the part of the owner.

How the Clip Injures the Horse's Foot

A. E. BACHMAN

My experience of forty years has taught me that the clip on the shoe should not be used. It is a frequent

cause of lameness; often giving rise to much trouble. The growth of the horn being downward, the clip offers an obstruction to the growth of the hoof which cannot be overcome. Hence, it is turned inward upon the soft structure of the foot. This is (after death) readily seen in the foot of a horse which has been shod several years with the clip. Removal of the cause will enable the horse to entirely overcome the lameness in two or three months. I have restored horses to perfect soundness in this way very frequently; even after a lameness of two or three years' standing. When it is thought necessary to use a clip, one of the smallest kind should be employed. Some smiths say that the foot, unless the clip is on, does not look finished. Others say the shoes will not stay on long enough without them. I used them a short time when I first started, but not for forty years, and I have never had any trouble in keeping the shoes on unless the feet were too long. The clip also tends to create seedy toe. I will attempt to explain later how to dress the foot, how to set the shoe, how to drive and clinch the nails, how to finish the foot so that the shoe will remain on until the foot has grown too long, without the use of a clip. I will also explain how to cure seedy toe when caused by the clip.

A Plea for Flat Shoeing

THOMAS NORTHWOOD, R.S.S.*

The shoeing of horses has been called a necessary evil, and no doubt there is a certain amount of truth about it, for when man sets his instincts to work in opposition to the requirements of nature troubles constantly begin to arise. The best course to follow when the time arrives for a young horse to be shod is to follow nature's lines as closely as possible, dress your colt's feet down perfectly level with the outer border of the sole and apply light, flat shoes which will allow the foot to take a bearing on the ground and will interfere as little as possible with the natural movements of the member. Horses shod in this way will travel better, last longer, and the feet and legs will keep sounder than if shod any other way. As regards nailing a light shoe (suitable for a month's wear) that

*Mr. Northwood holds the first prize of the Royal Agricultural Society (England) for horse shoeing; besides having won many other awards and medals. He has had twenty-two years' experience at the anvil.



does not require a lot of large nails to hold it on, get a perfect fit, which is the main point, and six or seven small nails (according to the size of the foot) which will hold almost any shoe on. No matter how nice the shoe or how good the nailing, if the fitting is bad, bad results will surely follow. If the shoeing of horses is to be carried out in a proper manner, a thorough knowledge of the structure of the different parts of the foot and the functions those parts have to perform or should perform is essential.

Foot Lameness of the Horse: Its Prevention and Relief

CHAS. GRUBER, D.V.M.

Below the carpus (knee) is to be found 95% of the front leg lameness in horses, and of this 93% is in the foot. With city horses, the first and most important cause of lameness is corns; and corns once present can never be eliminated entirely. If the cause of corns recurs, the corn will soon reappear. A corn is caused by pressure on the sensitive laminae, sufficient to bruise it. Corns are mostly found on low, weak heels; and on good strong, high-heeled and upright feet you seldom find one. The nearer the shape of a horse's foot at the heels approaches that of a mule's, the less trouble you have with corns. I have never seen a mule with a corn; and I treat a great many.

The second feature of importance in lameness is flat or convex heels which cause the most trouble of all, as they are invariably accompanied by brittle walls; and it is impossible to grow good high heels on account of the almost horizontal texture of the wall at the quarter.

The third important causes of foot lameness are: quartercrack (due to thin, brittle walls), inferior texture, improper relation of the foot to the limb, base-wide inside and base-narrow outside.

The fourth factor is sidebones, due largely to hereditary predispositions, and of lesser importance, sprains and bruises.

The fifth factor is navicular arthritis, which is incurable but can be relieved by the operation of neurotomy.

For the relief of corns (I don't say cure, which I think is impossible): first, remove the shoe, pare down

the weak quarter—bar and all—until it gets thin enough to yield under pressure. Try to keep the quarter and bar cut down as closely as possible—mark you: *not the wall*, but the portion between the wall and the frog, and in so doing you preserve the wall. I am going to show that the foot will expand sufficiently so that if the shoe will expand the foot, and the sole of the foot is removed at the quarter and bars, the pressure will be removed and relief secured. To apply the bar shoes: first level up the foot, preserving as much of the wall at the quarter as possible, then make the shoe with a bar that extends almost to the point of the frog; make it with the bearing surface on the bar and rim of shoe level about one third forward from the point of the heel or where the quarter and wall unite. See that there is plenty of pressure on the frog. If both quarters have corns, prepare both the same way; putting all pressure on heels and frog. These shoes can be made plain or with toe calks for the summer. Put heel calks on parallel with the foot; never at right angles. Bars for flat feet: bevel inside web of shoe and have it extend as far as possible so that it will act as a protection to the weak sole, and above all never allow the shoe to touch the sole. Make the bearing of the wall level and apply it so that at least one half of the weight of the quarter is on the frog.

For quartercrack: prepare the shoe in the same manner; putting on same way except at the bottom of the crack or where it would reach the shoe if it extended that far. Make a depression in the wall (bearing surface) one-fourth inch deep and two inches long; letting the wall rest on the shoe at the heel.

For sidebones: apply shoe as before; removing the pressure the same as for corns. In most cases a horse with sidebones also has corns.

Something New in the Shoeing Field

Despite the repeated assertions of the chronic pessimist, progress is the order of the day. Changes are taking place for the better, and even in such an old-established trade as horse-shoeing, new things are appearing. Probably what may be termed the newest development in this field is the appearance of a mule shoe for

drive calks. These new shoes are said to be the only adjustable calk mule shoes in the world, and are being made by the Giant Grip Horseshoe Co. They are drop-forged from special steel and are fitted with a toe clip as shown in the accompanying engraving. They come in sizes from 2 to 5 inclusive.

The Nebraska Association Convention

(REPORTED BY O. A. WELCH)

The recent Convention of the Nebraska Blacksmiths', Horseshoers' and Wheelwrights' Association at Norfolk was generally acclaimed the most successful of any yet held by the organization. The State was generally well represented by the delegates.

Some of the excellent constructive work done may be mentioned as follows: To extend the organization, locals will be formed in each county. Prices were discussed and certain questions regarding them settled. The organization was placed upon a systematic basis and a campaign for larger activities outlined.

The next convention was voted to be held at Grand Island, and the fol-



SOMETHING NEW FOR UNDER THE MULE

lowing officers were elected: Robert McIntyre, President; Jens Miller, Vice-President; S. P. Johnson, Secretary and Treasurer.

The social side of the convention consisted of an automobile tour, a smoker, and a rousing banquet closed the proceedings.

The Nebraska Association will welcome any Nebraska craftsmen who



will join hands with them for the betterment of the craft in that State. If you are a live smith and want to join a live organization that has already done things and is going to do more write to S. P. Johnson, Secretary, Stromsberg, Nebraska.

Ornamental Ironwork in English Cathedral

JOHN Y. DUNLOP

In an age of utility, which is also one of art and craft, there is nothing so interesting as internal wrought-iron fitments. They are features which are primarily useful and which a very little ingenuity has made beautiful. Many striking examples of the use of ornamental ironwork are to be seen in Gothic edifices, together with much that is commonplace and inferior. There are nevertheless some fine examples in the churches—past and present.

1669. The restoration by Bishop Hacket was by no means complete as to detail, and it was not until the eighteenth century when James Wyatt took up the work that the details of the restoration were completed. At this time the organ had been removed to its present position and the choir was separated from the nave by the beautiful screen of modern wrought-iron metal work which was executed by Skidmore of Coventry.

This screen, which is of open ironwork, is arranged with a passage opening in the center and has three hammered and turned balusters on each side. Overhead, the main opening is a pointed arch which is ornamented on the soffit with light ironwork, forming five intersecting circles with scroll ornament. The side openings have each pointed arches over the open panels, while complete circles fill in the spandril spaces un-

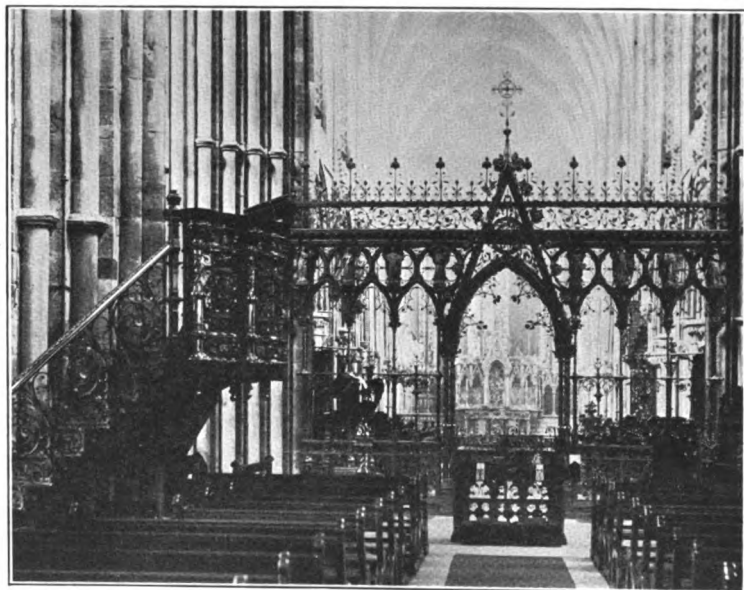
derneath the wrought-iron moulded and hammered cornice. In each circle is the delicate tracery of the quatrefort and a complete model of one of the patron saints of the church. Over the cornice there is a long open panel of scroll ornament which is finished on the top with artistic wrought-iron work in medieval pattern. In the tower part, each of the side panels has an intermediate

baluster which is received by a frieze rail and is finished with a scroll on each side. Underneath the seat rail, the side spaces are filled in with open scroll-work, which rest on the wrought-iron sill rail of the screen. This is one of the productions of the hammer, which we might say belongs to the present-day smith, in which much time and extreme care must have been afforded to its fabrication. The metal pulpit at the side of the screen is also evidence of this, and one has only to examine the beautiful railing which leads to the pulpit to say that "Skidmore of Coventry" should be handed down to posterity in connection with this work, for it is certainly one of the handsomest and most elegant specimens of a wrought-iron pulpit to be seen in England. It is a marvel of wrought-iron tracery work of the present age, and its beautiful scrolls with graceful foliage are the admiration of all lovers of real art in metal.

The hand rail is supported entirely by scroll-work.

In work of this kind, the master smith would have to make full sized drawings on a board, and bend his scrolls in the scroll wrench and fork to its outline. He would also probably make templates for the flowers at the ends of the scrolls and for the foliage with which the scrolls are ornamented, after which the work would be put together and built in position.

Of course, we can only guess from our experience of the means employed to produce them. Still it is safe to say that the methods employed at the time when these examples were built is the way of the present day art-smith, and that the work shown in the halftone illustration, which is eighteenth-century work, has the same remarkable amount of workmanship that is to be seen in the productions of the medieval ironworker which have been handed down to us by our forefathers.



THE CHOIR SCREEN, PULPIT AND BALUSTRADE IN LITCHFIELD CATHEDRAL IN ENGLAND

A well known specimen is the choir screen, pulpit and balustrade in Litchfield Cathedral. It is massive, simple and grand. The iron itself was taken from the original black country, on the borders of Sussex and Kent, from works which supplied the greater part of our older designs in metal. This cathedral was partly rebuilt from a design by Sir Christopher Wren and was pretty far advanced in

derneath the wrought-iron moulded and hammered cornice. In each circle is the delicate tracery of the quatrefort and a complete model of one of the patron saints of the church. Over the cornice there is a long open panel of scroll ornament which is finished on the top with artistic wrought-iron work in medieval pattern. In the tower part, each of the side panels has an intermediate

The Blacksmith a King in His Rights

WM. MORRISON

Go into a new town or a newly settled community and you will hear the unanimous question, "Where can we get a blacksmith? We must have a blacksmith; we cannot get along without one." Those remarks show



him to be a king; because the people in no line of business can get along without the smith. He must make the tools for all professions; he must make the plows to till the soil; he must keep them in repair; he must attend to all the wants of the farmers and the general public. They will walk into your shop with some article that is broken and say "Can this be mended? I don't believe it can." You look the piece over and say, "I can." You go to work and, in the course of half an hour, you have him ready to go back to work. He takes the article, looks it over and says, "I didn't think it could be done, but it's a good job and has saved me money and maybe a week's time waiting for a new piece". This shows the smith to be a king. Does not this man look at him as a king? Would not he be in a bad way without the smith?

Now the other side of the story:

After you have done the work of the public, they leave your shop satisfied with your work and brag about what a good fellow you are; but time goes on until your bills are due for work and material and, as you must meet them, you send statements to the fellows who cannot get along without you. Result: they pass by, smoking cigars; they don't see you now; their work is all done; they don't need any repairs. The smith is black and dirty; looks like a slave, not a king. Mr. So-and-so owes you \$25.00 or \$30.00. You send another statement. He comes in with a 10-cent job, "Say, here is \$2.00 on my account; give me credit for this; would pay you more, but I have got to take my family to the fair and enjoy myself!" But—you and your family stay at home and work.

You place your accounts in other hands for collection. The justice says, "Why, you can't collect a blacksmith bill; blacksmithing is a trade!" Must a smith toil and sweat over the fire and hold his customers up to make them pay? This is where the king is looked upon as though nothing were his. Wife and children do not need recreation or money or clothes. Yet this is the man they cannot get along without. What are we going to do? Can't we get together some way and get laws to protect the smith? Let's start the ball rolling and see if something can't

be done. Don't let any debtor pass you with \$10.00 in his hand, because you are a poor smith. Let us hear from some other king in slave's attire on this subject.

Repointing Plowshares

WM. POGUE

In a previous number of the journal I noticed an article on pointing plowshares of which I think very well; but it would be entirely too slow for this country (Texas) and the price too high. I will give you an idea of the way I point plowshares.

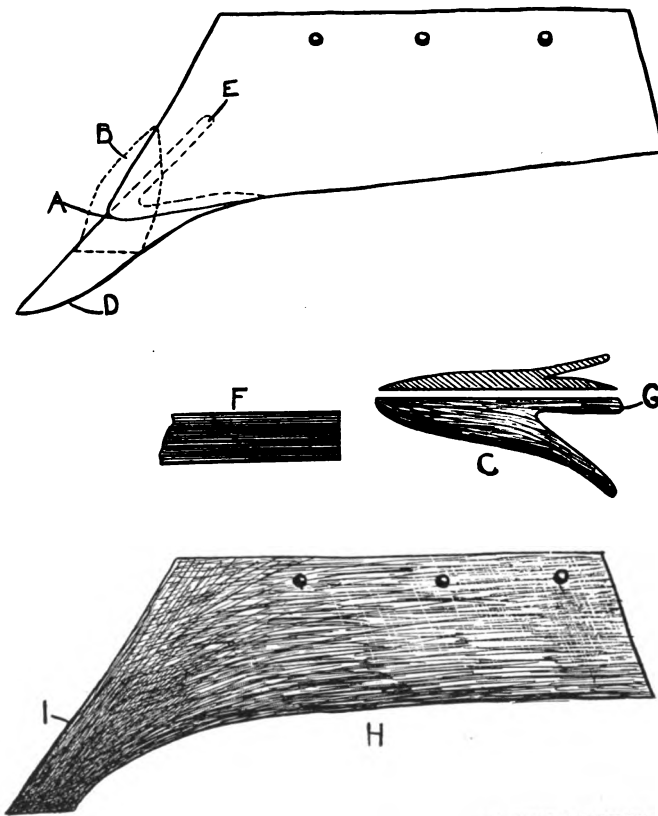
In the accompanying illustration, A shows the point of a plowshare that is worn off very short, but the share is still good. The piece, D, is welded on as shown, and then after welding heat again and bend back as shown by the dotted lines, B, and hammer down smooth and weld up. After this a small weld is made in the throat piece, E. In making the piece, D, take a piece of 2½ by 1½-flat steel, as shown at F, split the end about 1¼ inch, draw out E, as shown at C, to about 1/8 by 5/8 by 2½ inches.

Stave up G and make a short escapement on end cut of piece, as shown at F; draw down very thin and dress the edge with a rasp; making it smooth. Fig. H shows share finished. The point at I can be welded down so that it will not show. I can point up a plowshare in this way in thirty minutes and we receive fifty cents for small points and seventy-five cents for 14-inch points.

Hammers—Their Importance and Their Making and Tempering

E. V. S.

There is no doubt that the hammer has played an important part in the making of modern civilization. An old proverb says: "By the hammer and hand, all the arts do stand". But upon examining the more elaborate arts and complicated mechanisms of modern times we may be impressed that this expression is not applicable to the present day. If we pursue our investigations, however, and follow the progress of industry to its ultimate end, whatever its



A SHARE IS POINTED UP IN THIRTY MINUTES BY THIS METHOD



nature, we shall find that both hammer and hand had everything to do with establishing and maintaining it.

To trace the origin of the hammer, commencing with its prototype—the human fist—and advancing step by step through the stone age and down the intervening ages until the finished hammer of the present day is

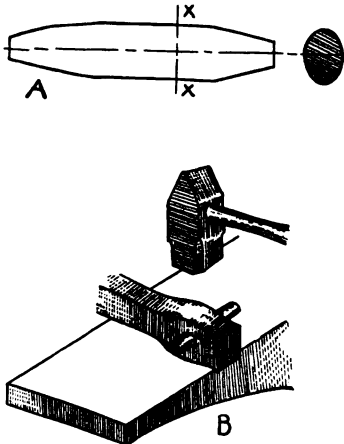


FIG. 1—THE BULGED SIDES ARE FORGED DOWN

reached, would read like a romance. But, like a pleasing story, it is perhaps of very little practical value, however entertaining the narrative might be. Suffice it to say that only since a comparatively recent date (1840) has the hammer reached its present state of perfection. This is all the more interesting to us because the inventor or perfecter of the hammer now in use was a blacksmith. His name stands as the criterion of all hammers, and is known the country, if not the world, over—David Maydole. The story of his achievement has often been told and is a fitting conclusion to the romance of the hammer. During the first twenty years after the adoption of his hammer, however, Maydole frequently experimented to discover further improvements in the instrument, and there is not a turn or curve which has not been patiently considered and reconsidered, until no further improvements seemed possible.

That the hammer, contrary to popular opinion, is a refined instrument is manifest from the great artistic skill shown in many handicrafts and in the number of beautiful specimens of *répoussé*, wrought and beaten work in iron, copper, gold,

silver and brass. They clearly evidence the high class of finished work involved in these crafts where the hammer is the only tool used.

There are numberless sizes and shapes of hammers for use in these various trades and for various operations. Blacksmiths themselves have different styles and forms to suit their individual tastes. One wants a heavy hammer and another a light one for the same work; one wants a long hammer and another a short one; one wants his handle to spring and another does not. So it goes, and every one will tell you that his way is the best and will explain why it is. The only rule that can be applied with impunity is that if your style suits, and you can do the work satisfactorily, that is all that is necessary.

A good hammer is a tool to be prized. The face must be properly hardened and tempered in order to prevent it from getting hollow in the center or being too hard in the corners; thus causing it to chip. The face must be perfectly smooth so as not to leave any nicks or dents in the work. There are certain rules that must be followed to attain the desired result and, while they may differ in method, the reasons for, and the results of, them are the same.

Second only to the anvil is the hammer in blacksmithing, and probably the most useful is the ball-peen, or machinist's hammer as it is also known. It is made heavier on the face than on the peen end so that the face will hang downward without

any special effort. This hammer generally weighs from 1½ to 2½ pounds and the handle is about 15 inches long.

In forging the hammer by hand, as a general rule, the eye is made first. A bar of steel—75-80 point carbon, of the proper size (1½-inch square is good) and convenient length for handling is used, and as much forging and shaping as possible is done before cutting from the bar. Heat the end red-hot, back three or four inches. Here is where the trouble begins in handling tool steel. If, in the process, you ever get it more than red hot, it is spoiled. The best thing in such a case is to cut off the burnt part in spite of all proposed cures. This is to be remembered whenever treating tool or spring steel. If the burnt part cannot be cut off, heat it to a low heat and cool in lukewarm water half a dozen times; this will improve it, and if you can hammer it some, do so.

Having heated it red-hot, a hole is punched about two inches from the end with a punch that will make a hole about 1½ by ¾. If the punch sticks in the hole, cool it off and put a little coal dust in the hole; that will prevent the punch from sticking again. This is a good thing to do whenever a deep hole is to be punched. Great care must be taken to have the hole true and straight. It is very difficult and sometimes impossible to straighten up a crooked hole.

After punching the eye, the sides of the stock are generally bulged

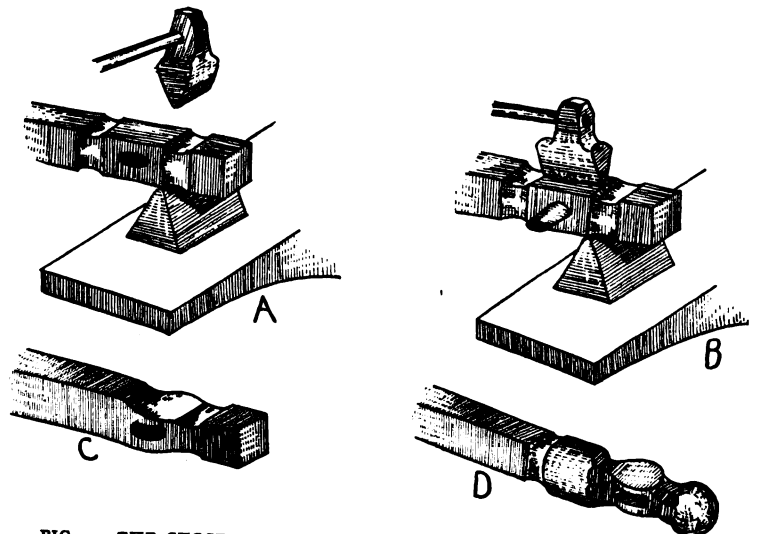


FIG. 2—THE SUCCESSIVE STEPS IN THE FORGING OF A HAMMER



out and, to prevent knocking the eye out of shape while forging down the bulge, a drift-pin (A, Fig. 1) is used. This is made of tool steel and tapers from near the center toward each end; one end being somewhat smaller than the other. The section in the engraving is taken at X, X. This center is the same shape and size as the eye is to be in the hammer.

When the bar has been heated, the drift-pin is driven tightly into the hole and the bulge forged down in the same way (B, Fig. 1) as a solid bar would be treated. When the drift-pin becomes heated it must be driven out and cooled, and under no circumstances should the bar be heated with the pin in the hole. The pin should always be used when there is danger of knocking the eye out of shape.

The hammer is then roughened out with two fullers as illustrated at A, Fig. 2. After this is accomplished, the metal around the eye is spread sideways, using two fullers as shown at B, a set hammer being used for finishing. This leaves the forging like C. The next step is to round and

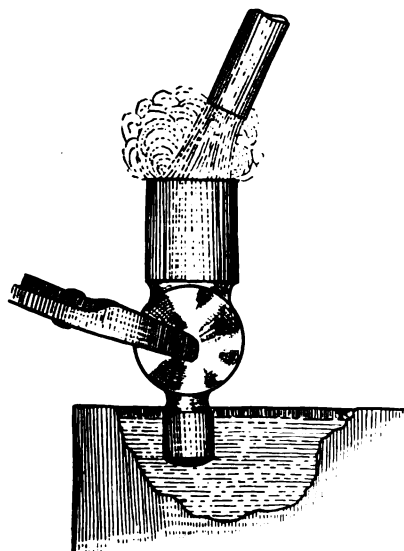


FIG. 3—THE FACE SHOULD BE HARDENED BY POURING WATER ON IT

shape the ball which is forged as nearly as possible to the finished size.

A cut is then made in the bar where the face of the hammer will come and the end rounded up; leaving the work like D. The necked parts of the hammer each side of the eye are smoothed and finished with fullers of the proper size. Some hammers are made with these necks round

in section, but the commoner shape is octagonal.

After smoothing off, the hammer is cut from the bar, the face forged true and both ends ground, when it is ready to be hardened and tempered.

The fire is gotten into good shape—the coal well charred and free from all sulphur and thick smoke. The face end of the hammer is then placed in the fire from an upright position and heated slowly and evenly; making sure that the corners do not get overheated. Should the corners get hot enough to harden before the center, stop blowing the fire until the center has come up to a cherry red or hot enough to harden evenly with the corners. Now pour a small stream of water directly on the center of the face of the hammer, as shown at Fig. 3, and hold there until stone-cold. An old teapot will answer nicely for this purpose and the face will be of a uniform temper. Polish the face of the hammer bright, then place the round or peen end in the fire in an upright position and heat very slowly; as while heating to harden the round end the temper will draw to a blue in the face end if properly timed or regulated; thus one end may be hardened and the opposite end tempered in one operation, but be careful to watch both ends of the hammer at the same time.

If the round end gets hot enough to harden before the temper appears on the other end, stop blowing the fire until the temper begins to show up. It will not matter about the round end (after hardening) whether any temper be drawn or not, as there are no sharp corners to break off, but the temper may be drawn by holding over the fire and continually turning the hammer around, or it may be done by placing a heated heavy iron band over the end.

When heating the ends of the hammer to harden, do not heat to a hardening heat more than three quarters of an inch back from the end, and *never* harden the eye. A hammer that is made, hardened and tempered after these instructions will not get hollow in the center nor break off at the corners on the eye.

The cross-peen, blacksmith's or riveting hammer, is shown in the different steps in the process of forging in Fig. 4. First the eye is punched as shown at A. The peen is then

drawn out and shaped and a cut started at the point where the end of the hammer will come (B); the drift-pin being used as illustrated at B, Fig. 1, while forging the metal around the eye. The other end of the hammer is then worked up into shape; using a set-hammer as indicated at

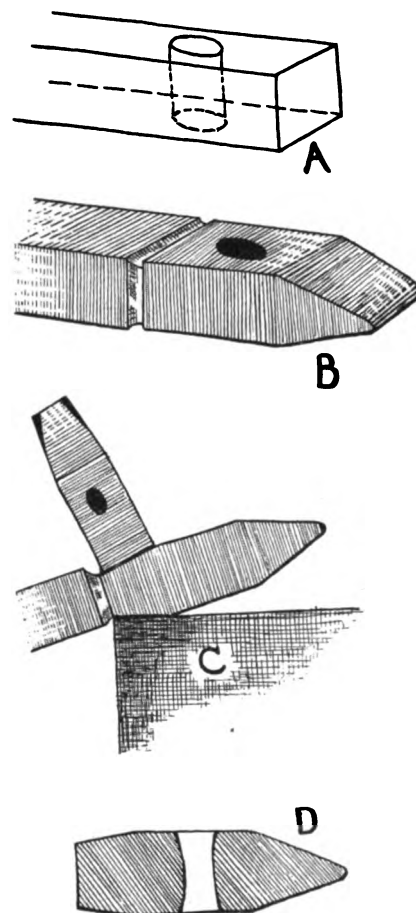


FIG. 4—FORGING A CROSS-PEEN HAMMER

C. When the hammer is as nearly finished as may be while still on the bar it is cut off with a hot chisel; leaving the end as nearly square and true as possible. After squaring up and truing the face, the hammer is tempered in the same way as described for the ball-peen. D shows a section of the hammer with the hole spread at each end.

Bear in mind that there is a great difference in the temperature of water standing in the troughs and tanks of the smithy at various times of the year. It is a great mistake to harden cast-steel tools in perfectly cold water, as this is one cause of the hammer cracking during the hardening process.

Sledges are tempered and hardened in practically the same manner as the

hammers. Of course, hammers are made in various degrees of temper, according to the work to be done, but for all ordinary usage the method outlined is practicable.

The next important job, and a particular one, is wedging the handle in the hammer head. Shave and rasp as little as possible from the head end of the handle when you have it near to the correct size. Then when you get the handle in the hammer far enough it will touch at all sides and practically fill the hole. The eye of the hammer is, of course, smaller in the center, and the handle does not fill the hole on the top side. Make sure that the handle sticks through five eighths of an inch and then take a cold chisel just the width of the hole and split the protruding end of the handle; driving the chisel well into it.

Now place the hammer in a vise, taking care not to bruise or mar it, and work out the chisel. Then into the chisel cut drive a wedge (of yellow pine or black walnut) as far as possible. Now with a suitable piece of flat stock, drive the wedge down carefully into the handle; spreading the end of the handle until it fills the hole in the head perfectly. The protruding end is now carefully cut off flush with the hammer head.

When it becomes necessary to dress the hammer again, the best way to get the handle out is to take a gimlet or bit the size of the wedge's width and bore out as much as possible. What can't be gotten out by boring, pick out with a scratch awl or a narrow chisel. If possible, now, drive the handle in a little farther; then turn upside down and squeeze the ends of the handle together in a vise. Now the handle can be driven

ant upon a good, well-formed hammer. A hammer, carefully and correctly made by yourself to suit your own eccentricities and tricks of workmanship, seems like an old and faithful friend—ever ready to do its duty in a masterly manner and willing to help you out of tight places. Don't envy a good hammer; try your skill and have one.



Benton's Recipe Book

Small wounds caused by a rusty piece of metal oftentimes develop blood poison, or lockjaw. Quickness and despatch in treatment are therefore essential requisites. The following old-fashioned but infallible "first aid to the injured" is of value to remember.

Ordinary brown sugar is heated on a surface sufficiently hot to produce a smoke and the wound is held in this smoke for several minutes. No serious results will follow after this treatment, and all soreness will be taken out of the wound, and may even prove effective though the application takes place some time after the accident. The smoke given off by burning woolen rags is equally effective, and they are perhaps more often available, particularly so in the shop.

Rust removers and rust preventers are there untold—the more the better; if you have one send it in—and the following four are particularly good, having been vouched for by competent mechanics.

A rust preventive for tools that has been found O. K. in every respect is as follows: Take a pound of vaseline and melt with it 2 ounces of blue ointment—what druggists call one-third—and add, to give it a pleasant odor, a few drops of oil of wintergreen, cinnamon or saffras. When thoroughly mixed pour into a tin can—an old baking

powder can will do. Keep a rag saturated with the preventive to wipe tools that are liable to rust.

Another one, to preserve steel from rust, dissolve 1 part caoutchouc and 16 parts turpentine with a gentle heat, then add 8 parts boiled oil and mix by bringing them to the heat of boiling water. Apply to the steel with a brush, the same as varnish. It can be removed again with a cloth soaked in turpentine.

Rust from polished steel is difficult to remove without scratching the highly polished surface. A very effective mixture for removing rust from such surfaces without injury may be made as follows: Ten parts of tin putty, 8 parts of prepared buckhorn, and 250 parts of spirits of wine. These ingredients are mixed to a soft paste, and rubbed in on the surface until the rust disappears. When no trace of rust seems to remain, the surface is polished with a dry, soft cloth.

To remove rust from small steel parts, such as screws, nuts, pins, etc., when they are not badly pitted, is accomplished by dipping them into a dilute solution of sulphuric acid. To prepare the acid bath, pour the acid little by little into a bowl partly filled with water. After each addition of acid, try one of the rusted parts, and continue trying until the proper strength is obtained to eat the rust off clean. Better results will be obtained in this manner than by working to a set formula. Let the parts remain in the acid bath until cleaned of rust, then remove and wash in soda water, and then in benzine. Finally dry the parts and brighten in sawdust.

About soldering aluminum—in answer to W. R. Q. of New Jersey.

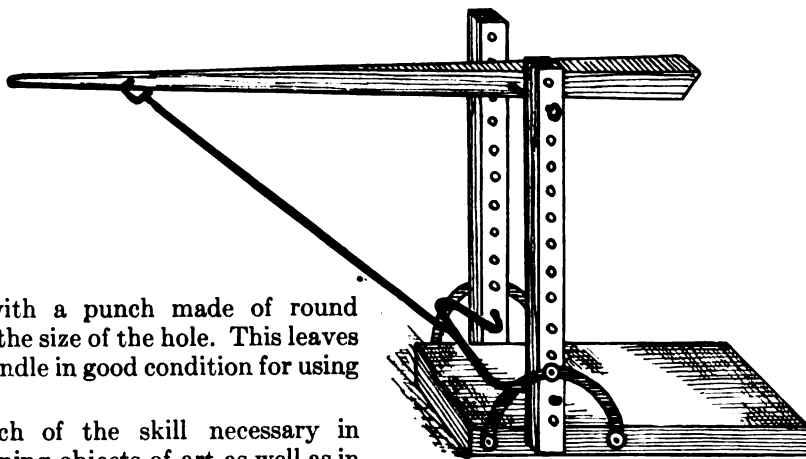
There are many mechanics who will vociferously state that they can "solder aluminum." Whether they can or not, it is a pretty well proven fact that you cannot "solder" aluminum; you must treat it as a brazing proposition. Firstly you want a special aluminum solder composed of these ingredients: Tin, 2 lbs.; spelter, 8 ozs.; aluminum, 1 oz.; phosphor tin, 1 oz. In making this solder put the spelter and aluminum in a crucible and melt. When melted add the tin and stir well. Then pull the crucible from the fire and add the phosphor tin. Pour the solder in thin strips, and it is ready for use.

The melting point of this solder is so low that it can be used on sheet aluminum as well as on alloys of zinc and aluminum. For brazing aluminum, such as the broken lugs of an auto casting, etc., it will be found excellent.

In handling the job, if it is a small piece, hold it in a vise; other large pieces, such as a cracked or broken auto crank case, must be done on the floor or bench. The broken parts must be firmly clamped together when the solder begins to flow.

Scrape free from dirt the edges or surface of the piece to be brazed, then heat with a torch or blow pipe, holding the stick of solder close to the flame so that some of it melts on the edges or surface of the piece being handled. This solder will not flow in liquid state like ordinary solder; it will be plastic and will cling together in lumps on the surface of the work. Now, while it is hot, take a steel scraper—a triangular file ground to a point will do—and thoroughly scrape the edges or surfaces of the pieces.

You will then find on wiping off the excess solder that you have a perfectly tinned surface. Then clamp the pieces to be brazed together and heat them hot enough to flow the brazing solder with which you have tinned the edges. When hot screw up the clamps until you have a tight joint—then let cool. By this primary tinning process



AN EASILY MADE BUGGY JACK

out with a punch made of round wood the size of the hole. This leaves the handle in good condition for using again.

Much of the skill necessary in fashioning objects of art as well as in performing every-day work is depend-



and subsequent melting of the compound you will make a repair that will stand any ordinary treatment.

The drilling of excessively hard material—replying to James Bond of Kentucky—is best accomplished by a perfectly flat iron drill. It should not be drawn out as thin as one which is to drill soft material, and the cutting edge should not have as much bevel. The temper is drawn to a light straw; if this is found too soft, harden and draw no temper. Should this fail, heat the metal and lay a piece of limestone on the exact spot which is to be drilled. Use as small a fire as possible, so as not to draw the temper or hardness over more surface than actually needed.



Queries—Answers—Notes

Factory-Made Shoes.—I should be pleased to see an article in your paper on factory-made horse and mule shoes. How they are heated, bent and punched; sketches of formers and tools for same.

F. A. POOLE, S. Africa.

To Cure Knuckling.—Replying to Bro. W. E. Thomas in a recent issue, regarding his plan for knuckling, I believe I have a better plan, which is to weld a piece on the toe and allow it to project out about an inch and a half, then circle back to the hoof. This helps to support the shoe.

J. O. WOFORD, Ky.

A Buggy Jack.—My plan and dimensions for making a buggy jack: Uprights, two feet high; width, 1½ inch; thickness, 1¼ inch; and block, 2 by 4 by 11 inches; lever, 3 feet long; rod, 2½ feet long with T welded on; bring rod up again at lever on straight line with T one inch from upright and mortise in lever. With bolt lift rod even with lever; place under axle and let rod loose and bear down. J. O. WOFORD, Ky.

A Michigan Smith's Opinions.—When I first subscribed to THE AMERICAN BLACKSMITH I thought one year would be enough, but now I look for it regularly and only wish it would come oftener. When my paper does come I always look up "Heats, Sparks, Welds", for this column has in many instances put my "thinking cap" on, simply because the remarks there invariably hit the nail right on the head. And I do wish that Dr. T. J. Kean would keep right on the subject of which he wrote in the October issue. I agree with him, although I am young at the trade compared to some of the brother blacksmiths, but I take a great interest in shoeing and in lame horses in particular. I don't care about automobile work; I believe horses will reign forever.

Around this section of Michigan we claim to have the best horses in the State. This may be considered a very broad statement, but Mr. Farmer thinks that if he hasn't got

a good team he is far behind his neighbor. For driving horses we rank very low, but for large draft horses we take the lead.

A little over a year ago the boys in this vicinity got together and made up a new price list for our work. We now get 20 cents for re-setting; 40 cents for new from 0 to 6, and 50 cents for No. 7 shoes, and all other work accordingly. There are five shops in this town of 1000 inhabitants and we all get along very agreeably. Benton's Recipe Book is a crackerjack and Bison's Notes are all O. K. That line just suits me.

A. H. ARMSTRONG, Michigan.

Experiences in Price-Cutting.—Speaking of price-cutting, I don't believe any smith ever made a friend by cutting prices or by refusing to raise them when conditions required a raise. I had an experience in 1901 while running a shop in a small settlement about half way between two towns. One town had the price of shoeing at \$1.50 per set and the other at \$1.25 per set. I started in at the higher price, but owing to the small amount of trade coming I dropped to the lower price; thinking I would get more shoeing and other work as well. I was mistaken, for I lost part of the trade I already had and gained none. I was obliged to sell out at the end of the year at a loss.

In my next shop I decided to keep up my prices, but the price of stock advanced considerably and all the other smiths wanted to raise the prices—commencing with shoeing. I refused; fearing that I would lose some of my customers. However, I got no thanks for this and lost several of my best customers as well. In the year 1905 I purchased my present location; feeling confident that I had learned a little about running a shop. In 1907 the horsehoers throughout the county got together and decided to raise the price of shoeing from \$1.50 to \$2.00 per set. This time I was strongly in favor of the raise. Of course, there were kickers among the farmers; some declaring they would boycott us; but they still come with work and plenty of it, and I don't believe that one of us lost a customer. I know I didn't, and I have been prospering ever since. IRA B. HARVEY, California.

From Far Zululand.—A little while back I wanted a pair of circle plates at once, and as I have previously always purchased them from a "jobber," as you would call him, I was in a fix for a moment, but I thought out a plan which I will explain to you for the benefit of some "out-of-the-way" smith. I got an old blockhouse plate, a piece of ¾-inch square iron, put the piece of square iron through the tyre bender and bent it to the required circle—26 inches—bored three holes in it and riveted it to the plate. I then put two studs in the plate, two inches away from the square iron, cut a bar of 2 by ½ inch in two, and heated both in the fire at once. As I was bending one piece the boy was heating the other, and I finished them in good time and made quite a satisfactory job. I shall always make my own in future and save the jobber's profit.

Living in this remote part of the earth one gets somewhat behind the times. I am 24 miles from the next shop and 79 from another, but I am glad to see by your "Honor Roll" that we are all subscribers to the same journal.

It is only within the last two years that a motor car has been seen in this part of the country, but they are not a curiosity now. Still, your "humble servant" cannot as yet boast of having ridden in one. "£2 (\$9.75) per hour" was the reply I received regarding price. I shall wait till the price comes down. The Ford is a very popular car in these parts; mainly, I believe, owing to its price (£195) being about £50 cheaper than any other and a good serviceable car at that.

I am here on "my only," and do all kinds of repairs; and sometimes when I run out of anything I have to use my head a bit to think out a way of doing a job.

J. BAIN, Zululand, S. Africa.

Brake Horsepower.—Will some of our readers please give me a little information on brake horsepower as applied by engine manufacturers?

One firm builds a single-cylinder engine with a 5 by 7½-inch cylinder and claims 4 horsepower at 400 revolutions. Another builds a 4-cylinder engine with 5 by 7-inch cylinders and rates it 40 horsepower at 500 revolutions per minute.

If the single cylinder only develops 4 horsepower, how can the 4 cylinder develop 40 horsepower at only 100 revolutions more speed than the single and smaller cylinders? Will someone please explain this and oblige, M. ALBRIGHT, Indiana.

In Reply.—This question cannot be answered accurately because three most important items are omitted: Whether the engines are two- or four-cycle, what the mean effective pressure (M. E. P.—average pressure throughout the stroke) is, and whether the horsepower as stated is the brake horsepower (B. H. P.) or the indicated horsepower (I. H. P.). Naturally, without this information we cannot be expected to decide this question. But we may remark that at 400 R. P. M. we should infer a 2-cycle engine, and if the 4-cylinder one is 4-cycle, the stated R. P. M. is very low. The average R. P. M. for a 4-cylinder, 4-cycle motor is 1,000.

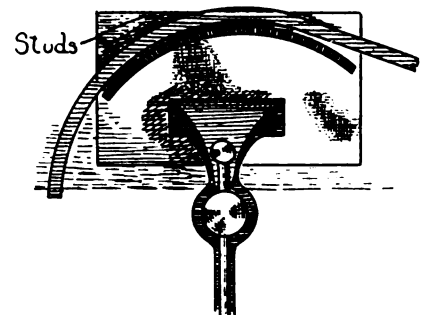
The indicated horsepower can be found for the latter engine by assuming the M. E. P. as being 75-100, as it generally is. In the following formula, D² = bore of cylinders in inches squared, L = stroke of piston in inches, R = revolutions per minute, N = number of cylinders and M. E. P. = mean effective pressure. The formula is:

$$D^2 \times L \times N \times M. E. P. \times R = I. H. P.$$

substituting the values, we have:
25 x 7 x 4 x 85 x 500

$$= 550,000$$

Multiplying and dividing this equation we find that the indicated horsepower is 54; giving 85 as the mean effective pressure and making no allowance for the mechanical efficiency of the engine.



A CIRCLE-BENDING IDEA FROM SOUTH AFRICA

The S. A. E. (Society of Automobile Engineers) horsepower formula is:

$$D^2 \times N$$

$$= 2.5$$

and based on 1,000 feet per minute piston speed. The number of R. P. M. for 1,000 ft. P. M. on a 7½-inch stroke is 800; but this engine is only going at 400 R. P. M. The S. A. E. rating for a 5-inch bore at 1,000 ft. piston speed per minute, or 800 R. P. M., is



10; and as the engine in question is traveling at 400 R. P. M., its indicated horsepower would be 5, without regard to its mechanical efficiency.

Allowing for difference in design between the two engines and determining the mechanical efficiency and mean effective pressure we may safely say that the ratings of these two gasoline engines are correct, as far as we are able to determine from the information given.

E. V. S., New York.



The Automobile Repairman

The carburetor's most usual complaint consists in the stoppage of the jet by some solid particle carried into it by the fuel. If this is suspected while the motor is running, the air supply may be reduced suddenly so as to increase the suction at the jet. If this does not remove the particle, the float should be agitated; this will make the carburetor flood, and the overflow from the jet-chamber will probably wash away the obstruction. If these operations fail to give the desired result, it will be necessary to open the passage to the jet with a fine wire pushed through it. Do not use a needle for this purpose, as it may break off in the jet. If the carburetor is provided with a well this should be opened so that the precipitate can be removed. The tap in the supply pipe should be turned off before the well is opened, otherwise much gasoline will be wasted. It may be found that water has collected in the carburetor; this may be removed in the same way by emptying the well.

To remove grease or oil marks from a French gray or light-colored car do not use paraffin or gasoline, but procure a piece of castile soap, a sponge and a bucket of cold water. Lather the sponge well with the soap and wash off the marks of oil or grease. Thoroughly rinse all the soap off, and then polish with a leather in the usual way. The other hint, which also deals with the treatment of panel surfaces, is for the removal of tar spots. This is effected by smothering the tar with butter in the evening, and leaving it on until next day. Then place a little paraffin in a pail of water before sponging off, and finally finish with a soft bit of linen or silk and a little linseed oil, as the latter freshens dull places where the tar has been.

Refitting an Engine Wrist Pin. In most auto engines the wrist pin in the piston, to which the connecting rod end is bushed, is held in position by cap screws and lock nuts through the bosses in the inside of the piston. The pin is rigid, the rod moving around it on its bronze bushing. When the bushing wears, a "knock" in the engine de-

velops, which is made worse by the wrist pin wearing on the under side which takes the thrust, that is the side next the crankshaft. To remedy this trouble it will be found a good policy to slacken off the cap screws, and turn the wrist pin one quarter round, making new "spots" for the ends of the screws to clamp on. Then refit the connecting rod bushing and it will be found that the knocking has disappeared.

Among the many causes that may result in loss of compression in a motor is the settlement of any dirt or foreign matter in the seat of either the inlet or exhaust valves, the latter being the more prone to this trouble. Bits of carbonized oil very often fall on the seat of the exhaust valve and are pounded into the metal, causing the valve and valve seat to "pit." They, of course, do not fit closely after this, and the compression is forced out between them as a consequence. In a case of this kind it is necessary to remove the valves and grind them in.

Aluminum floor and running boards will keep bright and untarnished for some time, but will eventually grow very dull in places where there is no wear to keep them shiny. Scrubbing with ordinary substances is of no avail, and the only thing to do is to apply a solution of 10 to 15 per cent. sulphuric acid. This should be well rubbed into the surface with a stiff brush, and afterward washed off with pure water. Care should, of course, be taken that none of the acid gets on the hands or clothes, or on the wood parts of the car.

One of the errors to which nearly all automobile users are addicted is the slamming of tonneau doors. Probably the habit comes from the accepted practice of slamming the doors of broughams and other horse-drawn vehicles which are so constructed that it does not injure them. With the ordinary type of touring car body, however, the door frames are not braced with sufficient solidity to withstand successfully the effects of repeated shocks from the door. As a result the frames of many bodies become loosened before their time. It is a good rule for the car as for the house, that attention be paid to the injunction, "Don't slam the door!"

How to keep cotter pins. A French contemporary suggests that assorted cotter pins should for convenience's sake be kept on a bit of string or wire threaded through their eyes. By picking up the whole bunch, then, it is much easier to select the size desired and to remove it than it is to "fish" for it in a small box filled with all sorts and sizes.

Castor oil not a good lubricant. Some steel balls from bearings which had developed a curious corrosion effect were submitted for investigation of the cause. These balls had been immersed in a lubricant containing castor oil. We quote the following:

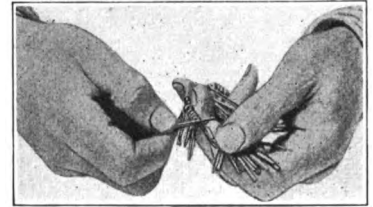
Preliminary experiments comprised the exposing of a number of balls to the action of various oils, including castor oil, compound and mineral oils, while among other oils were finest pure castor oils, pure mineral oils, various fatty oils, and the fatty acids of various fatty oils, such as lard, olive, etc., it being thought probable that such fatty acids might have a very pronounced effect. The experiments extended over several months at a temperature of approximately 100 deg. Fahr.

These tests point definitely to the conclusion that castor oil and compounds thereof stand alone as being especially energetic in this corrosive action of hardened steel surfaces, for the action of the above-mentioned fatty acids was practically negligible, as was that of the fatty oils

themselves, while with pure mineral oil there was no sign of any change.

The castor oil apparently has a selective action on hardened steel surfaces in that it dissolves out only certain of the crystals, and when the skin has thus been penetrated, its action on the underlying softer metal is more uniform, and so the still undissolved portion of the skin becomes detached and breaks away.

After a car has been in use some time, especially if the body be rather weak, the wood unseasoned, or the frame unduly springy, the doors will rattle. Although the actual play is very small, it makes a most annoying noise, and in these days of quiet engines and quiet transmissions, body rattles and body squeaks are exceedingly irritating. All that is necessary to stop a rattling door is to get a thin brass plate, or, if preferred, one may use a thin piece of fiber or leather, and fix it onto the door post. Of course, a little judgment is required. One should see that the thickness of the plate is only infinitesimally greater than the amount of play in the door, and if the door is loose all the way down another plate should be fitted about an inch or so from the lower end of the door jam. It is



STRING YOUR COTTER PINS ON A CORD

obviously a makeshift, but there is no other easily applied remedy, as nothing but entirely refitting the doors would stop the looseness, and this would necessitate repainting.

Spark Plug Adjustments

A. J. BIRD

Between the carburetor and the ignition it is a toss-up as to which causes the most trouble. The simplest and easiest way to test for ignition trouble in a missing cylinder is to open the relief cock on the top of each cylinder, one by one; and if a blaze is emitted, that cylinder is firing.

Nowadays there are numerous auto engines made that have no relief cock. What with electric starters, automatic carburetor adjustments and hot air regulators (besides the agitation for "cleaner" appearing, enclosed motors), they have been left off. A quick way to test the cylinders for a missing spark plug is to short-circuit one cylinder after another. This is done by holding a screwdriver or other instrument so that it will make a connection between the head of the plug and some part of the motor. The instrument must have a wooden



handle, so the operator will not receive any shock from the ignition current.

There are still many cars on the road that have the multiple cylinder coil or master vibrator, such as is on the Ford. The best method for determining which cylinder misses is to hold down each vibrator, one at a time, until the missing cylinder is found.

The ear can become experienced in detecting two general symptoms: regular misfiring (that is misfiring

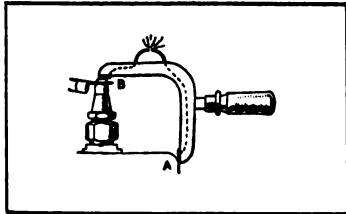


FIG. 1.—AN EASY SPARK TESTER

that occurs only once, but at the same time in every cycle of the motor) of which a defective plug or disconnected high-tension wire are the causes—a defective valve is also probable and intermittent misfiring in one cylinder may be due to a defective plug or loose terminal connection or may be a valve that is not closing tightly. It is in distinguishing regular misfiring, intermittent misfiring in one cylinder and intermittent misfiring in several or all cylinders that the ear must be trained to a nicety.

Fig. 1 shows a device which will prevent getting a shock while testing. It is provided with an insulated handle and carries two wires that are made terminals by the contact plates A and B touching the spark plug and the engine head. The two wires are brought up through the insulation and the ends bent in close to each other, or the same as the terminal wires of the spark plug. It is very useful in quickly ascertaining the location of the trouble.

After locating the misfire from the outside it may be necessary to observe the spark plug working exposed in order that the spark may be verified by actual sight. The usual way for this to be done is by unscrewing the plug after taking off its wire, recoupling the wire, and then balancing the plug on some convenient corner of the engine head. Several of the minor annoyances (which render the most peaceful life checkered at times) are

known to occur at this point. One is that the terminal end of the plug has an aggravating habit of tumbling into ground contact and short-circuiting the spark; another is that the plug will roll off the engine, and as the ground return is very possibly destroyed (if the plug hangs swinging), a considerable strain is thrown on the coil, and eventual failure of the internal insulation has often been made in this way. The easy way to preclude any possibility of these damages is to rig up a small metal bracket as seen at Fig. 2.

One end of the bracket is eyeletted, and may be threaded over any convenient bolt near the plug opening. Plug tests are then made without detaching the wire at all; the nut on the central electrode is simply slacked back a little, the plug removed and hung inverted in the forked end of the bracket while the tests are made. This bracket also comes in handy when cleaning a plug that is too hot to hold.

If the trouble is found to be in the spark plug, it is cleaned. The bushing which holds the porcelain in the shell is unscrewed, the porcelain (or mica) is removed and the shell and porcelain soaked in kerosene or gasoline. Clean all carbon off each. Don't scrape porcelain, as it will roughen the glazed part and cause it to retain carbon. If the oil is burnt on the porcelain, muriatic (or sulphuric) acid will remove it. In placing the porcelain back into the shell, be sure the copper washer is placed back and

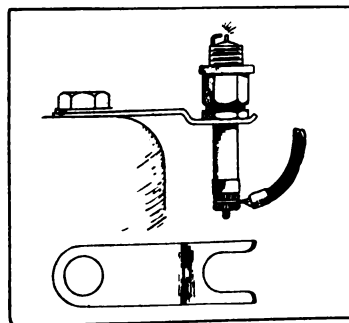


FIG. 2.—ANOTHER DEVICE FOR TESTING PLUGS

the bushing screwed up tight enough to prevent leaking.

Fig. 3 (next page) illustrates some more causes of spark plug missing. A shows where the spark arcs from the shell to the terminal when the electrodes are too far apart or the por-

celain becomes oilsoaked because of a loose bushing, and the porcelain is also too short in length as shown by the dotted arrow.

In B the electrodes have come together, which was probably caused in screwing plug into cylinder bent points together. C—the wire loose on the terminal; occasioned by imperfect tightening of terminal or worn thread. The method of adjusting the distance between the points of the plug, either by folding a piece of paper or using a business card and inserting between the points, is shown by the dotted lines at A. The distance should be about 1-32 of an inch, though on a magneto plug the points can be farther apart than on a coil system.

Of course, if it is impossible to get a spark at the plug when testing, the inspection must be carried farther.

Repainting the Automobile—4

M. C. HILLICK

Burning Off and Repainting the Car

The quick factory methods of painting automobiles is responsible for the early decay of a great many car surfaces. Burning off is not as frequently resorted to as formerly, in fact, it is only done as a last resort. The burning off is usually done with a gasoline burning torch or lamp. These lamps have a reservoir capacity of about one quart, and the modern type of lamp is a comparatively safe one. A broad non-elastic scraping knife is necessary. With the torch held in the left hand, proceed to heat the paint until it softens up so that the knife held in the right hand at an angle of about 50° can be pushed under the film of soft paint, and thus pushed along for the length of the arm, the paint is removed. Begin at the top of the panel, for example, burning off in strips the width of the knife blade; the hot paint thus rolling off and down across the unburned paint. Do not scorch the wood, but if this does occur, sandpaper and scrape the charred fiber completely away before coating with paint. After burning off the surface, sandpaper it down thoroughly with No. 1½ sandpaper; leaving no scorched or charred wood particles; then coat with a primer which can be either bought ready for use or made in the shop. If the latter, make it to consist of at least one part raw



linseed oil to two parts of turpentine; adding enough lead or good earthen pigment to stain the mixtures. Allow this coat 48 hours to dry. Sandpaper very lightly and apply a second coat of surfacer. If shop-made, have it carry one part oil, three parts turpentine and enough white lead (colored to the right shade with any desired pigment) to give the coat a good solid body. In all of these mixtures add a tablespoonful of coach japan to a quart of the thin material. On this coat, when dry, putty all cavities and surface defects with a hard drying putty. The following day apply two coats of roughstuff bought ready for use or shop-made. If the latter, make as follows: equal parts, by weight, of any good roughstuff filler and oil-ground keg white lead, mixed to a stiff paste in equal

dust off and apply one coat of color, one coat varnish color and one coat of rubbing varnish containing an ounce of color to a pint of varnish. Then stripe and apply one coat of clear rubbing varnish; rubbing each of these coats with pulverized pumicestone and water. Then finish with a high-grade motor car body finishing varnish; the chassis to be surfaced up with lead paint, puttied and painted and finished in the manner detailed in preceding articles. In all this work on the car, the hood should be finished with as few coats as possible; the less paint on this part of the car the better. One coat of color, one coat varnish color and one coat finishing varnish will usually suffice. The radiator will need a thin coat of some aluminum or asphaltum paint. Mudguards to be finished according

and remove the softened fabric with a glazing knife. Repeat this operation if necessary to remove the cracks and then rinse thoroughly in water, in order to kill the strength of the ammonia. Then apply a coat of roughstuff and rub down with water and artificial rubbing stone, after which proceed to paint and finish the car in the usual way.

In the case of a steel or other metal body car, burning off becomes a serious question and, under ordinary circumstances, should not be attempted. The paint on parts of the metal surface or the entire surface, in fact, when it becomes necessary can be removed from the metal with a mixture of five pounds lime and six pounds lye. Add the lime to the lye, stirring meanwhile, and then use a sufficient quantity of water to convert the mass into a thick paste. Apply with a partly worn broom or, better still for automobile work, with a towel. So far as possible, use this where moisture prevails. As a help in this matter apply the mixture late in the day and let it stand until the following morning—the night hours will thus assist in keeping the moisture at work. Wash off with a plentiful supply of water; using a scrub brush to remove the paint. A garden hose will be of use in this work. If necessary, make a second application of the lime and lye. Wash the surface, after using the lime and lye, with turpentine. Then sandpaper and apply a coat of primer. This coat should carry one part raw linseed oil to three parts turpentine with a tablespoonful coach japan to a quart of the two other ingredients. Stain the mixture with an iron oxide paint. Apply three or four coats of roughstuff, rub down with water and artificial rubbing stone and then bring the finish up in the manner prescribed for the wood surface. In connection with the removal of paint and varnish from the surface of wood or metal, paint and varnish removers are now being (it is stated) successfully employed. The writer (while having seen varnish removers extensively and successfully employed) is not sufficiently acquainted with the results obtained from the use of such materials in the removal of paint and varnish from the wood or metal car body to offer any definite data as to the economy of their employment for such purposes.

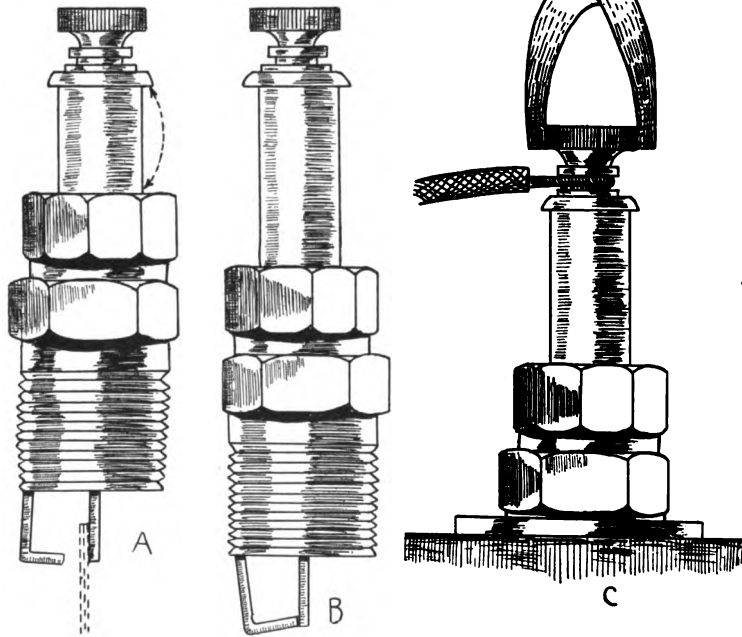
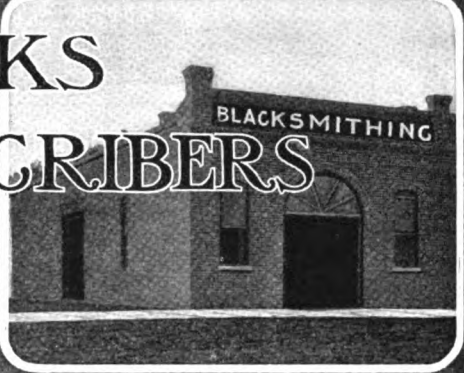


FIG. 3—SOME SPARK PLUG DEFECTS AND WHY THEY FAIL

parts of quick rubbing varnish and coach japan. Thin to a brushing consistency with turpentine. Make this roughstuff a little heavier than ordinary lead paint. At the rate of two coats per day, apply from four to six coats according to surface conditions. Allow from three to six days to dry, according to circumstances, then rub with water and artificial rubbing stone to a smooth and level surface. Sandpaper with No. 0 paper,

to their needs which, as a rule, will be what the body requires. In connection with this kind of work it sometimes occurs that the badly cracked finish does not go below the color coats, in which case the following substitute for burning off can be used. Apply 16% ammonia to the surface as evenly as possible with a brush, and allow it to remain until varnish and color have softened up. Then apply hot water to the surface



TIMELY TALKS WITH OUR SUBSCRIBERS

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Another Year

Again, we stand on the threshold of a new year; again, we pause momentarily in our laboring to ponder on the past and to speculate on the future. But in our pondering, let us linger only long enough to learn of the past; let us not stop to mourn over the past year, but let us rather delay for the moment only to let the examples of the past teach us; let us consider the doings and happenings of the past year in steering our course correctly for 1915; let us think of the past only in its relation to the future; and when we are speculating on the coming year, let us lay a course that will take us safely over the business sea.

Like a Mine

THE AMERICAN BLACKSMITH is like a mine—you've got to DIG in order to get out the valuable material it contains. You cannot skim the surface of the earth and hope to get all the valuable ore that the ground contains. You've got to DIG. Skimming, skipping and sliding through the pages of "Our Journal" won't give you all the valuable, usable information in its many articles and advertisements. You've got to DIG—read the articles carefully; and, just as in mining, you are probably not interested in everything in this "Mine of Information"; but as in mining you will take the "ore" that is valuable to you and, fearful that some will get away, you will pick carefully even in the most unpromising "veins" and gather that which is of value to you and to your business.

Are you a good miner? Are you digging carefully and thoroughly? Are you seeking not only in the editorial pages but in the advertising pages as well? DIG and make "Our Journal" profitable to you. The material is there—if you don't get it out, who is to blame?

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Resolutions for 1915

This is usually the time for resolution-making; for the turning of new leaves and for the beginning of reforms. We are therefore suggesting the following resolutions to the craft, generally. Surely there is not one that every loyal member of the trade cannot support:

RESOLVED:—

- 1.—I will not out prices.
- 2.—I will find out what my real costs really are—I will not guess.
- 3.—I will be fair and square with my creditor, my customer, my competitor, my employee, and myself.
- 4.—I will get acquainted with my competitors and really know them. I will try to form an organization for our betterment and for mutual good.
- 5.—I will systematize my business—I will increase my business—I will seek out the leaks and thus out expenses—I will increase my yearly profits.
- 6.—I will neglect no opportunity to improve my knowledge of business and conditions; I will neglect no opportunity to uplift the trade; I will support all good movements for the betterment of trade and the business.
- 7.—I will support the local association, by being a good member in all respects; I will do all I can to strengthen it and to further its purposes.
- 8.—I will read and study my trade papers; I will not allow my subscription to expire; I will write to the Editor, frequently, to state my views on the topics discussed and on the general worth of the paper as published; I will criticize when I feel criticism is deserved, and will praise when praise is merited; as I realize that it is MY PAPER and that what I get out of it depends upon the attention I give it.
- 9.—I will advertise my business, carefully; for I cannot expect people to know what I have to offer them unless I tell them about it in one way or another.
- 10.—I will work hard when there is work to do—play wisely when the play period arrives—read carefully of trade literature—be fair to my family, and be fair, square and honest in all things.

When You Are Puzzled

There's one department of our office that gets into closer touch with blacksmiths and their problems than any other division of "Our Journal." And that department does about as many different kinds of work as there are kinds of work to do. It suggests shop plans and shoeing methods; it plans advertising matter and dunning campaigns; it sells books and magazine subscriptions; it prints business stationery and advertising literature; it will, in fact, do anything that can reasonably be expected of it.

And, most of the work it does is done freely and without charge; and the Subscribers' Service Bureau is constantly looking for more work. If you want to know anything, from the shoeing of a diseased foot to the dunning of a delinquent customer, ask Our Subscribers' Service Bureau. It won't cost you a cent to ask questions, and the more you ask the better we'll like it. The one and only job of this department is to help "Our Folks" in every possible way.



A GOOD TIME TO CHANGE

The "old crowd" has ridden with you long enough. Don't let them think the "machine" belongs to them. It's time to change business companions; and right now, at the beginning of the new year, is a good time to change. Right now, when you're starting out on a new "trip" with a brand new machine, tell the old crowd to "Get out!" Perhaps you'll even be forced to put them out. But get rid of them some way; and then see that the "new bunch" are comfortable. And when you know they are comfortably in place and in no danger of being jarred out, you can be sure that the next trip will be safe with an assurance of profit. The old bunch never paid you, then why permit them in the machine at all? The new crowd at least look cheerful and, if treated right, are certain to pay you in the end. Give the new crowd a chance.



A Few Pointers About Contraction

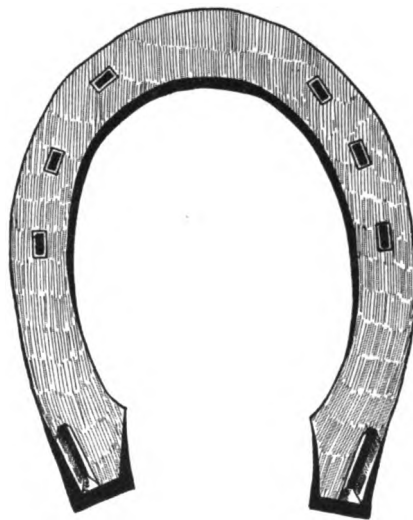
DR. JACK SEITER

CONTRACTION: in this one word are embodied, directly and indirectly, more of the misery-producing ailments that promote uselessness, inactivity and incapability in our "best friends," than any and all other troubles combined—be they local, constitutional, hereditary or acquired.

Contraction and the sequels that are found in its wake can be traced to just one origin, and that is to man and his carelessness. By this I do not mean to insinuate that the farrier is the whole cause of the trouble, and should shoulder the blame; no, we must go back further than that, to the time of the colt's babyhood. I imagine that fully one half of this trouble can be laid to the fact that no attention is paid to the feet of our colts previous to the time that they are first shod. Even if their feet are trimmed a few times a year, the chances are that they are simply cut down to where they will go and the edges rounded off a little—that is all. This operation, nine times out of ten, is performed by the apprentice boy, or the indifferent floorman who may be too busy to notice any defects that the foot may possess; when, with the least bit of attention at this stage of the game, he could rectify and remedy the faulty conformation of the hoof, and also the limb, with a few strokes of the rasp or the intelligent use of the knife.

There are, of course, numerous causes that lead to contraction; and they must be looked after in their several different ways. We will take the light harness horse—be he the roadster or the race horse. As a general rule, no attention is paid to the feet until the colts are weaned; when the feet are dressed and shaped up. We find then that some of them have grown excessively long toes, and others have the most growth at the heels; some have grown up one side of the hoof only, while the opposite side is warped in under and at times covers the frog. Now, if this

colt is about a year old, the trouble has grown to such an extent that it probably will take a year or more to rectify it. It is not advisable, from my experience, to attempt to straighten up a foot of this character in one dressing, as the deformity has grown so gradually. Naturally, if there is enough foot to work on, we could dress it in such a manner that it would have the appearance of a perfect one; but in doing this we will, in the great majority of cases, create more trouble and subsequent



THE NAILHOLES ARE PLACED NEAR THE TOE RATHER THAN TOWARD THE HEEL BRANCHES

lesions that will in the near future cause still more annoyance.

In trimming the foot of the colt for the first time, we must pay strict attention to the conformation, the general build and structure of the animal, and then if it is a long-pasterned colt, the toes too long and in consequence the heels are low, it is not advisable to reduce all of the surplus growth at the toe at one dressing. It must gradually be trimmed to its normal condition and a trifle taken off each week or so. Again, if the heels are the ones that have the surplus growth and the toes are short, we must proceed in the same manner; taking them down gradually. Now

in either of this type of foot we are prone to have contraction; in the long-toed foot on account of the unnatural thickness of the horn at the toe, its consequent resistance to the natural expansion of the hoof, and the "warping in" of one or both quarters.

In the high-heeled foot we find at times that the hoof is narrower at the upper portion of the heels than it is at the lower portion or ground surface, and in both cases we find that the frog is not properly developed. In the latter case I find it a good plan to dress the heels down gradually, never touching the frog or bars and, when we have trimmed them down to where they belong, the colt should be turned out where the footing is soft. After a week's time it will be surprising to see the apparent amount of growth that we can again take off the heels. It's not the actual growth of the hoof, but the distance that the sensitive laminae has been driven up, as it were, that allows us to trim off more of the horn; and in this manner we can eventually return the heels to a height that conforms to the natural conformation and general structure of the animal. At the same time, we are gradually returning the hoof to its natural width and the frog to its normal growth and elasticity; without which we are bound to have contraction.

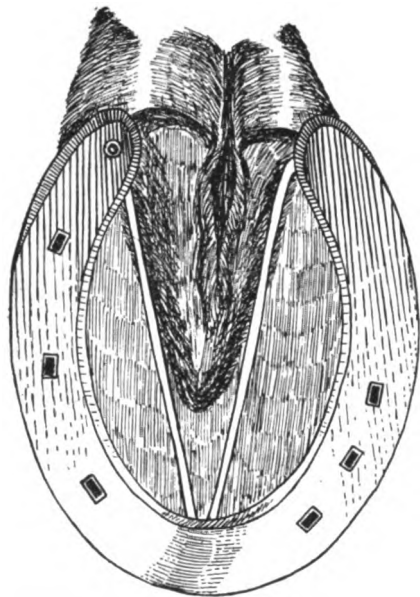
In summing up, we find that we have here a case of contraction brought on by the toes being too long; consequently, the bearing upon the tender heels is too much and they naturally "warp in." In the other case (the high-heeled one), we have the opposite extreme.

I have noticed lately in shoeing yearlings and two-year-olds, we shoe them light, simply to protect the hoof, and on resetting the shoes (say in two or three weeks after the first shoeing), after we take down the surplus growth, invariably we find that the shoe is too large for the foot and requires narrowing up and, at times, shortening at the heels; and right



here I want to state that caretakers should make every possible effort to keep the feet of the colts in their charge as soft as possible, in order to keep up the natural growth and expansion that they are, more or less, undergoing when we shoe them for the first time. I do not find this condition to exist so excessively in the feet of three and four-year-olds as I do in those of yearlings and two-year-olds.

As to treating cases of contraction of the feet of very young animals, I do not think it advisable to employ the usual radical methods that are at times indicated in the treatment of the same condition in aged animals. Generally, we attain success by simply keeping the feet trimmed down to where they will naturally go; keeping the animal barefooted and on soft ground or pasture; or, if shod, the feet must receive care and attention to keep them soft and pliable by the use of bar shoes, and pads well packed with oakum or sponge, and some good



FOR ONE-SIDED CONTRACTION, A SPRING TO PRODUCE PRESSURE

hoof ointment—the choice of which can be left to the farrier.

The most common sequel of contraction is quarter-crack and corns. In the light harness horse, we do not find this trouble as frequently as among the heavier breeds that are used for heavy work and, consequently, are shod very heavy—not that the weight of the shoe has a direct bearing on the cause. There are other reasons: first, on account of the high calks removing the frog and sole

beyond the reach of the ground and, in consequence, beyond the reach of all moisture they might derive in the natural way. This also robs the frog and sole of their natural function—that of aiding as weight-carrying bodies. This want of natural function to perform has identically the same action upon the hoof (even though it is horn) as it would have on any other organ of the body—it becomes dry and hard; in other words, atrophied. Then again, our work horses do not receive the same amount of attention from colt-hood up as do our better-cared-for light harness horses; and again, there is no gainsaying the fact that the latter are better shod. Their feet are thus naturally better and of a finer and denser quality of horn to begin with.

The average work-horse shoer is sadly handicapped by not having control of the length of time that should elapse between shoeings of the animals in his care. He often prepares to treat a case and, in order to be successful, the animal ought to be returned to him in a week or ten days' time; but here is the "rub"; that animal no doubt traveled better after the first treatment and, that being the case, the owner cannot see the sense of taking him back to be re-shod as long as he is going sound. So he waits maybe a month or two; anyway he waits until there is a decided change—for the worse, of course—before he beats it back to the horseshoer. Is the case as bad as it was in the first place? Well, yes, and then some.

That is the kind of treatment that discourages the average horseshoer, and we cannot blame him. I have seen many a man spend several hours on some animal in order to benefit it (and its owner) and not charge or receive a cent for his extra time and patience; then have the whole procedure to go over again on account of the carelessness of the owner in not returning the animal to the shop at the proper time for further treatment. Perhaps it was the extra dollar or so that he would be required to spend, even though it would save him ten times the amount (and his horse ten times the amount of misery and pain), that kept him away.

For work horses there is nothing, in my estimation, that equals a properly fitted bar shoe, and a leather pad well packed, for a case of this

kind. Cut the heels down so as to get all the frog pressure possible, but be sure that the frog is soft before applying pressure. Also shorten the toe; rasping the wall from the outside of the toe in order to thin the wall and give the heels a better chance to spread. If it is necessary to take the heels down too far, so that it is liable to put a strain on the tendons, it is best to build up the heels of the shoes with side calks; the idea being to get the foot, and especially the heels, down.

For one-sided contraction, there are several methods that may be recommended. On light driving horses, I generally use springs fitted so as to give pressure on one side only and turning up a clip on the shoe at the quarter to prevent expansion of the opposite side. Sometimes when a quarter is "warped in" pretty well I find that by taking the bearing off of that quarter (in the same manner as we do to take the bearing off for a corn) has the desired effect, and the quarter grows down straight. Did you ever notice the quarter of a horse that has been treated for corns in this manner? At times this quarter is far more prominent than its mate; but the better rule is to apply bearing, as it makes a stronger and better-developed quarter.

The one great error that I notice shoers making in fitting a shoe to a foot of this kind is that in their effort to fit the shoe full (which is positively necessary), they often fail to keep the web of the shoe on the wall and bars of the foot. Fitting a shoe so that it does not follow the wall clear around to the heel is far worse than fitting it too close and narrow. I like a hand-turned shoe for a case of this kind, in order to get the proper width to cover the contracted heel and still have the web wide enough to enable one to fit the shoe plenty "full" along the contracted quarter or quarters. With a hand-turned shoe, we can arrange the nailholes to suit the case; and for one-sided contraction, we can have the nailholes run around the sound quarter pretty well toward the heels; and on the contracted side, we can keep our nails toward the toe as far as possible, so as to give the quarter plenty of chance to expand. Rubber pads are indicated when it is possible to regulate the wear evenly on both quarters.

The main things, then, are: to



keep the foot in a good normal state as to pliability and softness; to keep it well trimmed down; nailholes not too far back toward the heels and, if possible, no calks. In fact, if the foot is kept close to the ground, there is no case of contraction that will not yield to nature; which means bearing upon the entire ground surface of the hoof, frog, sole and bars.

has a long-handled punch he is liable not to wait until the shoe is cool before punching. The fact should be borne in mind that all calk holes should be punched with the sizing punch after the shoe has been cooled.

3. The calk holes will be more perfect when punched with a short-handled punch, for the reason that the shorter the handle, the more nearly will you center the calk hole each time you hit the end of the punch with your hammer. With a long-handled punch, there is danger that you will make the calk holes either slightly oblong or slightly punched to one side.

It is not for any financial reason that we are arguing for a short-handled punch, but only so that the shoer will have success with drive calk shoes are we offering these recommendations.

GIANT GRIP HORSE SHOE COMPANY.

Dry, Brittle Feet

ALBERT MEIER

When a horse that has never been shod comes into the shop, and the feet are in a healthy condition, we usually find that the frog is soft, picks up and holds moisture and, in fact, acts as a sponge to the feet. The usual demand of the owner is: "Give the feet a good trimming, cut 'em down to where they belong and I want a set of shoes well calked." If shod according to the order, the first step would be to pare the foot protection all off. Next, shoe with high calks to keep feet off the ground or on "young stilts." The feet thus soon dry out and the frog shrinks, the heels draw in and we get a complete contraction of the foot; blood becomes congested, inflammation sets in and soon we have so-called corns, which is an internal rupture causing a pocket of blood at the wing of pedal bone—caused from cleft contraction of the hoof. Drying out a foot in this condition (if not properly treated) soon causes inflammation of the lateral cartilages, and ossification sets in, turning the cartilages to bone; then we have a chronic case of rupture and so-called corn and sidebone.

In summer, I like a flat shoe or rubber pad. When calks are used, I like a bar shoe and use a leather and pack the feet. It keeps one busy explaining what the foot is and the care it needs. Failure to pack or grease a horse's foot to prevent it from becoming dried out is more or less the cause of a horse's lameness. These owners are the ones who will come into the shop and tell you to cut the feet down and fix them up "right away"; but they don't want the shoer to tell them what to do in order to keep the feet in a healthy condition.

A Good Horseshoeing Circular

The Correll Shop, that already well-known institution of Illinois where good work is done and good advertising gets the business, has just sent out another piece of literature that is well worthy of special mention. This circular contains the pictures of a correctly-shod and also an incorrectly-shod foot and reads as follows:

"You know here—at Correll's Shop—we always fit the shoe before we nail it to the foot. Work like the job illustrated at the right is never turned out at our place.

"Did you know, or ever think of the fact that there is really an essential difference between a blacksmith and a horseshoer?"

"The blacksmith works on iron, an inanimate object, and—while the horseshoer is preparing the shoe—he, too, is 'blacksmithing.'

"But the shoer also works on the hoof—which is a living, feeling organism. Now, if the blacksmith make a mistake, he has simply spoiled a piece of iron; but, if a shoer pare a hoof too thin, if he fit a shoe improperly or drive a nail too close, he has either inconvenienced or lamed or perhaps ruined a horse.

"Now, WHAT DO YOU PAY FOR? Is it blacksmithing or horseshoeing?"

"If it's horseshoeing, spend your money at

THE CORRELL SHOP."

The Way to Figure Profits as Suggested by the Oklahoma Association

The problem of figuring profits is a big one and a most important one. There can hardly be too much time or attention devoted to it. In the past year or two we have been directing the attention of "Our Folks" to the importance of this subject; we have featured the subject in several issues; we have had authorities on business systems and on cost and profit matters write articles on the subject. So it is with a great deal of pleasure and gratification that we refer to the work of the Oklahoma State Association and their efforts toward showing Oklahoma smiths how to figure profits. This "How to Figure Profits" sheet of the Oklahoma Association is printed on a big card, and we are pleased to publish the contents of the same for the benefit of blacksmiths, horseshoers, and wagonmakers everywhere:

Blacksmiths', Horseshoers', and Wagonmakers' Association of Oklahoma

Officers: C. W. Rathbun, President, Oklahoma City; J. B. Wise, Vice-President,



The Horseshoer

Removable Calks for European Cavalry.—The pressing need for removable horseshoe calks in large quantities and quickly, by the allied European armies, led foreign commissioners to place orders for fifty million calks of the Ring-Point type with the Rowe Calk Company of Hartford, Connecticut.

This large order has necessitated enlargement of the Rowe factory; also day-and-night operation of the entire plant. This enlarged capacity will enable them to manufacture 150 million calks per year; making them, it is said, the largest producers of horseshoe calks in the world.

In connection with this order for calks from abroad, it is of extreme interest to know that but one size of calk was ordered— $\frac{1}{4}$ ". This size, it is believed, will furnish sufficient wear and last long enough without breaking for good average use, with the added and very decided advantage of requiring but one size of calk to be carried and but one-size hole to be drilled in the shoes.

In recent years, the tendency has been in this country (and particularly in large cities) toward the use of larger calks. Experience abroad, however, has shown that the larger calks are not nearly so satisfactory and that the extra weight on the feet of a horse is a decided disadvantage. The Europeans feel that while this may cost them a little more for calks, that what they save in horseflesh and in the extra efficiency of the animals is worth more than the difference in cost.

Why Giant Grip Punches Are Short-Handled.—It is very necessary to use a short-handled punch in punching out drive calk shoes in order to obtain successful results with drive calks. The reasons for the above are as follows:

1. The shorter the handle of the punch, the less liability there is of breaking the punch while in use.

2. There is a tendency among nearly all horseshoers to punch the calk holes while the shoe is hot; and if a horseshoer



Tulsa; J. P. Nicholson, Secretary, Kingfisher.

Executive Committee: W. R. Lantz, Muskogee; E. W. Reedy, Tulsa; R. H. Parks, Okmulgee.

TO OUR FELLOW CRAFTSMEN: There is a widespread opinion, which has been voiced at meetings of various State Associations, that many blacksmiths and wagonmakers do not take the overhead expense of their business into consideration in figuring the cost prices of jobs and, as a result, they do not make the legitimate profit on their work to which they are entitled and should get.

The following problems that enter into our every-day business have been carefully figured out by a duly appointed committee, and the costs for material are based on the market price at this time. The cost of labor is based on the length of time it takes to do the work where shops are equipped with machinery and power; and where hand-tool labor is used, the items of labor (especially on woodwork) should be increased in proportion to the additional length of time necessary to do the work.

The 25 per cent overhead cost includes rent (or interest on your property where you have no rent), taxes, insurance, investment, phone, coal, power, heat, light, water, waste, losses, wear and tear on tools, expense of collection, etc. You all have these expenses to pay, and 25 per cent will not cover your total expenses, outside labor and material.

The Way to Figure Profits

Buggy pole	\$1.85
Freight	.25
Paint	.20
Labor, 2 hours	.60
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Overhead cost, 25 per cent	.70
	<hr/>
Profit, 25 per cent	.90
	<hr/>
	\$4.50
	<hr/>
Buggy spoke	\$.05½
Labor, ½ hour	.15
Paint	.05
	<hr/>
Overhead cost, 25 per cent	\$.25½
	<hr/>
Profit, 25 per cent	.08
	<hr/>
	\$.40
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Oak wagon tongue	\$1.40
Freight	.40
Paint	.20
Labor, 2 hours	.60
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Overhead cost, 25 per cent	.65
	<hr/>
Profit, 25 per cent	.81
	<hr/>
	\$4.06
	<hr/>
Front bolster	\$.70
Freight	.20
Paint	.10
Labor, 2 hours	.60
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Overhead cost, 25 per cent	.40
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Profit	\$2.00
	<hr/>
Profit	.50
	<hr/>
	\$2.50

Pair hind hounds	\$.50
Freight	.20
Paint	.15
Labor, 2½ hours	.75
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Overhead cost, 25 per cent	.40
	<hr/>
Profit, 25 per cent	.50
	<hr/>
	\$2.50

Steel Tires, 3 x 3-4 in.

450 lbs	\$8.61
Freight	4.00
Labor	4.60
Bolts	.50
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Overhead cost, 25 per cent	\$17.71
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Profit	\$22.14
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Profit	5.53
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	\$27.67

Steel Tires, 2 x 3-4 in.

300 lbs	\$6.30
Freight	3.00

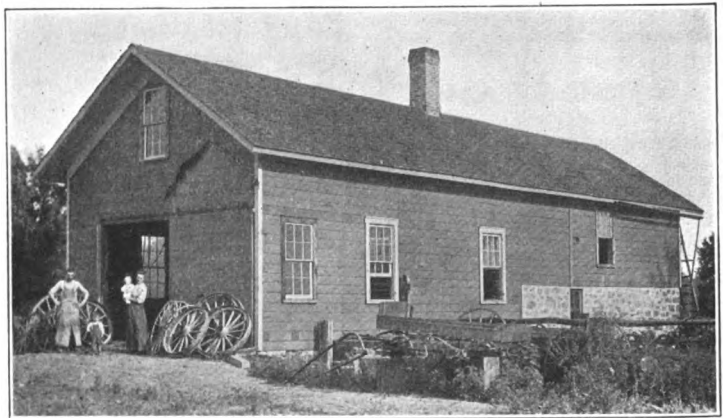
Profit, 25 per cent	\$.09
	<hr/>
	\$.44

Wagon axle, finished	\$1.40
Freight	.35
Paint	.15
Labor, 5 hours	1.50
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Overhead cost, 25 per cent	\$3.40
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Profit, 25 per cent	\$4.25
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Profit	1.05
	<hr/>
	\$5.30

Weld Shaft Iron

Smith labor	\$.15
Helper labor	.15
Woodworker labor	.05
Bolts	.08
Paint	.05
	<hr/>
Overhead cost, 25 per cent	\$.48
	<hr/>
	\$.12

Overhead cost, 25 per cent	\$.48
	<hr/>
	\$.12
	<hr/>
	\$.60



THE WISCONSIN GENERAL SHOP OF MR. THEODORE DORSNER

Labor	3.80
Bolts	.40
	<hr/>
	\$13.50

Overhead cost, 25 per cent	3.27
	<hr/>
	\$16.77

Profit, 25 per cent	4.22
	<hr/>
	\$20.99

Buggy shaft	\$.75
Labor, 1 hour	.30
Paint and leathers	.25
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Overhead cost, 25 per cent	\$1.30
	<hr/>
	.32

Profit, 25 per cent	\$1.62
	<hr/>
	.40
	<hr/>
	\$ 2.02

Wagon spoke	\$.08
Paint	.05
Labor, ½ hour	.15
	<hr/>
Overhead cost, 25 per cent	\$.28
	<hr/>
	.07

Overhead cost, 25 per cent	\$.28
	<hr/>
	.07
	<hr/>
	\$.35

Profit, 25 per cent	\$.15
	<hr/>
	\$.75

Half pat. axles, 1¼ in	\$2.00
Freight	.40
Labor	3.25
Paint	.15
	<hr/>
Overhead cost, 25 per cent	\$5.80
	<hr/>
	1.45

Profit, 25 per cent	\$7.25
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Profit	1.81
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	\$9.06

New Rim in 1 Wheel, 1 in.

Cost of 1 rim	\$.34
Freight	.15
Woodworker labor	.50
Paint	.15
	<hr/>
Overhead cost, 25 per cent	\$1.14
	<hr/>
	.28

Overhead cost, 25 per cent	\$1.42
	<hr/>
Profit, 25 per cent	.35
	<hr/>
	\$1.77



Set tire extra	\$.75
Freight	4.30
Labor	14.78
Overhead cost, 25 per cent	3.69
Profit, 25 per cent	4.62
	\$23.09
Short Arm Concord Axles, 1 3-8 in.	
Freight	\$.50
Labor	3.50
Paint	.15
Overhead cost, 25 per cent	2.01
Profit, 25 per cent	.51
	\$6.67
Cut Down Wagon and Apply 3 5-8 Tires and Rims	
Tires, 338 lbs	\$7.09
Rims	7.60
Freight	4.00
Labor, woodworker	3.00
Labor, smith	2.75
Paint	.50
Overhead cost, 25 per cent	6.23
Profit, 25 per cent	7.79
	\$38.96
New Rim in Wheel, 1 5-8 in.	
Cost, 1 rim	\$.75
Freight	.35
Woodworker labor	.75
Paint	.25
Overhead cost, 25 per cent	.42
Profit, 25 per cent	.63
	\$3.15
Set tire extra	1.00
	\$4.15
1 Set 7-8 in. Repair Tired Wheels	
Cost, wheels	\$6.80
Freight and dray	1.55
Woodworker labor	.75
Paint (1 coat)	.75
Overhead cost, 25 per cent	2.46
Profit, 25 per cent	3.08
	\$15.39
1-in. shackle clip	\$.15
Labor	.10
Overhead cost, 25 per cent	.06
Profit, 25 per cent	.08
	\$.39
Concord Long Arm Axles	
1 1/4 x 9, 166 lbs	\$9.13

Freight	\$1.35
Labor	4.30
Overhead cost, 25 per cent	3.69
Profit, 25 per cent	4.62
	\$23.09
Short Arm Concord Axles, 1 3-8 in.	
Freight	\$.50
Labor	3.50
Paint	.15
Overhead cost, 25 per cent	2.01
Profit, 25 per cent	.51
	\$6.67
Cut Down Wagon and Apply 3 5-8 Tires and Rims	
Tires, 338 lbs	\$7.09
Rims	7.60
Freight	4.00
Labor, woodworker	3.00
Labor, smith	2.75
Paint	.50
Overhead cost, 25 per cent	6.23
Profit, 25 per cent	7.79
	\$38.96
Buggy crossbar	
Woodworker labor	.15
Smith labor	.25
Bolts	.08
Paint	.10
Overhead cost, 25 per cent	.21
Profit, 25 per cent	.26
	\$1.30
Cut Down Farm Wagon Wheels, 1 Set Felloes, 1 5-8 x 2 1-4	
Cost, sawed felloes	\$2.25
Freight	.65
Woodworker, 8 hours	2.40
Smith and helper labor	1.65
Paint	.50
Overhead cost, 25 per cent	1.86
Profit, 25 per cent	2.33
	\$11.64
1 Set Special Select Wheels	
Size, 1 1/4 in.	\$12.75
Freight and dray	2.48
Woodworker labor	.60
Paint (2 coats)	1.50
Overhead cost, 25 per cent	4.33
Profit, 25 per cent	5.41
	\$27.07

Buggy Side Panel	
Poplar	\$.65
Woodworker labor	.60
Helper labor	.25
Repair seat rods and bolts	.25
Paint (1 coat)	.25
Overhead cost, 25 per cent	.50
Profit, 25 per cent	.62
	\$3.12
Buggy End Panel	
Same basis as above	
Buggy reach, straight	.15
Helper labor	.25



ROSES MADE OF IRON SHOW FORGING ABILITY

Woodworker labor	\$.20
Bolts	.10
Paint	.10
Overhead cost, 25 per cent	.20
Profit, 25 per cent	.25
	\$1.25

Some Hand-Forged Work And How It Is Made

J. P. MAW

Roses made of iron are a constant source of wonder to most people. There are various methods of forging them, but the manner described here-in is an easy one and I think the resulting flower can be made to look very natural. The rose and bud shown in the picture were made last spring before there were any roses to look at—better ones have been made since then by the same method. Let us proceed to make a rose.

First of all, make the tool for forming the seed bulb on the top of the stem. If an old stub of an axle is handy, heat the square part and



punch a hole as at 1 in the engraving. Then take a piece of Norway iron and forge out a stem, about 6 inches long and $\frac{1}{8}$ inch or less in thickness, and drive into the tool; leaving about $\frac{1}{2}$ inch sticking up. Put the tool in the vise and file protruding portion down to about $\frac{1}{4}$ inch round. Then the stem will be about as at 2. For the sepals, take a piece of 22-inch-gauge soft steel, as at 3, with a $\frac{1}{4}$ -inch hole in the center. Cut ragged ends and twist them irregularly. One of these is all you need. Now, cut five or more pieces of the same steel, as at 4, the largest about 3 inches in diameter, and gradually decrease the size of the rest. Heat them and hammer out the edge, which will give a slight irregularity and a softness of outline that looks more natural than any regular filed edge. (Always avoid filing as much as possible when making ornamental ironwork.) Now, with the ball face hammer up the petal plates on a block of wood. The smallest ones the most, so that you can fit one within the other. Then slip onto the shoulder of the stem, first the sepals, then the petals as they come, arranging them properly. Then, with the stem in the tool, rivet the end down tight; which you can do cold if you use Norway iron. Now, with pliers and hammer, curve and bend the edges of the petals to give the appearance of a real rose.

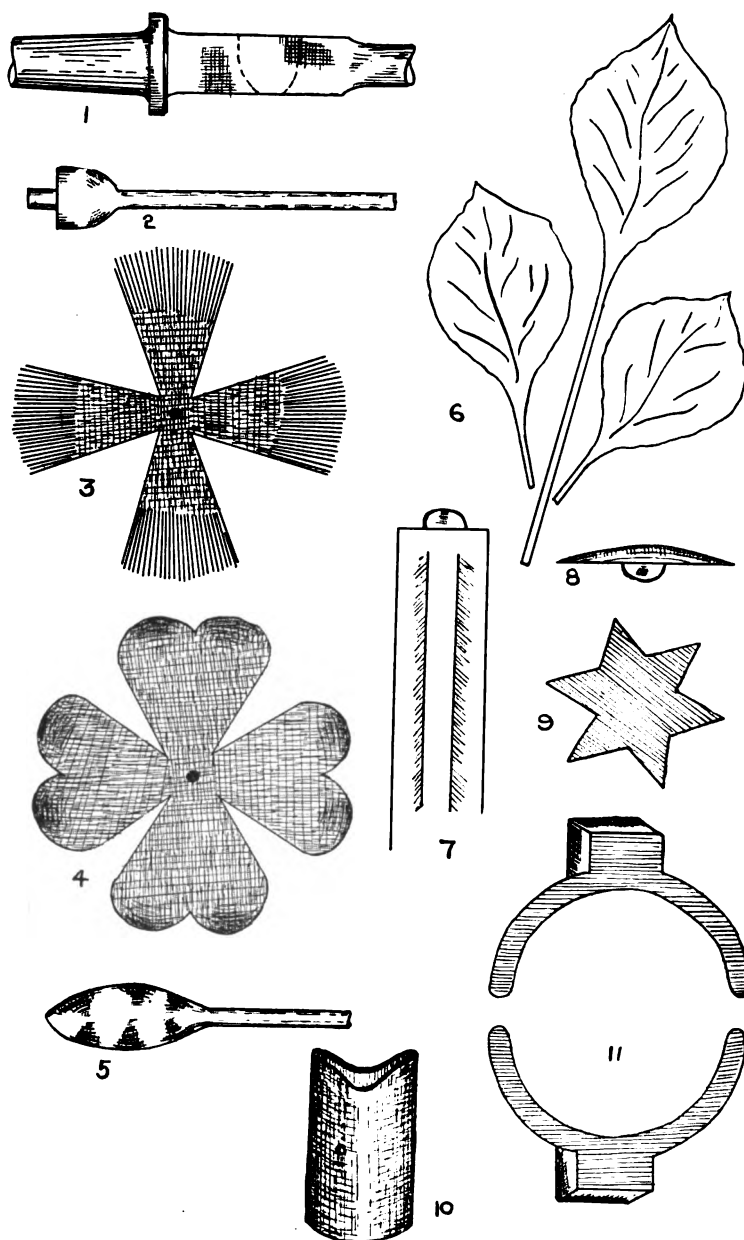
For the leaves, soft steel is best. Take a rod of $\frac{1}{8}$ inch round and draw out, as at 5. Then, with a light hammer with a rounding face, hammer out flat into the shape of a rose leaf, and mark the veins with a dull chisel; also, the fine serrations along the edges, as at 6. Leave the stem of the first leaf as long and as thick as you wish to have it. Then make four or six more leaves with short stems, and scarf and point the ends. Take the long stemmed leaf and two others and, laying the leaves together, hold them in a suitable pair of light tongs. Heat gently and fit scarfs close. Then sprinkle with boraxette, and weld; using a small, clean fire. After welding, bend out the two short-stemmed leaves to the proper angle, then take two more and proceed as with the last. (Five or seven leaves may be used on a stem.) Scarf the end of the leaf stem and weld onto flower stem by holding them together in tongs. By this method there is no danger of burning the delicate leaves.

Put as many leaves on the stem as you think will look well and then, with a light hammer, bend and curve the leaves and stems into a natural shape, which process will also loosen most of the scale (and it would be a wise precaution to protect your eyes). Rose buds are made in the same manner, only the sepals and petals are hammered in closely after riveting.

To make a lily of the valley: First, make a punch, as at 7, with a ball point and shoulder. Then take a little disc of soft steel and when hot place it over a hole and drive on the punch, when it will be found to have assumed the shape as at 8. Now, with a fine chisel, cut from the edge six triangular pieces; leaving six points as at 9. Curve these points

back a little and drill a small hole in the bottom of the cut. Make six of these for the stem. Take a piece of soft steel wire, flatten part of it and split off, on each side alternately, stems for the six cups. File a little shoulder on each and rivet on the cups. Make two leaves of thin sheet steel and weld leaves and stem together at the bottom as in the natural flower.

To make the vase, pitcher and tray, shown in the pictures, it will be necessary to have some special tools, but they are very simple and cheap. First, a punch, for which take a piece of 2-inch-round iron or steel and round the corners on one end. Then make some rings of $\frac{3}{4}$ -inch round iron, the largest about 5 inches inside diameter, and one each 4 inches, 3 inches and $2\frac{1}{4}$ inches. Make them round



THE VARIOUS STEPS IN THE FORGING OF THE ROSE AND VASE



and smooth inside. To make the pitcher, take a piece of 6-inch by 1/8-inch band steel, 6 inches square, and trim off two opposite corners. Then heat the plate and place over the large ring. Put the punch in the middle and drive the piece down through the ring with a heavy sledge. It will be like a saucer, so heat again and drive through the 4-inch ring; taking care each time you heat it to cool the bottom by dipping in water; this will avoid tearing. Do not be in a hurry, but go carefully; taking several heats slowly. After each drive, straighten up the edges to avoid starting a crack or coldshut. By exercising proper care you will succeed in getting safely through the last ring, when it will be fitted tightly round the punch and you will have to stretch it a little by hammering the outside to get it off. It will then be, as at 10, a cylindrical cup with two projections on the edge which will make the handle and spout. First, it will need to be fullered into shape. An easy way to make suitable fullers for this job is to take two pieces of round iron, bend into arcs and weld on shanks, as at 11. One can be fitted into the anvil and the other used as a top tool. With these it is quite easy to fuller in a neck. Hammer in the base and bottom until you get it into a pleasing shape, then form the spout over the bottom fuller and draw out and bend the handle, which will complete the job. Extra ornamenting can be done according to your fancy with chisel or prick punch. The vase is made according to the same method from a 6-inch disc. The base is also fullered and the edge drawn out with the hammer. The animals are separate forgings riveted on at the forelegs. The tray is made from a piece 6 inches square, by placing it when hot on a small ring, putting a large ring on top and driving down the top ring. Work up the corners into legs and hammer out the edges. To finish these articles there is nothing better than burning on grease. The kind known as "crisco" is the best, it will stand the most heat. Heat the work and apply the grease with a brush, holding over the fire until all smoke evaporates, then stand aside to cool, and rub with a soft cloth.

There is no limit to the variety of pretty things which can be made from wrought iron when a man likes

the work and has artistic ability. It may not be remunerative, but is certainly fascinating work when you once get into it and the pieces are pleasing to look at when you have them finished.

A Trio of Handy Labor-Saving Devices

A. E. GRANVILLE

A Handy Eye-Bender

A very handy eye-bender for use in a blacksmith shop is shown in the accompanying engraving, Fig. 1. The device is clamped to the anvil as shown. A heated rod is laid in the channel A against the pin B. The lever C, which is started over at the left, is then swung around into the position shown. The lever D, which is pivoted just under the channel, is then moved over enough to offset the eye and bring the hole in line with the rod. While the bracket E moves around the centerpin, the lever C is bolted to it in such a way that it may easily be adjusted to receive larger or smaller rods. The centerpin may also be bushed with pieces of pipe when a larger hole is desired in the eye.

Forging Link Bushings

The Pennsylvania Railroad Shop at Columbus, Ohio, has a method of forging link bushings from a solid bar without leaving any scrap. The end of the bar is first upset and shaped, then the center hole is punched out; leaving the punched out metal on the end of the bar. This end is again upset and another bushing formed and so on.

Fig. 2 shows three of the link bushings as they come from the forging machine. A piece of a bar from which the bushings have been made is also shown. In Fig. 3 are shown the finish-



THE ARTIST SMITH HAS AN UNLIMITED FIELD

ing punch and one half of the forging die. The punches used for the two upper forms are simply straight end ones, but the finishing punch has a piercing end on it to force out the metal in the center of the bushing and make the hole.

Pneumatic Yoke Riveter

In the Pennsylvania Railroad Shops, Columbus, Ohio, is an air-operated riveter used to rivet yokes onto the drawbars. This machine which is shown in the accompanying engraving, Fig. 4, was made from pieces of scrap and some old air cylinders. The admission of air into the cylinders A and B forces up the pistons, and yoke C which carries rod D with it. The lower end of this rod is coupled to a lever underneath the platform, the opposite end of which is connected to the lower end of ram E. As rod D is forced up, the ram is pulled down, and if the hot rivet to be headed is in the proper position the punch F will upset it. A riveted yoke and

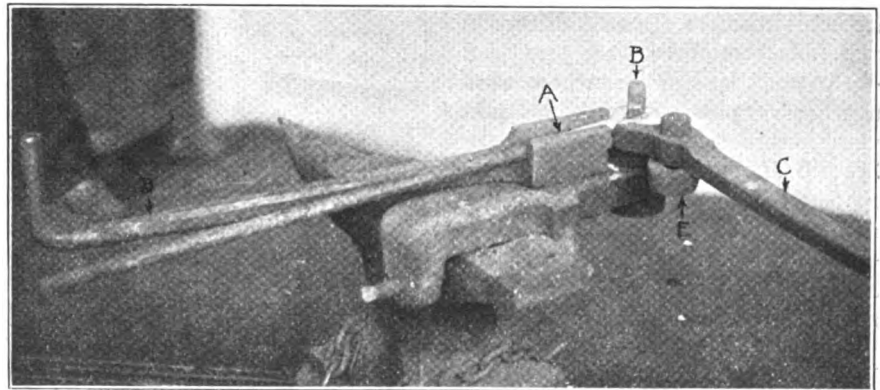


FIG. 1.—A VERY HANDY AND EFFICIENT EYE-BENDER FOR THE SMITH SHOP



drawbar are shown lying just in front of the machine.

A Modern Aladdin's Lamp*

Henry Daw's business was in what might be called, "the last throes of a struggle against death." For years, Henry Daw had turned his blower, poked at his fire and pounded on his anvil; and for years, folks had brought their horses, their buggies and their wagons to his shop. The struggle for business, which had at first filled Henry Daw with enthusiasm, gradually became harder as time went on and as changes took

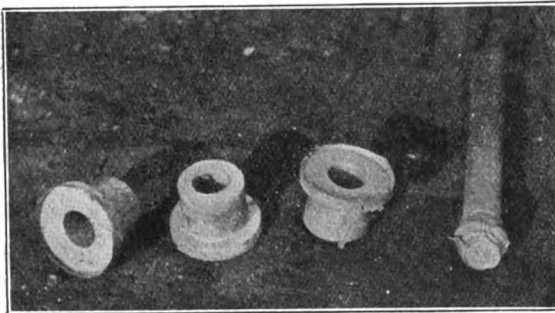


FIG. 2—THE LINK BUSHINGS AS THEY COME FROM THE DIES

place in the town until finally, instead of a real business and a real living, the shop netted nothing but hard work and an existence. And this unpleasant situation, coupled with sickness in his family, is the condition in which Henry Daw found himself at the time when the real story of this account opens.

A doctor's calls and medical requirements placed Henry Daw in Doctor Stuart's debt some four hundred dollars. The consequent worry and anxiety of continued sickness in his family placed a handicap upon him in his business. In an endeavor to meet bills, economies were practiced—help was "let out"—corners were cut wherever possible (and sometimes where impracticable); and Henry Daw did all of these things and others in an effort to turn the tide. But matters seemed only to become worse—business continued none too encouraging, and the family health, while improving, was far from entire recovery.

* This story is founded upon an actual occurrence as told to the Editor. The names have, of course, been purposely changed, but the story describes an actual happening in an Eastern city.

Henry Daw explained these things to his friend Jim Wilgus,—“Honest Jim” they called him when he represented the Old Honesty Horse-shoe Co., and since he had chosen to sell oxy-acetylene torches and equipment for a certain well-known company he had gained the rather torrid nickname of “Hot Flame.”

It was Jim's first call on Henry Daw since changing his selling line, and the smith hadn't seen his friend the salesman for somewhat over a year. Jim Wilgus had been at the factory of his new employer for several months; had examined every nook and corner of the plant; had seen them make every tube, screw and washer of their product and had “welded and cut enough iron, steel, brass and aluminum to build a new bridge across the East River.”

“And, Hank,” said Wilgus, “this torch and outfit I've got is the greatest thing for the blacksmith since they changed the old bellows for a modern blower.

Of course, it costs money, but if you cannot get your cost back within one month you have no business ability.”

And so Henry Daw listened to Jim Wilgus. Heard how John Williams paid for his outfit on one job alone; how Will Bradley turned his shop into a modern repair plant; how Oscar Johnson paid for a shop and home that had been mortgaged for years. And as story followed story, Henry Daw's hopes rose; his fire of ambition was rekindled and the old business fighting spirit was revived. He saw the practical nature of this new means of heating work; he saw how, as

the first user in his town, it would place his business again on its feet. But—

There is usually a “but” in all human dreams. In all human plans for rosy futures there are usually things that come up that appear as insurmountable obstacles.

The obstacle in Henry Daw's dream—the “but” in his planning—was expressed in his sage reply to Jim Wilgus when Jim finished his very able discourse on the value of an oxy-acetylene plant.

“But, where'll I get the money, Jim? I'm owing everybody now. I know I could make good with such an outfit, but my hands are tied; I can't move; I'm down and out.”

“Tut, tut—cut out that talk!” put in Wilgus. “Haven't you got two strong hands? Haven't you got a good healthy brain? Then don't say you're down and waiting for the count.” Then, continuing, the traveling man said: “Now, look here; let's look this matter right square in the face. You say you owe the doctor a big bill—four hundred dollars. Suppose we go 'round to see the doctor. Maybe he can help us out on some of the more difficult questions of the case.”

Dr. Stuart was found to be a liberal-minded man; decidedly not averse to helping out a fellow townsman, customer and business man, and his professional training soon enabled him to see the practicability of Jim's plan and of Jim's product.

The rest of the story is perhaps best told in Dr. Stuart's own words: “Of course, I wouldn't have listened to the salesman's plan for one

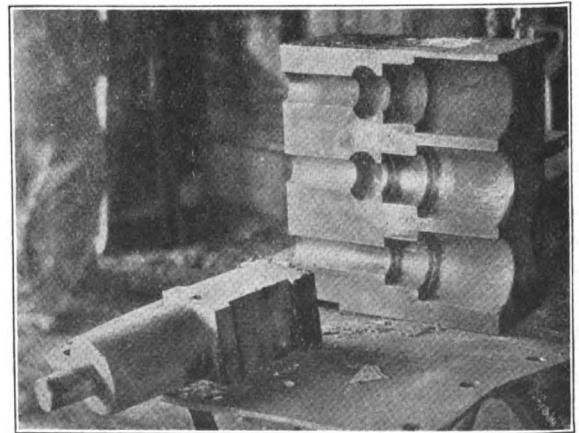


FIG. 3—THE FINISHING PUNCH AND HALF OF FORGING DIE FOR FORMING BUSHINGS



minute if I hadn't known Henry Daw as well as I did. Neither would I have been so willing and glad to let Daw run over four hundred dollars into my debt. But Daw is a good fellow—hard working, steady as an ox and as true as steel; but he'd been unfortunate. So, you see, when I said I'd guarantee payment for that oxy-acetylene outfit I wasn't taking any chance at all.

"And when that outfit came you should have seen Hank Daw—he was like a boy with a new toy. The day after it came he had it set up and was out looking for work. He offered to do one repair job free for each man who would bring his work to the shop on the Monday and Tuesday of the following week. That he explained was to get people to see what he had and to get them to talking; and talk they did—almost talked his shop full of work enough for two months.

"Well, to make a short story still shorter—Hank Daw paid for his outfit, paid my bill in full and is again on his feet—and that salesman came into my office less than eight months ago. Why, darn it, man! I myself have since paid Hank thirty-two dollars for one repair job on my car that would have cost me twice as much if I had to send for a new part to the factory; to say nothing of going without the car for a couple of weeks or a month. And I know scores of men—auto-owners, mill-owners and factory-owners—who have handed good-sized sums of good hard coin to Henry Daw—and what's more they've been glad to do it."

Head of Piston Rod Explodes

A most unusual accident occurred in the Monroe (Louisiana) shop of the Vicksburg, Shreveport & Pacific Railroad last August. The accident resulted in one man being killed, one man seriously injured and the painful injury of four others.

According to a newspaper report of the accident—"The explosion that carried death and destruction with it was terrific, the shock and noise being heard in every part of the city. That more men were not killed and injured was a miracle, as the force of the scattered fragments of the piston head that went to pieces while being heated on one of the large forges was such that they were buried in the

timbers or blown through the walls over adjoining buildings and about the grounds.

"The accident was an unusual one. A piston rod with attached head from a locomotive was being heated in one of the big forges in the shop. In the piston head are several cavities, the construction not being of solid metal, and the formation of gas or steam in these places caused the explosion when the piston head could no longer stand the pressure. The smith and helpers about the forge were showered with burning, white-hot coals, though none was hit by the flying metal. The piston rod, with

quires little floor space either in use or when stored away.

The heater consists of a cast-iron combustion chamber having eight separate outlets leading toward the tire. These outlets are equipped with sleeves which are adjustable to any size tire, from 30 inches up to 80 inches in diameter. At the end of these sleeves is an iron hood which distributes the heat along the tire.

The flame is produced by a Hauck kerosene oil burner. This is connected by six feet of oil hose to a twelve-gallon tank which is equipped with a brass hand pump and pressure gauge.

The burner is also detachable and

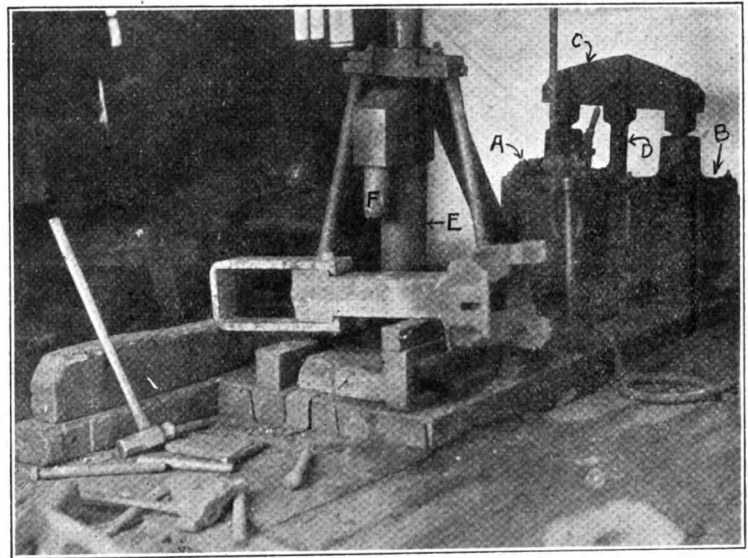


FIG. 4—AN AIR-OPERATED RIVETER USED IN RIVETING YOKES TO DRAWBARS

the head completely severed, was blown twenty feet across the shop where it struck Emmett Watkins a terrific blow over the heart and across the left shoulder, killing him instantly. One piece of the piston head was blown entirely through one of the rafters of the shop and deeply imbedded in another.

"The men who were not injured were stunned momentarily by the awful shock of the explosion."

A Portable Tire Heater

The accompanying engraving (next page) shows a new portable tire heater which is for use in heating wagon, truck or locomotive tires, and burns kerosene.

The heater is a complete outfit in itself. It is easily portable and re-

can be used for heating large work and for other work about the shop. This new tire heater is made by the Hauck Manufacturing Company of Brooklyn, N. Y.

Thoughts On Timely Topics

BY THORNTON

Caustic Censure and Cheery Comment

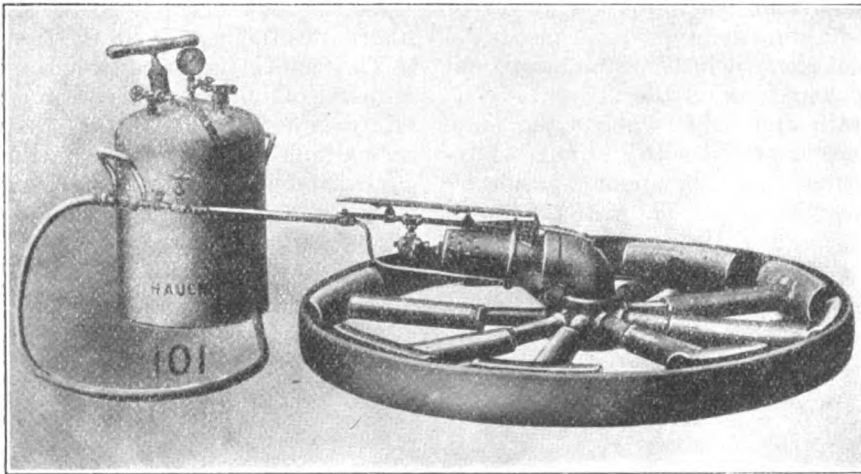
IF WE, IN OUR LITTLE WAY, have any notion of the correct dope for the future—and again an if—if we were a farmer or stock-raiser, we would do all we could (this side of pawning the family jewels) to sow a bumper crop of colts. Of course, it will be some little time before the crop is ready for shipping, but there's going to be a big demand for horses, Brother, and



don't you doubt it. They are using up the four-footed mount pretty rapidly, over across, and when their differences are settled, and even before, they will want more animals. So, doesn't it look like pretty good dope to breed horses? Of course, if you do breed, breed for size and

is why we put it in just the way we did. There is no excuse for speaking one word to one customer against another. A good word for everyone about whom a good word can be said and absolute silence regarding the other kind is a pretty good motto to follow, it seems to us. It's a business-

are the only folks who can better afford to pay the high cost of living because of having something to gossip about. So it still seems very necessary for a man to work in order to keep his family in the necessities of life—to say nothing of gasoline for the family bus; and realizing this (as every man and especially the blacksmith, must)—how can any sane mortal say: "I haven't time to advance—to improve—to better myself"? For that is just what a man says when he states that he hasn't time to read a journal or paper devoted to his trade. It's enough to make a forge fire go out nights to hear some of these awfully busy (?) smiths talk about their lack of time to do this, that or the other thing—and especially anything that will do them any permanent good. A man never has any time to do anything unless he takes time; and, of course, when a man can make more money at gossiping or at hoisting booze at a freeze-out party he doesn't care very much about increasing his earning ability at his chosen trade and profession. It has been my observation that the chaps who say "I haven't time" are just the ones who need to take time. They're like the big business man who said he had no time for a vacation until his doctor told him if he didn't take time for a vacation he would need to take time to die. Think it over, boys, if you've been saying you haven't had time for the necessary things.



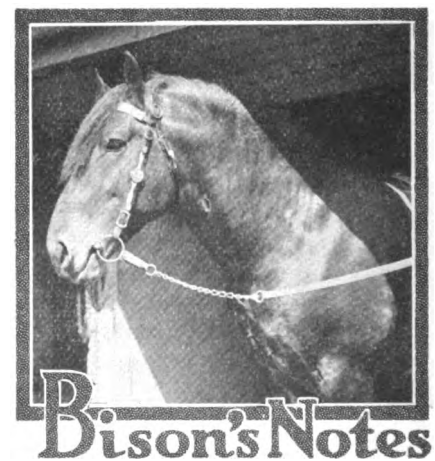
A NEW STYLE PORTABLE TIRE HEATER FOR THE WAGON SHOP

weight, not for speed only. The army specifications call for certain qualities, and those are the qualities to breed for. Don't try to take any old runt on the farm and expect to get just the kind of animal that is wanted to carry a general into battle or to help pull an ammunition train or to turn the ground of a former battlefield into a potato patch. And let us all hope that horses will soon be needed for pulling the machines of agriculture instead of the machines of war.

THERE IS ONLY ONE THING we hate worse than poor service in any store we patronize, and that is the practice of some storekeepers to make remarks about other customers. Doesn't seem as though any business man with the sense of a rabbit would do such a thing, but it's done, just the same. And every time we hear a storekeeper make a remark about someone else, we wonder what he is going to say about us to the other party. When you can open your cash drawer at the end of the day and pick out the money according to the nationality, the color or the general characteristics of the people who paid you that day, then and not until then can you criticise or joke about anyone who comes into your shop. Of course, we all know it isn't quite right to criticise people in any way, but we believe in putting it solidly on a business basis. That

builder, and anything that tends to that end should be given a liberal chance.

WHY WILL A BLACKSMITH fuss, fizzle and fume by the hour about the war, taxes, graft and about every other subject under God's sun, and then say he hasn't time to read a book or paper on his trade and business? In my talks with fellow tradesmen on a recent trip of several weeks the most frequent excuse given for not reading a trade paper was: "I haven't time to read"; and yet I have seen those same anvil-ringers and hammer-swingers turn the air blue for hours ranting and roaring on one or more of the already over-worked topics of the day. Great Shades of Vulcan! What are we coming to? Has anyone ever seen any man put bread and butter into the mouths of his family by spending his time sputtering about the war, weather and politics? If it's possible to put shoes on the family's feet by roasting the grafters, cussing the high cost of living and "decidin' the war" I'd like to know it! I'm a pretty good little talker and gossip, myself—when the time comes—and if mere bluff, bluster and blow would pour more mazuma into the family exchequer I would immediately tack a "for sale" sign on the shop; but, as far as I know, the newspaper owners



Just now, when the world of persons interested in the American trotting horse—that most marvelous creation of the breeder's art—are acclaiming the greatness of the famous Kentucky sire of trotters, Peter the Great, 2:07 1/4, it is not out of place to mention the romantic incidents connected with that horse's advent into the world. But

for something strangely like chance, this greatest sire of his generation would not have come into existence, and the turf would have been robbed of some of the most sensational performers of the present decade; including the two most wonderful colt performers ever known—Peter Volo, trotter, record at two years, 2:04½; and at three years, 2:03½; and Anna Bradford, pacer, record at three years, 2:00¾.

To get the history of Peter the Great, complete, it will be necessary to go back something like forty years. It was in 1871 that the late Robert Steel, of Philadelphia, then one of the most extensive breeders of trotters, paid to Richard Galloway of Orange County, New York, \$25,000 for a young son of Rysdyk's Hambletonian (called Happy Medium) that had trotted in 2:32½ in a race and shown much faster. At that time, the old-time gray trotting mare, Tackey, 2:26, was owned at Williamsport, Pa., by three men—Frank Herdic and T. L. Quimby (known far and wide as sellers of auction pools at all the Grand Circuit race meetings) and Alexander Davidson (a breeder and campaigner of trotters). The attention of these men was drawn to Steel's high-priced young stallion, and they sent Tackey to be mated with him; notwithstanding the high service fee of that horse—\$250.

In 1877, Tackey foaled a filly by Happy Medium, but when the three Williamsport men went to see her they found that she was partially blind and in other particulars she did not satisfy them, and they made a vigorous protest against paying the big service fee. Finally, Herdic, who was a most persuasive talker, got Steel to agree to mate the mare again to Happy Medium, free, if the first fee were paid. This mating resulted in a gray colt that when a few weeks old ran against a post and dislocated one of his hips; laming him for life. The next fall, when the colt's owners went to Philadelphia to ship Tackey home, they were so disappointed when they saw the lame colt that they refused to ship him home along with his dam.

The late Walter Clark of Battle Creek, Mich., was a visitor at the Steel farm on the day that the Williamsport men were there and he, after looking the colt over, made them an offer for him, and the colt went to Michigan where, under the name of Pilot Medium, he went into the stud and, at a comparatively early age, became a noted speed producer; having to his credit, among others, Peter the Great, 2:07¼; Pilot Boy, 2:09¼; Waubun, 2:09¼; B. R. T., 2:09¾; Aggie Medium, 2:10½; Jack, 2:12; Lee's Pilot, 2:12½; and nearly 150 others with standard records.

Peter the Great (the fastest of Pilot Medium's get) was out of a mare called Santos (a daughter of Grand Sentinel, 2:27¼), a horse of far from fashionable breeding. As a two-year-old he was second in the Kentucky Futurity in 2:15; and as a three-year-old he won that classic event; taking a record of 2:12½. Then the late J. Malcolm Forbes of Boston (who paid \$125,000 for Arion after that colt had reduced the world's two-year-old record to 2:10¾) bought the Michigan colt for a big price, and, after he had raced him to a record of 2:07¼, placed him in the stud with his other high-priced young horse—Bingen, 2:06¼.

In spite of his speed and racing qualities, Peter the Great was not highly regarded by Mr. Forbes, and in the winter of 1903 he consigned him to the sale ring. W. E. D. Stokes (a New York man who owned a farm in Kentucky) bought the horse on a bid of \$5,000, and thereby laid the foundation for as great a fortune as any man has ever accumulated by the purchase of a

trotting stallion. The summer after Peter the Great became the property of Stokes, his daughter, Sadie Mac, raced to a record of 2:06¼; and since that time his list of 2:10 trotters has increased by leaps and bounds far exceeding that of any other horse, with 27 members now and at least a dozen additions in sight for next year. More than that, Peter the Great's list of new standard performers totaled 42 this season—another world's record—and his get also won more money in 1914 than the get of any other sire.

Stokes has sold many yearlings by the son of Pilot Medium for prices ranging from \$1,000 to \$5,000 each; and many older ones for prices up to \$10,000. It is reported that he has refused an offer of \$40,000 for the champion three-year-old, Peter Volo, 2:03½, and Stokes also asserts that when the war now raging in Europe broke out, he was just about to close a deal with a syndicate of Russians, whereby Peter the Great, Peter Volo and several others of the get of the first-named horse were to have been sold to the Russians for a total of \$250,000.

Possibly it is a piece of good fortune for the trotting-horse-breeding interests of this country that something happened to prevent the deal going through; for not only is Peter the Great the greatest speed sire of this period, but he is really the only sire outside those of the Wilkes and Electioneer families that seems to possess the

vice. New York, in particular, has a superb lot of horses in the mounted branch of the police service; horses much better than the cavalry horses, for the reason that their buyers are permitted to pay higher prices for them than the government will pay for cavalry horses. The New York police horses run a little heavier than the average cavalry horse, because their riders are heavier, as a rule, than cavalrymen. In buying them, geldings are preferred; in fact, few mares are bought. In some cities any color except white, gray or cream is accepted, but in New York only bays are wanted. In size they must be fifteen to sixteen hands high and weigh not less than 1000 nor more than 1200 pounds. Horses under four or over eight are not accepted. With absolute soundness of limb, wind and sight, horses for police use must be gentle, free from objectionable habits and have free and prompt action at the walk, trot and gallop. In New York and other large cities the city has a regular training school where the newly purchased horses are made familiar with city sights and every branch of police work before they are placed in the service. The average life of a horse in the mounted police department of a big city is only five years; from which it may be concluded that this branch of service requires quite a large number of horses each year; taking all the big cities into consideration. To the farmer with the proper judgment of what constitutes a good horse for the service and situated so that he can raise horses of this class, the raising of horses adapted to police service offers good opportunities; for throughout the country are plenty of good trotting-bred mares suitable for producing them when mated with horses of a similar type, and the mares may do farm work during nine of the eleven months the foals are carried.

As there are thousands of horses being rushed to market by owners who believe them to be suitable for use in the armies of Europe it will perhaps be well to repeat some of the statements recently made by an inspector representing the British Government. It is needless to state that gray, white or cream-colored horses will not be accepted, and the same is true of horses under five years old or horses showing any lameness of any kind. Ringbones are a cause for rejection, but it is surprising to learn that this inspector says he would accept a horse having bone spavin if the hock was well shaped, the horse fully matured, the spavin situated well back, and provided the joint flexed well in action. A curb, too, this inspector would pass if the horse did not possess sickle hocks, and especially if the curb had been fired. He regards these faults, under the conditions noted, far less serious than signs that the horse was not sure-footed. "Every cavalry horse must carry a valuable life on his back," the inspector said, "therefore, any indication that he is not sure-footed should cause his rejection." Small feet and contracted heels indicate a tendency to navicular disease and if very pronounced should lead to a horse's rejection. Poll evil and fistulous withers are causes for rejection; and horses with tender skins, indicated by sore back or a rash over the body, are not desirable; as they become afflicted with saddle galls when subjected to steady riding. How senseless it is to send horses unsuited for military use to the market where the inspectors for the foreign governments are engaged in selecting horses for export is illustrated by the experience of a Western man. He bought five carloads of horses on his own judgment as to the requirements of a cavalry horse, and when the inspectors got through with the lot just forty-two of them had been accepted. The balance he was forced to sell, at a considerable loss, as light wagon horses.



THE BURBANK SPINELESS CACTUS—
THE DESERT FORAGE PLANT

inherent qualities necessary to enable a horse to establish a great family such as Hambletonian (Rysdyk's), George Wilkes and Electioneer established; and without doubt the time had come when a crying need in the breeding world was for another great family-founding sire to furnish an out-cross for the Wilkes and Electioneer strains; a need that Peter the Great seems to have filled completely.

The horses used by the mounted police of our large cities don't have to be fitted with harness, but they must be equipped with saddle and bridle; and the large number now in use—a number, by the way, that is constantly becoming greater—makes a very considerable hole in the supply of saddle and harness leather. In such cities as New York, Chicago, Philadelphia, San Francisco, Boston, St. Louis, and other cities of that class, the horses used in the mounted police service are superior to those purchased by the government for use in the cavalry ser-



The Great Machine of Things

E. B. GRIMES

Blest is the man who holds a job,
And holds it down aright,
By being Johnnie-on-the-spot
With all his loyal might.
Who puts his shoulder to the wheel,
And to his effort brings
The thought and force required to run
The Great Machine of Things.

The Great Machine of Things depends
On men who man the job;
And when they fail, they break the cogs
And play the very hob.
Whate'er the job may be, it counts
From highest in the land
Down to the lowest humble turn
Where man may lend a hand.

This Great Machine of Things includes
All kinds of work, you know,
And smaller jobs must so be manned,
To make the whole to go.
Thus, every one who mans a job,
Whatever it may be,
In driving on his own machine,
Helps on the big one,—see!

So fill your job, and do your best,
And keep a steady pace,
For these are ways that lead, at last,
Up to a better place.
The world is looking for the man
Who, through his efforts, brings
The thought and force required to run
The Great Machine of Things.



Heats, Sparks, Welds

Let us make good deeds our resolutions—
throughout nineteen fifteen.

The horse thinks one thing, and he that
shoes him, another;—treat the animal with
care.

Peace, prosperity and good times are at
hand; there is a big rift in the clouds, and
much silver is visible beyond.

The advertising index is a catalog of
necessary shop supplies and equipment; the
editorial index, a catalog of information.

A place for everything and everything in
its place, but don't let that place be the
same place for everything on the place.

That man who omits to keep accurate
and complete record of every single expendi-
ture is painting a "Failure" sign for his
business.

It is difficult, indeed, to keep a machine
from rusting and depreciating in value
when it stands idle for a long time. The
same is true of men.

Perhaps that customer was correct. It
is possible for even a blacksmith to be in

error sometimes. Ever look at a kick in
that light? We're all human.

It's the little acts—small courtesies and
thoughtful considerations—that make char-
acter and give more pleasure than the dis-
play of great accomplishments.

War or no war, freight rates or no freight
rates, tariff or no tariff, baseball or no base-
ball, grape juice or champagne, the farmer
is still on the job—don't forget him.

Of course, it seems hard work and to
take a long time to do some real and lasting
good, but remember it takes years to make
an oak and only weeks to make a squash.

The proof of the pudding is in the eating.
Subscribers' Service stands ready to aid you
in business methods, in knotty problems—
and, have you seen specimens of the print-
ing?

Life is a battle—of construction, not de-
struction; for harmony, not discord; for
promotion and longevity, not for death
and annihilation. Let us join in *this* great
fight.

Let us know what you think of the new
departments—"Bison's Notes" and "Ben-
ton's Recipe Book." They've been going
for several months now—do they interest
you?

Who supplies gasoline to the autoist in
your vicinity? The popular fuel is an easy
means of introducing your shop to the man
who needs an intelligent repairman to fix
his auto.

Let the bills, the statements, and letters
which are sent from your shop always be
neat and businesslike. It pays, and our
Subscribers' Service Bureau can help you
make it pay.

A blacksmith can hardly know too much
about farming if he is serving farmers.
The more real knowledge he has of actual
farming operations, the better smith he will
be; and the same applies to smiths serving
other lines.

Passing Friend Tardy's house the other
day we saw something that seems to indi-
cate that Tom believes most strongly in
women's rights. Mrs. T. was carrying in
the load of coal that the coalman had
dumped at the curb.

Wall Street is hopeful. The banks are
getting in better shape and the "made-in-
United States" movement is growing. We
have all the facilities to do this, and Ameri-
can energy will carry the movement to suc-
cess. The war is teaching some vital lessons.

A good motto is, 'tis often said, "Be sure
you're right, then go ahead"; but lots of
folks, dead sure they're right, don't get
ahead a single mite. Some folks who "look
before they leap" see nothing but the water
deep, while lots of those who leap before
they look, land safe on the other shore.

It is well sometimes to sit back and look
at things squarely in relation to ourselves.
An occasional intermission in our sessions
of self-satisfaction and contentment, and a
real good old-fashioned, honest "call-down"
will do more to raise our efficiency than a
whole wagonload of fault-finding from a
customer, or the boss.

The remarkable success of vaccination
in the prevention of typhoid fever in the
U. S. Army is well worthy of note. In 1910,
volunteers to take the treatment were asked
for at the various army posts. The immu-
nity of the men treated was so complete
that in 1911 all persons in the military
service were ordered to be vaccinated. The
result was that in 1913 not one case of
typhoid appeared among those who had
received the treatment.

A new method of obtaining very high
temperatures from the electric arc has been
developed. An ordinary arc is combined
with a jet of oxy-acetylene. The apparatus
has a high carbon electrode through which
a blast of oxygen is blown. The metal plate

True Tales of Subscribers' Service Number Two

AN AMERICAN BLACKSMITH reader in
England desiring to learn of oppor-
tunities in Western Canada, and to
know whether or not there was an
opening such as he was seeking, wrote
to us asking our help. We immedi-
ately "hit the trail" and got just the
information he wanted. We found that
while general conditions were not es-
pecially favorable toward his going into
the section he had picked, there were
two points at which he could undoubt-
edly make the desired connections.
We saved this subscriber months of
valuable time in seeking a location, and
only actual experience can tell how
much money.

to be heated forms the positive pole and
the carbon electrode the negative one. The
effect of the oxygen burning inside the arc
is to produce a temperature much higher
than the electric arc alone.

W. A. Thayer (an Illinois smith), be-
cause of his prominent part in cleaning up
his town, had the misfortune of having his
shop wrecked by the element that opposed
his vigorous and successful efforts at town-
betterment. Mr. Thayer—may his tribe
increase and may his power for good grow
an hundredfold—has our sincerest sym-
pathy. As a slight acknowledgment of his
good work, we are sending him "Our Jour-
nal" for the next year, with our compliments.

"Successful Farming" says (we give the
exact wording):

"Don't shoe the horses unless it is abso-
lutely necessary on account of heavy,
continued hauling or slick roads. Horse-
shoeing, once begun, must be kept up all
winter, and it has come to be quite an item
of expense. Then, a horse cannot possibly
handle his feet as well with several pounds
of iron or steel hanging to them, to say
nothing of the liability of injuring himself
by over-reaching or "calking." Nor should
we forget that the shod horse's feet are
more dangerous than those that are not
shod.—M. C."

Can we wonder at the poor condition of
farm horses' feet!

An Appreciation of Friend Tom T. "When
I first thought of acknowledging that I
liked Tom Tardy, I knew that I might be
misunderstood. Of course, Tom is too easy-
going, and he might be more careful about
a good many things. Tom is sleepy-headed;
that's really what's the matter with him.
He hasn't waked up; but he has some good
qualities. Notice how his wife stands up
and helps him along. I like that in her; and
it shows there's really something worth
while in Tom, somewhere. Besides, he
doesn't fuss or scold; he doesn't talk as if
he knew it all, nor as if the one thing his
neighbors needed above everything else was
to become just like him; he isn't always
criticising and condemning them.

"Recalling all the years that I've been
reading in THE AMERICAN BLACKSMITH of
Tom's blunders and careless ways, it dawns
upon me that you like Tom, too. Not once
do I recollect a harsh or unkind word for
him, but just good-natured jabs of fun, put
in a way to wake him up. I suppose that's
one of the reasons why I like THE AMERI-
CAN BLACKSMITH—the spirit in which it
tries to help Tom to be a better smith, to
get more out of his work for his labor, to
take better care of his shop and tools and
stock, and to have a better home and more
comforts for his wife and the little Tardys
as well as for himself."—SID CARROLL, In-
diana.



Siemens-Martin open-hearth steel $\frac{1}{8}$ in. thick.

One of the strips tested consisted of the original material, and the second one was a piece cut from the same sheet, cut in two and electrically welded at the joint. This material was of a somewhat softer nature than that referred to in Table II.

The Totman Carriage Works

A Repair Shop Specializing in Quality and Promptness

In 1883, three men started what was known as the Park Avenue Carriage Works in Meadville, Pennsylvania. These men, Messrs. Totman, Heiserman and Jones, were former employees of the firm of S. Toomey & Company, the well known builders of track sulkies at Canal Dover, Ohio. The Park Avenue Carriage Works make a specialty of building and repairing light road vehicles, and continued in business at Meadville until 1893, when the business was moved to Erie, Pennsylvania; Mr. Totman alone remaining of the original firm. In moving to Erie, the name of the business was changed to Totman Carriage Works, and remains so today.

The advent of the automobile made more floor space necessary; and this, together with the increased facilities needed for the growth of the repairing and repainting departments, led to the enlarging of the original shop to the buildings now occupied, and shown in the engraving.

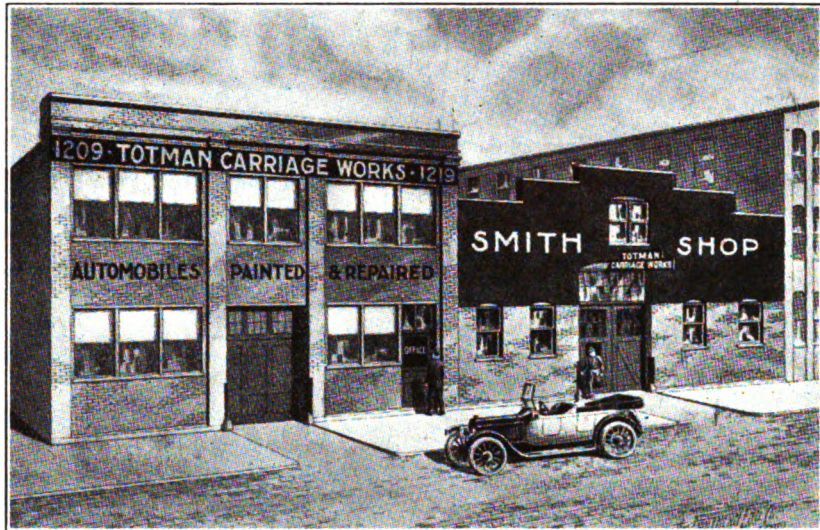
No new work is manufactured (except bodies for auto-trucks); the entire trade being the repainting and repairing of any kind of a vehicle, whether horse or motor-driven, covering engine repairs, woodwork, blacksmithing, trimming and painting; the policy being to draw custom by superior work and prompt deliveries rather than by low prices. When the shops are finished, the total floor space occupied will aggregate nearly 21,000 square feet; the wood shop being 40 by 50 feet; the smith shop, 40 by 80 feet; the paint shop, 45 by 180 feet; the machine shop, 45 by 100 feet; the trim shop, 45 by 30 feet; and the storage room, 40 by 50 feet.

The smith shop has facilities for four fires; three being in use at the present time. The shop equipment when complete will comprise a band saw, planer and vertical sand belt, in the wood shop; a planer, power drill,

emery stand, electric breast drill, power hoist, etc., in the machine room; power hammer, power drill, emery stand, electric breast drill, etc., in the smith shop. Three sewing machines with motor are included in the trim shop together with a powerful electric vacuum cleaner and a complete outfit of bench tools, jacks and labor-saving appliances in all shops. When completed, individual motors for each machine will be used. The construction is of steel, concrete

imate \$27,000 when completed. The effort has been to construct a model repair shop. Horseshoeing is not done. The buildings are equipped for both electric and gas lighting throughout.

Mr. H. M. Totman, the sole owner, is a Connecticut Yankee by birth, but was raised in Ontario County, N. Y. He learned the trade of carriage trimming; has raised a family of seven children to manhood and womanhood; has fifteen grandchildren and



A MODERN BLACKSMITH AND VEHICLE ESTABLISHMENT OF PENNSYLVANIA

and brick. The floors in the smith and wood shops are of concrete; in the other shops, of matched pine over sub-floor; and granite (fireproof) roof over all.

The wall openings have automatic fire doors. An American Radiator system of steam heating is used with boiler in a basement which is 40 by 50 by 8 feet; affording room for a carload each of forge and fuel coal and also space for dry lumber. The floors are carried by 46-foot steel girders with capacity of 250 pounds per square foot; so that there are no piers or posts to interfere with the handling of work. The roof is carried by trusses. The office is 12 by 20 feet; stock room, 121 by 12 feet. There are toilets on the first floor for use of office and shop help, and on second floor for the paint shop. Double doors at street openings are protected with steel gates to eliminate loafers; access to the shops being only through the office vestibule. The total ground area is 84 by 130 feet with an alley at the rear. The total cost of the buildings will approx-

is about ready to quit, but still has an abiding faith in the ultimate success of a business built on high quality of product with proper management. He extends a cordial invitation to all brother craftsmen to call when in Erie; the latchstring is always out.

Gasoline Engine Troubles

G. E. P. SMITH*

Gasoline engines are cranky. Even the best of them are subject to ill temper at times. When all conditions are right, the gasoline engine runs steadily and carries its load with a minimum of attention. But anon it refuses to run, and the operator must ascertain where the trouble lies. An experienced operator who understands his engine will determine quickly what is needed and will proceed to adjust or repair or renew the defective part. In recent years, the gasoline engine has been universally adopted for pumping, threshing, sawing, traction and other uses, and there

*In a report published after a series of experiments at the University of Arizona Agricultural Experiment Station.



are now a host of novices who run their engines successfully only until trouble occurs, whereupon they find themselves unable to locate the difficulty.

In locating trouble, one should have a system and should follow it closely. Very frequently an operator proceeds in the most random way—trying the spark, adjusting the needle valve, tightening a few nuts and, finally, he has not the slightest notion of where the trouble lies. Perhaps, indeed, he has five things out of order where he started with one. In one instance, two men worked on a stalled engine for two days. Twice they had the piston out. There was nothing that was not examined several times. After all was done, they did not know where the trouble lay and had to obtain an expert from the nearest town. The difficulty was found to be very trivial. In another instance, a cattleman came to town with a sorry tale concerning his gasoline engine. Moreover, it was June, and eight hundred cattle were at the corral bawling for water. The cattleman had taken off every spring and every valve and brought them to be examined. They appeared to be in good condition, so the mechanic went to the ranch and put the engine together again. He found that the only thing in the world that had caused the trouble was that the dry batteries had run down and new ones were needed. If Mr. Cattleman had had any kind of a system he might have located the trouble himself. In another case the operator was quite sure that the trouble "was somewhere in the ignition," but later it developed that he had exhausted the gasoline from the supply tank.

Every move that the operator makes ought to prove something. After testing the ignition, he should know positively either that the ignition is out of order or that it is in order. In the latter case, he should then test the carburetor, and should determine either that the carburetor is out of order or that it is in order. Proceeding in this manner, he figuratively drives the trouble to bay. Many operators have a system or scheme which they follow more or less unconsciously when hunting for trouble. Why should not a scheme be published for the use of all operators? A chart of gasoline engine troubles accompanies this article. It is intended to be tacked up on the

engine room wall for ready reference. For many operators the chart contains nothing with which they are not already acquainted, but if they will follow the system or scheme, they will be relieved of much perplexity, many needless delays and much expense.

The chart does not state what to do when the trouble is located. In most instances the operator knows already what to do, or the remedy will be obvious. In other cases, he will consult the book of instructions furnished by the manufacturers of the engine. The purchaser of an engine should always insist on personal instructions from the manufacturer or his agent at the time of purchase. Needless to say, too, he should insist on having the engine put in adjustment and demonstrated before accepting and paying for it.

The Chart and How to Use It

Begin at the top of the chart and work down. The first question is, does the engine start readily after



THE NEW YORK STATE SHOP OF
G. W. WHITEMAN

being shut down? If there is no difficulty in starting, the upper part of the chart need not be consulted, because the trouble must be one of those listed on the lower part of the chart (B). If there is difficulty in starting, then search in the subdivisions (under A).

Troubles in Starting

Starting troubles are classified under three heads—ignition, carburetor and motor.

A-I. The ignition is to be examined first, inasmuch as it is the most frequent offender, and also because its operation is independent of the rest of the engine. Test the spark just outside the igniter-block, and, if there is a strong spark there, remove the block and test at the make-and-break points. In case of a jump spark, first test at the vibrator and, if no trouble exists there, remove the spark plug to make a final test. But

suppose that a good live spark is not obtained, then:

A-I-1. Begin with the source of the current, which is either a battery or a magneto. Test the battery as a whole or test each cell separately. An ammeter should be used for dry or wet cells and a voltmeter for a storage battery. Either one can be used to test the magneto, rotating the magneto meanwhile to give the proper speed. If no meter is at hand, strike two connecting wires together and separate them, or draw one wire across a file or across the milled head of a terminal nut, so as to close and open the circuit suddenly. One can judge readily from the series of sparks whether or not the cell or cells are alive and strong. The most common trouble with the magneto is that it becomes short-circuited by over oiling. A magneto needs very little oil—only a couple of drops once or twice a week.

A-I-2. If the cells are all right, test the connecting wires close to the igniter block or close to the induction coil. If the current is weak or dead, then trace the circuit to see where it is broken and examine the contacts to see if they are bright and tight, also see that the wiring is correctly done, and that no two wires are crossed.

A-I-3. If the spark is good outside of the igniter block, but not inside, then the trouble must be sought in the igniter block itself. Perhaps the ignition is not timed right, perhaps one point is pitted or the points are foul with carbon deposit or oil or the insulation may be broken. In the case of a jump spark, the vibrator must be examined, also the spark points, the insulation and the timing. An extra igniter block or an extra spark plug should be provided with every engine. An old igniter block can be returned to the factory to receive new platinum points.

A-II. If, however, on the preliminary test, the ignition as a whole is found to be good, then the subdivisions under I need not be consulted; but the operator turns directly to A-II, the carburetor. One method of determining whether there is an ample feed of gasoline is to close the air admission port and turn the engine over once, opening the relief cock as the piston returns and noting the odor of the gas. On some engines, the surplus gasoline thus drawn in by the



Trouble Hunting Chart for Gasoline Engines

Note: First, turn engine slowly through a full cycle and note the occurrence of events

strong suction will run out through the air pipe. However, on some engines, the air port has no valve and is not accessible; and on others, there is no relief valve. It is impossible to state a method of testing of universal application, but each operator should know how to make the various tests for his own engine.

A-II-2. When the suspicion of the operator rests on the mixture, it is customary to believe the mixture too weak. This is a fairly safe assumption in cold weather, but it frequently happens that the cylinder has become "flooded." In that case, the best remedy is to close the throttle and turn the engine over a few times when, usually, it will begin to fire.

A-III. When the ignition and the carburetor are in order, although there may be many possible troubles to come, yet there are very few that can keep the engine from starting.

A-III-1. This calls for a little good sense. It can only happen in the winter, and at that season the operator should have some high-grade gasoline with which to prime his engine. The priming charge should not be poured in carelessly from a can, but a measured quantity should be put in. Then a few moments should be allowed for it to vaporize. Rocking the flywheel back and forth will cause the vapor to mix with the air. Then, if the engine does not start, there must be a more serious difficulty.

A-III-3. The compression is tested best by turning the flywheel slowly through the compression stroke. The easier the task, the worse the engine. It should be springy even after holding it in one position for a minute. If the resistance decreases while holding the wheel, it must show that the gases are leaking out. The compression must be very poor, however, to prevent the engine from starting on a light load and from running idle. So, finally, at the very end of the list, the operator may be justified in taking his engine down to examine the valves, the piston rings and, last, the cylinder gaskets. It is, and should be, the last resort.

Troubles After Starting

In the case of troubles after starting, the operator is assisted by the engine itself in locating the trouble, either by noises or smoke or by the engine parts becoming hot. An internal combustion engine is run largely

A. TROUBLES IN STARTING

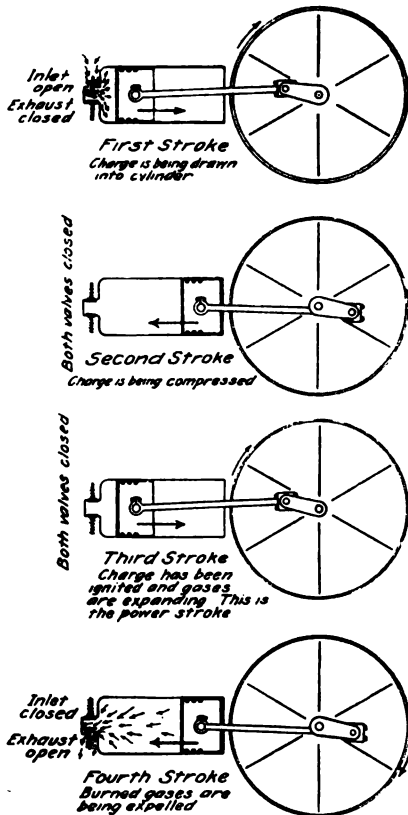
- | | | |
|--------------------------------|--|---|
| I. IGNITION | 1. a. BATTERY | Test cells for amperage. (Reject a cell when below six amperes) |
| | b. MAGNETO | Test storage batteries for voltage
Poor contact of brushes
Commutator smeared with oil
Driven too slowly
Electric circuit not complete |
| | 2. (FOR ALL ENGINES) | Poor contacts in wiring or in switch
Wiring incorrect or short-circuiting
Igniter mechanism out of time
Igniter points roughened. (Use file or small hammer) |
| 3. a. MAKE-AND-BREAK MECHANISM | | Igniter points making poor contact on account of carbon deposit
Igniter points short-circuited by soot or oil, causing poor break
Weak spring, causing slow break
Insulation of stationary electrode broken
Induction coil vibrator stuck or out of adjustment |
| | b. JUMP SPARK EQUIPMENT | Spark out of time
Spark points short-circuited by oil or carbon soot
Spark points too far apart. Distance should be 1/32 inch or a little less
Spark plug cracked and short-circuiting
Tank empty
Needle-valve insufficiently open
Inlet passages clogged
Gasoline pump out of order
Water accumulated in gasoline tank or in mixer
Too rich
Too weak
(Prime it, but not too freely) |
| II. CARBURETOR | 1. LACK OF GASOLINE | Exhaust or intake valve does not close
Piston rings much worn
Cylinder gaskets blown out
Weak rundown batteries
Poor connections
Foul igniter points (or spark plugs)
Lean mixture
Gasoline tank nearly empty
Fuel pump needs repacking
Water in gasoline
Cold cylinder |
| | 2. INCORRECT MIXTURE OF AIR AND GASOLINE | Very poor compressions
Should occur at from 10° to 20° before dead center
Cylinder overheated
Red hot carbon deposit in cylinder
Connecting-rod bearings
Main shaft bearings
Fly wheel |
| III. MOTOR | 1. COLD CYLINDER | No circulating water
Cold water added suddenly when cylinder is hot may be the cause |
| | 2. INLET OR EXHAUST VALVE OUT OF TIME | |
| | 3. VERY POOR COMPRESSION | |

B. TROUBLES AFTER STARTING

- | | | |
|--------------------------------|----------------------------------|--|
| I. MISFIRING | 1. IGNITION | Late ignition
Mixture too rich
Insufficient lubricating oil
Insufficient cooling water
Impeded circulation of cooling water
Poor compression
Lack of oil
Screwed down too tightly
Too late. (Advance it almost to where it causes pounding)
Foul igniters (or spark plugs)
Gasoline used up
Passages partially clogged
Needle and air valves must be set for running conditions
Inlet valve does not lift sufficiently, because of wear |
| | 2. CARBURETOR | |
| | 3. MOTOR | |
| II. POUNDING | 1. SPARK TOO EARLY | In cylinder
In bearings
Valves do not close properly, springs gummy or weak, stems bent, valves or valve-seats worn or pitted |
| | 2. PRE-IGNITION | Piston rings gummy and sticking
Piston rings and cylinder worn and out of circular shape
Cylinder gaskets leaking
Gummy and partially clogged |
| | 3. LOOSENESS | |
| | 4. HOT BEARINGS | |
| | 5. TIGHT PISTON | |
| III. BACK-FIRING | 1. LATE IGNITION | Mixture too rich |
| | 2. WEAK MIXTURE | Too much lubricating oil |
| IV. EXPLOSIONS IN EXHAUST PIPE | 3. GLOWING POINTS IN CYLINDER | Worn or stuck rings |
| | 4. INLET VALVE | |
| V. OVERHEATING | 1. WEAK OR IRREGULAR IGNITION | Weak batteries
Loose electric contacts
Worn make-and-break mechanism
Fuel pump needs repacking |
| | 2. WEAK MIXTURE | Weak springs |
| | 1. IN CYLINDER | Stuck up with gummy oil and dirt or with paint
Out of adjustment
Worn loose
Needs lubrication |
| VI. LOSS OF POWER | 2. IN BEARINGS | |
| | 3. OVERHEATING | |
| VII. SMOKE | 4. LEAKY COMPRESSION | |
| | 5. EXHAUST PIPE | |
| | 6. ENGINE OVERLOADED | |
| VIII. IRREGULAR SPEED | 1. BLACK SMOKE IN EXHAUST | Mixture too rich |
| | 2. LIGHT BLUISH SMOKE IN EXHAUST | Too much lubricating oil |
| | 3. ESCAPING PAST THE PISTON | Worn or stuck rings |

by sound, and the operator's ear quickly detects misfiring, pounding, backfiring, explosion in exhaust pipe, loss of power or irregular speed. Overheating, too, if allowed to develop, changes the sound. An engine should be examined at least once an hour, and at such times the temperature of the cylinder and the bearings should be felt with the hand.

Therefore, the second column gives the outward indications of trouble.



HOW THE GAS ENGINE OPERATES

These indications are arranged approximately in the order of likelihood of occurrence. The operator should look down the column, select the proper indication and examine the possible causes under it. If the engine becomes "noisy" in operation, then, first, it may be:

B-I. Misfiring. This may be due to poor ignition, carburetor troubles, or to very poor compression. If the last, then consult causes for it at the bottom of Table A. In cold weather, an engine is apt to misfire when first started, but after a few minutes the fire becomes normal and the explosions become regular.

B-II. Pounding is not an uncommon occurrence and should not be tolerated. It may be due to a variety of causes. If the ignition is timed too early, the engine will pound; and yet

the explosions should be as early as the engine will stand without pounding. Therefore, if possible, this adjustment should be made while the engine is running on its regular load. Some engines permit of this, others must be shut down in order to change the time of explosion. Pre-ignition, that is, ignition prior to the spark, causes pounding with a more irregular sound. It indicates a hot, dirty cylinder. Pounding due to loose bearings is accompanied by rattle and a metallic sound.

B-III. Backfiring is easily distinguished from explosions in the exhaust pipe. The backfiring gives a series of muffled snappy pops, while the latter sounds more like the sharp reports of a gun. The former occurs while the intake valve is open. The latter occurs just when the exhaust valve opens. Pounding due to pre-ignition occurs while both valves are closed. Backfiring and explosions in the exhaust pipe often accompany each other and are caused most often by a too lean mixture.

B-V. Overheating is an important danger signal. Sometimes it calls attention to the fact that the circulating water has not been turned on, or to the need of adjusting the mixture or of more lubricating oil. But sometimes the difficulty is more serious, as when the compression is poor, on account of a foul cylinder and stuck piston rings. This condition is not easy to remedy. If the carbon deposit has not become hard and gummy, it can be blown out sometimes by feeding kerosene or denatured alcohol in through the air pipe, or some kerosene may be poured into the cylinder and allowed to soak several hours. But it may be necessary to remove the piston and dissolve and scrape out all of the deposit, to smooth down the cylinder walls if they are scored and to loosen and free all the rings in their grooves. If the rings are burned and show places where the gases have been blowing by, then new rings should be put in.

If the bearings heat, and yet they are well lubricated, then the holding nuts should be loosened a small fraction of a turn.

B-VI. Let us assume that the engine starts readily on light load, but when the regular load is put on, the engine labors, and perhaps the speed is reduced. Or, possibly, the trouble develops gradually and the engine

may even slow down and stop. The trouble may be one of a great many, but if the operator follows the chart scheme he will soon know just what is wrong. First, is it the ignition? We will assume that it is tried and found to be strong and well-timed. Is it the carburetion? We will assume that the fuel is being properly supplied and that the valves are found to be set judiciously. Is the engine overheated? If the engine is heavily loaded overheating may cause it to labor, even though there may be no other symptom of distress. Thus the list of troubles is gone through, and on each point the operator ascertains (yes or no) whether or not there is trouble. If no trouble is found down to No. 6, the operator can conclude that the engine is overloaded. If he has not followed out a scheme of this sort, he can come to no conclusion.

B-VII. In case of smoke issuing from the exhaust pipe, the cause can be known from the color of the smoke. Black smoke indicating too much gasoline being fed, and light or bluish smoke indicating too much lubricating oil in the cylinder. If the piston rings are worn and leaky, smoke will issue from the crank end of the cylinder.

The above explanations are sufficient to show how the chart should be handled. It should be kept in some place where it is always and conveniently available. Any operator can add to it according to his experience. It must be confessed that some troubles of very rare occurrence are omitted purposely, in order not to make the chart cumbersome. Also, such difficulties as the breaking of parts of an engine are omitted, for troubles of that nature are made known immediately by unmistakable sounds.



Benton's Recipe Book

Take twenty-four hours; mix thoroughly with the milk of human kindness, and spice of life to suit the taste; a little discretion;



some common sense; knead with the hand of friendship, and bake in the open hearth of love; do not allow it to cool too quickly by trouble, or become sour by affliction; serve with generous sauce and a bright smile. This is our first recipe of the new year.

Formulae for bearing metal.—The Society of Automobile Engineers has recommended the following specifications for bearing metal:

BABBITT METAL

Tin, 84.00 per cent; antimony, 9.00 per cent; copper, 7.00 per cent.

A variation of 1 per cent either way will be permissible in the tin, and .5 per cent either way will be permissible in the antimony and copper. The use of other than virgin metals is prohibited. No impurity will be permitted other than lead, and that not in excess of .25 per cent.

NOTE:—This grade of babbitt is special, owing to the large amount of copper contained therein. It is used for the connecting-rod linings of gasoline motor bearings, locomotive work or for any service where machinery designers are confronted with severe operating conditions.

WHITE BRASS

Copper, 3.00 to 6.00 per cent; tin, not less than 65.00 per cent; zinc, 28.000 to 30.000 per cent.

Metal containing more than .25 per cent impurities may be rejected.

NOTE:—This alloy gives good results in automobile engines, but provision should be made to have it generously lubricated.

PHOSPHOR BRONZE BEARING METAL

Copper, 80.00 per cent; tin, 10.00 per cent; lead, 10.00 per cent; phosphorus, 0.05 to 0.25 per cent.

Impurities in excess of .25 per cent will not be permitted.

NOTE:—This is a metal similar to that specified by many railroads for various purposes. It is an excellent composition where good anti-frictional qualities are desired; standing up exceedingly well under heavy loads and severe usage. It should be used only against hardened steel in automobile construction.

Tempering Long Pieces.—One of the most difficult jobs you can encounter is that of tempering a long and narrow piece of steel without leaving any warp. A mechanic who has to temper a reversible shear blade, 10 inches long, 2 1/4 inches wide and 1/2 inch thick, having three 1/4-inch bolt holes along the center, made a good job as follows:

Two straight pieces of 1/2-inch by 1 1/4-inch iron, longer than the shear blade, were procured. After heating the blade to a bright cherry red it was laid centrally on one of the iron straps, then the other piece laid on top. All three plates were gripped firmly in the tongs and plunged into oil. The shear cooled off perfectly straight, but the central portion, lying between the side plates, was toughened so that it could not be filed. The cutting edges were tempered to a fine degree. Try this on your next long job.

A patented tempering composition for steel that has just recently been granted is made up with cyanide of potassium, 4 oz.; borax, 3 oz.; sal soda, 2 oz.; salt peter, 2 oz.; blue vitriol, 2 oz.; salt, 1 oz.; sal ammoniac, 3 oz., and rosin, 1/2 oz.

Cooling Steel Without Hardening.—Often when the smith is working a piece of tool steel he wants to cool it off without hardening it. The best way to do this is to plunge it into a pail of soapy water. If a small part, it can be stuck in a bar of soap. By this quenching, the steel is left soft enough to cut with a tool.

A simple acid test for iron and steel is made as follows: The sample to be tested

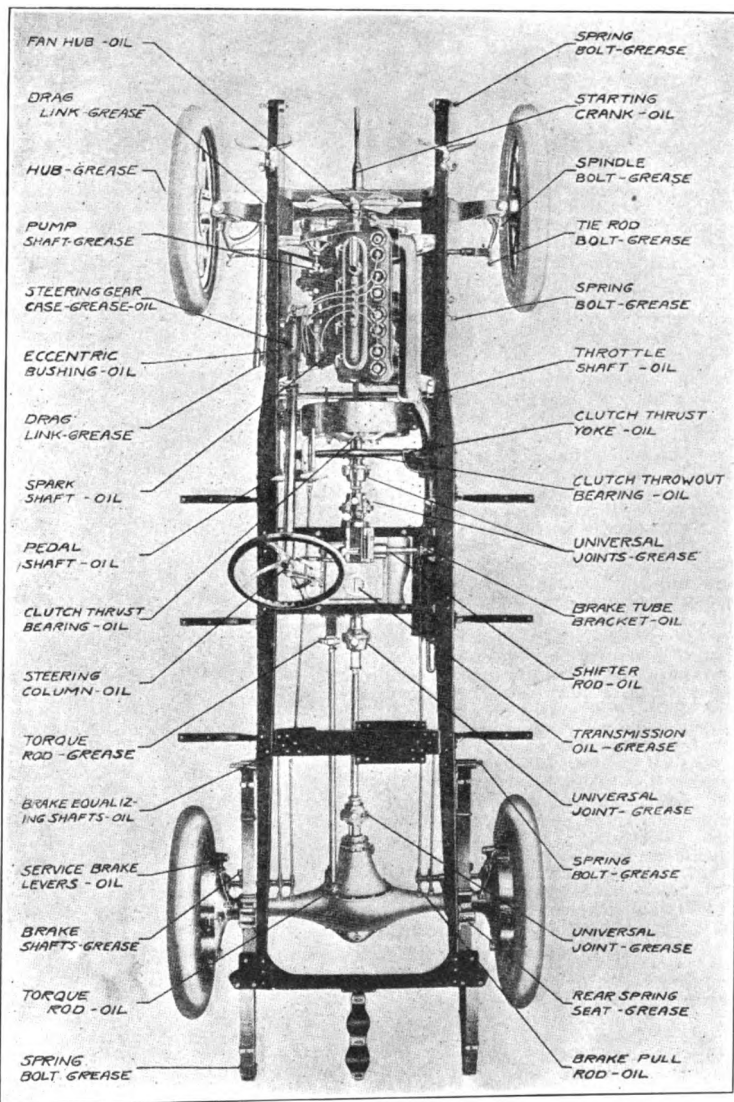
should be filed smooth or polished. Then place it in dilute nitric or sulphuric acid for from 15 to 20 hours; then wash and dry the sample. The best steel then has a frosty appearance; ordinary steel has a honey-combed appearance; and iron presents a fibrous structure in the direction in which it has been worked.

Washing Oily Waste.—The following is an excellent method of washing oily waste. The chief objection to most of the common methods employed is that the waste, after being dried, is found to be matted and of a hard, gritty texture. The common method of washing the waste (using sal-soda in solution) is a good one, as far as the cleaning qualities are concerned, but it leaves the waste hard and matted, so that it is difficult to handle. A simple remedy for this is to rinse the waste (after being cleaned in the sal-soda solution) in very hot water, to which has been added a quantity of liquid ammonia. This will render the waste soft and light when dry.



Queries—Answers—Notes

Aluminum Welding with the Oxy-Acetylene flame—in answer to W. Sandfort of



SHOWING PARTS TO BE LUBRICATED AND KIND OF LUBRICANT TO BE USED

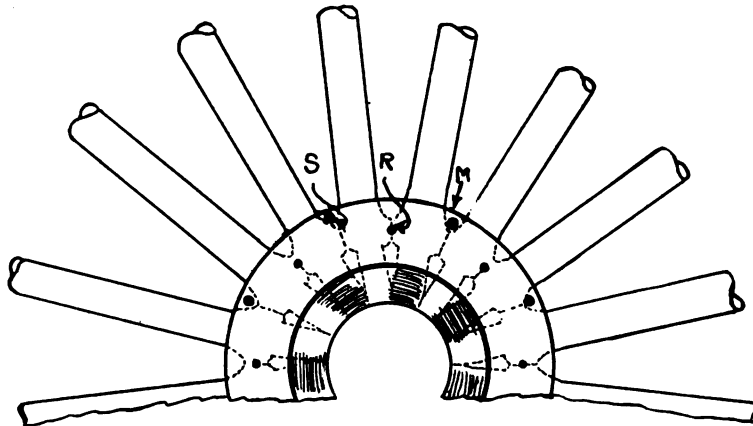


Nebraska.—The melting point of aluminum is approximately 1200° Fahrenheit, or about half that of cast iron, though it is difficult to weld satisfactorily. Its thermal (heat) conductivity is quite high, being comparable with that of copper, and it possesses a high rate of expansion and contraction.

The first operation is to cut the V-groove. On thin castings it is cut about 3/8 of the

water. Then fit the shoe, putting a little cotton waste in it soaked in tar (not coal tar), and nail shoe on. This is the treatment I give the feet when the wall is parting from the quick. For the split hoofs, I take a piece of 1/2-inch square iron, get it red hot, sharpen it to a chisel point, then reheat again to red hot and burn the top of the crack across. Fig. 1 A shows the cracks on the wall of the foot and how I burnt them.

rivets put in between the spokes, it would be far better for the work they are expected to do. I only give them a little tightening when tiring that class of wheel, and get on well with the tiring. I spliced a sarven wheel that was sprung at the hub. I straightened the wheel, then put a 2 1/4 by 1/2-inch band around the flange that is on the wheel. Remove every second rivet, then drill the flanges, after which rivet them onto the wheel. Be careful to have the rivets in between the opposite spokes. A wheel will last much longer made in this way. M in the engraving indicates the malleable flange; R, the regular rivet; and S, the extra one.—CHAS. PERRY, AUSTRALIA.



A SARVEN WHEEL IMPROVEMENT BY AN AUSTRALIAN WHEELWRIGHT

Crooked Pastern Joint.—Making an S-Wrench.—Although I am a young smith I have the reputation of being very good in general smithing and shoeing work, such as all country towns require. I notice quite a few comments on shoeing and will tell how I treated a horse which was brought to me with a crooked pastern joint which the owner said it was born with. It was so bad in the left front foot that it walked altogether on the outside, and the heel from the quarter back was turned flat on the ground. The bottom was turned up between its feet so far that it interfered almost every step. When he drove up to ask my idea on straightening the foot I suggested a bar shoe with the outside heel from the quarter back around to the quarter of bar welded on the top, and also a heel calk welded on. This sloped out a great deal and caused a little frog pressure on the bar. I thought this would give the foot a tendency to glance off toward the outside and cause the wall to turn out instead of in. I have put the shoe on twice now and the pastern joint is almost straight. When it first came to me it had a common shoe with the outside heeled out more than an ordinary long-heeled shoe. The owner said it seemed to straighten more than any other kind he had tried, but it would grow back just as badly if not worse every time it was set. I think this was caused by having too straight a bearing on the quarter that was turned in.

To make a good S-wrench out of old files or buggy spring, take a fuller and draw them

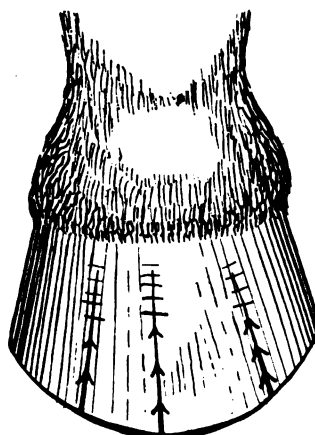
thickness of the casting, while on heavier ones it should be within 1/4 inch of cutting through. The object to be welded is next preheated and, as the expansion is very rapid, great care must be taken in performing this operation. It should be gradually brought to a heat which would turn small shavings or sawdust a brownish color. Now, as soon as this is heated, it is ready to be welded.

The matter of flux is a mooted point, and a definite stand cannot be taken on either side. However, a good strong weld can be made by "puddling."

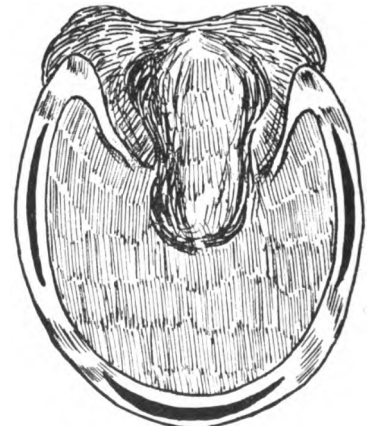
An aluminum welding rod or feeder is melted by the torch into the groove and then the soft metal is worked or "puddled" by the action of an iron or steel stirring rod; the flame being used to keep the metal in a sufficient molten state to permit mixing the added metal thoroughly with the part being welded. The torch should be held a greater distance from the work than with other metals because of the low fusion point of aluminum. There may be an excess of acetylene in the flame, as there is no danger of carbonizing the metal. The difference in toughness and ductility between cast and rolled aluminum is very great; some of this toughness can be restored by hammering the weld when hot; but the operator must bear in mind that this metal, when reasonably pure, is hot-short between 1110° and 1200° Fahrenheit, and may crumble or fracture under the hammer within this range. There is a knack to it and, once acquired, the metal seems easy to work.

B shows the bottom of the foot, the quick, the cracks and the way the cracks go up into the tender part of the foot. I have had success with this remedy, inasmuch as the cracks are nearly all grown over. The reason I burn them is to prevent the cracks from spreading further up the wall.

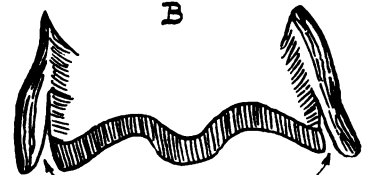
I also have a suggestion to make regarding the improvement that can be made on a sarven wheel. The wheels do not last any length of time in this country. They all wear at hub and, in my opinion, this is where the improvement can be made on them. The malleable flange generally used is not large enough. If it were put about 1 1/4 inch farther up the spokes, and the



A



B



SEPARATED

Split Hoofs and Separated Wall.—A Sarven Wheel Improvement.—I wish to ascertain through the columns of the journal the treatment of horses' feet that have cracked or split hoofs and the wall parting from the quick with sand cracks. I will describe the treatment I have been giving them, but am uncertain as to whether or not it is the proper kind, although I know the feet are not any worse because of the remedy I have used.

First of all, I treat the crack on the bottom of the foot with tar after the regular cleaning out of sand and dirt with warm

AN AUSTRALIAN'S TREATMENT FOR HOOF TROUBLES—ARE THEY CORRECT?



down to about 2½ or 3 inches from end. Then split the end in the center, back to about ¼ inch of the shoulder. Now turn each side out in the shape of T. Next, turn each T back across one each way in the shape of S; making the T 3 inches in thickness. Take heat and weld solid, then turn the T in a V-shape and square up on the sides of the hardy. After one or two are made you can easily tell about the amount of stock it will require to make any size wrench you may want.

Among other things I would like to see a law passed to compel horseshoers to procure a license such as the barbers and other lines of trade have. L. H. LOCKE, Illinois.

A Hand-Made Miniature Auto.—As I am an apprentice to the trade, and am interested in THE AMERICAN BLACKSMITH, I thought I would send you a picture of the little Buick car which I made with my jack-knife. The car is 2 feet long, 10½ inches high and 10¼ inches wide across the fender. I am not sending this picture because I want to show off, but at the request of the boss (my father).

I was seventeen years old when I made the car (which was about a year ago). I have been in the shop with my father off and on for about six years, and for the past two years I have been there steadily. I have made other small models such as wind-mills, header, cement mixer, threshing machine and several other useless articles. The car has no engine in it and is mostly made of wood, except the fenders, top irons and rumboard irons.—GENE HAYS, Kansas.

The "Big Book" and Auto Work.—Away up north of here (Oklahoma) there is printed a great "big book," containing 824 pages, and chock-full of bargains of every kind. My friend got one, so did his friend and also his enemy. In this book they see bargains galore, and conclude that they can save 25 cents every few days. For example, my friend comes in and inquires what I charge for pointing shovels. "\$2.00," is the prompt reply, with the explanation that the work will be done immediately and satisfaction guaranteed, but we are informed that for \$1.35 he can get a new set; so we are obliged to tell the friend that we cannot meet his price. This same friend comes in again for a 16-inch plowlay, and inquires our price for making. We inform him that \$3.50 is our price, and he promptly tells us that he can beat it, as the "big book" is again looked up and he can save about \$1.70.

Now, perhaps you will say "why don't you keep these bargains and sell to your friend?" But I cannot buy cheap enough to meet the price. *If you can, please tell me how.*

Then we are informed that we can make a pile of money if we will add automobile repairing to our business—that we can make from 50 cents to \$1.00 an hour. So, having had about 25 years' experience with all kinds of machinery, we conclude to add to our shop sign, "Auto Repairing Done Here." Shortly after, we see our friend coming along with a large car behind his wagon, and the occupant of the car comes in and asks if we can fix it; he advises that he cannot get the engine to run. We tell him that we are prepared to do that kind of work at a price of 60 cents per hour with material added. He quickly informs us that they charge only 25 cents per hour down the road and that he will go there. We look the car over carefully and find that it will take about 20 minutes to fix it, with \$1.50 for material. But he goes down the road to the 25-cent man who puts in five hours' time before he can locate the trouble, and the owner of the car is out \$2.75. We charge \$1.00 for welding the main spring on an auto and 50

cents for each additional leaf, but our friend charges only 25 cents straight, so we do not get all of the springs to weld.

I think that for real information, THE AMERICAN BLACKSMITH is the best paper published in the United States. I am always anxiously awaiting my copy.

H. C. TAYLOR, Oklahoma.



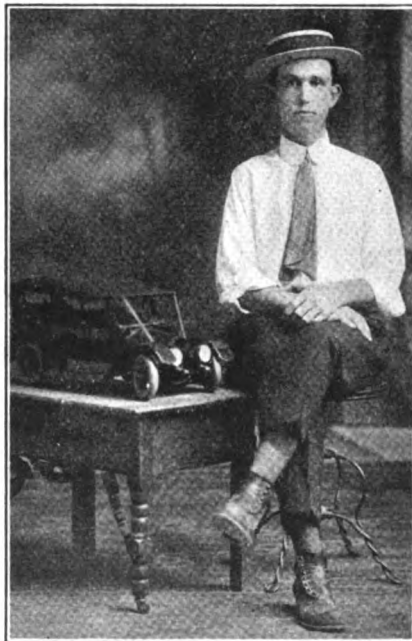
The Automobile Repairman

Inlet valves do not get nearly as hot and, consequently, do not expand as much as exhaust valves. For this reason less clearance should be allowed between the stems and push-rods of mechanically-operated inlet valves than would be allowed between the stems and push-rods of exhaust valves.

Simple Nut Retainer. In the modern car it is usual to find that all nuts are retained in some special way—either by split pins or cotters passed through castelations on the

but very few who have to do with them know how to make one nut retain the other securely. The proper method, as pointed out in these columns some time ago, is to run the "short" nut on first, since it is the outer nut that must take the load when two are used in this way, and after pulling up the longer nut upon the shorter, to give the short nut a slight backward twist. Nuts locked in this way cannot accidentally come loose. Split washers are convenient for use in places where there is not room to work two nuts, and they provide very secure locking means. But they are made very hard so that they will "take hold," and are very often broken in removal. We now come to the simplest if not the most workmanlike nut retainer. It is simply to punch or otherwise distort the thread just above the nut after the latter has been fully run on. It is impossible for the nut to back off through vibration if this is done, and it need be done but slightly, so that the nut, when backed off by a wrench, will straighten out the thread without injury to itself.

Case Hardening. It often happens that when some slight repair has been made or a wearing part replaced by one specially made and not obtained from the factory, it is desired to harden it against future wear. Below is a method outlined that so completes the work that the necessity for it will not again arise before reasonable service has been had from the part in question. As a matter of fact, it is a method that is applicable to all parts of the clevis joints and their pins that are used in the throttle, spark timing, brake and other linkage about the car, whether they have become worn or not. The hardness of these parts can be tested with a small, sharp file. If the file does not "take hold" or "bite" they are probably sufficiently hard; but if it does either of these things, greatly increased life can be had by case hardening the parts. Secure a small iron pot of about one quart capacity and one and one-half to two pounds of cyanide of potassium and melt it down in the pot with the aid of a large blow torch or other source of heat. When the cyanide has become a light orange-red color, immerse the parts to be hardened in it and allow them to remain until they also are a bright yellowish-red in color. They are then to be removed by means of a long wire hook and immediately plunged into cold water. It will be found that the surface has become quite hard and therefore capable of resisting wear; but the hardening has only penetrated through the outer "skin" of the metal and has not in any way changed the main body of the metal or made it brittle. The depth to which the hardening is done can be regulated by the length of time the parts are left in the heated cyanide.



A YOUNG SMITH'S CLEVER WORK

nuts, by lock nuts or by split spring washers. Of course, the first is undoubtedly the best of the methods, but it is expensive and troublesome when nuts are to be taken off and replaced. The extra lock nut method is good when the two nuts are properly locked together, but the fact remains that

Brake Linings

A. J. BIRD

The brake lining is the most vital part of the brake, and a close inspection should always be given the linings when overhauling the car to note the condition of the fabric.

Slipping of the brakes is generally caused by a coating of grease on the surface of the fabric. This grease comes from the differential housing. It works its way along the axle housing and into the brake. A slight coating of oil causes a remarkable lessening of the coefficient of friction and



reduces the efficiency of the brake, materially. A thick wadding of felt is placed around the drive axle and acts as a stuffing-box. In time, the felt will become worn away, but can readily be replaced, and should be if the brakes exhibit a tendency to slip when the felt is left out. To remove the grease from the surface of the fabric, apply gasoline. The gasoline will cut the grease and remove it from the surface very well. But this method has a drawback, in that it does not take the grease from underneath the surface of the material. To do this, the flame of a blow torch is very gently applied, so as not to char the fabric itself. After the heat has been directed against the surface of the brake for a short time it will be noted that the grease will literally fly out of the fabric; leaving it upon the surface in the form of a black carbonaceous deposit. In this state it is easily removable by a cloth soaked in gasoline. The surface of the brake will now be in good condition if the lining has not been worn out.

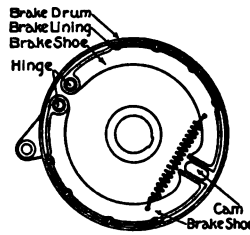
Upon examining a lining it may be found that it has worn flush with the rivet heads. This may be due to the fact that the rivet is not sufficiently countersunk, and can be cured by flattening out further with hammer and riveting iron. In place of a regular riveting iron, a nail punch or small chisel will serve excellently.

If the lining is torn and badly worn, so that it is evident that it cannot be restored by cleaning to good condition, it must, of course, be replaced. The fabric is first pried away from the shoe. The rivets are cut off by means of a cold chisel and hammer and then punched out. It may be difficult to get the rivet out after the head is cut off; owing to the burr that is made on the end in cutting. The brake should be placed across the jaws of a vise that is opened just

sufficiently to allow the rivet to be punched through. The rivet can then be readily removed with a small punch assisted by light blows of a small hammer. Extreme care must be taken in the operation, so as not to spring the shoe out of shape, for this would cause the brake to "drag" and would mean an immense loss of power and at the same time a rapid wear of the new lining.

New lining can be ordered from the automobile manufacturer, and it will be necessary to state the model and year of the car, also the serial number (these are found on the nameplate on the dashboard or under the seat). The brake lining will then come in correct size and ready punched. All that is now necessary is to rivet it in place again and the repair is made.

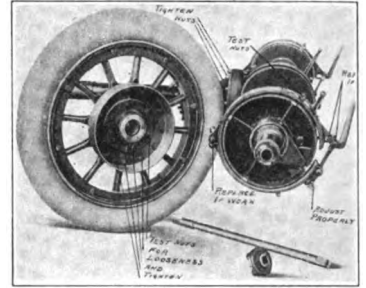
However, this fabric may be ordered in a single length at wholesale



THE INTERNAL OR EMERGENCY BRAKE

prices, thus saving money and time, and the punching done by yourself. The tendency of many buyers of brake lining is to test it by bending and, if it breaks, it is condemned as being of inferior construction. This is a very remote test and does not obtain the true value of the material any more than would bending a piece of tin until it breaks determine its value in service. Even a tin roof requires attention, such as paint, and in a like manner the brake lining should be looked after. Sufficient attention should be given to the brake band clamp. It should clamp evenly and uniformly on the entire surface of the brake. The brake rods should be so adjusted as to allow both brakes to clamp evenly, and the pressure should be the same on both.* When one wheel slides and the other moves, the adjustment is faulty. These conditions and others, such as use

*ERROR'S NOTE:—These adjustments have been explained under the title, "The Care, Repair and Operation of the Automobile".



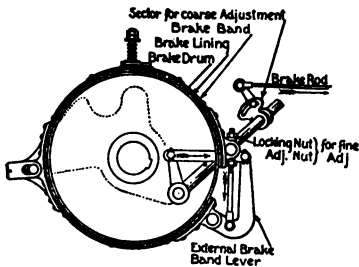
THE WHEEL AND BRAKE DRUM REMOVED TO SHOW BRAKES

of brake under power, etc., are the cause of many efficient linings being unfairly condemned.

A certain axle company states that it subjects brake lining to 1000 degrees of heat in testing, which is a degree of heat never attained in actual service. The lining will never get that hot; it will not have a chance; it will grip and hold the wheels before there is much heat generated at all. On the same basis we might take an axle and subject it to 1000 degrees of heat, then criticize it because the temper was taken out; or we could put a pinch of emery in the axle and ruin it quickly. This, of course, would be an unnatural and uncalled for test, but just as reasonable as some of the tests to which brake lining is subjected.

There are a number of guaranteed, trademarked brake linings on the market backed by reliable manufacturers. And so, having selected the material, lay it around the drum, cut off to the proper length and with a drill pierce the holes for rivets through the new lining. The holes that are in the metal will serve as a template in making the new ones. The holes thus drilled are then countersunk, to allow the head of the rivet being below the surface of the material so there will be no possibility of a metal-to-metal contact. The rivets are put through from the fabric side and riveted over on the other. The head of the rivet should be, at the least, $\frac{1}{16}$ inch below the surface when the work is finished.

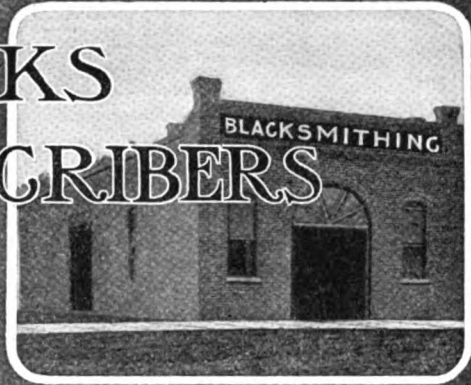
Replacing the brake upon the drum requires a little knack and should be done carefully, so as not to bend it. The adjustment of the brake clamp, the links, levers and rods should all be carefully made, so as to insure proper and smooth working of the brake.



THE EXTERNAL OR REGULAR SERVICE BRAKE



TIMELY TALKS WITH OUR SUBSCRIBERS



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Credit Information About Customers

There are several questions to be considered in a legal way when you give credit information to fellow shop-owners concerning your customers. To be certain of your stand in a legal way, read Mr. E. J. Buckley's article in this issue. Mr. Buckley takes up the various phases of this subject in a clear, understandable way and tells the reader just what to do and how to proceed safely in the giving of credit information. If you are in the habit of exchanging information of this kind with your fellow business men you'll be glad to know just how to go about it. If you do not exchange such information, better read Mr. Buckley's article and do so for mutual protection.

Shop Pictures

Of course we are always looking for shop pictures. If you have had a photograph taken of your shop, send it in for publication. Or perhaps you have had a picture taken of some odd job or some exceptionally difficult work—if you have we'll be glad to see it. And you may rest assured that if the picture is suitable for publication it will appear in "Our Journal".

If you haven't a photograph and have a well arranged equipment send us a layout of your shop and the arrangement of your machines. A letter describing your pencil plan will make it entirely clear to "Our Folks". Let us hear from you with a photograph or a shop plan.

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When a stranger solicits your subscription to THE AMERICAN BLACKSMITH, or any other publication, insist upon his showing you absolute proof that he is an agent in good standing and is employed by the publication which he represents. Don't, under any circumstances, give the man your money if you are not sure that he really he really works for the paper he says he does. No matter what the man offers you—no matter what price he makes—no matter what premium he promises to send—DON'T GIVE HIM YOUR MONEY IF YOU ARE NOT SURE.

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A Comparison

When a reader says what Mr. H. A. Baker of Pennsylvania has said about "Our Journal", what do you think he means?

Mr. Baker wrote in just the other day and among other things said: "I would rather have THE AMERICAN BLACKSMITH at one dollar than any other I ever had for one cent".

Doesn't that indicate that "Our Journal" must be "delivering the goods"? Doesn't that seem to imply that THE AMERICAN BLACKSMITH is "pretty good"? Doesn't it seem to say that THE A. B. is O. K.?

Getting the Meat out of the Nut

You cannot get the full value of "Our Journal"—you cannot reap the full benefit of its contents—you cannot get out all there is in THE AMERICAN BLACKSMITH, unless you study its pages. You can no more get the real full lasting benefit of "Our Journal" by simply reading it, than you can get the meat out of a nut without cracking the shell. You've got to dig in order to get the gold out of a mine—you can't get it out by looking at it. And to get the valuable matter out of "Our Journal" and into your shop work, and which will result in putting real gold into your pocket, you've got to "dig".

Study the articles in this issue. Read the matter carefully. Don't just pass it over as so much trade literature. Try out the new methods suggested. Study the formulas, the hints, the kinks—and then try those that are suited to your shop and to your conditions.

That's what the men are doing who say the paper is worth two to ten times the price. That's how they get such big interest on their investment. That's why they pay for years in advance. They are not content with simply a reading of the paper. They read, study and think—and then they apply the matter to their establishments.

And to be modern and up-to-date a smith cannot depend upon himself alone. He must consider and learn from the experience of others. He must know what others are doing—what successes they have had,—what failures. And he must let those successes and those failures teach him. He must avoid as much as possible the traveling of roads that have already been traveled.



THE NEW COAT.

How about getting the boy a new coat, Mr. Blacksmith? He's worn that old one for many a year—it's getting small, is looking pretty shabby and looks not at all well with that fine cap. Listen to the dictates of your Business Sense. You may well stroke your chin, yes and scratch your head and corrugate your brow. Look at the boy squarely and without sentiment. Face the facts. "Is this really my child?" you ask. And as you gaze upon that fine looking cap, you must realize that the old coat won't do. Don't stunt the boy's development. Get him the new coat and let him develop and grow. What if it is a bit roomy at first. He'll grow, if you treat him right. Give him a chance.



THE TECHNICAL HIGH SCHOOL AT BUFFALO

E. V. SYRCHER

the students the broadest possible training.

The structure itself, as you will notice, is built upon imposing yet severely practical lines. It may be a large, well-kept factory for all we know, with its expanses of metal-framed windows and the tall chimney that arises from the power plant at the rear. And if we should walk around to the back we should feel sure that it was such, as here are situated the forge-shops and the foundry with the boiler room and engine room between, all housed under a one-story, brick and steel structure. We know, however, that is not a factory but a well-equipped technical school and we admire the housing of this rear structure, containing as it does the three shops detached from the main three-story building to obviate the noise and vibration incident to their use. This structure is also the entrance for raw material that enters the building and which is very efficiently dispatched to the various shops in the basement of the building proper by means of an industrial track making a circuit of the corridors.

Most all the shops are located in the basement (though it really looks like the first floor in the engraving) and the foundry and

forge shops are on the same level in their separate housing. The advanced and elementary machine shops, the steam engine and gas engine laboratories, plumbing, pottery, elementary and advanced pattern shops and wood-turning room are ranged around the outside of the basement. In the center of the basement is the gymnasium, plunge, locker rooms, etc., lighted on both sides by a large court. On the first floor are the carpentry and joinery shops, and the two cabinet shops, elementary and advanced; the west of the building is given over to classrooms and laboratories—and for practical subjects for girls (yes, they teach craftsmanship—the art of using the hands—to girls, too).

The woodworking department altogether occupies fifteen rooms and a list of their equipment from electric glue pots to the lumber dry kiln would fill two columns or more. The woodworking machinery consists of up-to-date machines equipped with proper guards, starters, controls and other safety devices that keep accidents to a minimum. An extensive exhaust system is installed as will be noted in the accompanying engravings. All the rooms have floor sweeps and hoods for machines, and the

LIKE the beginning of nearly all of our American industrial schools at the awakening of the movement for industrial development, the inception of the Buffalo Technical High School was small—sixty-four boys and five instructors was the original enrollment. But this awakening grew rapidly and progress was active, so that in three years the students numbered over two hundred. The city, the public, the Board of Education began to realize that industrial development was not just a movement, but a necessity. Expansion had been so rapid that the original building was inadequate for housing the students. So they constructed one of the finest and best equipped technical schools that modern ingenuity can produce; complete and diversified, to give



shavings and dust are automatically fed into the fires of the power plant. The machines and lathes, by the way, are individual motor-driven, thus further promoting the "safety" idea. The pupils start with the simple rudiments of carpentry and joinery and progress through the grades until they reach the pattern making or advanced joinery departments, having fully covered the ground in hand tools and using the various machines, jointers, mortisers, vertical borers, spindle and drum sanders, universal saw tables, tenoners, band and buzz saws, etc. The work is all directly correlated so that the progression is smooth yet varied and complete.

The machine shop is interesting because of this diversity of machines—there are no two machines alike and hardly any two of the same manufacture. There are no machines, however, that are not of a standard type. The idea is to give the student, not a specialized

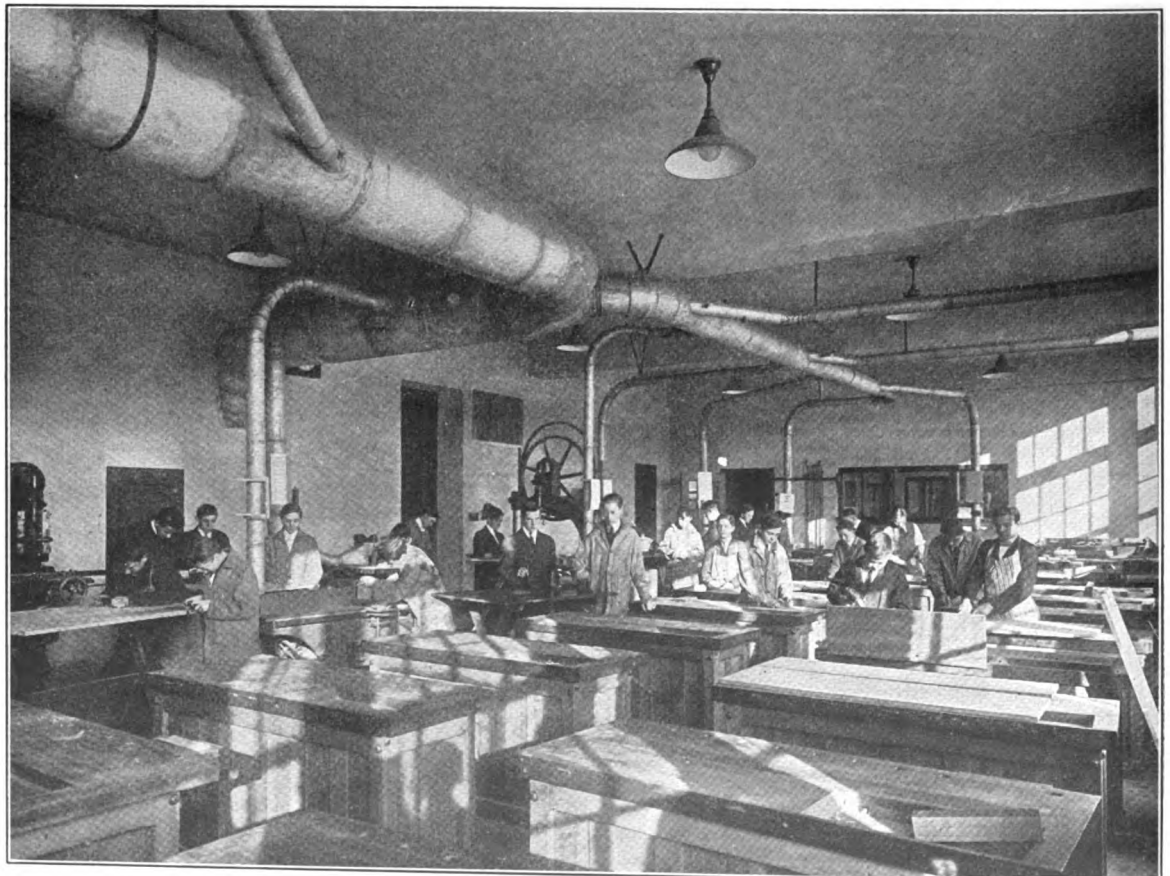
knowledge, but a versatile yet comprehensive training. A great many of the lathes have the standard feed change gears. This gives the student experience in calculating gears and setting the machine for screw cutting. In all, the machine shop occupies three large rooms and works in co-operation with the forge and foundry in turning out practical work.

The forge shop is, of course, particularly interesting, situated in its separate well-lighted and ventilated building, making it one of the pleasant shops. It contains twenty-four 24 by 36-inch Buffalo Down Draft forges and one 38 by 42-inch for large work. A 6B Volume Blower furnishes the blast and the exhaust is taken care of by a 65 inch conoidal exhaust fan. Further equipment consists of a 100 lb. Fairbanks power hammer, striking 325 blows per minute; a power punch and shears, a drill press, and a 12-inch grinder.

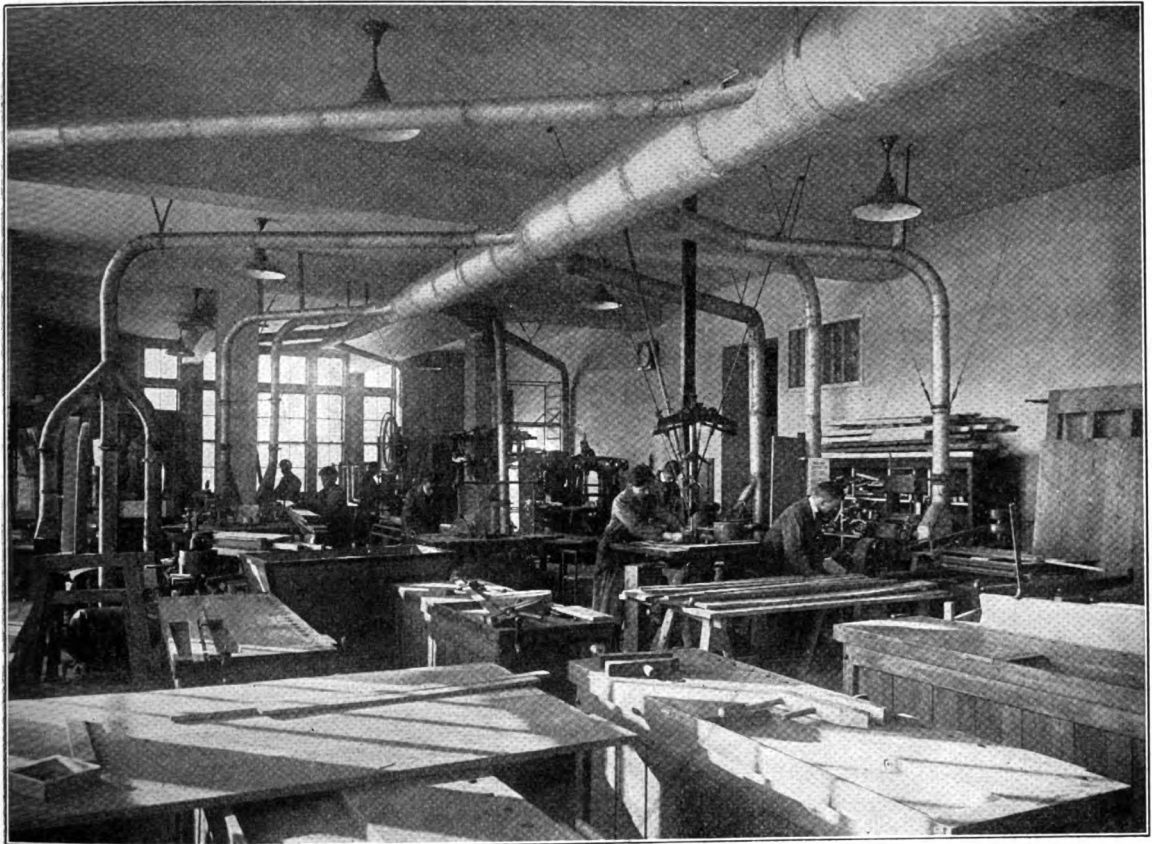
The forges are of the double type,

thus making for economy in space, and each has its own set of hammers, tongs, fullers, etc. A 150 lb. anvil, that rests on a portable cast iron base designed by the students, accompanies every forge. The shop has a varied line of vises, sledges, a tapered mandrel, swage block and stand, etc. The students, however, do not stop with only the working of iron and steel, but continue their investigations and practices in scientific hardening and annealing, and for this purpose they have installed a No. 1 American annealing and hardening furnace.

The foundry occupies a space similar to the forge at the other end of this separate structure. It is connected with the building proper by corridors, and being near the street provides easy entrance for all material necessary in the work. The shop is ideal, being large, well-lighted in the usual factory way, and well-ventilated. As has been mentioned before the power plant with the



THE WOODWORKING DEPARTMENT IN THIS TECHNICAL HIGH SCHOOL IS MOST THOROUGHLY EQUIPPED IN EVERY RESPECT.



AN EXTENSIVE EXHAUST SYSTEM KEEPS THE AIR CLEAN AND FREE FROM DUST AND PREVENTS THE OBSTRUCTING OF MACHINES

dynamo and fan room is between the two shops. A No. 30 Colliau Standard cupola is installed. This cupola has a fine arrangement for experimental work, having two sets of tuyers, an upper and a lower row, so that either one can be closed from the outside; also a safety tuyer is provided to prevent metal running over the lower tuyers into the wind box. A Monarch "Steel Harvey" is used for melting brass, aluminum and alloys. The furnace is of the tilting type and may be used for melting and refining ferrous or non-ferrous metals. This furnace and a "ladle heater" are both heated by natural gas under pressure.

A large core oven, having five swinging doors, an 18-inch tripod shaker, a tumbling barrel, three types of moulding machines, and the small tools and individual kits for each of the sixteen moulding benches, make up the greater part of the equipment. A large floor with a deep pit in the center is for

loam, dry sand, sweep and for heavy green sand moulding. The benches are arranged around the windows and each pupil has plenty of space to mold and cast his patterns.

There is always a potent joy in making or building something—each one of us has experienced that feeling. But add to this, the usefulness and need of the object we have constructed and the joy is doubled. The boys of the Buffalo Technical have not only experienced this joy, but the school has profited by it. For instance, those sixteen moulding benches in the foundry were designed in the drafting department, and constructed by the students in the forge shop. They are an improvement over the typical moulder's bench. The core bench, the bins for storing the raw material are also a "home" product. In the machine shop an entire engine lathe, and a drill were built by the students in that department; a tool

crib (a small room where the expensive and sensitive drills, centers, etc., are stored) was made entirely by the classes. When they moved from the old building to the present structure, the machines were dismantled and then set up in their present position. The counter-shafting for these machines was also put in place by the boys. And we must not forget a model steam engine built by the machine shop classes.

The writer, in passing through the school, saw an interesting example of this efficiency. A cone pulley of three steps used in one of the lathes had broken. Did they send to the maker for a new one? No; they sent the broken parts to the drafting department where working drawings were made; these were then sent to the pattern shop, where the pattern was just being finished when the writer saw it. From there the pattern will go to the foundry to be cast and then back to the machine shop



to be properly machined—and used. Thus both school and students profited by the accident.

The instructor in pattern making mentioned a host of patterns that were being made for parts on various machines—new and old—and he further stated that since this department had been running in the new school and even in the old one, it had been making patterns for tools and parts to be used in the school. The carpentry and joinery shops have contributed their full share, though this work shows up more in quantity than in variety, illustrating the factory ability. Benches innumerable, for the electrical and physical laboratories, for its own woodworking department, drafting benches, and large cupboards for the domestic science room were made. Then there were many articles made for the annual sale and exhibit that is

a yearly feature of the institution.

In connection with these shops the drafting department deserves praise for their drawings and blueprints. Many equipments were designed here and made outside, so that the special, peculiar needs of the school would be individually met. Furthermore, the specifications for the various machines and shop equipments were prepared by the pupils while in the old school.

Summing this up, we might say that each pupil has an economic value to the school. And, moreover, the attitude of both students and school enhances this value for “to respect work and the soiled hand of the toiler”—that is the spirit, the thought, the slogan that animates the boys and girls who attend this institution. And the hum of many wheels, the pound of sundry hammers and sledges, the shriek of the

saws, the noise and whirl of the machines, all contribute to the scene of useful activity that impresses you as you go through this building.

The Forging Course at Wentworth Institute

Wentworth Institute in Boston was founded by Arioch Wentworth, “for the purpose of furnishing education in the mechanical arts”. Applicants must be at least sixteen years old and thoroughly in earnest. For the one-year day courses and for the evening courses, no entrance examinations are required, but the applicant must prove himself able to succeed in the work and to have the necessary experience and education. Applicants for the two-year day courses are re-



A BATTERY OF TWENTY-FIVE MODERN DOWN DRAFT FORGES COMPRISE THE PRINCIPLE FORGE SHOP EQUIPMENT



THE FORGE AT WENTWORTH INSTITUTE IS WELL EQUIPPED WITH MODERN TOOLS

quired to pass extra examinations.

The tuition fees are six dollars per term for the day courses with a laboratory charge of three dollars per term for a one-year course and five dollars per term for a two-year course. For the evening courses a charge of six dollars per season (two terms) is made, and for certain courses an extra laboratory charge of six dollars per season is made.

The courses offered at Wentworth Institute include practically all mechanical and technical lines. The one-year day course are intended for beginners who have had little practical experience and include the manufacturing and building trades. The two-year day courses are intended for those who wish to become superior workmen, master mechanics and foremen and these courses are naturally of an advanced nature. The evening courses are intended for those who are employed during the day and include practically all lines of trade.

Besides having a special evening course in forging and tempering, these subjects are included in other courses: For example the one-year

course in machine work includes such subjects as forging, tempering and tool making, which includes practice in hardening and tempering and the treatment of tool steel; case-hardening and a study of the various steels on the market. Actual work is also done in the making, hardening and grinding of arbors, gages, drills, taps, reamers, milling cutters, etc.

The course in forging, hardening and tempering includes practice in these subjects, with heat treatment of different kinds of steel, the study of different special steels and annealing, case-hardening, etc.

All the shops and laboratories are thoroughly equipped with modern tools, machinery and apparatus, and while the buildings so far completed offer every advantage, additional structures are both in course of construction and in prospect.

Wentworth Institute offers worthy young men a means of securing that education and training so much needed these days to secure advancement in the trades and technical lines.

A Modern Idea in the Blacksmith Shop

W. O. B.

The modern idea in merchandising, in manufacturing, in selling, is to make or to produce cheaply a thing which will sell for a price out of all proportion to its actual cost, because of the thing's high ability to save labor or money or time. Many articles, machines and devices are today produced and sold on this plan.

Take the thousands of such well known machines as the typewriter, the sewing machine, the cash register, the adding machine, and then the numerous machines that are not so well-known, but are used by the thousands in various businesses and industries. These all take their selling price, not from the cost of production, but from the service they render; the money, time or labor they save. Their cost of production is a mere fraction of the selling price. Quantity manufacture, automatic machinery and quality production of parts has cut their costs to the bone, so to speak.



The price is, however, based upon the work the machine will do—the time, labor or money it will save. The price is based on service.

And this same pricing idea can be followed out in the smith shop. Take for example the oxy-acetylene plant and the work it does. If the smith based his charges for oxy-acetylene work on his costs only he will not come within hailing distance of what he should really get for his work.

For example: take a cracked automobile engine cylinder, a broken gear wheel, a broken threshing machine part or a broken part from a steam or other power plant. To secure a new part from the factory and the consequent delay awaiting it would mean considerable to the owners of every one of the machines mentioned. Yet the part brought

to the oxy-acetylene equipped shop will mean the replacement of the part almost immediately and in as good or even better shape than before. And such repair work while it will cost the smith little in either time, labor or material, should be charged for on the basis of service. If charged on the basis of cost of materials the charge would be a mere fraction of the actual value of the work to the customer.

One shop we know of charges from thirty to forty per cent. of the cost of a new part. Thus they make a saving for the customer and also make a good profit for the shop. Another shop makes no charge of less than fifty cents for oxy-acetylene work, and while taking into consideration the original cost of the part repaired, they also

consider the amount of work to be done on the part.

There is really no rule to be laid down for the guidance of fixing the prices for oxy-acetylene work. Some smiths for example have attempted to adjust their prices on the basis of the number of lineal inches of welding and having a basic price per inch. This, however, is not fair to the smith or torch operator inasmuch as some jobs require considerable preliminary work in the setting up of the parts before welding operations can be started. And then again a one or two inch break will in most instances impair the usefulness of a machine quite as much as a longer break or a number of long breaks. And on the service pricing basis, which after all is the correct basis, the per inch charge is unfair.

This service pricing idea may at first seem unreasonable from the customer's viewpoint, but when explained on the basis of the saving made for the customer, he is usually willing and glad to pay what you charge. Apply then this modern idea—charge for your oxy-acetylene work according to the service rendered and not according to your costs, and on this basis there is big profit in oxy-acetylene work.



THREE EXAMPLES OF THE "PRODUCT" IN PROCESS OF FINISHING AT WENTWORTH INSTITUTE

A New Method of Measuring Temperatures

A new method for measuring temperatures wherever heat is applied has just been developed by the Carl Nehls Alloy Co., of Detroit, Mich. This consists of different kinds of metallic salts which are made into molecular mixtures that will melt down at different temperatures, throughout the range between 220 and 1330 degrees Centigrade (428 and 2426 F.). Practical means have been devised for using them in place of the more costly pyrometers. They are also very useful for checking pyrometers. Then a cylinder is placed at the end of the thermo-couple and when it melts the pyrometer should read the same as the temperature marked on the "Sentinel".

One way is to cast them into solid cylinders, 7-16 inch in diameter and 3-4 inch long, as shown by those standing on end in the accompanying illustration. Each one is wrapped in a paper on which is printed its correct melting temper-



ature in degrees Centigrade, as shown by the samples laying down. For all temperatures below 932 degrees F., these "Sentinel Pyrometers" can be used in an air-tight glass tube, such as is shown in the center. The salts can then be used over and over again. By using the small porcelain saucers shown, the salts do not run to waste and litter up the place where they are used. This also enables them to be used several times, as the salt will melt each time the temperature raises above the one marked on the cylinders and become solid again the moment the temperature falls below this degree.

These salts are also made up in the form of a paste. Enough to make several hundred determinations is packed in the tins shown. Pastes with various melting temperatures can be daubed along a steel bar as shown in the front of the picture and inserted into furnaces, ovens, retorts, flues, gas mains, steam pipes, etc., to find the temperature at which they are which would be between the two. By using a long bar one can determine whether the temperature is uniform in the front and back, top and bottom, or corners of a furnace, oven, kiln, etc.

This is the only method that will give the exact temperature of tools heated in a forge fire. A paste is selected that represents the correct hardening temperature for the tool. This "Sentinel Paste" is daubed

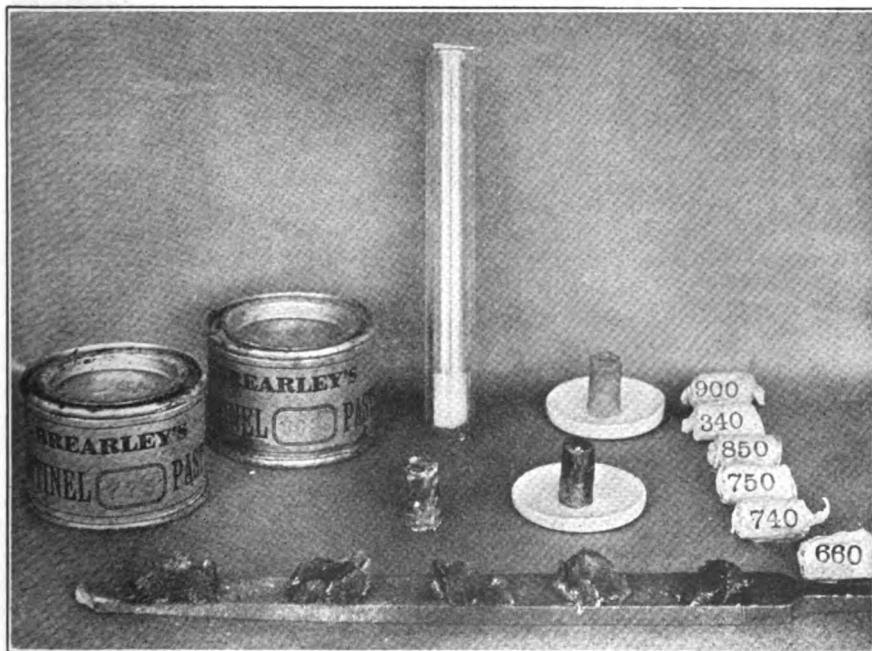
on the tool and when it is heated to this temperature the salt will melt and the tool can be taken out of the fire and quenched. It will make it easier if the tool is surrounded by a piece of sheet steel or is inserted in gas pipe as that keeps the paste from coming in contact with the fuel.

Another handy way of using the "Sentinel" cylinders is to plug one end of a tube or pipe and drop in a cylinder. A small rod can then be lowered into the tube and made to rest on the salt. When the salt melts down the rod will lower and thus indicate that the melting temperature of the salt has been reached. This is very useful for finding the temperatures of molten metals, salt bath furnaces, etc.

The many uses to which these molecular mixtures of metallic salts can be put are too numerous to mention. A few are: where metals are melted, cast, rolled, forged or heat-treated; in baking, enameling, japanning and other ovens; distillation retorts; for flue, chimney, producer, and other gases; in gas engine exhausts; in chemical works; sugar refineries, etc.

"Made in U. S. A."

This is the slogan that is now arousing country-wide interest—and will become a world-wide by-word. Detroit's Board of Commerce has offered a prize of \$500 for the best design of this trade-mark. Detroit is to be commended in so promoting the slogan, as the winning design will be given free to the manufacturers of the United States to use on their products.



A NEW METHOD OF DETERMINING TEMPERATURES OF METALS



The Horseshoer

Horseshoers Prosper in "Horseless Age"

D. A. MERRIMAN
in Juniata News

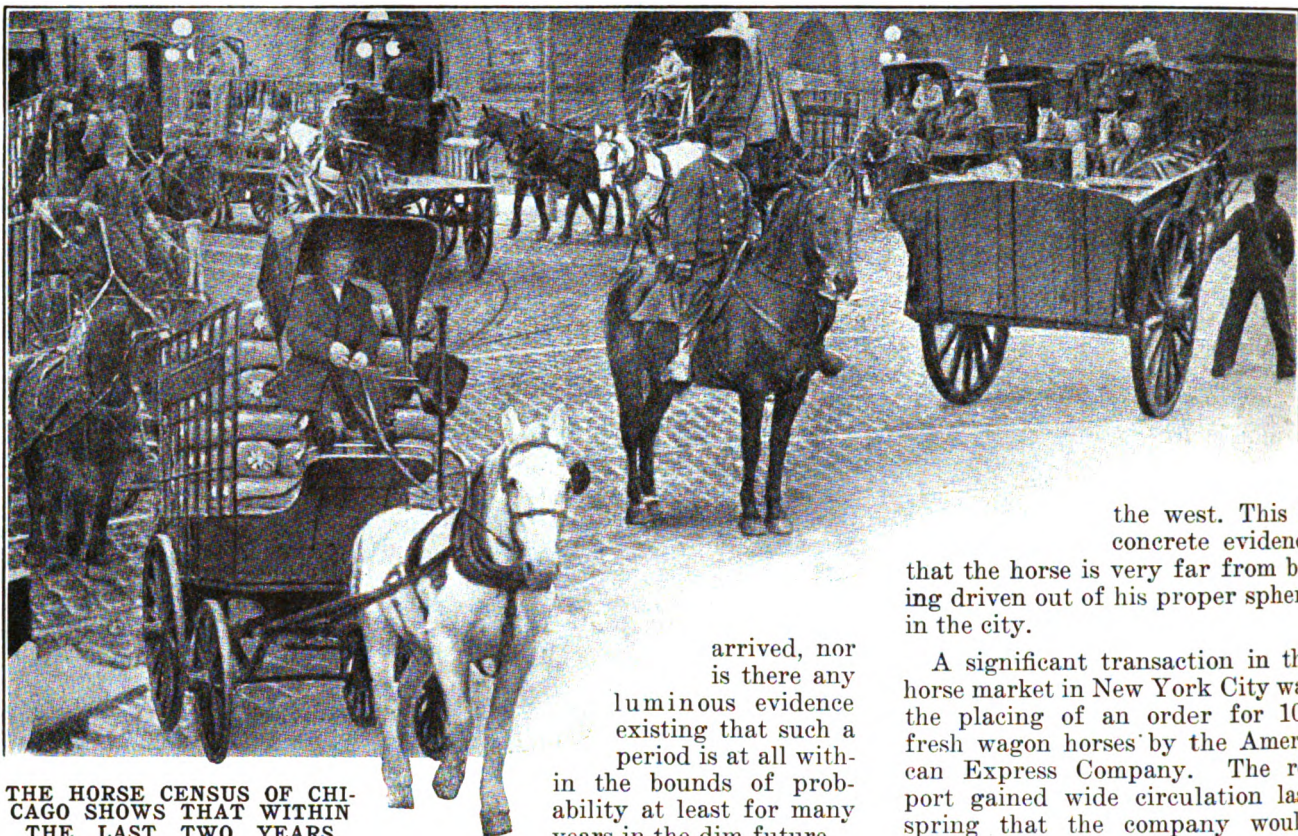
Horse shoeing as a profession not only is on a firm foundation today, but the future is pregnant with greater possibilities than the average citizen imagines.

Those who dwell in cities have come to accept an impression as a belief that with the advent of the automobile truck and pleasure car, the horse has taken and will take secondary consideration in the economics of the country's transportation.

True it is that, to the eye, this impression might have the form of actuality, as one gazes at the continuous procession of gasoline motor cars along the streets of towns and cities, and lead to a prediction that the horse in time shall disappear. Fuel is added by the flamboyant claims of automobile advertising campaigns and by the considerable space given to motor car publicity by the newspapers and other publications.

Facts, however, are stubborn things. The horse, instead of decreasing in numbers, continues steadily to increase, and also his value is much greater in money terms and service.

This is no mere assertion, because the proof is vividly brought to the fore by a recent statistical publication issued by the United States Department of Agriculture. The estimates are from agents of the department who report the numbers and values of farm animals on farms and ranges in the United States on January 1, 1913, with



THE HORSE CENSUS OF CHICAGO SHOWS THAT WITHIN THE LAST TWO YEARS HORSE DRAWN VEHICLES HAVE INCREASED 30 PER CENT.

similar estimates for the two preceding years. These estimates do not include horses and mules in cities.

Year	Total	HORSES	
		Value Per Head	Total Value
1913	20,567,000	\$110.77	\$2,278,222,000
1912	20,509,000	105.94	2,172,694,000
1911	20,277,000	111.46	2,259,981,000

Year	Total	MULES	
		Value Per Head	Total Value
1913	4,386,000	\$124.31	\$545,245,000
1912	4,362,000	120.51	525,657,000
1911	4,323,000	125.92	544,359,000

These figures show that, compared with January 1, 1912, horses have increased 58,000 and mules increased 24,000. In average value per head, horses increased \$4.83, and mules increased \$3.80. In total value, horses increased \$105,528,000 and mules increased \$19,588,000.

As a further comparison, the official census of 1910 shows that for the ten years from 1900 to 1910 the nominal increases in numbers of horses, mules, asses and burros aggregated 2,522,780, or 11.7 per cent. while horses alone increased 8.6 per cent.

The "horseless age" has not yet

arrived, nor is there any luminous evidence existing that such a period is at all within the bounds of probability at least for many years in the dim future.

While the figures previously quoted are understood to be those bearing directly upon farm and ranch horses, the city horse also must be taken into consideration. In the city is where the horse's so-called competitor, the automobile, makes itself prominent in showy numbers. However, the automobile is present really more in shadow than in substance.

In the metropolitan city of Chicago authorities state that within what is known as the "loop" district, or the very heart of the city, the number of automobiles has increased over 600 per cent. within the last five years. That would naturally mean that the number of horse-drawn vehicles had correspondingly decreased. Exactly the opposite is true. A recent census made by the police of Chicago shows that within the last two years the number of horse-drawn vehicles has increased by 30 per cent. and that every day, 80,000 tons of freight is trucked by horse-drawn vehicles through this particular district. The same census shows that every day there are 130,000 teams moving through some part of the district bounded by Twelfth street on the south, the lake on the east, Chicago avenue on the north, and Halsted street on

the west. This is concrete evidence that the horse is very far from being driven out of his proper sphere in the city.

A significant transaction in the horse market in New York City was the placing of an order for 100 fresh wagon horses by the American Express Company. The report gained wide circulation last spring that the company would shortly sell off all its horses and replace them with motor vehicles, but an exhaustive investigation of comparative cost and efficiency seems to have turned the decision in favor of the horse, and it is now reported that the company will use more horses than ever in its collection and delivery service.

Admission is made that there has been a curtailment in the horses for various pleasure or social purposes since the advent of the automobile—such uses as shopping, theatre and opera attendance, paying social and incidental outings, but these changes have not affected the horse in its most practical fulfillment of helpfulness.

In the corn belt and in the irrigated section of the West the draft horse is becoming the farmer's horse almost to the exclusion of horses of the light type. Where conditions of environment are satisfactory a farmer is wise to use draft horses because he can haul larger loads, get greater power for moving heavy implements, and suffers a minimum loss from blemishes when he markets his surplus. Also where a prosperous farmer formerly kept a team of fine drivers to get about the country, the drivers have been discarded and the farmer now owns an automobile of moderate price.

That the lines are being closely



drawn between sections producing draft horses and those producing light horses is clearly shown by reports to stallion registration boards, the percentage in favor of the draft horse ranging from 24.03 in New York to 88.51 in South Dakota.

At this time there are 1,200,000 automobiles in this country, popularly representing 42,000,000 horses in gas-power, supposing each car may average 35 horsepower. It is a wonderful fact that, with this in view there should be no diminution in the number of horses. Forty-two million horsepower is a huge sum to conjure with, and perhaps some liberty may be taken with the exact meaning of "horsepower" in the reference to automobiles. Scientifically, horsepower means the lifting of 33,000 pounds one foot in one minute, or one pound lifted 33,000 feet in one minute. James Watt was asked how many horses his engines would replace. To obtain data as to actual performance in continuous work, he experimented with powerful brewery horses, and found that one traveling 2½ miles per hour, or 220 feet per minute, and harnessed to a rope leading over a pulley and down a vertical shaft, could haul up a weight averaging 100 pounds, equaling 22,000 foot pounds per minute. To give good measure, Watt increased the measurement by 50 per cent, thus getting the familiar unit of 33,000 minute foot pounds.

Since the time of the invention of the steam locomotive and all down through the years of rapid development in means and methods of transportation, the pessimist has croaked and croaked about the doom of the horse. But the horse sweeps along unmindful, holding its unique position as man's best animal friend.

The future, therefore, is a most hopeful one for the horse shoer, for the feet of the horse ever must require the ministering care of the smith. With the natural increase in numbers there must correspondingly come sufficient numbers of shoers who find remunerative prices and scientific satisfaction in the profession.

Shoeing the Gaited Saddle Horse

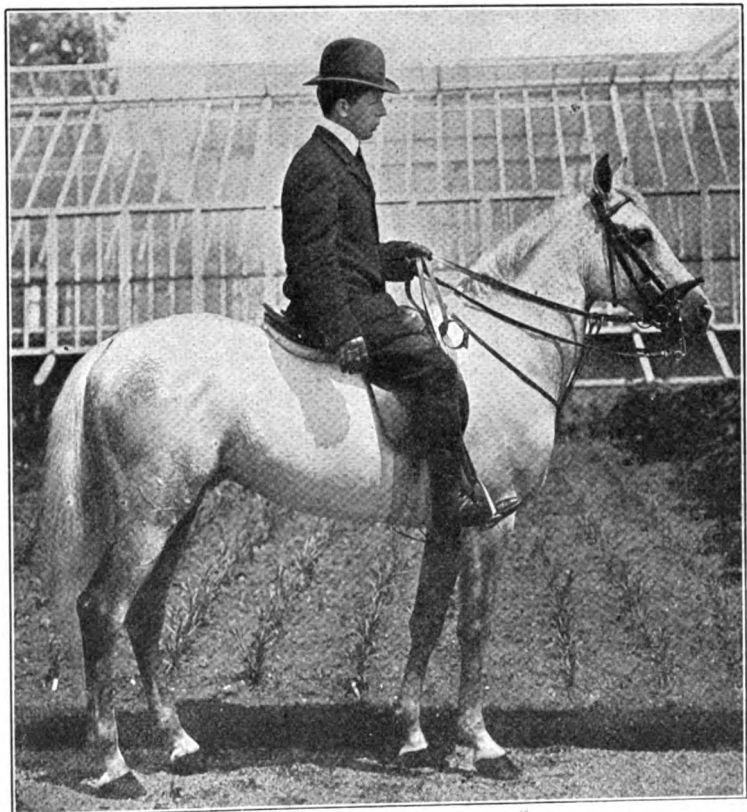
LESTER SIMS

The subject of shoeing and balancing the gaited saddle horse is a

very interesting one, when considered from a scientific horseshoeing standpoint. I freely admit of it being a very fruitful subject especially when we consider the number of different gaits expected of the one horse, with each gait done to a nicety and as near as possible to perfection. I have been watching with keen interest the cream of the country, the Kings and Queens of the show ring or arena, for more than a quarter of a century, and I doubt if the present day cracks have anything on some of the old timers; admitting, though, a greater number of good ones.

With reference to shoeing the three-gaited saddle horse which

sons, namely: First, in going on a rack (known to some as single foot)—this being a very mixed gait, a cross between a trot and pace is very much of an artificial gait and a tangle between the two gaits of trot and pace. It is an unnatural gait that in the majority of cases is developed and taught by skillful handling of the rider (of which there are many experts) by the bit, and by means of balancing the feet which in many instances means the unbalancing of other gaits in order to find this one. For example, shoes on hind feet and on front; by means of working them on slightly down grade; and by letting the forefeet wear a little



SHOEING AND BALANCING THE GAITED SADDLE HORSE IS AN INTERESTING SUBJECT

consist of the walk, trot, and canter class, it might be well covered in connection with the subject treating on shoeing the five-gaited saddle horse as he does all that the three-gaited horse does, and a great deal more; which makes him all the more difficult to properly shoe and balance his action, for several rea-

sore or tender, etc. Very often after having found the gait in this way (or as the saying goes "have struck a rack") the front feet are shod and the weight will often benefit by holding them steady.

With this gait, is just when the trouble really begins, for the reason that cross-firing, bruising the front



quarter and pulling the shoes are even worse than in the pacer, especially so until the gait becomes well established and balanced. Then come a number of other facts not to be lost sight of in doing these various gaits, and that is to have them well balanced. We often find them to have plenty of action in doing the trot, and to be low-pointed, gaited and dwelling too much in front in going on the rack. And vice-versa, again, one that is perfectly well gaited on trot will paddle with front feet when going on the rack. Others with good action in front have comparatively little action behind. Of course, in such a case the action must be developed or built up, and to overcome the many little defects of action to be met with in shoeing the gaited saddle horse, from the beginning (in the raw) to a well-balanced, good-gaited all-around saddle horse, requires a vast fund of knowledge and experience in the art of gaiting and balancing. The action, meaning the proper use and distribution of into the proper shape, comes from many shapes and forms of shoes, to be modified and in keeping with the

rules and laws of nature and which are intended to overcome the defects and to building up from a green one (in the raw) to the finished product, as seen in those who get to the shoe ring. But very few people realize or appreciate the important part that shoeing has to do with it.

The writer having had a great deal of experience along this line, will follow this with an article on the shoeing proper.

Thoughts on Timely Topics

By THORNTON

Caustic Censure and Cheery Comment

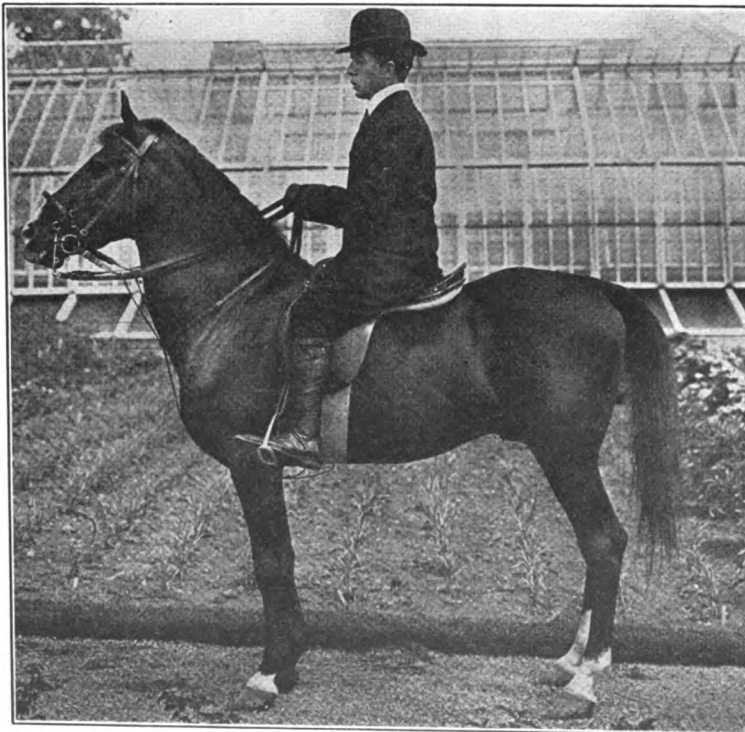
ABOUT NOW IS THE TIME when the average resolution which had a constitution as strong as an ox at New Year's time, begins to show white in the neighborhood of the gills and rapidly succumbs, finally resting in a state of innocuous desuetude. Here most any house-broke resolution will rest peacefully until another year rolls around, when it is again revived, given a shave and hair cut and is made to

look like a brand new store clerk.

It is a common quality among resolutions to show enough grit, determination and real spunk to fight a lantern-jawed temptation to the ropes during the whole of the year's first calendar month. But the continued fighting instead of strengthening, seems to break down the g. d. and s. of Kid Resolution and before the end of the second period he is usually floored for the count. Thousands of resolutions meet this sad fate at about this period of the year. We haven't yet found anything to keep a groggy resolution in the pink of condition and fighting, but we are in hopes of some day being able to put the great and grand Order of New Year Resolution Makers onto some tonic that will keep a wobbling resolution on its feet and fighting for existence.

IF THERE IS ONE THING more than any other that sets our teeth on edge and inclines our otherwise peaceful soul toward shucking its coat and rolling up its sleeves, it is the habit some farmers have of ever and anon, attempting to beat a bunch of blacksmiths out of a ten-cent raise in the price of shoeing. The Editor was telling me some time ago of a case in Jersey where a bunch of smiths decided on a small raise, only to have the horny-handed sons of toil form a company and equip a shop to do their own work at the old price. And I'll wager a doughnut against a Belgian cent that every one of those penny-pinching hayseeds wants the very highest market price for a bushel of potatoes and will then ask the smith to go out and dig 'em himself. Funny thing to me is that these alfalfa chewing yaps will spill, sputter and spout by the hour on the high cost of shoeing and wagon repairs, and will talk the air blue on the subject of "The Downtrodden Son of the Soil" and then end up with a tirade of the "Farmer's Burden"; and when you even suggest that the price they are asking for their produce is pretty good they'll throw you a line of talk about "the sacrifice of profit" that has a professional auctioneer beaten off the boards.

We were lead to believe some time ago that parcel post would bring the farmer closer to the city and allow city folks to get fresh farm truck easily and cheaply. Just ask any farmer what he wants for a dozen of eggs or a bushel of po-



THE SHOES MAKE UP ONLY A FRACTION OF THE ANIMALS EQUIPMENT
THOUGH THE SHOING MAY BE THE MOST IMPORTANT



tatoes delivered to you at his gate. If he wants anything less than he can get in the city, which is a good ten, twenty or more miles away, he is one in a thousand and you can bet on him being willing to pay a fair price for shoeing. The fact that in order to be able to charge city prices for his wares, his goods must be in the city doesn't seem to enter the farmer's alluvial dome of thought.

I am in favor of the farmer's success and that he get a good price for his produce. The better the price he gets the better I will like it for the success—the real success—of any country depends upon the success of its agriculture. The farmer has been better off in the last, comparatively few years, than ever before—and I am glad of it. But when these success-laden sons of agriculture kick about the little advances that smiths all over the country are trying to get, it's time to hand out a few forty-horse power kicks to jog their brains and jar their back bones. I haven't said all I want to say on this subject, but maybe it'll do for this time.



Bison's Notes

Some way the impression prevails quite generally that harness racing has been dropping back in popular favor. Possibly it is the large number of automobiles which are in use that has caused this idea to become prevalent, but whatever the reason, there is no justification for it. The secretary of one of the two great parent trotting associations, a man who has more detailed information regarding harness racing than any other person in this country, recently stated that more harness race meetings were held in the United States and Canada in 1914 than were held during any other year since the sport had its origin, a century ago. Up to December 1, this official had received reports of 1,368 meetings held during the past season, which is a considerably larger number than reported for any other

year, not excepting 1892, when an extra volume of the official reports was required to contain the summaries of the year's races and the breeding of the performers. How great an attraction harness racing is for fairs is indicated by the fact that seventy-five per cent of the race meetings held in 1914 were held in connection with state or county fairs. The 1,368 meetings were held on 1,200 different tracks, forty-nine being mile tracks and the balance half-mile tracks. And despite the increased number of race meetings, the average number of starters in a race was smaller than a year ago, due to a scarcity of horses. So important was harness racing considered by managers of fairs that an innovation, inaugurated by the big fair associations at Allentown, Pa., and Nashville, Tenn., was the abolition of entrance fees for horses. At these meetings owners of horses were not required to pay anything to enter in races and the purses were of the usual proportions. The experiment is said to have turned out most satisfactorily to the fair associations, and it seems apparent that other associations will adopt the same method next season, for there is no other one feature that will attract the public in the same degree as racing, in fact, a fair without racing speedily becomes a money-losing proposition.

In many cities where the harness racing interests depend upon private capital and private effort to attract the support and co-operation of the public this typical American sport has failed to hold its own with other sports. In one city, however, Milwaukee, with municipal assistance, harness racing has grown so rapidly in public favor that now only baseball exceeds it in popular interest in that city. This result has been attained since 1906, when, at the request of a gentlemen's driving club, formed that year, the common council appropriated \$2,500 toward building a public race track on land included in the city's park system. The track was finished so late in the fall that only one matinee could be held and 5,000 persons turned out to participate in and witness the afternoon's program although the temperature was below the freezing point. The next year public matinees were held every Sunday and the average attendance was 6,000. This was made known to the common council and an appropriation of \$10,000 requested to build a grandstand, but the request was refused. In 1910 the average attendance for the season was 9,000 and then, convinced that the public was deeply interested in harness racing, the common council set aside \$10,000 for the erection of a grandstand. The stand was finished last season and the weekly attendance increased until now each Sunday sees 15,000 persons at the track to witness the racing. This year, without any urging the common council granted an additional \$10,000 to put a roof over the grandstand and to build stalls for the horses.

These matinees are conducted under the direct supervision of the city. The city takes care of the track, one of the best half-mile tracks to be found, while the horsemen furnish the horses to supply the sport. No cash prizes are raced for; only silver loving cups, donated by the business men of the city who have found municipally encouraged racing an

excellent thing for the city. When the track was first built members of the driving club had 32 horses to take part in the sport with. Now 92 trotters and pacers are available to furnish sport for their owners and enjoyment to the thousands who delight in seeing them put forth their best efforts to land first at the wire.

—o—

Frederick Wagner, president of the largest firm of horse dealers in New York, estimates that Europe is likely to take very close to one million horses out of the United States before the great war now raging in Europe is ended. He states that sickness brought on by exposure, confinement and shipping kills 50 per cent. of the horses purchased in this country before they reach the danger zone. This statement is borne out by observations of horsemen who were in a position to know the percentage of loss among the horses and mules bought in this country fifteen years ago to be shipped to South Africa during the British-Boer war, when only about one-third of those shipped reached the firing line. Of the countries engaged in the great war now raging, Russia alone has sufficient horses to equip her army. As a nucleus of her European mounted force Russia has 83 regiments of cavalry, but counting in her Cossacks, the Russian mounted force will number almost a million men. It is estimated that France has approximately 100,000 horsemen and that England has sent about 25,000 mounted men across the Channel. At the commencement of the war Germany had 102 regiments of cavalry and Austria 58 such regiments, while Turkey has about as many more, making about 225,000 mounted men. Counting in the cavalry divisions of Servia and Belgium there are not far from 1,500,000 horsemen engaged in the terrific conflict. Taking the statement of General Frederick von Bernhardt, who not long ago said that within six weeks after the outbreak of the Franco-Prussian war the greater part of the horses taken into the German cavalry were useless for field purposes, it is not difficult to understand why military authorities make ten days as the average length of time a cavalry horse lasts in the war zone for the heavier equipment of the armies of today over that used by those of 40 years ago. The greater rapidity of movement, the increased power of weapon now in use and the frequent necessity of sacrificing mounted troops in covering retreats and in other movements of vital importance to the success or safety of the main army, means an appalling wastage of horses. That the War Department of this country has a very definite idea of the great number of horses that will be taken from the United States will mean, is evident from a recent Washington dispatch which states that the department will ask Congress at the approaching session, to authorize an embargo on the exportation of breeding horses. If the embargo is authorized it will mean that the agents of the foreign countries who are to confine their purchase to geldings as in this country buying horses will have such an embargo would prohibit the exportation of stallions and mares.



There's Work To Do

With Apologies to George Lounsbury

Old man McForge across the way to war's alarms has fallen prey; from morn to dewy eve he frets and all his other jobs forgets. He spends his days in fear and fright and fumes and stews throughout the night, and nearly has conniption fits for fear we'll soon be on the fritz. No more he whistles cheerful songs and hustles round with smithy tongs or with his rasp and shoeing box—he'll soon be fit for saw-bone Docs.

I sit at night in slippared ease; all day I blithely turn a breeze into the fire that heats the rod that makes the shoe when a horse is shod. For Wilhelm I care not a groat, his armies cannot get my goat; this country will not go to pot, such fears as that are simply rot; there's no use feeling sad and blue especially when there's work to do.

And down the street there's Anvil Jones who feels things comin' in his bones; he thinks that other smithing shops will open up like corn that pops. Disaster's hanging o'er his head, he often wishes he were dead. "More shops", he moans "will bust us all, our profits now are far too small; this new gazook who's movin' in will cut his prices down like sin and I will have to meet his rates on threadless nuts and hingeless gates. I might as well shut up the place and let the county feed my face."

But I am not like neighbor Jones, I have no time for weeps or moans, I am not scared by smithies new, in fact I think we need a few. He may cut prices down that's true, perhaps he'll cut 'em right in two; but I'll keep right on tacking shoes and forging hoops for casks of booze at prices that are fair and right and treat my patrons good and white, and I'll do business right along and life will be one glad sweet song. This fear of competition keen is only for the slot machine. Don't let it throw you in a stew, especilly when there's work to do.



Heats, Sparks, Welds

The shortest month is here. Is the work short, too?

When using a monkey-wrench, remember it isn't a hammer.

How are collections? Ask Subscriber's Service to help you. Describe your needs fully and then see if S. S. can't help you make collections better.

Place equal parts of pluck, patience,

push and persistence into any smith shop and you'll come pretty close to having a full measure of prosperity.

Are you getting your share of the agriculturists' money? Better plan to get a grip on some of it. Tools in shape and equipment up to date will help.

We're looking for articles on how to sell side lines. We want actual experiences—not imaginings. Tell us how you are selling things "on the side".

Procrastination is painfully plentiful. That's why you see so many "Do It Now" signs. We all know that well enough by this time, so let's change it—Do It Well.

The friendly pipe and the neighborly chat have little place in these modern days. The pace is swift and to the swiftest belongs the spoils. The pipe and chat are time eaters.

It means work and it takes time but it pays. Customers like to come into a neat, clean shop. Anyway, we never heard of any one staying away from a shop "cause it was clean".

There's room on the Honor Roll for your name, and there's room in your pocket for the saving you'll make by getting on that list. Better figure on a long-time renewal Now.

Have you a place for the trade catalogs and other literature that comes to you? Better fix up a neat shelf or better still a drawer where you can keep these valuable books of trade handy.

Perhaps there isn't a new comer in your neighborhood, but, of course if there was you would have made a business call soon after his arrival. That's one way of grasping your opportunities.

It's one thing to serve a customer and another to serve him right. Don't be satisfied until you're satisfied that the customer is satisfied. Then and not until then is the deal entirely satisfactory.

"Funny", says Bill Forger, "that about the most important thing in the average smith shop gets the least attention. I cannot see why smiths don't pay more attention to their coal and forge".

Appearances speak volumes these days. How about the appearance of your shop—yourself—your help—your tools—your stationery—your advertising matter? Better look at these things as others do and then make them better.

Some smiths send out bills and seem to let the collections take care of themselves. But it doesn't work. Keep hammering at the delinquents. There is not much argument needed to tell why you should be paid for work you've already done.

Short cuts will cut short your costs and enable you to complete on the right basis. Don't think that just because your competitor does a certain job at a certain price that you can do the same. Keep accurate record of your costs and know just where you stand.

"Cleaned house" yet? Well when you do, clean off those patent medicine and tobacco signs on the side of the shop. They almost hide the walls. Put up a neat sign or two of your own—it'll pay bigger dividends than any little favor the medicine or tobacco men can do for you.

One smith we know charges a small fee for every tool he loans out. "This protects me from the chronic borrower and the honest man is glad to pay the little I ask of him. I have to pay for my tools—have an investment in them

and every bit of usage shortens their life".

How often you purchase something simply because you are reminded of its need by seeing it. Apply the same principle in your own business. Make up a wagon jack or two—put in a stock of whips, axle grease or some other common necessity. Then display them where they will be seen and will sell.

A smith cannot know too much about his trade these days. Nor can he have too good an equipment. Are your mental equipment and your shop equipment well balanced? As bad to have a poor shop equipment and a good mechanical training, as to be lacking in knowledge and have a modern shop equipment.

Economy is not going without the thing we need when we have the money to buy it. Economy is not keeping a good thing on the top shelf and using a poor one because it will do. Economy is making the most of what we have, and getting things that will help us to do better as fast as we earn the money to buy them.

Remember—"THE AMERICAN BLACKSMITH" means not alone a publication, a paper, a magazine issued monthly. But it means more, much more—it means service for Blacksmiths—it means helpfulness—it means co-operation. It is the name not only of a monthly publication but of a service of helpfulness and co-operation. Ask Subscriber's Service.

Ben Franklin had a great deal to say in his day about money and saving and economy, but you can go through all of his writings, read them forward and back, and you'll not find one word advising you to place money in wild-cat ventures and in gold-brick schemes. Franklin knew something of money and money matters and he expressed his convictions most tersely.

Let us have the truth. Write us an occasional letter on just what you think of "Our Journal". We get lots and lots of letters of praise on what we are doing, but we want an occasional criticism; we want to know more particularly what it is that you do not like. Sincere praise is good, and we are always glad to get a good letter of commendation that has the sincere ring to it, but we want the criticism, too; and if you have a real criticism—if you can point out a fault in "Our Journal"—do so by all means, and do so quickly.

Mr. Editor: I am writing you this letter to warn you against the consequences if you don't quit talking about me and my ways of smithing. I want you to understand that I am, in my own particular way, as good a smith as you ever were. I warn you to stop writing about me for I am getting awfully tired of it—especially that fellow telling me my good points.

I will now close, as I want to fix a window that blew out last fall.

TOM TARDY.

Encourage the shop boy by showing an interest in what he is trying to learn. Properly instructed that boy will be one of the big men of the future craft. Leave your enduring impress on the trade by giving him all the help, knowledge and encouragement you can. THE AMERICAN BLACKSMITH has been a big factor in the rise of many smith shop boys. We've had letters by the score attesting to the fact. Are you giving the boy the right kind of encouragement? "Our Journal" will help you help him.



Our Honor Roll

Just Think Of It

There are about 350 readers names on this page, every one of whose subscription is paid up to or beyond January, 1918— every one, three or more years in advance. Of these Honor Readers 145 are paid up to some time in 1918; 73 are paid up to some time in 1919; and so on until we find The Fix-It Shop, of Utah, paid up to July, 1935—over 20 years in advance—; Mr. W. C. Watt, of Kansas, paid to December, 1930; Mr. I. J. Stites, of New Jersey, to January, 1929, and Waddington Farm, of West Virginia, to March, 1928. And in referring to these paid-in-advance readers we have said nothing about the thousands of readers whose accounts are paid up one, two and three years in advance.

When you consider these facts doesn't it indicate that The American Blacksmith must be working along the right line and that its work has the support of the smiths and craft workers who are really worth while?

If your heart is in the craft you'll approve of our labors for craft and shop betterment. And the best way to demonstrate your approval and support of Our Journal and its work is to take advantage of Our Long Time Rates—place your name on Our Honor Roll.

Table showing subscription rates for U. S. and Mexico, Canada, and Other Countries. Rates range from 2 yrs. \$1.60 to 5 yrs. \$5.00.

Send your order and remittance now—today. Don't wait until you forget all about it. You'll never regret it. Our subscription insurance saves you money. The sooner you begin saving the more you save. There is no time better than NOW.

Table of names and subscription dates, starting with The Fix-It Shop, Utah (July, 1935) and ending with L. C. Larsen, Iowa (July, 1923).

Table of names and subscription dates, starting with W. K. Kline, Kan. (May, 1921) and ending with C. Ziehe, Iowa (Nov., 1918).



Safety Shields on the Anvil and at the Steam Hammer*

BERT HILLYER

Figure 1 shows another safety device when trimming or cutting off ends of forgings at the anvil. The shield prevents pieces from flying across the shop and injuring

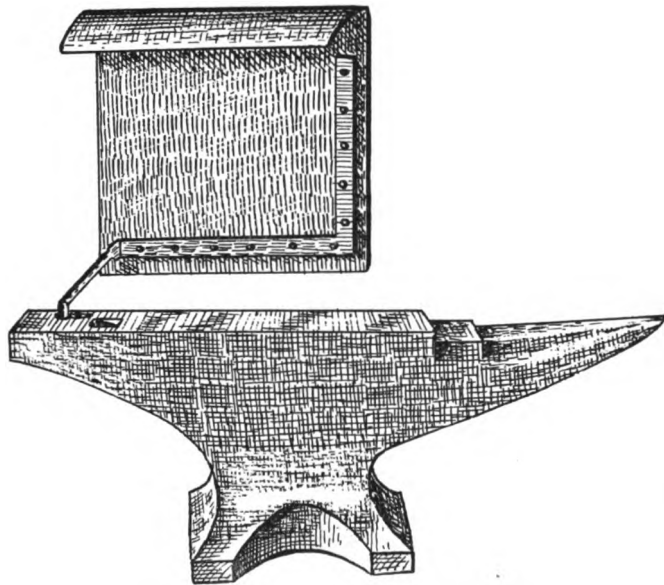


FIG. 1.—A SAFETY SHIELD THAT PREVENTS HOT CUTTINGS FROM FLYING ABOUT THE SHOP

workmen. It is so simply and easily made that a lengthy explanation is unnecessary. The shield is made of 1-16 inch steel which is riveted

***Editor's Note:**—The need of safety shields and safety appliances in the smith shop is shown most forcibly in the following newspaper account of a recent fatal accident in the Pennsylvania Railroad Shops at Renovo, Pennsylvania:

"John Burkhart, a well known resident of Renovo, employed in the P. R. R. blacksmith shop, was fatally injured Tuesday evening at 6:30 o'clock while at his work in the shop. The particulars of the accident are given by 'the Record' as follows:

"Mr. Burkhart was putting a box in the case-hardening furnace, when he was struck on the right temple and right side of the chest, by a piece of iron 18 inches long, 1 1/4 of an inch thick and 4 inches wide, which was hurled with great force from a steam hammer.

"A large hole was made in his temple and two of his ribs were crushed. The blow rendered Mr. Burkhart unconscious; and in this condition he was taken as quickly as possible to the Renovo hospital by Dr. C. L. Fullmer, in his automobile, and died a few minutes after he was admitted to the institution".

to a frame 5/8 inch round which is flattened down on the part that is riveted. The arm part is left round and the end bent down to fit into the round hole in the anvil. The shield should be about 16 inches away from the anvil, to allow room for the helper to strike. It can then be easily swung out of the way when the trimming off is finished.

Another guard to prevent pieces from flying across the shop is shown in Fig. 2. The guard is similar to the one shown in Fig. 1, except that this one is portable and can be used at any place desired—steam hammer, swedge block, face plate or any place where bits of steel are liable to fly after being cut off. Besides being portable it is adjustable to any height required in the smith shop. The base of the guard shown was bumped out of a piece of 1/4-inch sheet steel, 16 inches in diameter. A piece of 3/4-inch pipe was then cut off, 18 inches long, a collar welded around one end and a plug in the other. This was then shouldered down to fit into a hole that had been punched in top of base; the stem was riveted tightly inside of the bowl forming the base. A hole was drilled and tapped in the collar of pipe to take a 3/8-inch set-screw. The upper part was made of light sheet iron, bent over at the top as shown.

A light frame with a 3/4-inch stem to it was made and riveted onto the sheet iron. This stem was set inside of pipe and, by tightening setscrew, it could be set at any height. The following matter should have been mentioned before: the reason for punching the hole in top of base instead of drilling is that in punching it was all done from one side with a punch rounded on the end. At the start of the punching, the piece was placed over a hole 1/2-inch larger than the punch, and as the punch was forced through it dragged the metal in a long socket-shaped hole which gave plenty of bearing to hold the stem rigidly; whereas, if it had been drilled, it would have had 1/4-inch bearing and would soon get loose. Holes punched in this manner are a big advantage over drilled ones in some classes of work. Fig. 3 plainly shows two different guards in place on one side of our shop. Note the roughed floor in front and back of the steam hammer in Fig. 2, to prevent the men from slipping while working at the hammer.

All of these shields have been approved by the Safety Inspector as something new and good. He made a note of them for the purpose of introducing them in other shops.

"If You Want to Know Who's Boss—"

W. O. B.

The Smith Who Found Out and Was Glad He Did

The Young Dreadnaught—so named on account of his mischievous tendencies—had, with the help of two chairs, three boxes, the family album and a hammer, tacked a card of about four by six inches in size directly over the top-most part of the dining room mantel. Its location was planned to a nicety, for just as the father and mother of the aforesaid Dreadnaught were about to sit down to their morning "coffee and"—which had been substituted long since for the luscious "ham and" because of high cost of living and other terse newspaper reasons, which fact was partly responsible for the morning spat that was in progress with both contestants going strong—(so much for the scenery and staging). Well, just as Pa and Ma D. are about to be



seated and are in the midst of their spat, Pa D. catches sight of the aforesaid card. For the moment he forgot the said business of spating and read aloud: "If you want to know who's boss around here—start something." And Ma D.—strategist and majority winner in spating contests—thinking this sudden exclamation of Pa D.'s to be a continuation of said morning spat, discharged a broadside that not only confused the "enemy," but a broadside that was destined to be "heard 'round the world."

"Yes, why don't you?" Ma D. exploded. "Seems to me that's all you need do—start something—go ahead. Perhaps if you would start something you'd be doing some business. May be if you'd start something, you'd get something more for breakfast than just coffee and rolls. Maybe if you'd start something we could afford to live like regular human beings instead of like a bunch of starving Belgians. Start something—yes, go ahead."

This left Pa D. so badly crippled that the remaining rolls and coffee were consumed in silence, Pa D. even forgetting to register his usual morning kick about the "morning mud." And Ma D. having had the last word by a wide margin, was content to let the affair stand as it was.

You can thus imagine Pa D.'s state of mind as he opened shop that morning. When Joe, the helper, came in, he found the boss pondering over the books. Joe's cheery—"good morning" was met with a grumble and a grunt and a few minutes later, by a line of instructions that almost took the helper off his feet. When Joe inquired, "what's up, boss?" Pa D.'s only response was that he was "goin' to start something. An' if I an't back here by closin' up time you close up and get back early tomorrow—'cause we're goin' to start something and we're goin' to start it quick too." And without another word Pa D. put on his coat and hat and went down street in the direction of the livery barn.

"'Mornin' Hank," greeted the livery man as Pa D. came in. "What's doin'?"

"Nothin' " returned Pa D. still feeling the effects of his defeat at the morning breakfast table skirmish. "But I'm goin' to start some-

thing and to do so I want a horse an' rig."

"What a 'y' goin' t' do Hank? Thur ain't nobody buying anything or gettin' anything done these days—money's tight I tell y' an' thur ain't any business t' be had. Ain't no use t' git out these days fer business."

"I tell you I'm goin' to start something," repeated Pa D. "I'll pay for the horse and rig. I don't want it for nothing, and if I want to rent it what do you care whether I go out for a pleasure drive or on a wild goose chase. And now hustle up." And Pa D. settled into his shell of grouchiness that even the "good-luck" greeting of the livery man could not penetrate as Pa D. drove out of the stable.

He drove first to the grocery store. "'Morning Hank," greeted the grocer as the smith entered. "Been investin' in a horse an' rig?"

"No, that's one of Thompson's

outfits," returned Pa D. "And I hired *that* rig to drive over here especially to see you about that wagon you've been talking about for the last year. I came over to get an order for that wagon. You've talked and I've figgered, and we've both fussed more about that danged wagon than its worth. Now I want you to give me that order. I'm goin' to be busy and if you don't order it now I can't promise to get it out for you before three months' time.

"You're going to be busy!" echoed the grocery man. "Why there ain't no business, we're not doing half what we ought to do. And I know you ain't either because yer wife told my wife that times was getting pretty hard."

At the word "wife," Pa D. would have sank to the floor if it hadn't been for a cracker box upon which he was sitting.

"What's my wife know about it," said Pa D. hotly, "what does

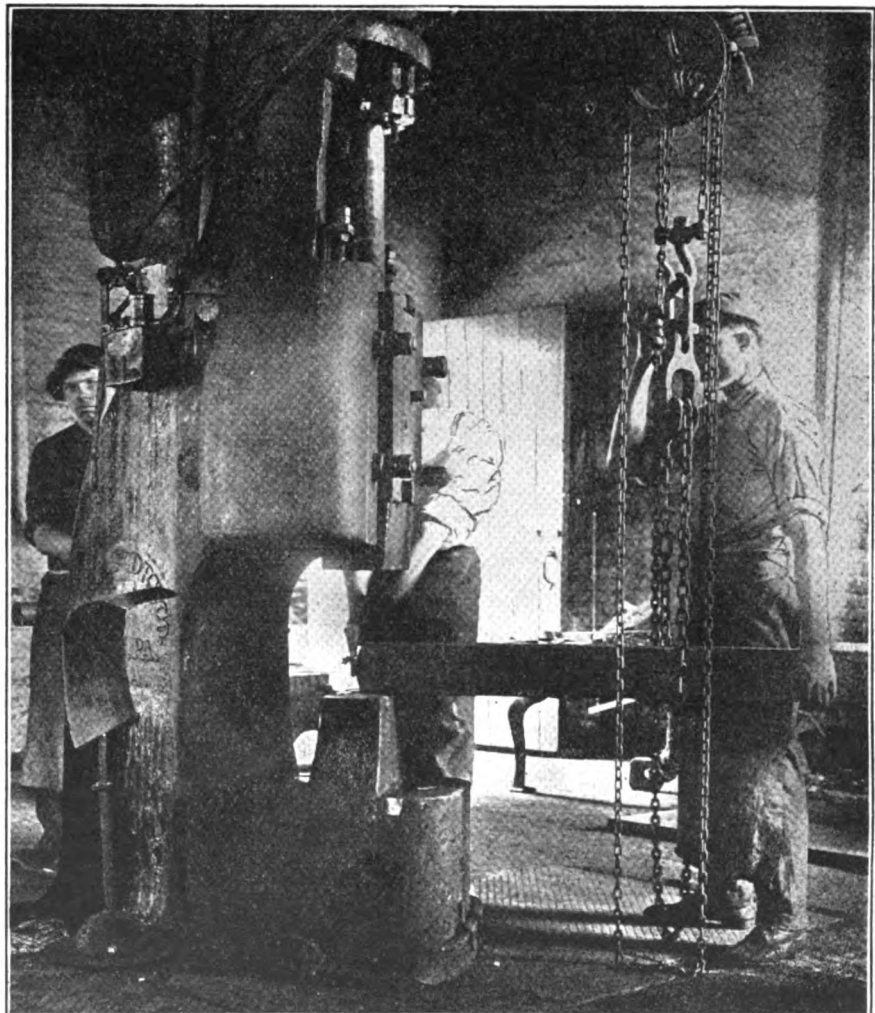


FIG. 2.—ANOTHER SHIELD FOR USE AROUND THE STEAM HAMMER WHEN CUTTING STOCK



she know about business? I tell you I'm starting something and if you don't order that wagon now, I don't know when you'll get it or if you ever will. I'm going to be mighty busy from now on. So just speak up—yes or no."

"Well, you must know you're own business Hank," returned the groceryman. "And if you're going to be busy I suppose you might as well go ahead on that new wagon. And while you're at it you might as well build a top for it too. By the way, do you think things are picking up?"

"I certainly do, John," said Pa D. "Something's happening and pretty soon you'll find business better than ever. I'll get at your wagon right away and let you know when it's ready." And with some additional details as to painting,

"Well, I'm going to be pretty busy—just got an order for a new wagon from Jack Green and with the other work that's coming along I'm going to be very busy. If you want that new top better order it now."

"Well, it means a lot of money," returned the butcher, "and things are somewhat slow now. Maybe I'd better wait a while until things pick up."

"If you don't order that top now I won't be able to get at it for some months," insisted Pa D. "And as for the top costing a lot of money, do you know that that top will save you more money than the interest you're getting on it from the bank? Of course if you would sooner have meat spoil on you than give me an order for that

help of two motor wagons did a very considerable business in the town and surrounding country. Pa D. finding Jonas Jenkins, the proprietor, in the private office stalked in bold as a lion and greeted Jonas with: "Who does your auto work?"

"Why, we have to send down to Acton and get one of the garage men from down there," replied Jenkins. "You remember, I asked if you could do the work and you said you'd see me in h— first before you'd touch one of the pesky stink wagons! Now, Hank, I'm willing to forget that if you are looking for auto work. I'm not the kind to cut off my nose to spite my face, and I don't mind telling you that it would be a big accommodation to get that work done right here in town."

This speech almost took Hank's breath away. "I'm certainly starting something" thought he. and then he said to Jenkins: "Well, you see Jenkins, my shop is developing and in order to keep trade right in our own town I've decided to take on auto-work. I've been a mechanic all my life and if I can't do better work than some of these made-in-a-hurry auto experts I'll not charge you a cent. Now to get right down to brass tacks, have you got anything you want done right away?"

"Yes, one of the boys just came in with a broken part this morning. His machine is about five miles out on the Clarence road and he just came in with a farmer about twenty minutes ago. So we'll want a quick job and somebody to take the boy out again."

"Well, I can do the fixin' but I'm too busy to take the boy back—you'll have to arrange that with someone else."

And so Pa D. went back to the shop to fix the auto parts. As he neared the shop he wondered what had happened. He saw a half-dozen or more vehicles of all descriptions clustered about the tie rails and several groups of gossiping farmers and merchants before the shop door. When he entered he found Joe hammering and sweating at the anvil and along the shoeing wall were half a dozen animals waiting to be shod.

"Guess, something's started boss," said Joe between breaths as he bent a shoe neatly over the horn of the anvil. "These chaps all came in here within the last hour



FIG. 3.—HOW ANOTHER LITTLE SAFETY DEVICE SAVES THE HELPER AND OTHER WORKMEN

lettering and other incidentals, Pa D. thanked the grocer for his order and departed.

His next call was on the butcher. "Do you want that new top on your wagon or don't you?" was the way Pa D. greeted the purveyor of sausage and steak.

"What's the rush Hank?" questioned the white aproned knight of the chopping block.

top, why I can't say anything more."

But as Pa D. started away the butcher said: "What did you say it would cost?" and that "started something" that ended in Pa D. climbing into his buggy with order number two.

His next stop was at "The Emporium Dry Goods and Furnishing Company." This store with the



and said they wanted their work done right away, because they heard that you were going to be busy and they didn't want to get caught in the rush. Look's to me as though we were going to be busy too, boss."

"You bet we are Joe," agreed Pa D. emphatically. And then continuing, "Better run down to the house and tell that Dreadnaught of mine to hustle right over to Billy Evans' on his wheel and over to Charley Hunt's and tell them both to come back to work right away. And Joe—you hustle right back, 'cause something's started. And Joe—you might tell the Dreadnaught that he'd better get that air rifle today before they're all sold, 'cause business is going to boom."

And Joe in his surprise almost fell into the watering trough; for had not the Dreadnaught been hinting, arguing and openly asking for that air rifle for these two months' past?

When merchant met merchant and farmer met farmer the conversation usually took this course; "Guess something's started—Hank's shop as busy as a flock of hens at feeding time. Green's ordered a new rig and Butch Schmidt's getting his rigs fixed and it's about all you can do to get anything done at Hank's. Guess business is picking up."

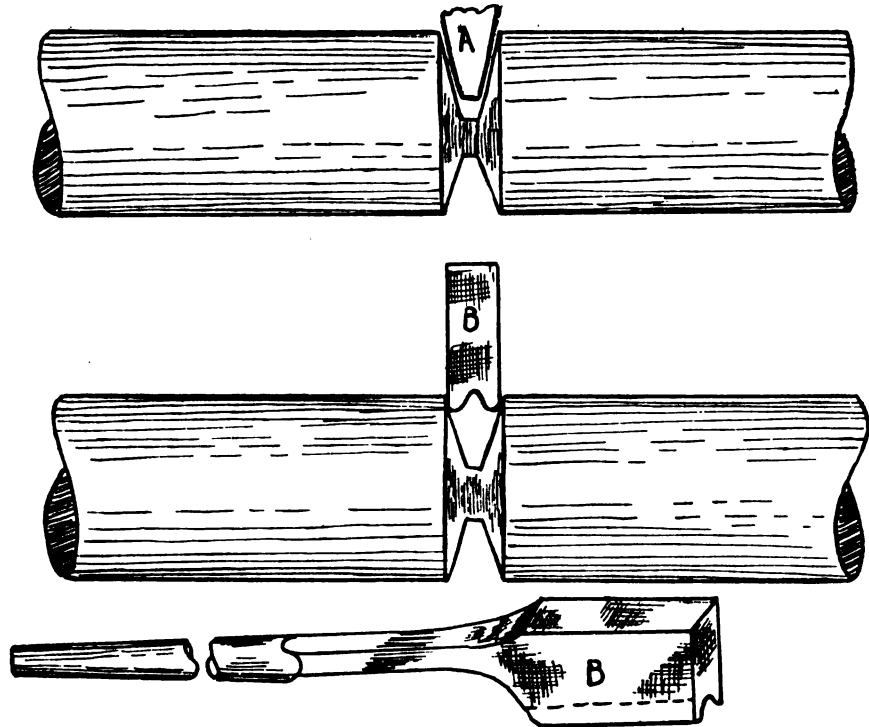
And so the word traveled from town to town and to the big cities. And city folks said: "Guess something's started. The farmers and small town merchants are getting things done. They must be doing some business for they're certainly busy. Looks as though money was loosening up too. Maybe things aren't as bad as they seem." And business brightened in the eyes of the big city—something had started and business prospered until the whole country forgot its war, bad-times and calamity talk and everybody started in to start something that somebody else had started for them.

Moral:—There's some sense to some morning spats after all, but that's no reason for placing one regularly on the morning menu.

A Steam Hammer Tool to Cut Square Ends

BERT HILLYER

In cutting off heavy iron hot



A STEAM HAMMER TOOL THAT WILL MAKE A CLEAN SQUARE CUT

under the steam hammer, it is seldom that a nice clean, square cut is made in one operation, and if so, it is only on one end; the other end having the center bulging out and in a hacked up condition that will require a lot of trimming to get in proper shape again. A tool made like B in the engraving, will cut both ends square and smooth with the one operation. An ordinary hack is first used as shown at A, and driven in with light blows so as to keep the cuts as even as possible when going around the piece. After cutting in fairly deep with the hack use tool B, as shown and will sever the two pieces and leave square cuts. This tool is made in a rectangular shape about the thickness of the top of the hack. A groove is made by heating the tool and driving a piece of round iron in the edge lengthwise of the tool. The outside edges are ground square across leaving square corners to cut with. The top of tool should be a trifle smaller than the cutting edge to allow for clearance. The handle near the blade is drawn down to give it some spring while being used. This should be done on all hacks as it takes the jar off the hands when the hammer strikes the tool.

This tool is very easily made and has been used by the writer very effectively in cutting square ends, saving considerable time.

The Legality of an Association's Credit Department

E. J. BUCKLEY

Every retail association in existence either has a credit department or hopes to have one some time. The same can be said of many wholesale organizations. Every association that already has a credit department, or expects to have one, confronts the chance of circulating derogatory reports about some consumer which will lead to a damage suit.

By credit department I mean a department through which reports of consumers' financial standing, promptness in paying bills, etc., are circulated among the members. Where the members act frankly and in good faith, such a credit department can be made to give almost absolute protection against bad debtors.

I have been furnished with the report of a case involving the right of an association, and of a member of an association, to supply for other members, information regarding the financial status of a consumer. The case is typical, and very interesting. It was brought against a physician as a member of a local association of physicians, but the law is of course the same no matter what business the defendant is in.

The plaintiff in the case I am discussing was a former patient of the defendant, who was a member of an association of the physicians of a certain city. These physicians determined to prepare for their own use a list of the names of patients who were slow in making payment for medical services rendered to them. The information was for the benefit of the members only of the Medical Association, and there was no understanding between them that pro-



professional services should be refused to those whose names appeared upon the list. The defendant, a woman doctor, was a member of this association, and she furnished to the secretary, among other names of persons whom she regarded as able to pay, but who were slow in making payment for services, the name of the plaintiff. The list of names thus reported as slow pay was printed by the association with the number of the physician who furnished the name added. There was nothing upon the face of the publication to indicate its purpose, and no one but a member could understand its meaning. The publication was considered confidential and was confined to members of the association.

The patient whose name was classified among the slow pays in some way found that fact out, and promptly brought suit against the doctor who had certified his name for libel. Of course if the patient in question had not been slow, the statement that he was would have been published libel. But in a civil suit like this, the truth of the charge is always a good defense, and therefore if it could be proven that the patient was slow pay, the case would have to fall.

The case was tried and collapsed completely, as any case like it would collapse if the credit department complained against has been conducted properly and within the law.

The court held as follows:—

1.—There was no evidence that the plaintiff had been damaged by the report that he was slow pay.

2.—One doctor had a perfect right to certify to the others who were members of his association the fact that a patient with whom he had had dealings was slow pay.

3.—There was no evidence that there was anything malicious about what the doctor did.

4.—The statement that the plaintiff was slow pay was true, as proven by the evidence.

Anybody who is accused of being slow pay, and who knows that he has been, seems very reckless when he goes to law about it, but the world is full of reckless people, and any dead beat who is certified as such is liable at any time to sue the merchant responsible, in the hope that he will pay a small sum rather than go into court. And doubtless many would, though they ought not to, where the case is evidently a straight hold up.

Any association can circulate among its members, with perfect safety and legality, credit information about present or former customers, provided the following requirements are complied with:

1.—No customer should be cited as slow pay or delinquent if the debt is disputed. Before citing such a customer get judgment against him, and you can then cite him safely.

2.—The financial status of the particular customer, in the list sent to members, should be indicated by some simple cipher, known only to the members. Such as A for first credit, B for fair credit, C for slow pay, D for very slow pay and doubtful, and so on. On no account should the list be so framed as to convey any information to a consumer into whose hands it might fall.

3.—There should not be any arrangement among the members that credit should be refused customers under the

C and D classes. That might be considered a conspiracy, and doubtless would be. Such an agreement is surely unnecessary with sensible men, anyway. If a merchant could not make up his mind whether to sell a consumer applying for credit, whose report was given as "D—very slow pay and doubtful," he could hardly be held by an agreement.

Following the above suggestions will not prevent an association or an association member from being sued, but it will prevent the getting of any verdict for damages.

A Unique Match Box

BERT HILLYER

The engraving shows a match box or holder that was entirely hand-forged on the anvil. The only tools used were hammer, tongs and a small round punch. The part representing the stump of a tree was made from a piece of $\frac{1}{8}$ by 3 inch iron which was bent around in the shape of a small tapering band and then welded. The bottom was flanged up and riveted after the bark was formed. The bark-like



A UNIQUE HAND FORGED MATCH HOLDER

appearance was made by heating the band and placing it on the horn of the anvil. A cross pene hammer was then used. Striking with the pene up and down the band gives a fine imitation of bark as shown in the engraving. The snakes were made the same way as described in the November, 1911, issue, which contained a description on the making of a bird and snake inkstand by the writer. It is therefore unnecessary to explain the work again. A match box like this or even a better one can be made by most any smith, and it is rather startling when passed to a friend unexpectedly.

Safety First and Fires in The Smith Shop

G. D. CRAIN, JR.

A blacksmith shop can get as low a rating from the fire insurance companies as a dry goods or a grocery store, which two classes of risks are proverbially low. So when blacksmith shops are destroyed by fire it must mean that somebody has been careless. As THE AMERICAN BLACKSMITH noted in its November issue, there is great need for "Safety First" among blacksmiths. This is the only conclusion that can be drawn from the small element of danger from fire in blacksmith shops generally as contrasted with the frequency with which fires are reported from all parts of the country.

"The blacksmith is one of the few—" said an insurance man who is at the head of one of the important actuarial bureaus, speaking of this very subject the other day, "who can properly equip his shop and at the same time reduce the fire hazard. For instance, the ordinary, non-combustible, dirt floor, I am told, is better for the blacksmith shop than plank. It does not wear out, can be sprinkled when the shop is closed for the night, and will be firm and dustless in the morning. When holes do appear they can easily be filled by the simple process of filling with cinders. If to the dirt floor the smith will add brick walls or walls built of non-combustible material of any kind, he has got a plant that will represent small outlay for upkeep and one that will involve small chance of serious fires.

"Smiths overlook the fact that 'Safety First' applies just as much to shop and equipment as it does to men and horses. I have known of more than a few smiths who were so careless that they used ordinary wooden boxes for their forge fire boxes. Some of them get along all right for the time being, of course, but taking long chances sooner or later will be routed out of bed some night by a neighbor who brings news that their shops are in flames and their tools ruined, though happily that state of affairs was more frequent than it is nowadays."

But just as there are very few blacksmiths who are in positions where they can work out ideal con-



ditions surrounding them, so are there few who are exclusively blacksmiths. Most blacksmiths do a greater or less amount of wood-working, of carriage and wagon building or repairing. Here again, is an altogether different set of circumstances. Instead of their activities being limited, iron-working and woodworking are going on side by side. Even when the iron-worker handles only an occasional bit of woodworking, this occasional job affects his standing with the insurance companies. When he does a large amount of carriage and wagon repairs, his insurance charges increase accordingly.

Now the rate of insurance that a blacksmith and woodworker has to

based on the assumption that his shop will remain intact. Fire loss is actual destruction of property, and, though the individual may recover a large part of its value, every other propertyowner who carries fire insurance contributed to the fund to reimburse him. The fire underwriters have figured the system down to where they make each owner contribute to the fires that consume millions of dollars' worth of property in America every year, according to the danger, the hazard, and the probabilities in each single case.

So when a shop owner's rate is high, his fire hazard is greater than it ought to be; he is being taxed accordingly for the fires the

to go ahead with improvements designed to reduce the danger of fire, and will also know how to proceed so as to hold the outlay for fire protection to a minimum.

In this day of compact and efficient forges which do away with danger of fire being communicated to the structure of the shop through the bellows which used to be in every shop in the land, there is no excuse for the wooden box forge. A contrivance of that kind for use in an emergency and away from the shop could be excused, of course, but no man who has any thought of "Safety First" will make use of such a makeshift inside his shop. Are the floors weakening? Will they have to be renewed in the near future? If so, they offer the smith an opportunity to restore his shop to a condition where the danger from fire is at a minimum. Even if only a small space around the forge and anvil is filled in with clay and tamped down, this will mean something. When the smith comes to build a new shop, he will of course build with the idea of permanence and indestructibility, and employ brick or concrete for the walls at any rate.

The writer knows of a shop that has escaped a serious and destructive fire probably more through chance than anything else. The old-style bellows occupies a position close to the side of the forge, and between it and the brick walls of the forge the smith keeps his kindling piled, and from time to time adds shavings to the pile so that they will be handy when the time comes to start the fire.

Numerous fires have originated in this pile of firewood, it is true, but, happily, they have chanced to break out in the day-time when someone was around. The wonder is that anything is left of this shop, which is cluttered up with wagon and carriage jobs most of the time. In due time it will all go.

As in all other cases when the shop becomes a woodworking as well as an ironworking shop, the greater the possibilities of damage or destruction by fire become, and the greater is the necessity that the shop owner begins to get busy on his "Safety First" campaign. He has been so familiar with fire from the time he first began to work at the forge that he is inclined to be careless with it. An open flame in a woodworking shop is something



THE NEAT APPEARING GENERAL SHOP OF MR. A. O. DANBERRY OF NEW JERSEY

pay is not as important in itself as what it indicates. The rate of insurance is the best possible indicator of just how great is the danger of fire and the best indicator as to the precautions the shop owner ought to take. The insurance men work this thing out according to an exact science. Each man's insurance rating will show him what are the scientifically figured probabilities that he will sooner or later have to contend with fire in his own shop.

Insurance is a good and an essential thing, but for all of that the owner's first consideration should be not the collection of insurance money, but the preservation of his plant. All of his activities are

country has, and he has a reminder that it is up to him to begin a "Safety First" campaign on his own premises. Take the exclusively iron-working "blacksmith" referred to by the insurance man. He cannot help but know when there is a certain condition of affairs in his shop that means a possible fire. Any man can profitably look his shop over from the viewpoint of the fire underwriters. The next time the insurance solicitor comes around, ask him for suggestions as to how to reduce your insurance charges; ask if they are high and whether your shop is a "good risk" or a "bad risk." You are sure to learn something that way, and then you will be in a better position



that sends the insurance rate up, and something which, at the same time, should inspire the smith with greater caution. In the big plants—the big carriage and wagon manufacturing concerns where both iron and woodworking are practiced—these operations are done in separate departments, but the heads of these concerns do not let down in caution and in preventive measures. "Safety First" is more than a phrase with them. It means dollars and cents to them just as it does to the owner of the one-man,

or the two or three-man shops.

The big shop owner can install automatic sprinkling devices which will put his insurance rate down to the point where the saving will actually pay for the equipment. Such a course is impracticable for the man with the small shop. He may and should prepare himself with some of the various devices including chemical extinguishers for subduing incipient fires—or even buckets of water sitting around and kept always ready will mean a good deal when the need arises. But these would be available only for the fires that develop in the daytime, when somebody is at work. At such times no fire will get a very great lead or develop to the point where the whole plant goes up in smoke.

It is the smoldering fire that carries the menace—the fire that no more than keeps alive in a pile of shavings or a heap of chips from the wood-working bench. It might be assumed that everybody would certainly see to it that these piles of waste did not accumulate wherever there might be a chance of fire being communicated to them, but the fact is that fires are constantly occurring under just such conditions. Poor "housekeeping" is what is the matter in shops like these. In shops where wagon and carriage work is done as well as blacksmithing, someone must have it on his mind that the fire is an ever-present danger. If "eternal vigilance" was ever the price of anything, it is the price of safety from fire in shops such as these.

"The combination means constant danger," said the insurance man, already quoted, referring to blacksmithing-woodworking shops. "The smith specializing only in iron work can hammer sparks into the uttermost corners of his shop with little or no danger of fire, but the smith who is also a wheelwright

and carriage builder is in much the position of a man who sits down on a keg of powder to smoke a pipe. This man can smoke with safety if he is careful, but the danger is always present. This smith has simply got to be careful,—he must organize his shop on the safety first plan."

There is no magic in it, there is no easy way to do it. Every man has his own conditions to meet, just as he has his own specific insurance

of a Flemish character. Certainly the porch which is shown in the illustration is on those lines.

The vertical bars which form the central and corner supports in this feature are 1-inch square and each of the long vertical panels are forged separate, that is four for the front and four for the two return fronts. In these panels the upright and curved line suggests ample vigour all in harmony and indicative of the ceaseless striving and



A FINE LOOKING SCOTCH HOME EMBELLISHED WITH WROUGHT IRON

rate. The only way he can be safe is too plain to operate safely. He can see plainly how fire can start. To keep it from starting he must make sure that it will not start. This, and nothing else, is "Safety First."

A Wrought Iron Porch

J. Y. DUNLOP

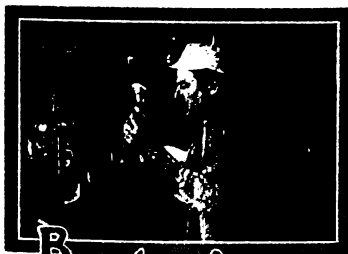
Much of the iron work in Scotland differs in its characteristics and in its finish from that in England. How this comes about it is very hard to account for, but one reason is that we have had no outstanding smiths of note and the most of the good examples of old work which is to the fore has been the work of the local smith. The smith would work under the direction of the Lord of the Manor who having traveled much abroad would have the various features about the grounds modeled after some example he had seen in Europe. Thus much of the work is

activity of its producers.

The most interesting part of the design is at the top where the charm of the scrolls and the simple foliage which link together the horizontal and the vertical panels of the smith work are perfect. These horizontal panels have a shaped or especial soffit and are welded together in a frame 1-inch by ½-inch thick and from all appearance have been rivetted to the vertical panels in position. On each side there is a large double scroll with the pause points in each almost in the same vertical line and with their junctions one on the vertical rail and the other on the soffit rail. In the centre of the panel light margin rail are wrought in which in turn receives the quatrefoil foliage. The modelling of the foliage has been carefully observed and the leaves in section are similar to corrugated iron curved and bent with a set longitudinally along their centre line which make them look full of accent and vigour.

To view the example as it is today it is a fine example of geometrical wrought iron smith work—no compass made but designed by using ovoid curves instead of arcs of circles to get rid of the customary hardness. This will be quite easily understood if the shaped openings in the porch front are examined carefully when it will be seen that their outline is more elliptical than circular. The method of treatment of the iron work at each side of the opening is a repeat, but since the size of the centre opening is less than the side ones there is a less number of ornaments in the centre.

Whether the blacksmith who made this example of work received his ideas of art smith work from his master or the forms of expression are his own we are left very much to guess. But in presenting this geometrical arrangement in iron it has no doubt been of value and assistance in showing what can be done in porch construction with this interesting material.



Benton's Recipe Book

A formula for metal polish—in answer to R. T. C., of Rochester, N. Y.

A paste of whiting and ammonia is frequently used; the ammonia acting as a solvent of some kinds of dirt. The following formulas are both good:

(a) Prepared chalk, 2 parts; water of ammonia, 2 parts, and water sufficient to make 8 parts. The ammonia saponifies the grease usually present. It must be pointed out that the alkali present makes the preparation somewhat undesirable to handle, as it will affect the skin if allowed too free contact.

(b) A mixture of equal parts of sperm oil, paraffine oil and naphtha is said to make a good cleaner for metals and is a lubricant as well.

To hold leather on iron pulleys. First soak twelve ounces of good glue in cold water. Put four ounces of boiled oil and four ounces of turpentine into the glue pot, and in this dissolve three ounces of resin. When the resin is dissolved, add the glue. The resin and glue should be well stirred while dissolving.

Before applying the leather cover to a pulley have it warm and dry, and scrape off all matter that may have accumulated

on its face. Then, with a swab, apply muriatic acid (full strength) to all parts of the face of the pulley. When dry, wipe gently with waste. Cut leather lengthwise of hide, and a little wider than the face of the pulley. Have the cement melted in the glue pot, apply it across the face of the pulley, with a brush, for about six or eight inches, lay on the end of leather and rub it down hard with the corner of a piece of wood. Fold back the leather and continue to apply cement until the pulley is covered. Two thicknesses of leather are used. Make the first thickness a butt joint, and the last a scarf or lap joint of about three or four inches long. Make the laps on the driven pulleys the way they run, and on the drivers the opposite way. Pulleys should be cleaned by holding a piece of coarse sand paper against them.

For washing shop windows. Soap and water are poor materials with which to wash greasy and dirty shop windows. The soapy water gets into the joints of the window sashes and hastens decay; and there is liable to be a good deal of soapy water slopped over the benches and tools. The quick way, the economical way, and the good way, is to use the following preparation, which has been used by the writer with good success and satisfaction for the past ten years. Dilute alcohol with three times its bulk of water. Stir into this whiting enough to thicken it somewhat. Apply this to the glass with a cotton cloth or waste. Leave it fifteen or twenty minutes to dry. Then rub off with a cotton cloth or a handful of waste. If sashes are to be painted, there will be no need of a long wait for the wood to dry, as the alcohol will very much hasten the evaporation of the water and leave the wood-work in fine condition for the painter.

Liquid court plaster. At your druggist's procure an ounce bottle and have him fill it three-fourths full of flexible collodion, and fill up with ether. Apply to cuts, bruises, etc., and it protects them and will not wash off. If the ether evaporates, leaving it too thick for use, have more ether put in to liquify it. It is a good thing to have in the house; also the tool chest.

Soldering steel on iron. The copper coating found on the so-called "Bessemer Rod" of the hardware dealer and on many metal parts of steel articles is produced by simply dipping the steel into a solution of blue vitriol (sulphate of copper). This readily takes hold of steel or iron, coating it with a film of copper, on which soldering can be done better than when applied directly. When you're bothered to make the solder stick when trying to solder iron or steel parts, clean the pieces well and swab each with a rag or piece of waste (or a stick) dipped into a solution of blue vitriol.

To harden cast iron. Many times it is convenient to make an article of cast iron that needs to be finished, and which should be very hard. Cast iron can be hardened as easily as steel, and to such a degree that a file will not touch it. Take one-half pint of vitriol, one peck of common salt, one-half pound of saltpetre, two pounds of alum, one-quarter pound prussic potash, one-quarter pound of cyanide of potash, all to be dissolved in 10 gallons of soft water. Heat the iron to a cherry red and dip it into the solution. If the article needs to be very hard, heat and dip the second or even the third time.

Tool and mill steel. In a great many shops very little attention is given to the steel corner, rack or box. In some more than we like to admit—the most popular place is the floor. Very often good machinery and tool steel are piled together in one heap, and when the smith goes to secure a piece he has to guess which is which. There are any number of means for finding this out, but a quick way to test the metal is to touch the end lightly against a dry emery wheel and watch the sparks. A tool steel gives forth a spark which seems to burst into a light point of light when it strikes against the frame of the grinder, while that from machinery steel is merely a dull red incandescent particle. All air hardened steels give forth light red sparks.

A babbitt kink. Don't try to keep the melted babbitt clean, no matter if there is dirt, coal and other refuse on the surface. Let such dirt stay there. Oftentimes it is well to throw in a little dirt of this sort if metal is clean. This is for the purpose of preventing oxidation of the babbitt. Oxidation causes a lot of dross to form and uses up a corresponding weight of babbitt. Covering the top of the babbitt pot to keep air from the hot metal will prevent considerable of the dross forming.

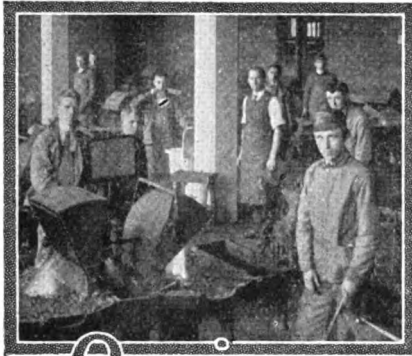
An anti-friction metal of most excellent quality—says H. C. K., of Massachusetts—and one that I have used with success for a bearing on an internal grinding shaft, which was 5-16 inch diameter, 7 inches long, and 5 inches in the bearing, and run at a speed of 36,000 R. P. M. is made as follows: 17 parts zinc; 1 part copper; 1½ part antimony; prepared in the following way: Melt the copper in a small crucible, then add the antimony and lastly the zinc, care being taken not to burn the zinc. Burning can be prevented by allowing the copper and antimony to cool slightly before adding the zinc. This metal is preferably cast into the shape desired and is not used as a lining metal because it requires too great a heat to pour. It machines nicely and takes a fine polish on bearing surfaces. It has the appearance of aluminum when finished. Use a lubricating oil made from any good grade of machine oil to which 3 parts of kerosene have been added.

To prevent hands chapping. The winter season is with us in full blast and a smith's hands—particularly the shoer—are apt to get stiff and sore from exposure. Take a 4 oz. bottle and put in 3 ounces of glycerine, 1 ounce alcohol, and from 20 to 30 drops of carbolic acid. After washing the hands, and while they are a little damp, apply a few drops and thoroughly rub it in. A good time to use it is at night.

To waterproof tool bags or cases made of duck or other cloth, either of the following formulas may be used.

Use ½ pound of alum and 2 ounces of saltpetre dissolved in 1 quart of water. Immerse the article to be waterproofed in this mixture for 40 minutes, and boil hard; then rinse in cold hard water, hang up and let dry thoroughly before using.

Melt ½ pound of paraffine wax and mix in 1 quart of gasoline. Immerse the article in this and wring out and spread out to dry. In a short time it is ready to use.



Queries— Answers— Notes

Welding Calks in a Vise. I make a die of $\frac{3}{8}$ -inch square mild steel and as long as the jaw on the vise. Then I cut a groove with a chisel so that the calks fit in a little more than half. I then rivet on two straps of iron, one on each end and place in the fire to get the straps hot, after which put into the vise and hammer the straps to fit the vise. (See engraving). In this way the dies remain in the vise while you are screwing back and forth, and it works very good. For the smith who hasn't a calking machine it is a good way to weld them on as it leaves no hammer marks, the shoe stays in the same shape and you get a good weld. I know from experience that a pressure weld is better than hammering. — ROBERT JOHNSON, Nebraska.

Aluminum and Cast-Iron Welding. I recently had an aluminum gear case to weld, as shown in the engraving. It was broken clean through. It measured 12 inches across big end and flange on opposite end 4 inches diameter; inside diameter 2 inches for shaft. It had four ribs connecting flange to body. I set it up as follows: A piece of piping, 12 inches long, was turned to fit loosely inside bearing. Across flange was a coupling with two studs to fit inside piping, across the big end was another similar coupling with studs. The couplings held together with a bolt through each end and through holes in big end of casing kept the lot together true for welding. Before putting together, the turned piping had a coat of graphite and oil to prevent sticking. I heated the whole casing with a big brazing lamp (it was not in a furnace) more than hot enough to "sizz" water. I then tried to weld but could not obtain the first fusion. I eventually got a little metal stuck and built up on it, but it was not welded and afterwards picked out very easily. The piping also got stuck inside. In the end the job was sent to the oxygen company and when they had it done for us, the piping had to be turned out. Can you tell me where I was wrong? Could the setting up be improved on? Should the casing have been hotter before I started to weld? I take it that the high conductivity of aluminum drew the heat away and so made it difficult to obtain fusion. I may state that I can make a perfect weld of two flat pieces of aluminum; it is very simple and easy, and yet I failed on the casing. I've noticed on weld-

ing flat pieces that there is a dull glow all through by the time the weld is accomplished, but with the casing I got no glow at all. Was it that I did not give enough time to weld casing? Another point I would like to know is how would such a casing be supported inside against collapsing if a crack had to be welded along the bell shaped end?

Another job was a malleable casing for a crown wheel, 12 holes (in lots of 3) had to be filled and re-drilled. I heated the lot over the forge and made one section of holes a red heat, took it to the welding bench and welded up one lot of holes. I then heated the next lot of holes red and welded up (using cast iron welding rods) and so on till finished. I then heated the lot a good red and left to anneal in lime. The result was a job as hard as flint and impossible to drill. What was the cause? Other cast jobs I have welded and finished very easily. Is it that malleable welded with cast rods cannot be worked?—ROBERT ANDERSON, Australia.

In Reply:—In regard to the setting up of the case you did as nearly correct as your experience would dictate but you evidently shrunk the piece in, which had to be bored out as you mention. In this case, if you had used carbon from old batteries, or purchased some from carbon makers that would just fit, or pieces that could be fitted in, and then put the shaft through the carbon, the same with the rest of the holes (where necessary), it would have given the best results and would have saved you the boring out part afterwards.

We would advise you to use carbon wherever you can and especially to save threaded holes, either iron, aluminum, or any metal. It will save you a lot of work and worry. We would say in connection with this that you must be careful not to draw the nuts too tight, or you will be apt to draw the pieces out of shape when you get it preheated, so you must watch this very closely. You also state that you heated the whole casting hot enough with a brazing torch to sizz water, which is all right if you cannot get charcoal, but we would suggest that you use charcoal as per instructions below. You say you could not get fusion, but you do not say how long you waited, neither do you say what number of tip you used.

We would advise a No. 4 tip on the Cox torch, as we understand that this is the make you are using. In regard to the length of time that fusion begins is covered below. You ask should the casing be hotter before you started to weld. This is also covered by instructions below.

Aluminum radiates heat very quickly, hence the covering of the piece when you begin to weld as per instructions below. That is why you can weld two flat pieces, but failed on the casing. In regard to a crack in the bell-shaped end we would say that there is not any danger of the piece collapsing unless you used a very large tip and preheated the piece too hot; however, you could bend some pieces of sheet iron to shape inside and support in place just enough to hold it in place, but this is hardly necessary as you will see as you progress.

In regards to welding malleable iron, we would say that in our opinion, you did not do right in adding cast iron in the welding. You should have used

cast steel rods of good quality and of $\frac{3}{8}$ -inch diameter, after the piece is chamfered out. As soon as the metal shows the least sign of getting soft, lay the cast steel lightly on the spot where it is melting, let them both start to melt together and keep doing this until the piece is finished. If you keep this up and use your judgment, you will stop large holes from developing in the piece, which would happen if you did not have the rod ready to melt as soon as the casting started to melt. Let the flame strike only the very tip of the cast steel rod.

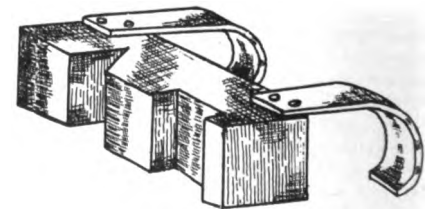
You will find this will drill or machine very nicely. You should not have taken it to the welding bench, as that would chill the piece, but you should have welded it right where it was preheated, and then covered it over with hot coals, or charcoal, as mentioned in aluminum welding.

When you weld malleable with cast iron, it is no longer malleable iron, but cast iron where the weld was made, and would not stand the strain as you can readily see.

To weld aluminum proceed as follows:

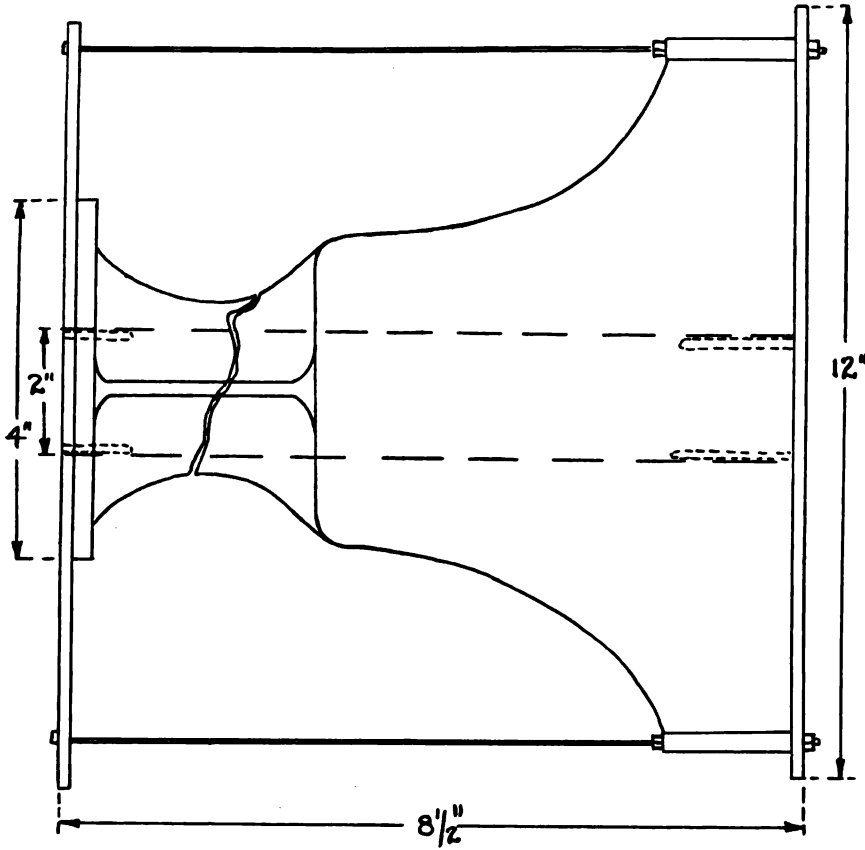
First, get a jar and put a handful of salt in it. Then fill it up with water. Next make some wrought iron pokers, about 15 inches long with a bend of $\frac{3}{8}$ -inch and flatten. Have this point sharpened about like a lead pencil. Throw a ring on the other end with which to handle, to make it easier to hold. These are the things that will be needed first. Take the aluminum casting, put it in a large forge or some suitable table, and set it up on bricks. Then build a small charcoal fire all around it, not too large a fire. Keep this fire going for about an hour and a half.

At the end of this time cover the piece to be welded with asbestos paper, leaving an opening large enough to get at the fracture. Then take one of the pokers in the right hand, and hold the torch in the left hand. Apply the flame on the part of the fracture that you are going to weld, and keep poking with the poker until it gets soft. When it begins to get soft, you can puddle it until



A SIMPLE ATTACHMENT FOR THE SHOER'S VISE

you get almost through on the other side. Keep doing this, all the way along until you get the fracture welded. Never start welding at the opening, always start at the back end, work toward the opening and finish there. It would probably be a little rough, but you can play the flame on it, drawing the poker over it, and keep smoothing it down to your own satisfaction. Of course add metal from aluminum stick from time to time to make the weld higher than the rest of the casting. It can be filed down to a size afterwards.



THAT ALUMINUM WELDING PROBLEM AND HOW IT WAS SOLVED

Then turn it over quickly and do the same thing on the inside as on the outside. Be sure not to uncover the piece after you begin to weld or a cold draft may strike it and it will break again, especially with crankcases and pieces like that. After the piece is finished turn the welded part over into the fire and cover thoroughly so as to retard the cooling. Do not cover it with asbestos paper before starting to weld, or the piece may melt on the parts nearest to the fire. Do not uncover the piece under any circumstances until the next day.

There are many pieces of aluminum that can be welded without preheating, as will soon be learned by experience of the operator. Lugs or projecting pieces broken completely off do not require preheating. Pieces broken out and entirely lost can, in nearly all cases be fitted in or built up with little difficulty. Always remember that the pieces are chamfered first.

This process can be considerably shortened by using the Cox lightning aluminum flux, which has produced marvelous results in the welding of aluminum. It is not necessary in using this flux to go through the laborious work of puddling the aluminum. To weld a piece of aluminum with "Lightning Flux," the workman has only to apply a good, strong flame to the article until it gets hot, holding the aluminum welding rod close enough to get good and hot, but not melting. When the piece is hot, dip the rod in the flux and apply quickly to the part where the weld is to begin. The rod and the piece will immediately flow together

the same as cast iron. Keep applying the flux and rod in this way until the break is all amalgamated, when the piece would be smooth and need practically no further finishing. Turn the piece over and proceed as before on the opposite side.—F. W. COLLINS, New York.

Dressing the Well-Drilling Bit. In the Government Bulletin on "Well-Drilling Methods," Isaiah Bowman has the following to say about dressing the drill bit:

"As the bit gradually becomes worn on the edges, its diameter is constantly reduced—that is, it loses its gauge. When the tools are withdrawn, if the bit has become noticeably worn, the screw joint connecting the bit and auger stem is 'broken' by means of the wrenches and floor circle, the bit is unscrewed and removed by hand, and a freshly dressed bit is then substituted. During the first part of this operation the tools are steadied by keeping them partly in the drill hole. At this time the whole string of tools is rigidly examined and each joint is 'set up' in turn, as the constant and tremendous jarring to which the tools are subjected tends to loosen the different parts. Before drilling is resumed the temper screw is also screwed up or 'elevated' so that it can be fed down as the drill hole deepens. The tools are then let down again and drilling is resumed.

"The worn bit is heated in the forge, the circular tool gauge is slipped over while it is hot, and the edges of the drill are hammered out to fit the gauge, which has a diameter one-eighth inch greater than the required diameter of the bit to allow for contraction due to

cooling. In heating the bit it should be turned occasionally to get an even heat, and brought to a cherry red for a distance, 3 or 4 inches back from the end, so that in hammering it the outer part will not tend to spall off. It is usually spread with a sledge, working from the center to the edges, to a diameter a little larger than the gauge, and then hammered down to proper size. The edge should not be made very sharp or it will tend to drill a three-cornered hole. In tempering the end is heated until it shows bright cherry red in the shade, then placed upright in 1 1/2 or 2 inches of water so as to cool only the part to be tempered. After a minute or two, when the edge is cool, the bit is removed until the heat flows back into the end and causes it to pass through straw, orange and purple to a blue color. It is then re-immersed and allowed to cool. The treatment gives the proper temper for drilling moderately hard rock. If the bit is cooled at one of the colors that appear earlier, it will be too hard and brittle to work well, and if allowed to wait longer before tempering it will be too soft. The upper (threaded) end of the drill should be thoroughly cooled before it is screwed to the stem, otherwise subsequent shrinkage may cause the joint to loosen.

"As the bit becomes worn by continued drilling, the size of the hole is correspondingly decreased. In hard sandstone one-quarter to three-eighths of an inch may be worn from the width of the bit in drilling three or four feet, so that when a newly dressed bit is introduced it may find the last feet too small, and may work hard or even stick for the first few strokes. A well-worn bit will cut a hole no larger than its shank, but a newly dressed bit provides clearance like the teeth of a newly set saw. To prevent sticking the bit is run up and down a few times and turned constantly. It is thus prevented from forming a groove which it would tend to follow so as to direct the repeated strokes of the drill in the same place. When the rock is very hard and the bit is more rapidly worn jars are necessary to prevent accident to the drill rope by the sticking of the drill."

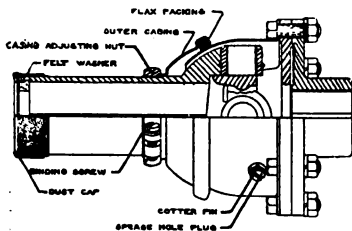


The Automobile Repairman

Wrenches are probably the most abused of all tools, so just a word in regard to them. In the first place, the jaws must

always be so set that there is no "play" between them and the nut they hold; this will prevent wear of the jaw faces and also saves the nuts. In the second place, the strain must always be in the direction the jaws point; if a wrench is used the other way the tendency is to break one or the other of the jaws off. And, last but not least, the leverage obtainable with a given size wrench should never be increased by increasing the length of the handle, the most convenient means of doing so being to slip a length of pipe over it. Wrenches are made strong enough to sustain the load put upon them at the radius permitted by their length. Hence, if they are temporarily lengthened, it cannot be expected that they will "stand up" under the unusual strain.

Contact points excessively wearing on a coil, the points pitting and necessitat-



THE UNIVERSAL JOINT MUST BE CORRECTLY ASSEMBLED

ing frequent dressing and occasional replacing, indicates one of two things—either the points are not made of platinum or the condenser has a short circuit. Sparking at the points, if excessive, will lay the trouble at the door of the condenser, which is supposed to prevent sparking when the circuit is broken. If the sparking does not appear excessive, however, the purity of the platinum of the contact points should be suspected.

The maker of the Spicer Universal joint states that when its product is assembled in the machine, care should be taken to see that the holes in the flange and the inside casings are matched up in such a way as to bring the oil hole, which is closed by a threaded plug, opposite an open space in the joint, and not opposite one of the lugs, which would prevent the introduction of grease through the hole. The object of observing this precaution is to enable the user of the car to renew the supply of lubricant by means of a grease or oil gun.

In adjusting the joint, it is essential that the outer casing, shown in the sectional view be properly adjusted. If too loose, the lubricant will not be retained and foreign matter excluded, and if too tight, under heating will result. When loose the outer casing may be freely rotated by hand. Loosen the binding screw and turn the casing adjusting nut until the outer casing is as tight as may be rotated readily with both hands, then tighten the binding screw. This adjustment should be repeated after the car has been run about 200 miles and again after 2000 miles of service, after which no attention will be necessary, unless the outer casing appears to be very loose.

New universal joints are shipped directly from the factory to prevent the entrance of foreign elements in transportation, and as the bearings and bushings are a close fit, there is comparatively little

tendency for a stiff grease to work into the bearings. The company states, however, that once the lubrication is established, almost any grade of grease will follow into the bearings.

The joints should be thoroughly cleaned before assembling, but before being operated a small quantity of first-class light steam cylinder oil, one that is of light enough body to run freely at the atmospheric temperature, should be introduced. The amount should be sufficient to thoroughly drench the entire inside of the joint when rotated. The joints should be run a minute or two by jacking up a rear wheel.

Another method is to pack the joints with a soft grease, after which about half a pint of cylinder oil is introduced through the grease plug hole. The above suggestions apply with equal importance to the slip joint.

When overhauling a motor, care should be taken to assemble as many parts as possible before laying same aside; that is to say, bearings, bushings, bolts, nuts, and other parts should go back into their proper places at the time reassembling is commenced. Considerable annoyance can be avoided by bearing this in mind.

The hub bolts are placed with heads out and the nuts on the inside of the wheel in many makes of cars, and in some of these no means of locking the nuts in position is provided. If such is the case, be sure to go over these nuts occasionally with a wrench to be sure that they are as tight as they should be. Those in the front wheels may be seen and easily reached, but looking at them only will not do, it is the "feel" that tells. With the rear wheels the necessity for tightness and the chance for looseness are even greater, and getting at the nuts means pulling off the wheels. But it will pay—as the one who did not do it when he should have known—and, after all, it does not take much time. Even if the nuts do not work loose through jarring, the wood which is clamped between the flanges will shrink somewhat and wear so that the "bite" of the nuts is lost, after which the looseness rapidly increases.

Repainting That Automobile

W. A. RIGGLEMAN

In the first place, it is the greatest thing a man ever undertook to clean and this part of the work is worth ten dollars alone.

To paint a runabout is worth from 50 to 75 dollars, a 4-passenger car is worth 100 dollars, but since the country shops have been cutting prices so recklessly, it is getting like the carriage business; "nothing in it". Who has ever seen a poorer looking thing than an automobile when it begins to show the sign of wear? This condition is usually due to the fact that the proper care in regard to cleanliness has not been given the car from time to time, and an occasional repainting. When repainting, I like about three colors used and a nice striped effect.

When the painting is being done, there should be plenty of room and light. The paint shop should be located on the ground floor in the rear of the garage or shop. This arrangement enables the painter to also do the work required on carriages and buggies.

I want to remind the boys not to forget the horse in their fast pace. "Go slow" is a good motto to bear in mind.

In my next article I will tell you a quick way to paint that greasy "bus wagon". It is necessary to article because it is necessary to start fixing it almost from the day you get it until the end.

Reaching for the Passing Dime

Just how profitable is the way-side sale of gasoline is best indicated by the great number of supply stations that have sprung up on all the main lines of travel, particularly those radiating from the larger cities. The blacksmith shops, too, naturally obtain a share of the business—that is, of course, if they handle "gas" and oil; and there is no earthly reason why they shouldn't grab those passing dimes—they would secure much more of it did they make a real effort. Emphasizing the value or superiority of filtered gasoline is one manner of doing so. It can be done cheaply and effectively by the display of one or more signs reading something like this:

WE SELL

FILTERED

GASOLINE

20c — Only — 20c

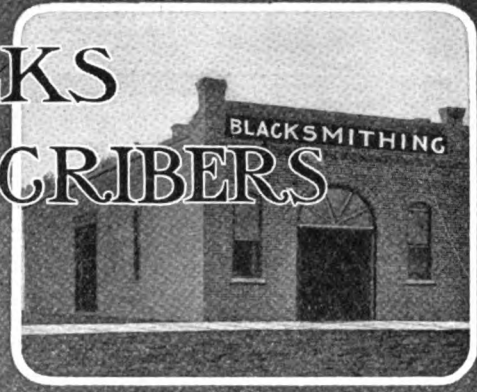
No Extra Charge

Full Measure Guaranteed

The words "Filtered" and "Full measure guaranteed" should be prominently displayed, preferably in red and with the underlining and fingers as shown. The sign or signs should be so placed that they may be easily read by motorists approaching from either direction. There is a potency and snap in the words that induces the passing dime to stop at the establishment. This is doubly desirable as it frequently leads to the expenditures of dollars for accessories and repairs. If you are situated on a line of travel—even a reasonably traveled one—here is Opportunity with a capital O knocking at your door.



TIMELY TALKS WITH OUR SUBSCRIBERS



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Saving the Lives of Horses

The story of the Red Cross Society and what it is doing in the present great war has been told and retold until its doings are familiar to every newspaper reader. The work of the Blue Cross Society is not however as well known. The workers under the Blue Cross devote their attentions and energies to the saving of horses. It is well known that many horses, some slightly wounded and others not at all, stray about until finally shot. These animals are now cared for by the Blue Cross workers. They are removed from the danger zone and given such treatment as needed to make them again fit for use. This is said to be the first time in history that real care and attention has been given the horses on the firing lines.

The Automobile Industry.

It is said that during 1914 the number of motor vehicles turned out in American factories was 515,000, which were valued at \$485,000,000. These cars were turned out by 450 factories, sold through 15,000 dealers, and 13,630 garages and 680 auto-supply houses are ready to take care of them. The number of cars as shown by the state registration bureaus is said to be 1,500,000. And yet some smiths hesitate to make a big bid for automobile work.

Subscription Agents

When a stranger solicits your subscription to THE AMERICAN BLACKSMITH, or any other publication, insist upon his showing you absolute proof that he is an agent in good standing and is employed by the publication which he represents. Don't, under an circumstances, give the man your money if you are not sure that he really he really works for the paper he says he does. No matter what the man offers you—no matter what price he makes—no matter what premium he promises to send—DON'T GIVE HIM YOUR MONEY IF YOU ARE NOT SURE.

Contents, March, 1915.

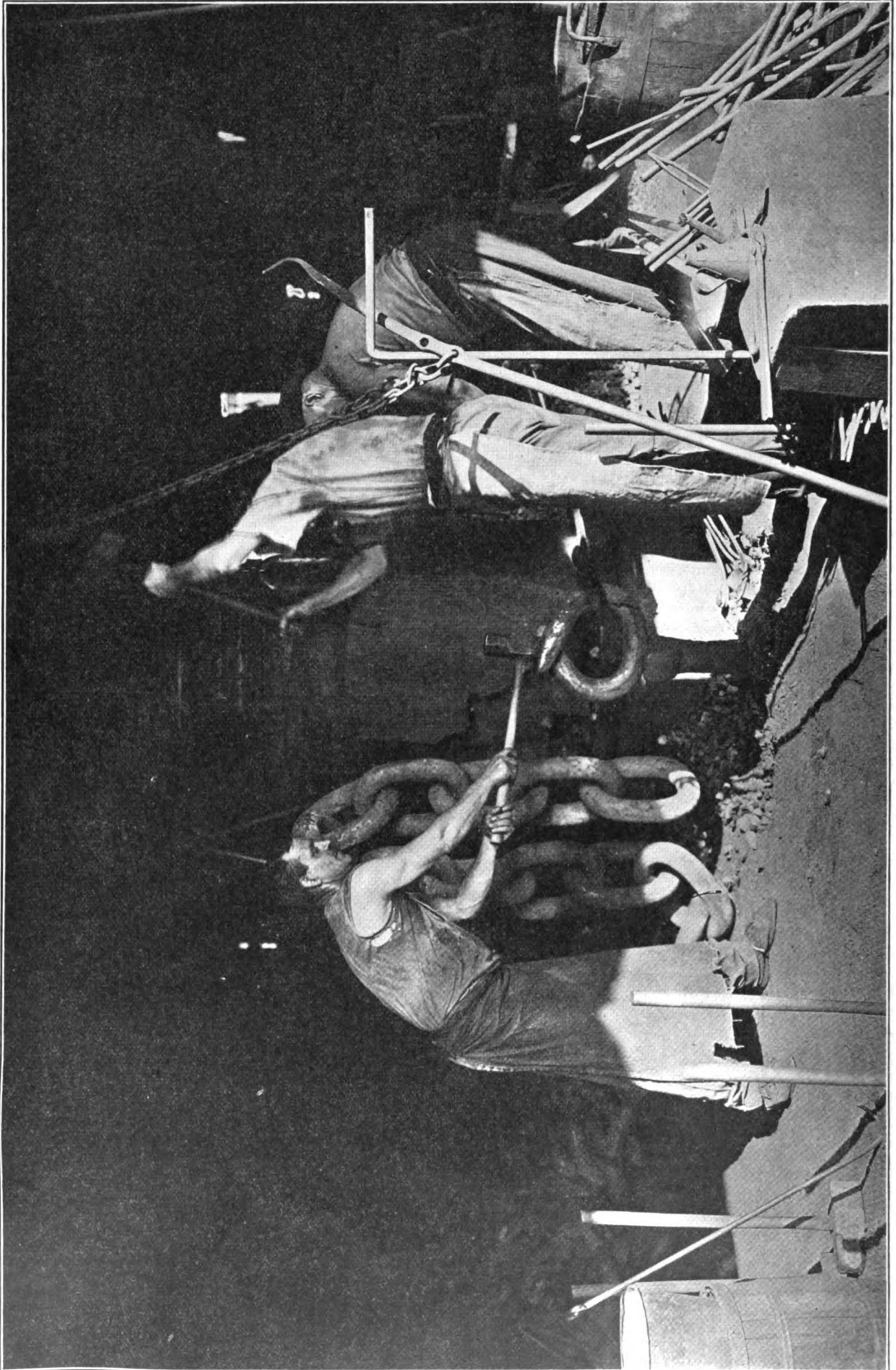
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As the Customer Sees It

There's a great deal of good, sound, business-building sense in that attitude of looking at things from the customer's side. It pays best in the long run and means an increasing business. For example: A while ago we witnessed the purchase of a line of factory supplies for temporary use. The purchaser knew little about the materials he intended purchasing, but inasmuch as they were for but temporary use he told the company from whom he intended buying that he did not want to pay any more than he positively had to for the materials needed. In fact, he asked for second hand quality as he did not intend using the materials but a few months. The seller said there were no second-hand goods in the market, but suggested the purchase of the best possible materials and then quoted him a price at which they would be willing to take them back at the end of the period of use. This was done, and the user will now do all he wants to do under the most favorable conditions and yet be under only a reasonable expense.

Another case a bit closer to the smith shop was that of a farmer who intended to purchase a gas engine. He knew little about them and so interviewed his blacksmith. The smith had a good engine in use in his shop and was supplying engines of the same make to the community. The smith inquired concerning the machines and equipment which the farmer wanted to operate and found that a saw for cutting cord wood was all he wanted to hitch the power to. Upon learning this the smith suggested engine power for other purposes, offering to put a large engine in on trial and to supply the machines as needed, after the farmer was sure of what he wanted. This seemed to hit the customer right, and with a large engine sale to his credit already, the smith is assured of the sale of some power farm machinery. And not the least important, the farmer-customer by this trial of the engine is assured of the success of the plan as suggested by the smith.

It is another example of looking out for yourself by looking out for the customer.



MAKING BIG CHAINS IS A BLACKSMITH'S JOB. BRINGING THE NEW LINK INTO SHAPE PREPARATORY TO WELDING



writer's possession for about twenty years. A portion of this bar was bent into loop form, the ends of which were placed in an Emery testing machine and drawn until the specimen broke. It should be borne in mind that the test pieces here used were untreated and drawn cold.

The three views in Fig. 1 show the remarkable pliability of this grade of iron. The knotted pieces show the extent to which the loops closed before breaking, while the other piece shows the result of a plain bending test. From these views we would infer a high grade of iron free from impurities. The production of such a grade of iron depends largely upon the quality of the ore used, smelting and puddling; and as both of these factors are inferior in modern practice, no iron can be bought on the present market that will give results equal to those obtained with the old Swedish iron.

To carry this experiment a step farther two test pieces of Swedish

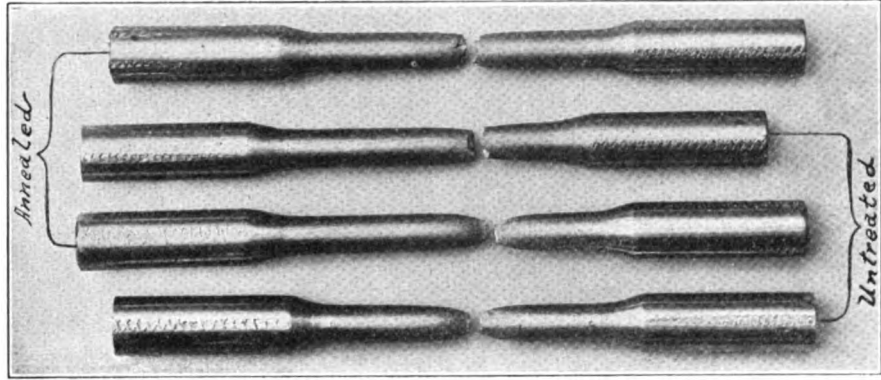


FIG. 2.—OLD SWEDISH IRON AND ORDINARY WROUGHT IRON PIECES AFTER BEING IN THE TESTING MACHINE

iron and ordinary wrought iron, respectively, were prepared according to standard specifications. One test piece of each was annealed before placing same in the testing machine to ascertain whether annealing improves the material. The accompanying table shows the results of the test and is self-explanatory. It

will be noted that the elastic limit and ultimate strength is higher for the ordinary wrought iron, while the Swedish iron has a higher percentage of elongation and a larger reduction of area. In other words, we gain in ductility with the Swedish iron but lose in strength as compared with the ordinary wrought iron.

The effect of annealing apparently raises the elastic limit for both grades of iron here considered but decreases the ultimate strength. The percentage of elongation is higher with the annealed specimen of wrought iron but lower with the corresponding test piece of Swedish iron. The percentage of reduction of area is not changed by annealing.

The results obtained in this test apply only to this experiment and should not be accepted as broad, general facts. The writer's object was merely to make a brief comparison between ordinary wrought iron and the old Swedish iron, rather than make an exhaustive study of the two materials, though the tests and the resulting data are none the less interesting.

Some Blacksmith Shop Arithmetic

Jos. G. SIMCOCK

There are few blacksmiths who do not know the rule for finding the length of a piece of iron necessary to make a ring, collar or tire of any given diameter. But there are many who do not know how to calculate the amount or length of stock required to use to make a piece of a given length when it is to be drawn down to a smaller size of the same or different shape, or upset, as in making steel pinions to a larger size.

The writer, in a varied experience in numerous railroad, ship and machine blacksmith shops, has seen very few smiths who could figure out

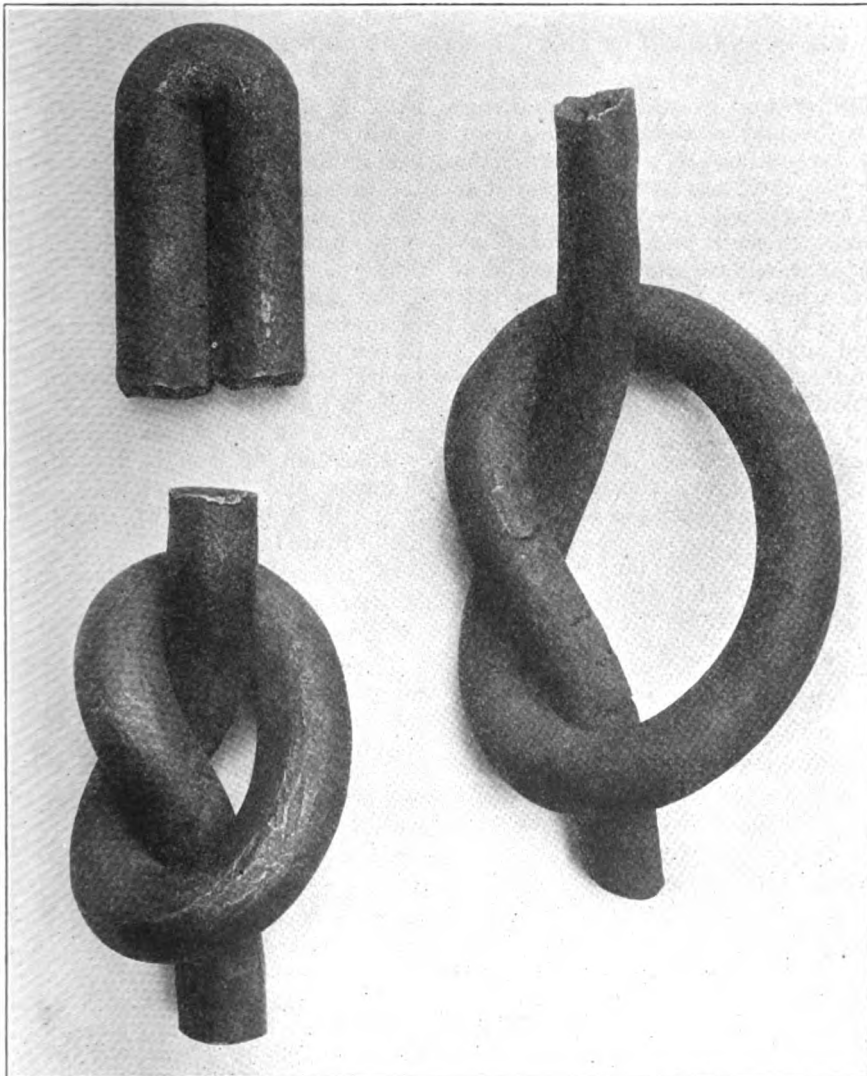


FIG. 1.—OLD SWEDISH IRON AND WHAT WAS DONE WITH IT



such problems, which, if worked out would save considerable labor and time for themselves and much material for the firm.

The few formulas needed for such work are very simple and easily learned, and, when once known, can be applied to finding the required lengths for round, square or flat

squared or 6x6 or 36—10² is 10x10 or 100, etc. After squaring the diameter you multiply by .7854. This number, .7854, is what is called a "constant". That is, it always has the same value and is used as such in determining the area of a circle. In a like manner there is the "constant", 3.1416, with which we are all

$$(4\frac{1}{4})^2 = 4\frac{1}{4} \times 4\frac{1}{4} = 17\frac{1}{4} \times 17\frac{1}{4} = 289\frac{1}{16} \times .7854 = 226.9809\frac{1}{16}$$

$$2269.8069\frac{1}{4} + 226.9809\frac{1}{16} = 2269.8069\frac{1}{4} \times 10\frac{226.9809}{2269.8069} = 40$$

40 inches is the correct answer. (It must be remembered that we have only indicated the operations with the proper results, as space prohibits that we do all the work of mul-

PHYSICAL TESTING LABORATORY WORCESTER POLYTECHNIC INSTITUTE WORCESTER, MASS				RECORD OF PHYSICAL TEST									
				Of <u>Wrought Iron.</u>									
				For <u>John Jernberg</u>									
				January 19, 1915									
KIND OF TEST	NO.	ORIGINAL DIMENSIONS IN INCHES	AREA IN SQ. IN.	ELASTIC LIMIT		ULTIMATE STRENGTH		ELONGATION		REDUCED DIMENSIONS IN INCHES	REDUCED AREA OF SECTION IN SQ. IN.	% REDUCTION	REMARKS
				Pounds	Pounds Per Sq. In.	Pounds	Pounds Per Sq. In.	In.	%				
Tensile	A	0.5000	0.196	7095	36,000	10,835	54,900	0.70	35	0.370	0.1075	45	Annealed
"	B	0.5000	0.196	6845	34,900	11,350	57,900	0.62	31	0.370	0.1075	45	As received
"	C	0.5090	0.2034	5945	29,200	9,075	44,600	0.96	48	0.240	0.0452	78	" do "
"	D	0.5030	0.1995	5980	30,000	8,785	44,000	0.87	43.5	0.243	0.0438	78	Annealed
				Nos. A and B were from stock used in the regular work in testing of materials; purchased from the firm of Pratt & Inman, Worcester, Mass.									
				Nos. C and D were from a piece of Swedish Iron									

TABLE SHOWING RESULTS OF TESTS. THE COMPARISON OF THE OLD WITH MODERN IRON IS INTERESTING

forgings, or a combination of these shapes, in a few minutes.

To find the length required to forge a piece of iron any given size, shape and length, multiply the area of the end of the piece to be made by its length and divide the product by the area of the end of the piece you are using to make the forging, and the result will be the length required. For example: We will take a piece 2½ by ½ inches; now how long must this piece be in order to exactly make a forging 5 inches long, 2 inches wide and 1¼ inches high? Following the rule, we determine the area of the piece to be made, this is 2x1.25 equals 2.5 inches; multiply by the length, 5x2.5 equals 12.5 inches. Now, the area of the end of our iron is 2.5x.5 or 1.25 inches; so then dividing 12.5 by 1.25, we get 10 inches as the required length of our stock to make this forging. Of course, any practical blacksmith will allow a little extra length for waste and straightening and squaring the ends.

Now, for round iron we have a little different operation. And to find the area of the end of a piece of round iron you square the diameter and multiply by .7854. Squaring a number is simply multiplying that number by itself; when this operation is to be performed on a number it is designated by placing a small 2 after the number, thus 6² means 6

familiar, and by which we multiply the diameter of any circle in getting its circumference. Mathematicians have found these laws out and it is an advantage to use them.

Now, there is another curious factor that enters into our consideration when the forging required is round and our stock is round, also. And that is, when any "constant" (in this case it is .7854) occurs in the opposing parts of the same example, and you multiply and then divide by the same "constant" it is not necessary to use that "constant" at all. Let's take an example and see the reason:

How many inches long will a piece of 8½ inch round steel, 10 inches in length, make if reduced to 4¼ inch round? First, we will do this example by the shorter way, leaving out the constant .7854. Following the rule,

$$(8\frac{1}{2})^2 = 8\frac{1}{2} \times 8\frac{1}{2} = 17\frac{1}{2} \times 17\frac{1}{2} = 289\frac{1}{4} \times 10 = 2890\frac{1}{4}$$

$$(4\frac{1}{4})^2 = 4\frac{1}{4} \times 4\frac{1}{4} = 17\frac{1}{4} \times 17\frac{1}{4} = 289\frac{1}{16}$$

$$2890\frac{1}{4} \div 289\frac{1}{16} = 2890\frac{1}{4} \times 16\frac{1}{289} = 40.$$

Therefore, the length of this reduced piece of steel will be 40 inches. Now, to prove that this result is correct and to show the other method we will use the constant .7854 for determining the area of the end of the piece.

$$(8\frac{1}{2})^2 = 8\frac{1}{2} \times 8\frac{1}{2} = 17\frac{1}{2} \times 17\frac{1}{2} = 289\frac{1}{4} \times .7854 = 226.9809\frac{1}{4} \times 10 = 2269.8069\frac{1}{4}$$

Any one can readily see how much quicker the first method is than the second where the unnecessary operation of multiplying and then dividing by the same number—the "constant"—is performed.

But when you change round iron to square or flat, and square or flat to round; then it is a different proposition and it is absolutely necessary to use this constant, .7854, and find the area of the end of the piece.

A section of iron is 2 inches in diameter and 22 inches long. How long will it be if drawn down to 1 inch square?

$$2^2 = 2 \times 2 = 4 \times .7854 = 3.1416 \times 22 = 69.1152$$

$$1^2 = 1 \times 1 = 1$$

$$69.1152 \div 1 = 69.1152 \text{ or } 69\frac{1}{8} \text{ inches.}$$

Here is another way of using this method when you have the iron square and you wish it forged round: A portion of steel is 2 inches square and 28 inches long. How many inches of ¾ inch round will it make?

$$2^2 = 2 \times 2 = 4 \times 28 = 112$$

$$(\frac{3}{4})^2 = \frac{3}{4} \times \frac{3}{4} = \frac{9}{16} \times .7854 = 7.0689\frac{1}{16}$$

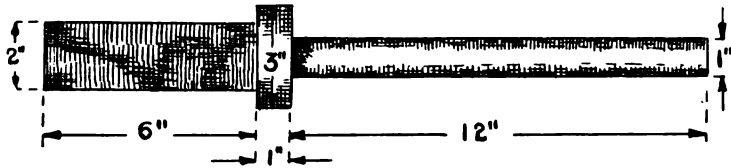
$$112 \div 7.0689\frac{1}{16} = 11\frac{3}{4} \times 19\frac{1}{16} = 170\frac{3}{4} \times \frac{1}{16} = 253.5 \text{ or } 253\frac{1}{2} \text{ inches.}$$

These preceding examples show just what can be done, and it will surprise one how quickly a result can be obtained when once the habit is formed. These principles can be applied when considering piece of

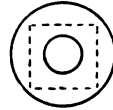


various shapes and sizes and you can very easily obtain the correct amount.

A piece is to be forged in which the material used is the size of the largest dimension. How much material will be required for this forging as shown in the accompanying engraving?



CALCULATING THE STOCK FOR A FORGING



1²=1×1=1×.7854×12=9.4248

The section 1-inch round, and 12 inches long:

The section 2 inches square and 6 inches long:

2²=2×2=4×6=24

9.4248×24=33.4248

The material is three inches in diameter, so:

3²=3×3=9×.7854=7.0686

33.4248+7.0686=40.4934

Adding 1 inch for the collar we have 5 5-7 inches as the length required. This whole formula then sifts itself down to the simple fact that: The area multiplied by the length of a known piece equals the area multiplied by the length of an unknown piece and that, therefore, the unknown length equals the sum of the known areas, multiplied by the known lengths and divided by the area of the unknown piece; in others words, let A = known area and L = the known lengths; also, a = the unknown area, and I = the unknown length. Then AxL = Axl and therefore, transposing the members of the equation, l = AxL ÷ a.

blinded ladies of leisure. And right inside the line fence of this same subject comes the matter of fault-finding with the current educational system. Usually the loudest bray is from some lop-eared yap. He'll spit, sputter and spill a whole train-load of hard talk on "The Needed Reform in Our Modern Educational

System". And if you delve deeply into his real fitness to criticize and into the extent of his educational research you'll most likely find that the last time he was in the local schoolhouse was the time I. Napoleon Blowhard, or some other local spellbinder, was stumping the state for Garfield. Let us have more of the effort toward a 100% human. The greatest product this country or any country can produce is not its manufactured articles, not its farm and field crops, not its orchard and ranch products, but its future men and women. Read over that quotation from the Kansas "Phoenix" and then read it over several times more.

THE OTHER DAY I came across an old acquaintance I'd not seen in years—Joe Barker. Joe and the writer worked side by side during apprenticeship days and ever since Joe's been looking for "a big strike", pretty much as a miner who lives on grub-stakes and hope. Joe seems to have gotten the wrong slant early in life. Had somebody told him the story of the rolling-stone and the moss, I really think Joe would amount to something today. But Joe was never content anywhere. He'd no sooner get started somewhere when he'd get to squirming like a man with the seven-day itch, and he'd never be satisfied until he'd gotten a new start somewhere else, when the entire procedure would start afresh. Joe's been into and out of more different lines of business than there are colors to a rainbow. He's owned and run shops and stores, and he's worked for wages in most every line you can think of. But somehow or other he's never landed. He seemed to think that the fight for success was like a dash in an aeroplane in the war zone instead of a hard, tough climb and a fight every inch of the way.

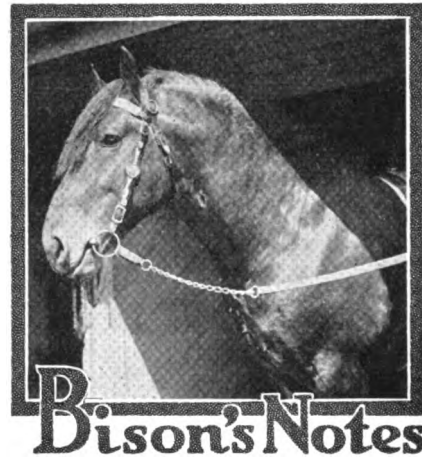
AND SPEAKING OF SUCCESS—I've often thought how well the telegraph lineman illustrates about the best sermon on success that can be given. Ever notice one of these pole-climbers? He'll walk up to the pole, give it a good look and then he'll look over his climbing equipment. He'll make certain that all straps and buckles are right and then he'll grab the pole. First he jabs one steelspike into the pole, and his whole attention is on that one jab—for pretty soon his whole life will depend on it. Then being certain that it's a safe jab he raises up for the next jab. And so on, each time he sees that he has a good solid foundation for each step before risking his weight on it—each time concentrating his attention on the one step. Thus before you hardly realize it the man is at the top and safe. It's the concentration on each step and the certainty with which each is made that insures his safety. Isn't the same principle applicable to business?

Thoughts on Timely Topics

By THORNTON.

Caustic Censure and Cheery Comment.

THE KANSAS "PHOENIX" said the other day: "It is a peculiar thing that a man who owns a bunch of cattle will go out to look at them every few days, but not once during the whole year will you catch him at the schoolhouse where his children get their education". Pretty close to a whole bookful of thought in that one lone sentence. It just bears out what I've said before, that when folks pay as much attention to the raising of 100% girls and boys as they do to the raising of 100% hogs and critters, then we'll have fewer wishy-washy Willies and fewer title



At a meeting of the Albany Driving Club, a couple of weeks ago, a movement was inaugurated which will be developed into a State-wide campaign for better accommodations of horses on the public highways. It was pointed out at this meeting that inasmuch as there are more than four times as many horse owners in the State as there are owners of automobiles, it is time for the horse owners to demand of the State authorities that the road improvements being made shall hereafter recognize the importance of horse traffic and the rights of horse owners. The organization of horse owners throughout the State into clubs to secure better road conditions for horses will be undertaken and through them an effort will be made to have gravel side roads for horses where brick or concrete roads are constructed for automobiles and heavy trucking. The justice of the proposition is too plain to need any reference to and, inasmuch as the horse owners of the State pay a vastly larger part of the cost of road building than the automobile owners do, it would seem as though their efforts, under proper organization, ought to secure what they will demand.



The success which marked the recent Red Cross Horse Show, held in New York after the National Horse Show Association declined to hold their annual show, fearing a loss on account of the European war, is responsible for a movement in the Metropolis to have another show Easter week, in fact to make a show at that time an annual event. It is pointed out that Easter week comes at the time of the year when everyone interested in horses is full of enthusiasm and that public interest is also at a higher pitch than in December when the show horses are just about to be put in winter quarters. It is not intended that the proposed Easter show shall be in any sense a rival of the National Show, but rather a means of working up added interest in the big winter show. Just before the opening of the Red Cross Show some ill-advised purveyor of press news sent out a country-wide dispatch, referring to that show as "probably the last big show that New York would see" when, as a matter of fact there is likely to be two big annual shows hereafter, instead of one.

fact, when it is remembered that the greatest campaigning pacers of the past have been free-legged ones, such pacers as Dan Patch, 1:55¼; Audubon Boy, 1:59¼; John R. Gentry, 2:00¼; Joe Patchen, 2:01¼; Flying Jib, 2:04; Mascot, 2:04; Hal Pointer, 2:04½; Direct, 2:05½, etc., there appears to be plenty of reasons for favoring the free-legged pacer over the one requiring the extra leg equipment.

A comparison of the best records for trotters and pacers twenty-five years ago and those of the present era is the only method by which those who have not kept close track of harness racing affairs, can come to a correct understanding as to the great improvement there has been in the speed rate of this breed of horses. The present record holders and those of twenty-five years ago (1889) follow:

TROTTING DIVISION

1914.

Stallion—The Harvester, by Walnut Hall 2:01

Three-year-old—Anna Bradford, by Todd Mac 2:00¾
 Two-year-old—Directly, by Direct .. 2:07¾
 Yearling—Frank Perry, by Taddington 2:15

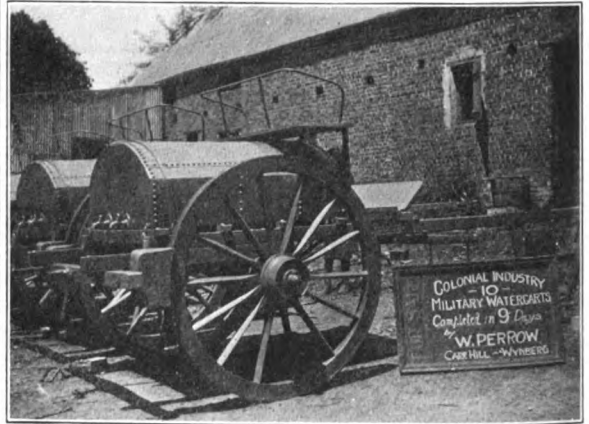
1889.

Stallion—Brown Hal, by Tom Hal, Jr. 2:12½
 Mare—Gold Leaf by Sidney 2:11¼
 Gelding—Johnston, by Joe Bassett 2:04¼
 Four-year-old—Gold Leaf, by Sidney 2:11¼
 Three-year-old—Yolo Maid, by Alexander Button 2:14
 Two-year-old—Ed. Rosewater, by Vasco 2:20¾
 Yearling—Daisy, by Prompter 2:38

It will be noticed that the record for trotting stallions has been reduced eleven seconds, for mares ten and one-half seconds, and for geldings, twelve seconds. In the age division the record for four-year-olds is twelve and three-quarters seconds lower; for three-year-olds, seven seconds; for two-year-olds thirteen and one-half sec-



MILITARY WATER WAGONS MADE BY MR. PERROW, OF AUSTRALIA



A NEAR VIEW OF THE WAGONS MADE BY ONE OF OUR READERS

Of the two score of pacers that were racing below 2:10 on the Grand Circuit tracks in 1914 just about half of the number wore hobbles, but a comparison of the races of the free-legged and hobbled pacers does not show any foundation for believing that a free-legged pacer is at a disadvantage, as has been claimed by some horsemen ever since the agitation was started to abolish the hobbles as a part of a pacer's race equipment. The best of the free-legged brigade of 1914 were Directum I, 1:58; William (4) 2:00 and Anna Bradford (3) 2:00¾. Probably nine out of ten horsemen will admit that the best of the hobbles were Frank Bogash Jr., 1:59¼; Peter Stevens, 2:02¼, and R. H. Bratt (4) 2:03¼. The greatest contests ever seen on the turf between pacers were the races between the free-legged horses, Directum I and William. Directum I also showed himself the superior, as a race horse, of any pacer the world has known. William, a four-year-old, was separately timed below 1:50 and Anna Bradford, although only a three-year-old, paced to a faster record than the two next best hobbled pacers, after Frank Bogash secured. In view of these facts it is exceedingly difficult to present any argument tending to prove that a pacer wearing the hobbles has any advantage over one not so equipped, in

Mare—Lou Dillon, by Sidney Dillon 1:58½
 Gelding—Uhlan, by Bingen 1:58
 Four-year-old—Etawah, by Al Stanley 2:03¼
 Three-year-old—Peter Volo by Peter the Great 2:03½
 Two-year-old—Peter Volo, by Peter the Great 2:04½
 Yearling—Airdale, by Tregantte .. 2:15¾

1889

Stallion—Axtell, by William L. 2:12
 Mare—Maude S., by Harold 2:08¾
 Gelding—Jay Eye See, by Dictator. 2:10
 Four-year-old—Manzanita by Electioneer 2:18
 Three-year-old—Sunol by Electioneer. 2:10¾
 Two-year-old—Sunol by Electioneer. 2:18
 Yearling—Norlaine, by Norval. 2:31½

PACING DIVISION.

1914.

Stallion—Dan Patch, by Joe Patchen. 1:55¾
 Mare—Dariel, by Alexander 2:00¼
 Gelding—Frank Bogash, Jr., by Frank Bogash 1:59¼
 Four-year-old—William by Abe J. 2:00

onds, and for yearlings, fifteen and one-half seconds. In the pacing division the stallion record has dropped seventeen and one-quarter seconds; the record for mares, nine and one-quarter seconds; the record for gelding, six seconds; for four-year-olds, eleven and one-half seconds; for three-year-olds, thirteen and one-quarter seconds for two-year-olds thirteen seconds, and for yearlings, twenty-three seconds. It is hardly to be expected that there will be the same amount of improvement in the next quarter of a century, but when it is considered that the greatest improvement during the past twenty-five years has been during the last decade, it is evident that the speed rate will continue to be lowered appreciably during the next few years. It is not a wild statement now to prophesy that, before the end of another quarter of a century shall arrive there will be more than one three-year-old of either gait that will have a record of two minutes or better, with 2:10 two-year-olds much more common than 2:10 three-year-olds are now. Along with this lowering of speed in the colt division will also come a gradual lowering of the records for aged performers so that few if any, of the best records of today will be the best records in the aged division twenty-five years hence.



John H. Shutts, whose death occurred in New York a few days ago, occupied a unique place in the world of trotting horse breeding. For more than a quarter of a century he conducted a big breeding farm and, from first to last, he probably paid out more than a million dollars for trotters and pacers. He first became known as a big bidder in the sale ring when, at the dispersion sale of the Glenview Farm, in Kentucky, he paid \$28,000 for the stallion, Pancoast, 2:21¼. Later he paid \$26,000 for the stallion, Mascot, when the California breeder L. J. Rose sold his big breeding stud at auction in New York. Since then he had probably bought over one thousand horses in the sale ring, many of them costing him from \$10,000 to \$15,000 each. His chief pleasure with horses seemed to be in buying and selling, although he kept up a breeding stud of considerable magnitude. His most fortunate purchase was the stallion, Axworthy, 2:15½, that he bought as a colt at a comparatively small price, selling him at auction, after he had started him on the road to fame as a sire, for \$21,000. Mr. Shutts never kept up a racing stable, although at different times he had a trainer and frequently sent colts of his breeding to other trainers. Most of the youngsters bred by him went to the sale ring and when they failed to evoke spirited bidding he, in numerous instances stepped into the ring and would tie a one-hundred or a fifty-dollar bill into the horse's tail and then request the auctioneer to sell the horse with the bill attached to him. This method of arousing interest among the bidders seldom failed. Although Mr. Shutts did not campaign a racing stable, no less than eight of the trotters carrying records below 2:10 were bred by him, they being Hailworthy, 2:05¼; Tom Axworthy, 2:07; Guy Nella, 2:07¼; Queen Worthy, 2:07½; Eva Cord, 2:08¼; Olcott Axworthy, 2:08½; Guy Axworthy, 2:08¾, and Nunda Guy, 2:09. About five years ago he sold his last trotter and had not taken an active interest in breeding since.

While the season of 1914 was productive of a record breaking list of new 2:10 performers, the list of such horses living is not as large as might be thought as thirty-seven horses with records of 2:10 or better died during the year. Among the trotters the most notable one to be taken was Colorado E., the colt that in 1907 placed the world's record for three-year-old trotters at 2:04¾, where it remained until last season when Peter Volo reduced it to 2:03½ the two next most noted trotters which died last year were the old-time sensational performers, Lord Derby, 2:05¾ and Fantasy, 2:06. Both products of the once famous Village Farm at East Aurora, N. Y. As a three-year-old Fantasy lowered the world's record for three-year-olds to 2:08¼ and as a four-year-old she became the champion mare of her age, when she took her record of 2:06. She was a big, plain-looking mare, but when at speed was a veritable trotting machine. Lord Derby during his second year on the turf that was the winner of a series of wagon races have never been equalled and he took his record in one of those events, drawing a four-wheeled vehicle. The son of Mambino King has the distinction of having won more money in a single season than any other horse that ever lived, in 1902 his third season on the turf, when he won \$37,625. In his first season he won \$8,465 and in his second \$11,825 so that his total winnings in the three years which made up his career on the turf totalled \$77,915. In 1902 Lord Derby took part in one race

that, in a financial way, was and still is, a record breaker. He was at that time owned by E. E. Smathers, of New York. Thos. W. Lawson, the Boston financier, then owned the trotter Boralina, 2:07 and believing him to be a faster trotter than Lord Derby, made a match with Smathers, each owner wagering \$20,000. The race between the great geldings was trotted at Hartford, Conn., the association there adding \$10,000 to the stake, which, by agreement, was all to go to the winner. Boralina won the first heat, but Lord Derby beat him the next in a stretch finish. Boralina was lame when called for the third heat, and Lord Derby won that and the next in slow time, the \$50,000 in the stake going to Smathers.

The fastest of the 2:10 pacers in the death list of 1914 was Sir R., 2:03½, the gelding that the noted trainer, Thos. W. Murphey, raced through the Grand Circuit in 1911, but probably the most notable one was the three-year-old colt, Squantum, 2:09½, that was in Lon McDonald's stable last season. When the now-champion three-year-old pacer, Anna Bradford, 2:00¾, took a record of 2:01½ at Columbus, O., Squantum was second to her and was officially timed in 2:02. The colt was regarded as the fastest pacer in sight eligible to the 2:10 class after that race and McDonald expected to name him in all the big events of 1915, but death took him at Phoenix, Ariz., while on the way to California with the balance of McDonald's stable.

The list of 2:10 performers that died in 1914 is as follows:

Silk Hat, by Silk Weaver.....	2:09
Idolita, by Mendocino.....	2:09½
Bush, by Alcyone.....	2:00½
John W. Davis, by Bernadotte.....	2:09½
Contralto, by The Conqueror.....	2:10
Lady Wanetka, by Peter The Great.....	2:10
Minna Ward, by Prodigal.....	2:10
Moquette, by Wilton.....	2:10

PACERS

Sir R., by The Stoic.....	2:03½
Egozen, by Egotist.....	2:06¼
Kirby Star, by John Kirby.....	2:06¼
Early Thacker, by Early Reaper.....	2:06½
Spill, by Wawan.....	2:06½
Lady Nottingham, By Nottingham.....	2:06¾
Vassar, by Vatican.....	2:07
Doc. Gentry, by Beazley.....	2:07¼
Wyatta, by Gambetta Wilkes.....	2:07¼
Stephen A., by McKinley.....	2:07¾
Effie Powers, by Anderson Wilkes.....	2:08¼
Cayce Jones, by Bonnie.....	2:08½
Bert Oliver, by Ashland Wilkes.....	2:08¾
Billy Patten, by Bingen.....	2:09¼
Banner B., by Bannerliss.....	2:09¼
Diamond Dispute, by Dispute.....	2:09¼
Roy D., by Roy C.....	2:09¼
Veta, by Dunton Wilkes.....	2:09½
Joe Interest, by Interest.....	2:09½
Squantum, by Squanto.....	2:09½
Venture, by Bald Hornet.....	2:09½

The opening of futurity races for trotters and pacers by organizations devoted to harness racing in an amateur way is likely to be a feature of many cities this year. This idea was originated by the horsemen of Watertown, N. Y. two or three years ago. Last year the Syracuse Driving Club and the Buffalo Road Drivers' Association gave futurities and in each city a new interest in harness racing was created, many lovers of the sport who had not actively participated in it for several years, buying colts to represent them in those events. This year all three of these New York cities will again have one or more of these futurities and three or four other cities in the state are likely to be the scene of similar events. In other States, too, the idea is being taken up and it is certain that these futurities will do more to renew general interest in harness racing and, incidentally do more to widen the market for well-bred young trotters and pacers than anything that has occurred in many years. These local futurities are not so large as to be burdensome and they do not require a system of payments extending over a period of three or four years, like the big breeders' futurities. One of the conditions governing them, also is one limiting the price that may be paid for a colt to be entered to a moderate price, which encourages men of moderate means to participate in them. In these futurities all the money paid in, in entrance fees is raced for by the starters with such money added as may be secured from the fair or racing association which gets the race, such associations being glad to pay a fair amount to get the race for an attraction. In case the promoting association gives the race itself the gate money is added to the money received for entrance, the cost of promoting being defrayed by a membership fee which must be paid by owners of colts entered. These local futurities have re-enlisted many men in harness racing who have found participation in the regular professional events too expensive for them and their re-entry into the sport has greatly stimulated every interest connected with racing, such as breeding, training, shoeing and equipping with harness, vehicles etc.



A SHORT SMITH, A TALL SMITH AND A BIG PILE OF SHOES

TROTTERS

Colorado E., by The Bondsman.....	2:04¾
Snyder McGregor, by Gilman McGregor.....	2:05¼
Lord Derby, by Mambino King.....	2:05¾
Fantasy, by Chimes.....	2:06
Fred Kohl, by Guy Wilkes.....	2:07¾
Genteel H., by Gambetta Wilkes.....	2:08¼
John Taylor, by Dispute.....	2:08¼
Lisonjero, by Dexter Prince.....	2:08¼



The Visitor From Buffalo

JAY G. SPARKS.

I am enclosing my check on the Eastwood bank,
So to my subscription just weld a good shank,
I like "Our Journal", I would have you know,—

I call it a visitor from Buffalo.

Each month when I get it I feel so proud,
I tear off the wrapper and read out loud
Good things from our friends all over the land,

Put down in print for our happy band.

To read and ponder, and laugh and squall,
When we get the news from all over the "Ball".

Our wisdom and knowledge is bound to grow,

When we read "Our Journal" from Buffalo.

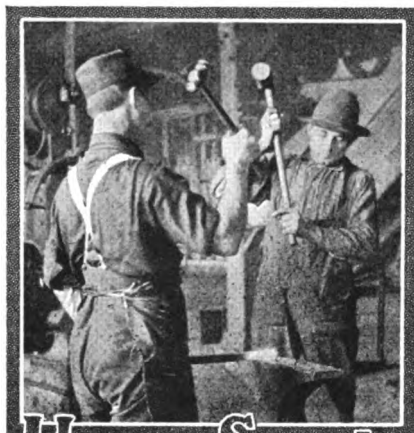
Often when tired to the office I went
To read of Benton and the Editor's argument.

(I'll bet Benton's full of jokes down to his knees,
As he makes the Editor's cigars fly like bees).

And so, Mr. Editor, I'd like to read without fears

The good old magazine for about three years.

This is about all I have to say,
In sending a check for two today.



Heats, Sparks, Welds

"Be Prepared" is the Boy Scout motto—not so bad for men, either.

Is there any place where headwork will save more hard work than in the smith shop?

Why not a "baker's dozen" in the smithing business? Give the customer full measure.

It's abuse more than use that affects the successful or unsuccessful performance of a machine.

No report has been received, as yet, that there will be any change in the style of dressing tools this season.

It's not the amount of a man's knowledge that determines his success or failure, but the way in which he applies his knowledge.

Recent experiments seem to indicate that artificial rubber can be made from coke-oven gas.

A good bookkeeping system, it must be admitted takes time to run and pains to install. But its worth—have you found it out?

Speaking of aviation records and high flights, old Hi Cost O' Living still holds the world's record. Better dust off the price list.

White pine shingles, put on a house 168 years ago, are still serving their purpose on a historic Maryland home, and show few traces of deterioration.

When you're figuring on modern tools and machines for the shop, don't forget that the home may need one or two modern items of equipment also.

A new tool designed for plumbers' use is a pipe reamer attachment for a threading tool. Thus as the pipe is being threaded the reamer is also at work.

"We don't let anything get away except the fellow that won't pay. We believe in mixing-in the 'puttering jobs'—just in order to keep busy and out of mischief."

M. W. A.

What would a smith shop be without an anvil? An Illinois smith wrote the other day and said: "I find 'Our Journal' as necessary as my anvil." Tell your neighbors.

The Best Advertisement we know of for a general blacksmith business is a neat, well-painted, orderly-kept shop with a neat sign over the door and a smile on the face of the neat proprietor.

There are several combinations that will successfully overcome bad luck in the smithing business, but each must contain a liberal measure of grit, determination, knowledge and system.

You may have a good location, a good shop, a good stock, do good work and have good customers, but—if you haven't a good method of caring for your money and accounts, you cannot get all your profits.

"H. E. Birely of Hagerstown", says the Waynesboro (Pa.) Herald, "put on 1,372 horse shoes in six days of 9½ hours each". According to these figures Mr. Birely averaged 228 shoes a day and 24 shoes an hour.

"We are going to be more progressive and get all we can out of the business by putting more into it. As a rule, it pays to do a thing right; to this rule the smithing business is not an exception."

M. W. A.

A recent visitor likened blacksmithing to sculpture, saying: "The true smith must have the imagination, the active brain and the skill of the sculptor—he must see things in his mind before he can produce them in iron".

"The old scrap pile blacksmith shop is passing. Let's not be the last fellow to clean up. Plenty of good tools in their places when not in actual use, a clean floor and fair treatment of your customers, are some of the essentials towards success".

M. W. A.

Under British law a chimney, 300 feet tall, must, if constructed of brick, have walls about 4 feet, 10 inches thick at the base, while if made of concrete, the outer wall need have a thickness of only 9 inches and the inner wall 5 inches, with a space of 4 inches between the two walls.

"It's true", says Ol' Cal Ransom, "thet the steam thet blows the whistle ain't never goin' t' turn any wheels, but if thet thar whistle wasn't blown who'd ever know whar the mill was? I'll tell y' young fellar, sum energy hes got t' go into advertisin' if y' want t' stay in business these days".

The Horse to the Master

I am a horse; you are a man;
I've been your slave since I began,
And though I'm strong enough to shake
My shackles off and make a break
For freedom that would lift the lid,
You've noticed that I never did.
By day and night I've worked for you
And done the best that I could do;
And though I may not always like
Your methods, yet I never strike;
In heat and cold, in wet and dry
I'm always ready—glad to try
To do the very most I can
To satisfy my master, man.
Therefore, my master, if you please,
Consider such facts as these:
Say, don't you think it ought to be
Your pleasure to look out for me,
If for no other reason than
My great usefulness to man?
Of course, you might be worse, I know
You sometimes treat your own kind so,
But I'm a Horse, and truer than
The man-slave to his master, man.
And, furthermore, my nature is
Much more dependent than is his.
And as I trust you, Sir, you should
Do all you can to make it good.
Nor do I ask a lot, I guess,
To be fairly fair success—
Good food, good shelter, good care,
I think, is just about my share.
No other pay I ask—no touch
I make, but this! Is that too much?

W. J. LAMPTON in *New York Times*.

The reason the house to house canvasser sells so many items that the housewife can get right at her own store and at a lesser price is because the canvasser concentrates attention to one or two articles. The way to sell a side-line is to present it to your customers so they can not get away without seeing it.

The removal of the engine boilers from one of Uncle Sam's warships necessitated their being cut into strips. When the size of such boilers is taken into consideration it would seem to be an almost endless job. Two men, however, each supplied with an oxy-acetylene torch, cut through 1,000 feet of steel plate, averaging one inch in thickness, in 30 working hours.

Five accidents reported to us in one day shows the real need of safety appliances in the smith shop. The five accidents ranged all the way from a torn thumb to a fatal fall due to a slippery floor. There cannot be too much care exercised in the smith shop. Of course, the number of accidents occurring in proportion to the number of men employed is small, but human lives and limbs are too valuable to permit of carelessness. Every possible safeguard should be used to protect both workers and visitors in the shop. And no device is too expensive if it will prevent accident and injury.

TRUE TALES OF OUR SERVICE NUMBER THREE

An Illinois reader purchased a bill of supplies from a middle eastern dealer and because of some fault of the railroad, the shipment miscarried. After an unsuccessful attempt to adjust the matter and to get some trace of his delayed supplies, he finally reported the occurrence to us. We immediately pursued the matter and prodded the railroad into activity, so that our Illinois friend got his goods with a comparatively small delay.



The Horseshoer

Shoeing the Gaited Saddle Horse

LESTER W. SIMS.

After our subjects having learned to do the different gaits, especially to rack and trot, although only in a rough gaited, unsettled way, (in the raw) the actual time of shoeing is at hand and the methods and principles to be employed, are best explained by taking up of the different subjects (as met with) and to deal with them separately and accordingly. Right here, I confess a difficult problem, for the writer must continually keep in mind a number of facts, to be met with. First, that our readers may be able to see and readily understand the defects or faults of action. Secondly, the corrective measures, with what may be accomplished, by the all-important, dressing of the feet into their proper shapes and positions. Third, the designing of shoes, of proper shape and weight, with the weight properly distributed through the shoes. Fourth, absolute necessity of changing the shoeing and the reasons therefor. Fifth, the importance of training or drilling a horse mostly on his weaker points or gaits, with special shoeing for same, in order to bring them up to a standard with his natural, better gaits.

In view of the facts, as set forth, demonstrating, we choose first, the easy and most simple subjects, which leads us, in a systematic way, into a clear understanding of the deeper and more kinky problems to be straightened out. For instance, to get the system, make a comparison of two youngsters which have never been shod. The first has naturally a big, bold trot, but is hard to keep on a rack. As a rule shoe this one very light in front with more weight behind (for this same reason we often pull off front shoes, leaving the hind

ones on, in teaching a horse to find the rack). Thus, unbalancing the trot, he is more inclined to rack. Our second subject is naturally strong on the rack but weak on the trot. We shoe this one with weight in front, and light behind. However, you must not get the idea that this is an iron-bound rule, for we occasionally find one just to the contrary, the reason for which will be explained later.

Now back to the subject: First, the front feet toe-in (pigeon-toed) breaking over, and wearing off the outside toe. There is an inclination to paddle, (swinging outside of what should be a straight line of action). Of course, level the feet on bottom and dress off all wings, especially at inside toe, getting the foot as level and straight as possible, using a squared toe shoe (boxed toe) and if necessary, punch the nail holes of the outside branch so the shoe can be extended over the foot to the extent of getting a balanced foot. It is sometimes necessary to have one side of the shoe thicker or to build up the foot with leather, etc. This method will afford an easy, quick, square breakover, causing straight forward action. Note the fact that this shoe with the toe squared back quickens the break over and assists very materially in getting on a rack. The second with same conditions in the feet, we advise the use of weight in the shoe. Also remember that the length of the toe is of much benefit in getting a horse to trot. In such a case we advise shoeing full on toe, with enough extension on outside toe to get a straight breakover.

Now turning our attention to the shoeing of the hind feet, I have made the matter of weight already clear to you, but at this stage, the horse being unsettled in these gaits (all new to him), more than 90% are crossfiring, bruising the quarters and pulling front shoes, etc.

Now what measures of prevention have we? A great many, but to be applied in accordance with the need, often the hind feet are found to be too long or too high inside with some wing. In this case lower inside of foot. Dress off the wings, then shoe by setting the shoe back a little from inside toe, (after having hot rasped inside of toe to a level edge). Turn light calk on outside heel and turn trail out well, no other calks, will often bring the desired results. Often a side weight shoe with trail turned well out, with light calk on outside heel, no other calks, straightened back at inside toe, with the whole inside of shoe beveled off, from center of toe to heel, will suffice.

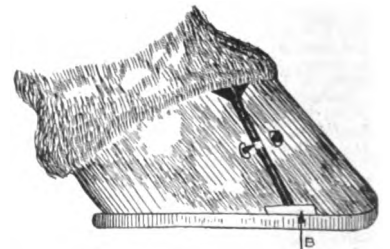
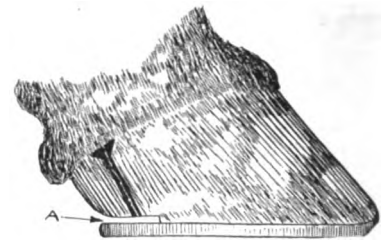
This is by no means the limit of the crossfiring hind shoe. If the outside of the hind foot is too low (too short) to be parred level, it may be balanced up, by building up with leather, or by a shoe made thick on outside or by turning up a rim calk, and by extensions, calks, etc., until we do get a balanced foot. Now when the gaits have become more settled and well established, then our next will treat on the building up and balancing the action of the different gaits in its various forms.

(To be Continued.)

Treating Quarter-Cracks

FRANZ WENKE.

I have often read articles about quartercracks, some very good, some not so good. Permit me to give my version and experience with regard to quartercracks. First, of all what induces quartercracks. My observations have brought me to the conclusion that laminitis or founder is the principal cause of the malady. A foundered foot of the horse is always more or less brittle, according to the degree of founder. Such a foot will, as a rule, shrink more in the outer envelope or actual hoof portion, than it will in the sensitive area. Our



MR. WENKE TREATS QUARTER CRACKS

first impression is that the horse will go tender, as if on eggs. This is the consequence of the horny part shrinking and pinching the sensitive part. Something will have to give way and this is, naturally, the smaller envelope, the hoof. The question arises, what are you going to do about it? In my 39 years' experience I have found that whenever time and circumstances permit, to apply a poultice. If nothing more convenient, use a cold water bath 3



or 4 times a day. If time will not allow either poultices or the use of the cold water baths, then proceed at once to mechanical devices, that is, shoeing.

In all quartercracks it is advisable to use a bar shoe right from the start. As a rule, I do not use a shoe with the branches turned in; on the contrary, I fit an open shoe with the branches as wide as possible, without running the risk of interfering. I then weld the bar into the shoe well to the front so as not to have the hind shoe catching it in overreaching. If the quartercrack is well towards the heel, I remove all pressure from the heel afflicted as shown at A. But if more toward the front, I leave

On Fitting the Shoe and Shoeing the Horse

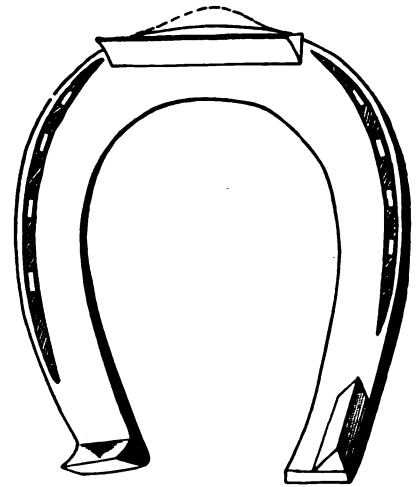
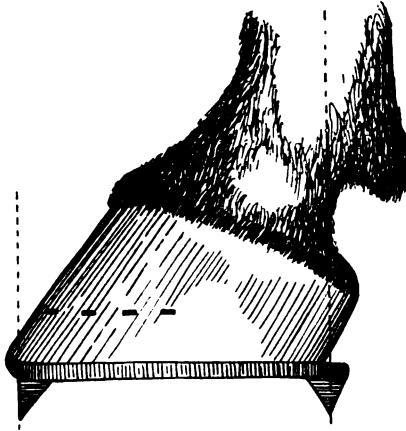
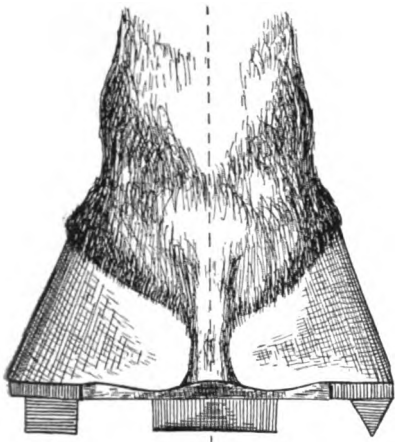
M. W. ABTS.

Having been a reader of THE AMERICAN BLACKSMITH for a number of years, in fact, nearly ever since the first copy was issued, and having obtained a great deal of valuable information therefrom to be put into practical use in the shop, it strikes me that if I have any suggestions to offer in the way of doing things in the shop and conducting the business generally, it is my duty to do so to help the craft along.

The contributions to the paper by the boys regarding horseshoeing

my observation where shoes were so improperly fitted and nailed on that when the horse set his foot on the ground one branch of the shoe would receive, perhaps, 25% more of the weight of that member than the other. It is plain to see why so many horses are injured through improper shoeing.

The reader at first may think there is nothing to this that is worth putting into practice. Let me suggest that the next time he shoes a horse to observe how the shoe appears when the foot is on the floor, after giving the above some thought. Then knowing the result he is after, it will sort of grow on him and he will try to do the next job still better. Many



THE MOST ESSENTIAL POINT IN SHOEING, ACCORDING TO MR. ABTS, IS THE RELATION OF THE HEELS OF A CALKED SHOE TO THE FOOT AND LEG

the pressure to some extent on the heel, as shown at B.

The next process is to make a V-shaped cut, from the coronet, of about an inch or an inch and a half, according to size of hoof, as shown. I then cut to the bottom of the crack thoroughly, even down to the quick without, however, drawing too much blood. In case the hoof is thick or heavy enough, I put a No. 3 nail as a clinch across the crack as indicated in the engraving. The clinch should be drawn up while the foot rests on the ground and while the opposite foot is being held up. This will tend to close the crack. After having prepared the crack in the manner described, I run ordinary shoemaker's pitch with a hot iron into the crack. This pitch will remain indefinitely and will exclude all sand and dirt from getting into the crack. I have never had any trouble in curing quartercracks with this method.

There are several methods of holding the walls of the crack immovable but probably the method most easily applied is the one making use of horse nails as described.

naturally have varied considerably, I suppose, because we have different ideas and cannot all see alike. The articles referring to hot and cold tire fitting, fitting with and without toe clip, etc., were all worthy of consideration, yet I do not remember of ever having seen anything published that took up for discussion what seems to me one of the most essential points in shoeing, namely, the relation of the heels of a calked shoe to the foot and leg. I remember of having read an article that appeared in THE AMERICAN BLACKSMITH some time ago, evidently by an experienced shoer, that advised taking the frog as a guide to, supposedly, the center of the foot and fitting all the shoes accordingly. It is my opinion that if this were followed out it would result in misfits in many cases. With good judgment, the trained eye will soon discern whether the shoe is properly fitted and nailed on when the horse sets his foot on the floor. The engraving shows the shoe setting squarely on the foot.

Several instances have come under

smiths dislike shoeing very much, and it seems to me that the better we understand our work in the same degree will we learn to like it. To become a good shoer requires no little study and practice. The thing that has hindered us most, in my opinion, is that we didn't get started right, so it is up to us to endeavor to establish a better way of doing things and the coming generation will profit thereby.

The engraving shows a right front foot with shoe for winter use with side calk on outside branch to help prevent side slipping. We fit our shoes with a clip for one reason, if for no other, as a smith in an article to "Our Journal" some time ago put it, the floorman cannot nail the shoe on other than where the fireman intended it to be. A good fireman should know just where the shoe should be set. If the shoe is fitted without a clip and your floorman is not one of wide experience, take for instance a round foot, the heels might be shifted, perhaps, 1/4 or 1/2 inch out of line and yet have a



pretty good fit with the hoof when looking at it from the front. We hot rasp the heels which not only makes the job of shoeing have a neater and more finished appearance, but, should the horse overreach, he is not so liable to strike the shoe off as he would were the sharp corners left on.

The side view of the foot with shoe attached shows the front of the toe calk to be perpendicular. The center of toe when welded in this way is a great help to the horse when at a hard pull, as when he gets up on the toe. The heel calk has more of a double duty to perform, coming and going, and, therefore, should set as shown. The shoe for winter use shows the heels giving plenty of frog clearance without bending the branches of the shoe outward.

Jobs of shoeing have come under my observation where the shoer had bent the branch of the shoe outward perhaps $\frac{3}{4}$ of an inch from the calk, the job being done on a round foot. These were misfits in the extreme, to say nothing of the danger of the horse stepping on the bent out reel with the opposite foot and pulling the shoe. We fit the hind shoes by cutting the inside branch off just a little, then to have the two branches of shoe properly related to each other, it is necessary to bend the outside branch slightly.

With reference to the dressing of the foot and preparing same for the shoe, we do not believe it a good plan to pare extremely low, but consider it a good plan to take off the surplus growth, excepting in cold weather when paring low would cause the horse considerable suffering from cold feet.

The shoeing contest held at Des Moines, Iowa, is a long stride toward bettering the craft. In my opinion, the managing and the way the work was judged, etc., was wisely decided upon, the job had to be workmanlike and comfortable to the horse.

We should do what we can in order to make a better business of smithing so far as dollars and cents are concerned, but let us become better mechanics also. When you charge the customer a good price for a piece of work, try and give him his money's worth. We should do our work so that it has a workmanlike appearance and at the same time be serviceable.

The engraving of the shoe collection shows a case of fancy shoes that hangs on the wall of the shop. It shows a number of shoes of different types and for use in the treatment of the various kinds of feet and limb

formation that the shoer constantly finds and which he must remedy satisfactorily.

Some Systems of Paying Wages

The Third of a Series of Articles on Efficient Cost Keeping

By A. M. BURROUGHS

Burroughs Adding Machine Co.

Labor is time and time is money in factory and shop economy. Time is one of the most expensive things the average shop owner pays for, because it involves a cost that, in most cases, is about equal to cost of



MR. ABTS CASE OF SHOES

material and overhead expenses combined.

The proper cost system gives an absolute check on the time reports of workmen and foreman and shows just how each man's time has been expended.

To know where and how we may most efficiently apply the time of our employees to get the best results, is the great question of the day.

A man is paid wages in order to produce certain results. These results are more or less well defined just in proportion as each man's work is defined. Hence the necessity to know from actual records the comparative worth of a man, not only for the employer's own protection, but also that he may pay the man all that the work is worth.

There are numerous plans by

which the wages paid to a workman can be determined. They are—

- 1—Day Rate Plan.
- 2—Piece-work Plan.
- 3—Differential Plan.
- 4—Premium Plan.
- 5—Bonus Plan.
- 6—Profit Sharing Plan.
- 7—Stock Distribution Plan.

The value of any wage system over another necessarily depends upon the conditions of the shop in question, and the plan must be adopted after a careful study of these conditions.

The different systems are briefly explained in the following lines:

Day Rate Wage Plan

The Day Rate or the Day's Work Plan is one of the most generally used: First, because it is the simplest, and second, because it makes a less complicated pay roll.

It applies both to high class labor and to men engaged in more or less routine work and those employed in non-productive labor.

It consists in paying a workman a certain rate a day or an hour; the amount of pay is determined by the market rate for the class of work and afterwards by the special skill of the workman.

There are objections to this plan, especially where no adequate cost system is used because there is no incentive to make a workman do his best or to produce to his full capacity. If he happens to be faster than his fellow workmen and discovers that he is doing more work than they, he asks for a raise; and if he doesn't get it, he slows down to the same pace.

In other words, the day rate gives the men an opportunity to take it easy; their only incentive is a prod from the boss when he sees that they are "soldiering". It is all in favor of the workman.

The only way in which a day rate plan can be equalized between employer and employee is by a cost system. Of course, the total labor cost can be predetermined on account of the fixed rate paid to the men, but the relation between the rate and the amount of work each man is turning out cannot be exactly known unless some kind of record is kept.

Suppose that each man turns in a labor distribution ticket every night, showing how much work he has done during the day, or turns in a separate ticket when he has finished a job. The information thus gathered, if properly used, will show the relative value of workmen.

Piece Work Wage Plan

The Piece Work Wage Plan is based on the principle of paying the employee for the exact amount of work he does.

He gets so much a piece or so much a hundred pieces and therefore has a chance theoretically, and to a considerable extent in practice, to earn according to his efforts and abilities.

The tendency of workmen to lag when paid by the day or hour is so universally manifest in all kinds of business that the manufacturer must realize that he is paying too much for his labor when he uses this plan.

In order to remedy this defect in the day rate plan, the piece rate was instituted. No sooner did it go into effect, however, than the rate of production in some factories jumped by leaps and bounds and men who were formerly employed at \$2.50



and \$3 a day began to earn wages of \$4 and \$5.

This fact immediately showed the manufacturer that he had been imposed upon by his workmen while operating under the day rate plan. In order to adjust properly the wages to the class of work being done, he made a cut in the rate of each piece.

The inevitable cut shows the workmen that if they produce too much they will only set for themselves a high speed standard and still be unable to earn more than a certain maximum amount. So human nature again creeps in and the men begin to work just fast enough to get the highest wage without going beyond the limit that will mean a cut.

In this way the full advantage of a piece-work rate is considerably modified.

This system also makes it necessary to inspect carefully all parts because of the increased rapidity with which they are made and the corresponding liability to faulty workmanship. Each workman is held responsible for the parts rejected and in this way compelled to exercise care in their manufacture.

Labor distribution tickets are used the same as with the day rate plan, the time required for making a certain number of parts being recorded.

There must be standards of production and the results secured by the various workmen, as shown by the tickets, must be compared with these standards.

The fact that a certain employee turns out an unusually large number of parts a

cause of the equitable adjustment of wages to production.

The Differential Rate Wage Plan was invented by Dr. Frederick W. Taylor.

It gives unusually high pay to the man who turns out a high output and unusually low pay to the inefficient workman. Before this system can be installed, however, the conditions and equipment in the plant must be standardized. It is particularly efficient on work that is done day after day and year after year.

This plan consists of paying the workman an increased rate for each piece according to the increased number of pieces that he produces above a certain standard, and likewise of decreasing the rate for each piece in case the number he produces falls below the standard. The standard is fixed by ascertaining through time studies the normal output for a day of the first-class workman.

The easiest way to explain this plan is by an illustration.

Suppose the manufacturer has found out by experience that eight of a certain kind of parts can be made by the average workman in a day of ten hours and that for each part 27 cents can be paid.

The manufacturer tells the workmen who are engaged on this class of work that if they will make ten parts a day and do the work perfectly they will receive 29 cents apiece for them, and if, by their industry and ability they can make eleven parts a day, they will receive 30 cents apiece for the work.

Likewise he tells them that in case they fail to make as many as eight parts, the price for each part will be lowered so that if only seven parts are turned out, they will get 25 cents apiece for them. It will be seen from this, that each workman is given an opportunity to earn extra money.

Looking at it from the manufacturer's standpoint the man who can turn out the most work, even at the increased rate for each part, is more economical to him and reduces the final cost of each part more than the man who turns out only a few pieces and gets the smaller rate for each part.

This is true because the burden of overhead cost for manufacturing a few more parts a day is not as great in proportion to the number of parts manufactured as when fewer parts are made each day and the work is spread out over several days.

Thus the amount of burden to be added to the eleven parts that a skilled workman turns out in one day is not as great as the amount to be added to the same number of parts when made by a less rapid workman who turns out only seven parts in one day and leaves four parts to be manufactured the second day. This reduction of burden on each piece very materially reduces the final cost.

The following table shows how the man who makes the fewest parts a day actually costs the company more money than does the man who makes more parts and gets more for each part:

No. of Articles	Rate per Article	Labor cost	Cost of Material	Overhead Cost	Total cost	Cost per Article
7	\$0.25	\$1.75	\$0.70	\$1.50	\$3.95	56 3-7
8	.27	2.16	.80	1.50	4.48	55 3-4
10	.29	2.90	1.00	1.50	5.40	54
11	.30	3.30	1.10	1 50	5.90	53 7-11

One of the best features of this plan is that the poor workman gets poor pay and the good workman gets good pay, thus differentiating the grades of employees much more effectively than when the straight piece work plan is used.

The poor workman cannot reasonably

"kick" on his lower pay when he is shown that his inefficiency is actually making the manufactured article cost more apiece than in the case of the man who is getting higher pay and doing more work.

When the differential rate plan is in operation it is necessary to maintain a

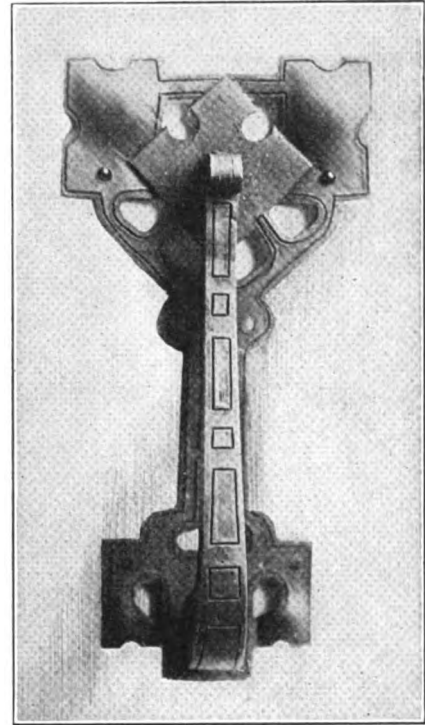


FIG. 2.—A MISSION STYLE KNOCKER

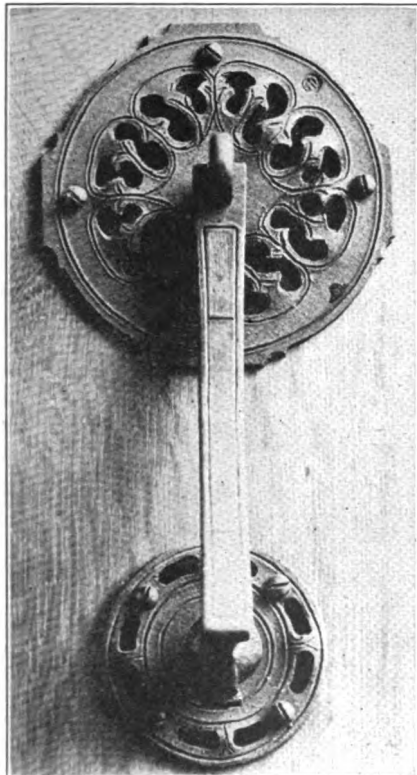


FIG. 1.—A VERY ARTISTIC DOOR KNOCKER

day means nothing in itself. The efficient manager wants to know how this production compares with his scientifically determined standards for that work.

Differential Rate Wage Plan

The third plan is known as the Differential Rate Plan and has met with the approval of a great many manufacturers be-

very rigid inspection department so that faulty workmanship due to the increased speed on the part of some workmen, may not slip through.

A few advantages of the differential plan may be summed up as follows:

First—The wages are raised and the cost is lowered, thus bringing about a better feeling between employer and employee.

Second—The work is of a uniform quality, owing to the system of inspection.

Third—It obtains a maximum production for each unit of time because the workman is laboring for higher wages and at the same time is prevented from turning out inferior work by the inspection of the parts that he makes.

Fourth—It discourages and automatically relieves the factory of incompetent workmen since they can't blame anyone but themselves for their small wages.

Premium Wage Plan

The next wage plan, which is conceded to be one of the most successful in actual operation is known as the Premium Plan.

"An efficiency reward, based on standard production, will do more to create a spirit of co-operation and a willingness to turn out a maximum amount than all the driving tactics that could be schemed out by the keenest mind existing."

This is somewhat similar to the differential plan, the difference being that instead of increasing the piece rate, increased pay is based on time saved.

A standard is fixed based upon the quickest time in which a job has been done. If a workman does the same job in a shorter time, he received the regular hour rate for the time he worked on the job, and in addition, a premium for hav-



ing worked faster, consisting of from $\frac{1}{4}$ to $\frac{1}{2}$ the difference between the wages earned and the wages originally paid when the job was done in standard time.

In addition, a minimum wage is incorporated in this plan, which assures the workman of a certain amount of pay in case he fails to save time on account of accidents, etc.

It can best be illustrated by an example:

Suppose a man is working ten hours a

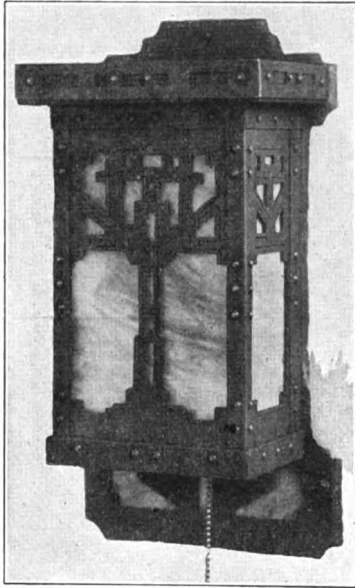


FIG. 3.—A VERY GOOD LOOKING LAMP

day at the rate of 25 cents an hour. At this rate, he will earn \$2.00 a day.

Under the premium plan, if he cuts down the time on a job from ten hours to nine hours, he receives 26 cents an hour for those nine hours, which is \$2.34 and a certain percentage of the wage that he would have been paid for work done in the remaining hour. If this division is on the 50% basis the workman will get \$2.34, plus 13 cents (or $\frac{1}{2}$ of 26 cents) or \$2.47. Then he has another hour to work during which time he can earn more. If he saves two hours, he will receive 26 cents an hour for the eight hours, which will amount to \$2.08, and get one-half of the two remaining hours' wages, which, on the half-and-half basis amounts to 26 cents. In this case he has two hours more during that day in which to earn an additional wage; and even if he earns no additional premium during these two hours he will at least get the regular rate of 26 cents per hour, or 52 cents in all.

So for the day of 10 hours' work under these conditions, he will earn \$2.08 pay for eight hours, plus 26 cents bonus for saving two hours, plus 52 cents additional wage earned in the two hours, or \$2.86 in all.

Thus the workman's superior skill and speed have earned him more money while the employer has obtained a greater number of parts at a lower final cost for a part.

This plan has also the advantage of inspiring the men with an ambition to exert themselves to their full capacity, and at

the same time it automatically remunerates them according to their ability.

In the Piece Work Plan the employee gets the benefit, the employer saves only in the burden or indirect expense.

It will be seen that the Premium Plan has a great deal in its favor as regards the reduction in the cost price for each article.

Under the Premium Plan, the profit is divided more evenly, and both the employer and employee enjoy its benefits.

Bonus Wage Plan

The Bonus Plan is based on the principle of increasing the pay in a certain ratio as the time of completing a job is decreased, the rate depending on the per cent of time saved.

This plan is practically the same as the Premium Plan, and in fact some cost accountants make no distinction between them.

The Task and Bonus System, invented by Mr. H. L. Gantt, has some excellent advantages.

Each workman receives a regular day's pay, even while he is learning.

A definite standard task is scientifically determined for each worker, and he receives from 50 to 100 per cent extra wages for performing this task within the time allowed.

If he finishes his task in less than the standard time, he is paid by the piece for all extra output at the regular piece rate for this work. This furnishes an incentive to the workman to "speed up".

The foreman receives a bonus for each man under him who makes a bonus and he receives an additional bonus if all his men make bonus. This furnishes him an incentive to help his men.

This method insures a definite minimum rate to the unskilled and a suitable reward for skilled workmen.

The same circumspection must be used in introducing the Bonus Plan to the factory as with the Premium or Piece Work Plans care being taken to fix as accurately as possible the rate of increase in wages resulting from the time saved on a job.

One fact in connection with the installation of the Premium or Bonus System should be borne in mind. Where there is only a little machine work the rate should be made fairly low since the rate per cent of increase will be large. But if the work



FIG. 4.—A TABLE LAMP OF NEAT DESIGN

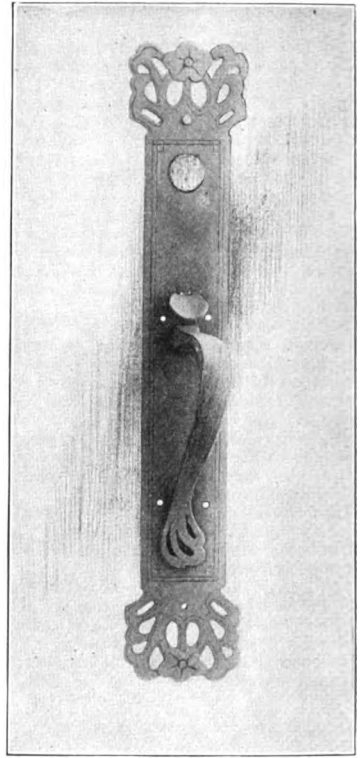


FIG. 5.—A DOOR LATCH THAT IS ARTISTIC

involves machine work, it will require a greater application of skill and effort to effect a large increase, and therefore a premium rate with a fairly high premium can be used.

Other points of excellence in the Premium and Bonus Plans may be summed up thus: In using these plans the employee's reward is immediate as compared with the results of other plans, such as profit sharing. The fact that quick rewards are obtainable appeals to the average workman.

The workman does not have to pay a penalty for not "speeding up", except the loss of his "bonus" or being discharged when he has proven unfit for the work. The minimum wage makes it easier to install the Premium and Bonus Systems because it does away with the intense antagonism that is generally shown where a new plan is proposed.

The management does not suffer as much loss in case of an over-estimation in the rate of premium or bonus and it provides a more equitable division of profits between employer and employee.

Some Ornamental Iron Work From the Illinois State Reformatory

The accompanying engravings show a number of excellent examples of ornamental iron work recently made at the Illinois State Reformatory under the supervision of Thomas Googerty, the well-known



exponent of this work. Mr. Googerty's work is already so well-known to readers of THE AMERICAN BLACKSMITH that hardly anything need be said with reference to his work, its artistic execution and its careful finish.

In the engravings, Figs. 1 and 2,



FIG. 6.—A SIMPLE COAT HOOK

are door knockers, especially designed for modern mission style plaster houses. It will be noted that the designs are especially suited to this style of architecture. The piece in Fig. 1 is exceptionally well made and should show up to excellent advantage on a door finished in a color to contrast sharply with the iron. The design of Fig. 2 is also good, the outlining around the open places

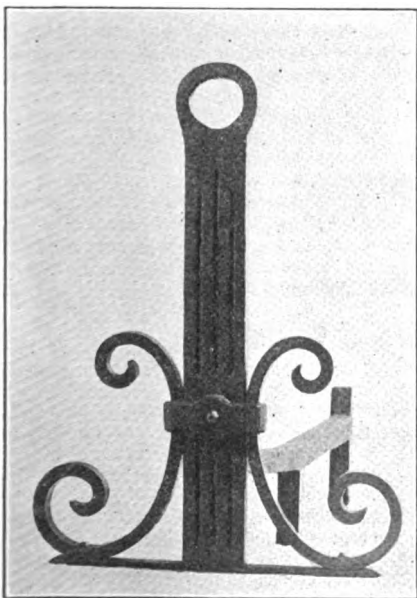


FIG. 7.—A WELL DESIGNED ANDIRON

of both designs showing up very well and giving an appearance of finish and completeness.

The lamp represented in Fig. 3 was designed for the side wall. It is open at the top, and the bottom part is closed with metal and glass. This lamp is fitted with amber-colored glass which gives a soft and diffused light. The metal is rather heavy, No. 14 gauge being used. The lines around the open places are cut with a chisel.

At Fig. 4 is represented a portable lamp with one light. The shade is made from No. 20 soft steel and fastened on the corners with an angle strip of the same thickness. The base is made from 1/8-inch thick metal with a 1/2-inch steam pipe screwed into it, which makes the standard. Pieces are then made and riveted to the base and standard as shown by the illustration.

Fig. 5 shows a latch for a door. It is made from 1/4-inch thick soft steel. The design is sketched onto the metal with a slate pencil, it is then gone over with a narrow cold-chisel. The plate is then heated and cut on the lines. The inner openings are drilled and then cut.

Fig. 6 is a reproduction of a hat and coat hook. The wall plate is 1/8-inch thick and made in the form of a leaf. Fig. 8 is a hall lantern, to be suspended from the ceiling by a chain. The stock used is No. 20 soft steel, with amber-colored glass in the sides.

At Fig. 7 is shown an andiron. These are, of course, made in pairs and used in fire places for logs, or they may be used to set a grate on so as to burn coke or coal. The upright pieces are made from a piece of soft steel, 2 1/4 by 1 inch. The method of construction is shown in the engraving. It is fastened with rivets and a band. The log rail is made from 1-inch square stock and must be made of a length to suit the depth of the fireplace.

All of these designs are worthy of imitation and are excellent for use as ideals to which to work. Those readers who consider themselves experts with hammer and tongs may do well to try their hand and hammer at some of Mr. Googerty's productions.

Mr. Googerty's work is familiar to most of our readers. His productions are especially noteworthy because of their finished design and excellent execution. Mr. Googerty while designing his work never loses sight of the utility of the finished article. He combines artistic design with utility.



Benton's Recipe Book

Tempering steel axes, knives or chisels. Take a bucket of warm water and add 1 oz. of murate ammonia to 1 gal. of the water. Heat the object to a low red heat and cool in the water. Let the temper come back to a blue and then cover with a paste made of 1 lb. beeswax, 1/2 lb. English rosin, and 1 pint linseed oil. Then cool off in the water. With a little practice this method is very successful.

H. C. WALKER, Texas.

A good polish recommended for bodies of all kinds is composed of equal parts of vinegar and linseed oil or olive oil. After all dust has been carefully removed, the polish is applied with a soft cloth and rubbed dry. Highly polished wood surfaces may also be treated with this simple mixture without fear of injury.

To soften cast iron for drilling, heat the part to a cherry red, and have it lie level in the fire. Then with the tongs put on a piece of brimstone, a little smaller in size than the hole to be drilled. This softens the iron entirely through. Let the piece remain in the fire until cooled.

In using glue, a mistake not uncommonly made is to break up dry glue in hot water. This is bad practice as the adhesiveness is greatly impaired. Always soak dry glue in cold water and then cook, but do not cook too long as that is injurious also. Glue that has soured should not be used, and every precaution should be taken to keep it sweet if the best results would be obtained.

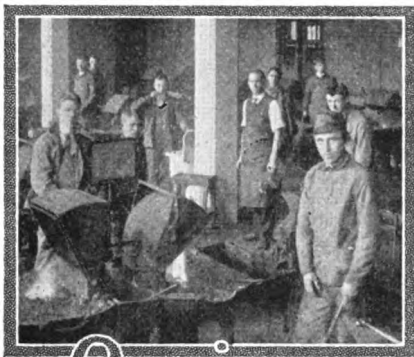
To make a cheap cement for general use, mix gum acacia (pulverized, 1 ounce; French isinglass, 2 ounces; vinegar, 4



FIG. 8.—A HANGING LANTERN OF NEAT STYLE



ounces; essence of sassafras, 5 drops. After mixing allow it to stand for 12 hours, then heat until thoroughly dissolved when it is ready for use. For covering pulleys with leather, paper, etc., add $\frac{1}{2}$ ounce glycerine to one quart of cement; heat and use while hot. Oily belts can be successfully spliced with this cement by rubbing the scarfed ends with powdered sal-soda and applying a coat of cement, which is allowed to dry; then apply a second coating and put together.



Queries— Answers— Notes

Repointing Plowshares.—In the December issue I notice an article about repointing plowshares by Mr. W. M. Pogue, of Texas.

However, Brother Pogue doesn't say whether or not he can forge the point he's to put on the share, and weld it on, sharpen the share and finish it off in thirty minutes. He says he takes three welds to put the point on the share. Now, I will tell you my way.: Take a piece, $\frac{1}{4}$ by 2-inch flat steel, 5 inches long, forge as shown at B and then bend as at C and place on your share at D. In this way a good, clean fire will weld all in one heat. When you stick point on share hammer it snugly to the share so that it won't fall off when heated. The $7\frac{1}{2}$ -inch side of the point makes the throat of the share. If any of the readers have a better method I would like to know about it.

N. TROMBLEY, Minnesota.

A Good Wet Battery.—We would like to get a recipe from Mr. Benton on how to make wet batteries for ignition—to be used in our gasoline engine. The dry cell batteries are expensive and the magneto will not always work either.

CAMERON MACHINE SHOP, Texas.

In Reply.—As a precaution, look over the wiring on the engine carefully and see that the current is switched off when the engine is not in use as there may be an unnatural consumption to so use up your batteries.

A good battery, though a little complicated, is made as follows: First, secure a porous cup of some description, about six inches high and two or three in diameter. This is made of unglazed earthenware; but if none is obtainable, a long, narrow flower-pot with the hole plugged up will do. Next, get a piece of "gas carbon"—this is obtained from any gas works (it is the deposit on the inside of the retorts and is fine and dense; it is not "coke"), or it may be purchased from an electrical supply house. Cut it to fit the cup or flower-pot easily and to project two

inches above. It should be twice as wide as it is thick.

Now, dip the end of the carbon into melted paraffine and keep it there for an hour. The paraffine is kept melted by placing the vessel containing it in boiling water. Next, after cooling, drill two quarter-inch holes through the paraffined end, $\frac{1}{4}$ -inch from the top. This is to hold a lead cap which we now make. Take a block of wood, $\frac{1}{4}$ -inch wider and thicker than the carbon. Tack a copper wire on the block as in the engraving and then wrap a strip of heavy, thick paper around it to project $1\frac{1}{4}$ -inch above as shown. Pour melted lead carefully into this box until half-full and then press the paraffined end of the carbon into this lead until it rests on the bottom. The lead will run into the holes and hold it firmly. Allow to cool and it will appear as in Fig. 2.

Place this carbon in the flower-pot and pack firmly with chloride of lime or bleaching powder. Next, cut a piece of sheet zinc as wide as the flower-pot is high and long enough to roll around, but not to touch the pot, as in Fig. 3. Solder a wire to the top. Take a glass jar and place in it the flower-pot with the zinc surrounding it.

Put about 4 ounces of common salt in the bottom and add water till three-quarters full, also pour a little water in the flower-pot. You now have a modified Leclanche cell, considered one of the best primary batteries. Once in six months add more salt and occasionally more water.

BENTON.

Bolt Heading—Loading Trap Spring.—I would like to see an article on bolt heading. I find it difficult to make a good head on small bolts. I think there must be a better way than welding them on as I do.

Another thing I would like to know is if it injures the springs of a trap to leave them loaded over night, although it was not too much for them over a rough road. Thanking you in advance for the information requested, I am,

C. P. GRUT, New Zealand.

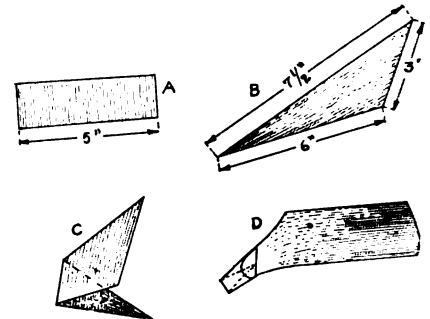
In Reply.—Bolt heads are made in two ways, the upset head or the welded head. If your bolts are large, the welding method is the best. Of course, care must be used in securing a good welded joint. One authority says: "Usually such bolts can be large enough to compensate for any weakness caused by welding, and they can be made cheaply".

However, the upsetting method consists in driving the round iron (Swedish

pecially with the loading of the trap and driving over a rough road; there is very little, if any, comparison to the two effects inasmuch as the springs while traveling over the road are allowed to relax more or less and are not forced to one position continually by the pressure of the load.

T. E., New York.

Preventive for Contracted Heels—Fast Shoeing.—The October issue gives an account of some very fast shoeing proposi-



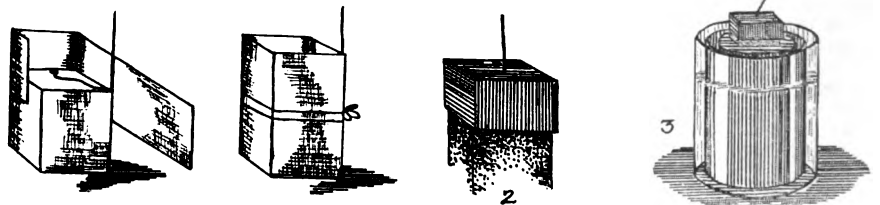
HOW TO REPOINT PLOWSHARES

tions. Just fancy a man claiming to have shod over twenty horses in one day of eight hours; an average of $2\frac{1}{2}$ horses per hour!

Now, those horses have my sympathy, and I say that they were not shod properly. Here is the argument: A man has to remove the shoes and dress the feet, then heat, clip and fit the shoes, file them up, nail them on and clinch them. That is working on "his own" as the paper states. And I think that it will be readily admitted that two men can get through more work when working together, than two men working independently.

It is not my intention to start an argument on this matter, but to give a hint, stunt, or tip whichever you choose to call it, for a preventative of contracted heels.

We all know that a horse running in the paddock and never shod, is not subject to and seldom has contracted feet. I have learned that no matter how careful a man may be in nailing the shoes on, you will find that after he has drawn up the clinches, the shoe is narrower than when he started to nail it on, and the consequence is that the horse's foot is drawn together with the shoe, and, of course, it is bound to stay there, and after a number of shoeings, contracted



HOW TO MAKE A GOOD WET BATTERY

preferable) through a heading tool to get an upset, and hammering the shank to the desired diameter. Then the rounded upset is shaped into the hexagonal head.

With reference to injury to the springs of a trap by leaving it loaded over night, would say that while the injury resulting from such practice may not be apparent after one or two loadings, injury does, nevertheless, result as would surely show up after repeated practices of this kind. You contrast this loading over night, es-

feet is the result.

For the prevention of the trouble, I find that after the shoe is put on and finished off, it is a good idea to take a pair of pinchers or tongs that has a good hold, putting them between the heels of the shoe and force it upon about $\frac{1}{8}$ of an inch. This will give proper relief. By doing this after every shoeing and on every horse, I will answer for it, that there will be less complaints about contracted feet.

R. F. WALKER, New Zealand.



Welding a Cracked Bell.—We have a modern acetylene outfit and are asked to weld a crack in a large school bell. The crack extends up the rim of the bell about ten inches. A. W. NORSTON, Utah.

In Reply.—In welding a bell there are several things to be taken into consideration. First, you have several metals to deal with, but the men who cast the bell had to deal with the same metals and evidently got the bell out and marketed it so there is no reason why you should fail to weld it. You see it was evidently cast with an internal strain which, under certain conditions, pulled it apart. To get somewhere near the original sound you ought to have welding sticks of the same metal that the bell is made of and have them small enough to melt readily, say not larger than half an inch in diameter. You could chip a piece out of the place where it is cracked and send it to some maker of bells and have enough sticks made to do the job. Be sure to have enough, or you might get a brass founder in your neighborhood to cast them for you. Then you would take a diamond-point chisel and chip out the crack on both sides on an angle of 45 degrees, and to within an eighth of an inch from the inside. Then heat the bell over a charcoal fire, have the fire all around and under it, and keep the charcoal fire about three inches high, add charcoal as the fire burns from time to time, not letting it get any larger for about one hour. Do this in a room free from draught. At the end of this time get the bell so that the crack will be level, leaving it right where it is on the fire. The torch tip to be used would have to be governed by the thickness of the bell, so we cannot guide you on that. Start welding on the back part of the crack, i. e., the upper end, and weld toward the opening. You will find on this class of metal, if you keep your torch moving around slowly in a circle it will help you considerably. You will notice as you heat the bell the crack will open up considerably, but work along and finish it. Then cover it all over with asbestos paper so that no draughts can strike it, and leave it right on the fire until the next day. You can then finish it by filling or any way to suit yourself. Kindly let us know how you make out.

F. W. COLLINS, New York.

Tempering Gun Springs.—To make the spring I need, I take a piece of steel, a little lower in carbon than ordinary tool steel. Draw the spring out and don't hammer when too cold. Then put the piece in the vise and smooth nicely with a file and bend to proper fit. Then take enough dry dust to cover the spring well. Make a hole in the dust and pour in ordinary mowing machine oil and heat the spring to a nice red and drop in the oil, covering it quickly with dry dust. This method insures a good job when the steel is good.

W. C. LEBOW, Missouri.

A Dead Hard Edge for a Cross-cut Chisel.—Regarding chisels, I would like to say to get a dead hard edge for crosscut, dress as usual and then drive into block of lead. Heat for hardening and place into hole to cool off. P. J. ORAM, England.

From Southern New York.—I like the paper very much and especially the articles on horseshoeing. I think this is a good thing for the men to take more interest in, although the automobile is very plentiful around this part.

I enjoy reading the articles on artistic iron work. I have done some work in this

line but time does not permit me to do a great deal of it. In reading THE AMERICAN BLACKSMITH you get the ideas of other people which aid greatly in your every day work.

SAMUEL WRIGHT, New York.

Some Thoughts on the Trade.—I think "Our Journal" is the best paper I have ever read on blacksmithing. I think blacksmithing is a great trade; I don't care if I do get black and smoky, it will wash off. And what would the world do if all of us should stop? Would they miss us then when they could not get their work done?

It is a trade that needs men, not the kind you see on the street corner with a cigarette in their mouth, but real men who are willing to work and help to make it a better trade because they are one of them.

I think we will see a great change in the blacksmith business within the next few years. Most of the young men are not willing to spend their time and lives in

fight is credit. I like to read THE AMERICAN BLACKSMITH and I get some good ideas out of it. In the picture my father is at the vise and I am at the back forge. F. F. GANOUNG & SON, Oklahoma.

An Interesting Letter and a Suggestion.—Business in the South is getting back again to where it will soon be good. I will say that no mechanic can read too many trade journals and I think THE AMERICAN BLACKSMITH is one among the best.

I have been following planing mill, sash and door factory work now for some time.

Some one might say: "Why, if you are a bench man, a cabinet maker or a stair builder, why do you want to read a blacksmith paper?" Well, because most every mill has a repair kit, such as a forge, anvil, etc., and you can always make yourself some kind of a tool for special jobs, that you are unable to find at a hardware store. You can also temper your wood tools to suit yourself.

And quite often this mill shuts down



THIS OKLAHOMA GENERAL SHOP IS RUN BY F. F. GANOUNG & SON

some tumble-down shack working with the tools their grandfathers used. Times have changed and the smith must change to meet the new conditions. The auto and motor truck must be repaired. Why not have what is ours? This trade belongs to us more than anyone else. And with modern tools and THE AMERICAN BLACKSMITH, hard work becomes easy. I am interested in auto repairing, well drillers' tools, and die work of any kind.

I like your advertising department as it keeps us in touch with the new machines being used, and I think if there were more new machinery used it would be an inducement to more young men to learn the trade, and it would not be necessary to work them all day and half the night, but they would have regular hours for employment.

ROSS WIGHTMAN, New York.

An Oklahoma General Shop.—The accompanying engraving shows a picture of our shop, which is 24 by 50 feet. We did a business of \$2,600.00 this last season. You will notice we have a board floor. We have taken that out and are going to put in concrete, and are going to build a 52-foot addition on the back end for auto work. We are in a town of about 400 people. It is a good cotton country, wheat and some corn. Have got pretty good prices—southwestern Oklahoma prices. All we have to

for repairs, and the foreman, knowing that you are a "handy man", will call on you to stay and help do this repair work, instead of being laid off until the mill is able to run again. Therefore, if you do not keep up with the times you are unfit for this occasion. And the way to do so is to keep the trade journals before you. We cant' read too much.

Many times I have had men ask me about some certain work, I say: I can tell you tomorrow", and then at night I get my trade journals out and look the work up for him. And this is a lesson to me also, for I will not then forget the problem. Another thing I want to say is, that nine-tenths of the blacksmiths are not close-enough workmen. When it comes to a perfect fit or measurement it is nearly all guess work. We can weld an axle, set and put it on, and bend, weld and shrink on a tire, and we can put on a plow handle or beam and then we smear a little paint on it, and as the customer takes it and don't know the difference we think that is all O. K.

And half of us think it a good job ourselves, when the main point of it is left off. That is this—good joints, proper draw on tires, proper gather and set of axles and all properly lined up and properly balanced up.

Will this wagon track? Does this wheel



look like the others? Do you know this plow beam is just right and not too high or too low at the end? Does it line up with the point and land side? Are all the screws, bolts and washers of right size and correctly placed? Are they left in a workman-like manner?

I have learned the importance of exact measurement in the sash and door factory and especially in stair work, where everything must fit, and be made to fit a certain place in some building, perhaps, miles away. The same in cabinet work. We get out, say, a china closet. We have to lay out and machine all the parts at one working, such as the paneled doors, the glass doors, frame for fronts, paneled backs, drawers, shelves, etc., so that when this goes to the benchman it must all fit and come up to a glove joint, or you are not on the job. The same applies to all classes of factory or shop work, or the workman is just a little behind with what he ought to know.

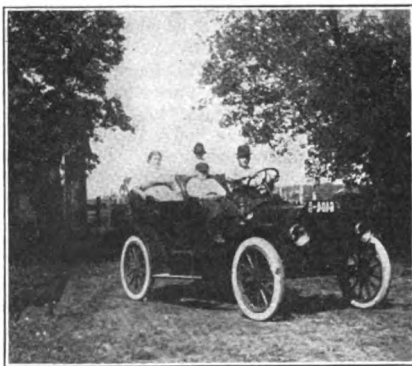
A man never knows how little he knows until he sees someone who knows so much more. As to myself, I think sometimes I know less and less. The world's ideas advance so fast it is hard to keep up with just this little part. And so we have to work and learn all we can from experience from other men and from trade journals.

Detail work is the thing to have for most any job you undertake. It saves time and material, and explains to your customer just what he is going to get before the work is done. It also saves explaining to the workman who is going to work it out, and finally it saves cutting up a lot of material too long or too short.

So let us have more details about home-made machines, floor plans of shops, plans for racks, work benches and scrap stock racks, designs for heating apparatus for heating the shop and for heating tires, plans for wheel racks, tressels, benches and things of similar importance. If some other readers will come in with some things along this line, I'll do my share.

JAY VESTAL, Louisiana.

Iowa Prices—Notes on Galvanizing.—I read THE AMERICAN BLACKSMITH from cover to cover, looking for all the new kinks in the trade and the machinery to



MR. J. S. JOHNSON AND FAMILY OUT FOR A SPIN

do the work. I am getting where I like to watch the work being done instead of doing it myself as I have been (like the fellow who hung out his sign, reading: "We hammer Iron and Steel for a living") for thirty-five years and feel like taking a rest sometimes. Prices here are the same as in most of the middle west, shoeing, 25 cents each for old shoes; set, 50 cents each for new shoes from keg; special shoes

from 75 cents to \$1.00; plow work, point and sharpen, 85 cents; sharpen, 35 cents; point shovels, 50 cents each; sharpen shovels, 50 to 75 cents. All work has to be polished; wagon work, new tongue with old hounds and pole cap, \$3.00; hounds with old irons, 75 cents each; front bent hounds, \$3.50; bolsters with old



A PROGRESSIVE WISCONSIN SHOP

stakes, \$2.50; axles, \$3.50; spokes, 25 cents; felloes, 25 cents; repairing machinery, such as mowers, binders, etc., 75 cents per hour per man, material extra.

We should like to receive some information on the subject of galvanizing.

L. P. ROLLINS, Iowa.

In Reply.—According to Work, the oldest zinc-coating process in common use is undoubtedly hot galvanizing. This is essentially a dipping operation, in which the work, after being properly cleaned, is immersed in a tank of molten zinc. Another method of rustproofing is the electro-galvanizing process, which had its inception before hot galvanizing; but only within the last few decades has it come into use. This is an electro-plating process, in which zinc is deposited from an anode on to the work. In addition to these two processes, there are others based on the immersion of the work in solutions of different kinds, and at least one in which the zinc-dust is sprayed on the work while hot. Another zinc-coating process is shearardising, originated in England by Mr. Sherard Cowper-Coles, about twelve years ago. Briefly, the process consists in sealing the work to be shearardised in metal retorts in conjunction with metallic zinc-dust. The retorts are then heated until the work at the centre has reached a temperature of from 500 deg. to 700 deg. F., depending upon the nature of the work. At the same time the retorts are turned intermittently, so as to give the zinc-dust access to all parts of the work. After holding this heat for several hours, the time depending on the thickness of the coating desired, the drums are taken from the furnace and allowed to cool. When cool the work is finished. Sherardising has advantages over other methods of zinc-coating, which may be classed under two heads—first, the superiority of the product, and, second, the economy of the process. The fact that the zinc coating penetrates unlike any other method of zinc-coating, and amalgamates with the iron, makes a finish that cannot be worn or eaten away. In addition, the coating is so evenly applied, and so thoroughly driven into the surface of the metal, that it does not alter the exterior of the article to any appreciable extent.

However, for the shop we are advise the hot galvanizing process as it is the simplest method and requires the least special apparatus. The goods are first cleaned in a "pickle" of acid (this is about a 10% solution of commercial nitre or sulphuric acid) to remove the rust, scale, dirt, etc. This solution, by the way, must be kept in a stone or earthenware tank because it eats through wood, iron, etc.

The goods, after being thoroughly cleaned, washed and dried, are now dipped into the molten zinc. Then they are placed in a suitable receptacle to drip and cool—there will be little dripping if the work is properly done. Care must be observed in dipping the goods as the molten zinc is apt to spatter when suddenly coming into contact with the cold articles. BENTON.

A Progressive Wisconsin Shop.—I am sending you a picture of my new shop, which is 40 by 60 feet, with plenty of light and air. It is equipped with two electric motors to run my fires. We do all kinds of repair work as well as horse-shoeing. I have a Parks woodworking machine, which, I think, is a dandy. This machine enables me to do woodwork in short order. I also have a 3½ horsepower New Way gas engine which runs the wood-working machine, emery wheel, drill and thread cutting machine. We have a nice run of business and three of us are kept busy most of the time. We get fair prices, such as, 20 cents per shoe for resetting; 40 cents for new shoes up to No. 5, and 50 cents for over No. 5. We use quite a number of adjustable calk shoes here in the winter.

As to THE AMERICAN BLACKSMITH, I do not know how anyone can keep an up-to-date shop without it. I am particularly interested in the shoeing and wagon work articles. N. P. PETERSON, Wisconsin.



The Automobile Repairman

To make a piston ring larger when it has become loose or worn, first remove the ring from the piston and hold it on some softer substance, so as not to jar or jam it. A sheet of copper laid on the anvil serves this purpose very well. Then take a light ball-pein hammer and tap along the inside of the ring, opposite the joint. On doing this it will be found that the ring will make a closer fit.

To Straighten a Front Axle.—A method of restoring a front axle, which has been bent in a vertical plane, to its original shape is to take two lengths of 4 x 4 inch joist, long enough to reach from the upper side of the axle, just outside of each spring plate, to a cross timber of the ceiling or roof of the garage. Then if a jack is placed beneath the axle at the bend enough pressure may be applied by means of it to force the axle back into shape.

If the cylinders receive too much oil or if the oil is no tsuitable for the temperature at which the motor works, it will be

burned by the internal heat, leaving a deposit composed largely of carbon. This condition may be augmented by too rich a mixture which is only partially burned and a residue is left in the compression chamber and on the head of the piston. The deposit thus formed will in time commence to scale, become incandescent by the heat of the explosions and prematurely ignite the charge. The symptoms are a knocking in the cylinders as if the spark was too far advanced, abnormal heating with loss of power especially noticeable in hill climbing on high gear, misfiring and many other disturbances indirectly attributable. The remedy is to take off the cylinders and remove the deposit by scraping, or, although not as effective, some prefer to inject a chemical remover through the spark plug holes instead of taking the

exhaust port and is ignited when the next fired charge passes the valve. Such a misfire may be due either to too weak a mixture or to faulty ignition.

Peroxide of hydrogen squirted into the intake manifold through a small hole near where it forks, and while the engine is running, will be carried into the cylinders and the excess of oxygen will quickly burn out the carbon deposits.

Assembling Piston Rings Properly.—Faulty compression on a gasoline engine is due in many cases to the lining up of the piston rings; that is, all slots are located so that they are in line with the length of the piston. This forms a path for the gas to escape. Trouble of this nature can be easily avoided if care is taken when the engine is overhauled and reassembled. The slots of the rings should be staggered, and in addition, the right and left slots should be alternated. Then, even if the slots should happen to line up, the path of the escaping gas is broken up more or less, and very little compression is lost.

Valve springs, like other parts of a motor, will not remain the same forever. After all methods have been tried and the motor still lacks its usual power, a new set of springs will usually remedy the trouble.

Pipes and passages of acetylene generators should be periodically blown through to see that they are clear, and if there is a cotton filter for the gas this should be changed occasionally if it seems to require it. Especially should it be seen that all the different parts of the generator go together freely, and that they can be fastened in accordance with the maker's instructions. If these things are done regularly, we are sure that the motorist who is apt to be bothered with lamp troubles will find that he has relegated them almost entirely to the past. When lighting up in a hurry, however, some saving of time may be effected by disconnecting the gas-pipes from the lamps for a second or two, in order to allow the air to be blown out by the gas more quickly. The burner holes are so exceedingly small that this process is often annoyingly slow if the connections are left intact.

The leather covers fitted over the joints of the steering gear are very necessary, as they protect them from damage from stones, grit, sand, etc. Furthermore, the joints should be kept well lubricated with hard oil or graphite, or a mixture of both.

Air leaks in the intake. Many times hard starting and missing on low motor speeds is caused by improperly fitting gaskets between the intake manifold and cylinders or carburetor flanges. A simple method of testing for air leaks is to use cylinder oil, covering the suspected part with the lubricant while the motor is operating. If the oil is drawn in it will indicate a leak.

The fit of the spark plugs and exhaust connections is best tested with the motor cold. Make a soapsuds and place it on the suspected parts, and turn the motor over slowly. If any leaks exist they will be indicated by the bubbles given off. This method is valuable in locating leaks in the pressure fuel feed system.

To obviate the rusting of parts beneath the hood, black enameling may be resorted to with good results both from the points of view of effectiveness and appearance. It is quite possible to get a black

enamel nowadays, which, if applied, looks and wears very little inferior to a baked enamel. The ordinary enamels, which dry quickly, are of little use as the surface soon chips and rubs off. Parts to be enameled should, when it is at all possible, be taken off and all rust cleaned off with a very stiff brush, a wire brush for preference. To apply the enamel a fairly stiff varnish brush should be used; a very soft camel-hair brush is no use at all, more especially if the surface to be enameled is an irregular one. The main disadvantage in applying a good lasting enamel is the time it takes to dry hard—it may require a whole week before the part could be handled. It is quite possible to enamel certain parts in position by the aid of a brush of suitable size, of course taking great care to have the part thoroughly clean and free from rust and grit to begin with. The work must be done in a good light, preferably daylight, otherwise one will find places here and there that have been missed by the brush,

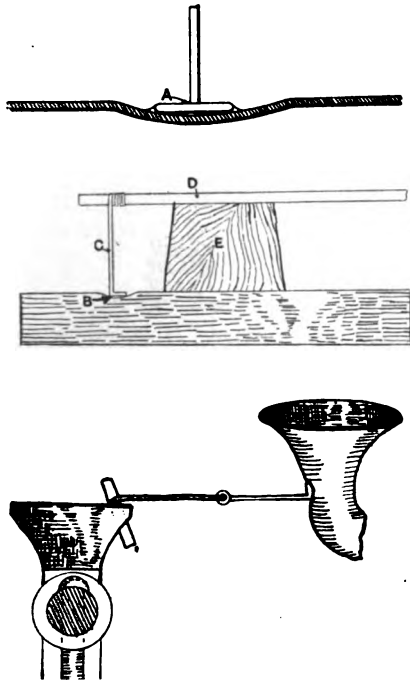


FIG. 1.—HOW DENTS ARE REMOVED

motor down. Carbon or soot will also form in the spark plugs thereby furnishing a circuit which the high tension current may follow instead of jumping the gap between the metallic points oftentimes causing intermittent firing. This trouble may be largely eliminated when reasonable preventive measures are taken.

The latest scientific method for removing carbon is the discovery of an eminent French chemist. It is now in use extensively on the continent, and is becoming more popular daily throughout this country. It is a method wherein pure oxygen is used. Oxygen when coming in contact with carbon through this device creates carbon dioxide, a gas, which is ignitable by flame, thus burning the carbon throughout without harm. A great improvement over the old way of dismantling and scraping and a waste of time and adjustments thereafter. Four to six cylinders may be thoroughly cleaned in from 20 to 30 minutes.

An intermittent hissing sound is heard at irregular intervals which seems to come from one of the cylinders. Often it is thought to be a leak but the fact that it is not heard regularly indicates that it is not, for a leak would be manifested at each point of high compression. It is due rather to a misfired charge which fills the

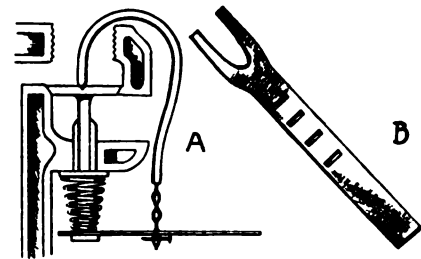


FIG. 2.—A HANDY VALVE LIFTER

and this looks careless and amateurish. Another detail to be kept in mind is to do the work in a clean atmosphere; there must be no dust blowing about, otherwise the surface will be spoiled. The parts that may be enameled with advantage include steel fan blades, pulley arms, brackets and elbows, nuts do not require to be disturbed often, exposed pieces of shaft, pinion wheel centers, operating rods, collars, etc. Even a cylinder casting or set of castings could be treated as a good enamel will stand the heat without blistering. Of course, it would be no use attempting to enamel the exhaust pipe. It is, in fact, difficult to do anything to it beyond black-leading it frequently.

Three Auto Kinks

GEORGE MAISON.

Removing Dents.

Radiator tanks, horns, lamps, and other hollow metal articles always become easily dented. This gives them an unsightly appearance and makes them harder to clean. Even on articles where a high polish is not used, a dent weakens the structure and often gives rise to a larger and more serious hole.

If the tank of a radiator or similar square object is indented, a loop should be made in a piece of stout brass or bright steel wire, bent at right angles, as at A in Fig. 1, and soldered to the lowest part of the dent. A larger loop should then be made in the other end of the wire, and with the aid of a lever and a block of wood resting on the



object to form a fulcrum so as to dispose the force of the pull on the lever over a fairly large area. The dented part can then be pulled flush with the rest of the surface. Use care in pulling out the dent so as not to pull it too far. Short, light knocks on the lever serve to bring up the metal better than a continued strain.

Dents in head lamps and other small articles can be taken out in a similar manner as above, though in place of the lever a strong cord should be attached to the wire loop and its free end fastened to a vise or any convenient anchorage. In Fig. 1 (P. 155), a horn is shown under treatment. The horn is grasped in the hands, and a few gentle jerks will remove the dent. The wire loop in both these cases can easily be re-

and .3125-inch thick. One end is cut in the shape of a fork, as indicated at B in the engraving. Next, four holes are cut, equally distant from each other. The holes can be made by using a breast drill, then breaking out the walls with a small cold chisel, after which the apertures can be smoothed up with a file.

The curved member—bent like a question-mark—is shown in position at A. This is constructed from an iron rod, about 15 inches long and approximately 1/2-inch in diameter. It is bent to the shape indicated and the end coming in contact with the valve head, is filed tooth-shaped so that it will fit the slot in the valve head. To the lever end of the hook member is attached a chain.

The method of using this valve

“nut” loose. The cheapest and, perhaps, the simplest way is by a spring washer. This is illustrated at A in Fig. 3. Another common method is to use a second nut—called the lock nut—above the first, and of a smaller size, as at B. There is an important point to remember in using this method: That the first nut should be screwed as tight as it can go, in fact, over-tight; then the lock nut is screwed on, leaving a small space between it and the regular nut; now, the lower nut is brought back hard and the two nuts are firmly locked. If this is not done, and the two nuts screwed just as usual, the lock nut will work loose and then the lower one follow after it, thus failing to accomplish its mission.

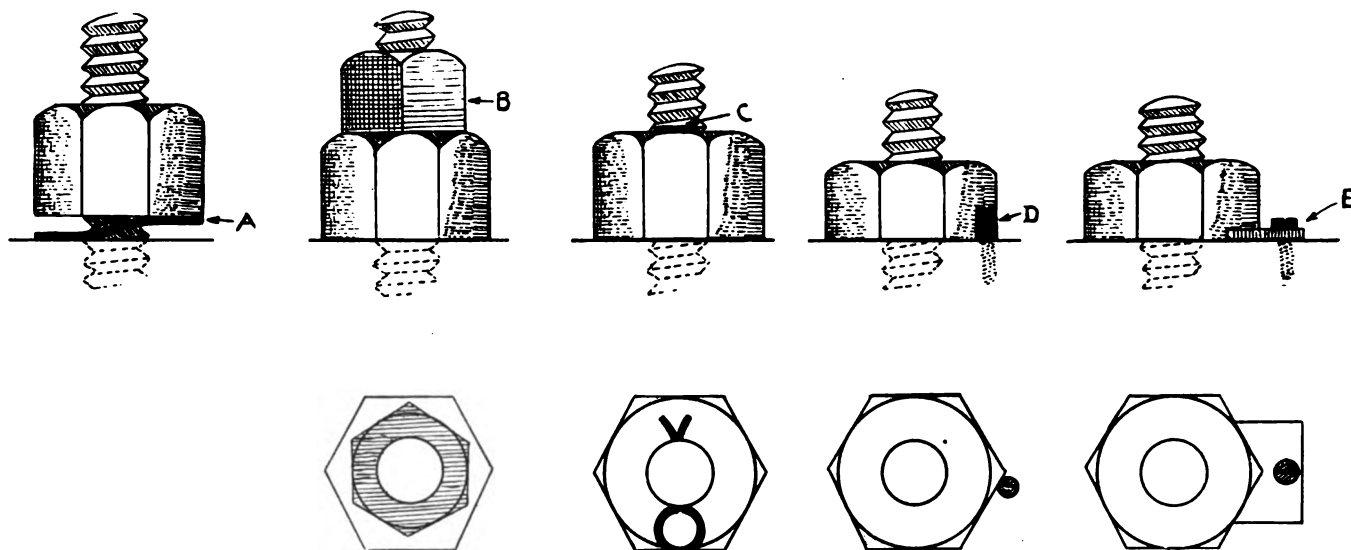


FIG. 3.—ALL NUTS ON AN AUTOMOBILE SHOULD BE SECURELY LOCKED

moved by means of a blow lamp or soldering iron.

Of course, where the interior of the object is open and the dent is readily accessible it is easy to push the dent out with a piece of flat or round smooth-finished wood, being careful to manipulate evenly so as not to further injure the article. No doubt more elaborate methods can be resorted to for this sort of work, but probably the above methods are as quick as any. A piece of wire can be bent to any shape to suit the job under consideration.

A Handy Valve Lifter

The removing of the spring before grinding valves is always a nuisance at best, and the average valve lifter will not fit all motors, though there are several marketed that can be universally used. A good, practical valve lifter may be easily made, as seen in Fig. 2 (P. 155). Take a piece of steel, about 15 inches long, 3/4-inch wide

lifter is simple. The valve plug is displaced from the cylinder and the hook inserted as at A. The lever members, B, is then used in the conventional manner, the chain being passed through one of the openings that is best adapted to obtain the desired leverage. A small nail prevents the chain from leaving the lever.

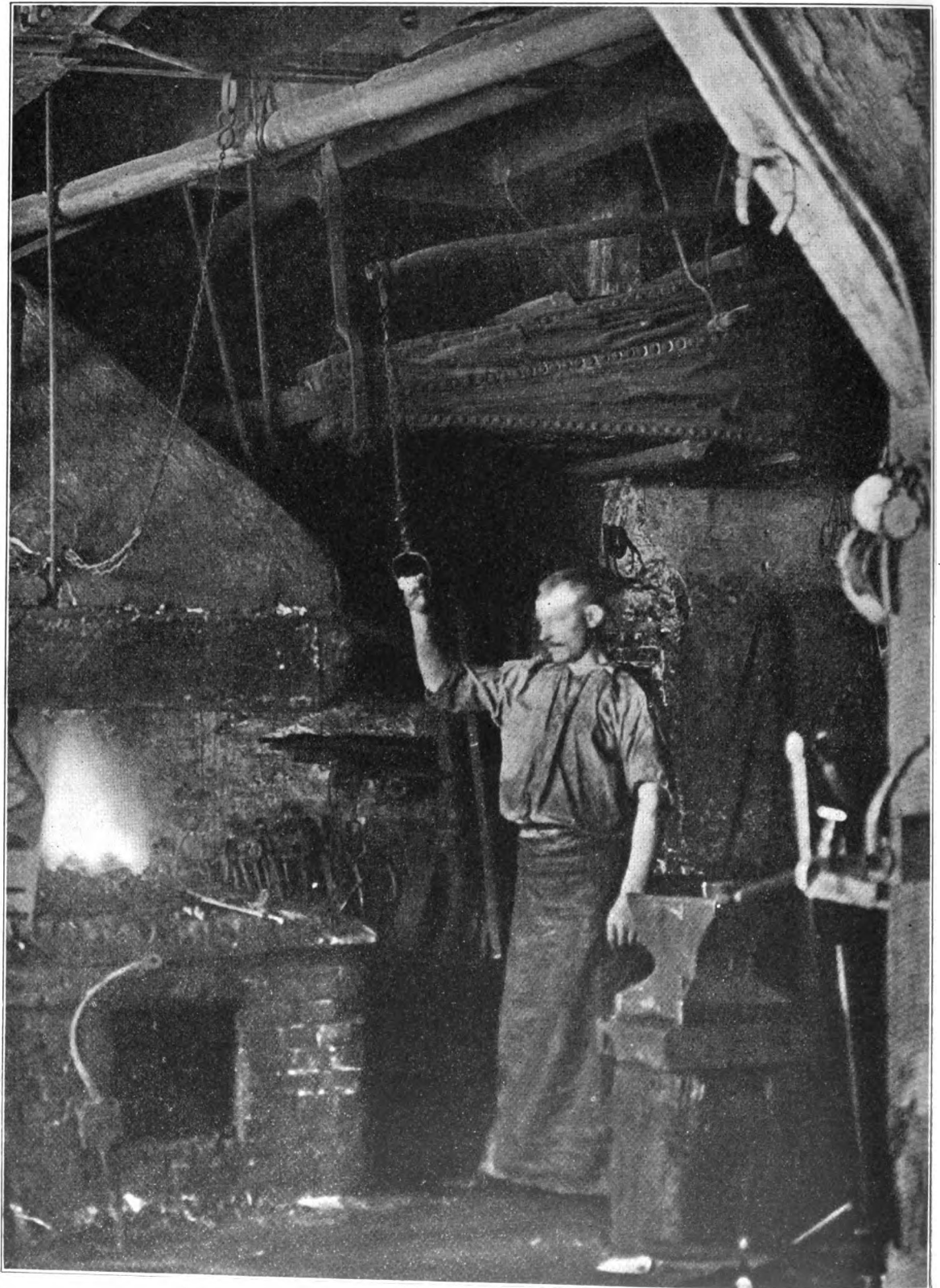
The advantages of this valve lifter are readily seen. The hook resting on the head of the valve prevents the latter from rising when the spring is compressed, and the slots and chain make it possible to change the position of the tool to meet the requirements of different motors, as well as to operate the lifter in different positions.

Locking Nuts

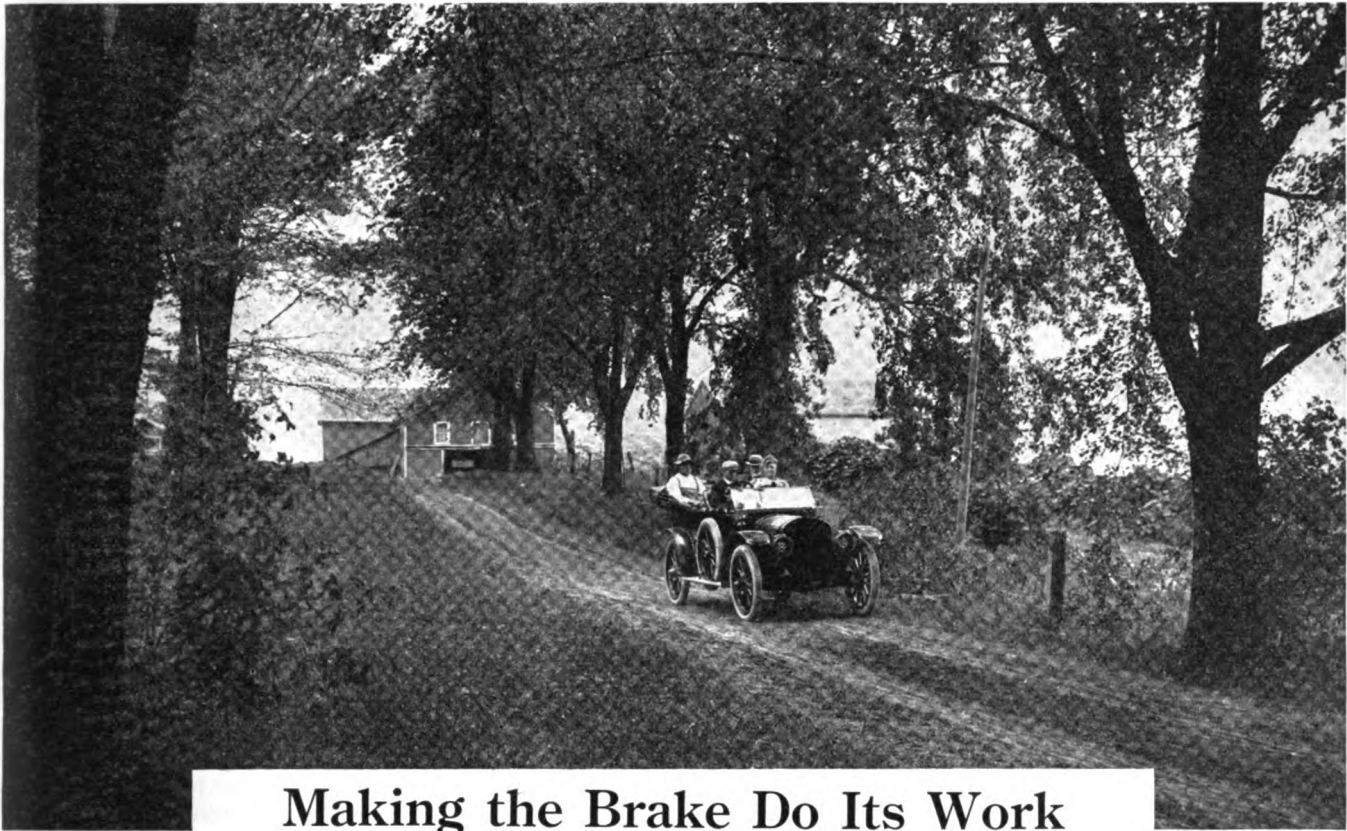
All the nuts on an automobile should be locked. The constant jarring and strain that the machinery receives is enough to knock any

The split pin method is shown at C. This form, when the nut has two slots cut at right angles, is called the “castellated” nut. It is commonly used on autos and many other classes of machinery because of its certainty of holding. D shows the nut held by a small set screw, and E shows a locking piece keeping the nut in a firm position. Certain conditions arise which make each of these methods easier to perform and more desirable to the end in view.

Small cuts in tires should receive attention at regular intervals and after any long runs. Dirt, stones and other foreign substances should be removed and the cut repaired either by vulcanizing or with some of the many preparations for that purpose. If this is not done, the foreign matter will be forced further and further into the cut, separating the tread from the fabric and admitting water and grease, which cause rapid deterioration. Care of the little injuries will prevent many greater ones and add many miles to the life of the tire.



"YE TOIL IN THE FURNACE GLARE, AT FORGE IN SCORCHING HEAT"



Making the Brake Do Its Work

C. P. SHATTUCK, M. E.

The failure of brakes to hold properly is not always the fault of the adjustment, their linings, or because the friction surfaces are covered with oil or grease. This is particularly true with old cars which require a considerable pressure upon the brake pedal or pull upon the brake lever to stop the machine, a condition due to factors that are generally overlooked in the attempt to restore the brakes to an efficient condition. As the age of the car increases, its braking effect decreases due to the decreased leverage diagrammatically illustrated at Fig. 1, the drawing showing the connections between the hand brake lever and that of an expanding type of brake, and it is assumed that the linkage, etc., are so badly worn that, when the brake is applied, they assume the positions illustrated.

The greatest leverage is obtained when the levers, A, B and C, are at right angles to the brake rods, D, for to transmit the maximum pull, all levers must be at right angles to their rods when the brakes are set. When the linkage, drums, shoes and expanding cams are considerably worn it is possible for the levers, A, B and C, to assume almost a straight line. If a new car be examined it will be noted that the levers, C, are generally back of the vertical position and that when the brakes are set

the levers assume the right angle position. This arrangement compensates for the lost motion that develops with the initial wear so that the levers come into the most efficient operating position. As the wear increases, the levers transmitting the pull will assume the position illustrated.

The failure of the linkage to transmit the maximum pull is due to another factor which is illustrated in the drawing at the left at Fig. 2, showing an ordinary type of expanding brake in which considerable wear on the drum and shoes has taken place. As may be noted the shoes make contact only at the right hand half and it is obvious that under these conditions that not only is the leverage considerably decreased but more pressure is required. When the shoes and drums are new the leverage is about 2 to 1, but under the conditions above described it will have decreased to about 4 to 3. The leverage may be figured easily by drawing a line through the points, A, B and C, representing the pivot, the center of the load and the point of application of the power, respectively. Add this to the decreased leverage illustrated at Fig. 1, and the reason for a decrease in braking efficiency will be readily understood.

To restore the parts to a service-

able condition the lever, C, should be adjusted at right angles to its rod. If not of the adjustable type the cam can be so reset that the desired angle will be obtained. Generally, the cam is pinned to the rod, and if it be found that a new hole will be too close to the old one, a new cam may be made. Countersink and pein over the pin. The intermediate levers, A, B and C, should be carefully examined for lost motion. If of the rivetted type they may be loose on the operating rods, and the pins of the linkage may be worn badly. Before removing the wheels disconnect the rod, D, for it may be that shoes have worn grooves in the brake drum, making it difficult to withdraw the wheel.

The most practical method of repairing the brakes proper is to fit new shoes, if of the metal-to-metal type, but the owner may not sanction the work and it may be that new ones cannot be secured owing to the age of the car. If new shoes are desired and cannot be obtained a pattern will have to be made and castings ordered. Worn types of expanding brakes may be considerably improved by separating the pivots or recesses shown in the drawing at the right at Fig. 2, these gripping a stud under the action of a spring. Make a bushing of sheet metal and slide

.EM



over the stud, A, thereby increasing its diameter, and chamfer the edges of the recesses to correspond with the circumference of the bushing. This repair will improve the leverage as it brings into action unworn surfaces of the shoes.

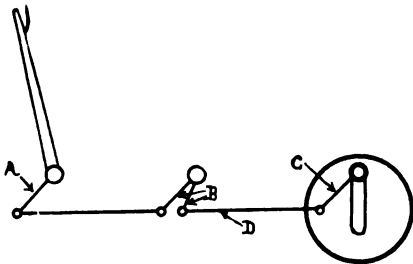


FIG. 1.—DIAGRAM TO SHOW CAUSE OF BRAKE FAILURE

Another method is shown at the left at Fig. 3, and it has the advantage of being adjustable. It consists of using a pair of square headed, threaded bolts recessed to fit the stud, B, as shown. The ends of the shoes are drilled to take the bolts which, however, do not screw into the shoes, but only into the nuts. To adjust the shoes the nuts are screwed up or down as is necessary, and with this method one shoe may be adjusted, an arrangement eliminating the tendency of one shoe to press on the stud and the other to rotate away from the pivot when the brake is applied. When the brake shoes are pivoted and their faces and the cams are so worn that with the cam vertical the shoes do not grip properly, the method shown at the right in the drawing at Fig. 3 is practical. It consists of drilling and tapping the shoes and fitting threaded bolts with nuts, an adjustable construction

linkage does not obtain the desired result, the turnbuckle, A, is employed. Care must be exercised in the adjusting to make sure that the shoes, when at rest, are concentric with the flange of the axle which supports them, and concentric with the drum when the wheel is replaced.

Fig. 5 illustrates modern types of internal expanding and external contracting brakes and these are easily adjusted if understood. It is important with the lighter types, such as are used on pleasure cars, that the distance from the centre of the anchor stud, F, to the friction surface of the drum be one inch for brakes under 10 inches in diameter, $\frac{7}{8}$ -inch for brakes, 10 to 15 inches in diameter, and $1\frac{1}{4}$ inches for those over 15 inches. With the heavy types employed on trucks the distance should be $1\frac{3}{8}$ inches.

To adjust, loosen the anchor stud nut on the inside of the support, set the brake firmly and turn the wheels ahead. Make sure that the pin, J, is in the forward end of the slot before loosening the lock nut, A, and set nut, C. The proper adjustment is secured by means of the lock nut, B, and it is important that the distance from the shoulder, H, on the screw, D, be $\frac{1}{4}$ -inch from the counter bored surface on the anchor stud, G. It is also important that when the work is completed, and the brake applied full force, that the pin on the shoulder, H, be below an imaginary line drawn from the bottom of the pin, J. This is necessary to insure proper toggle action of the lever. The set nut, C, and lock nut, A, are then tightened, and the brake set firmly before tightening the anchor stud nut. The internal brake has the

are responsible for the brakes dragging.

In relining brakes utilize the old material for obtaining the proper length, width and thickness of the new material. If the drum be worn badly, it may be that a lining, 1-32-inch thicker than the original, may be used, provided the thickness of the old is between $\frac{1}{8}$ and $\frac{1}{4}$ -inch. To attach the lining clamp one end of it to an end of the shoe or band and drill the holes for the first two or three copper rivets which are best. As it is important that the heads of the rivets be well below the surface of the lining, the bolts should be countersunk, and for this work take a drill of the same diameter as that of the heads of the rivets and grind it until the point is almost flat. Countersink the three holes and place the lining on the band, fitting the rivets but do not fasten them. Draw the lining tight over the band, clamp it in place, then prick punch through the holes to mark the lining for drilling. Drill and countersink the balance of the lining, then rivet it into place before cutting it with a hacksaw.

When adjusting newly lined brakes, jack both wheels clear of the floor, and with the service or pedal brakes, have someone apply it gradually while you rotate each wheel by hand, noting the resistance of each. If uneven, the linkage should be re-adjusted. Another method is to start the motor, engage the low speed, let in the clutch and apply the brakes gradually, noting the wheel that stops first. The wheel that stops last should be adjusted.

The most practical test of the holding qualities of the brakes may be

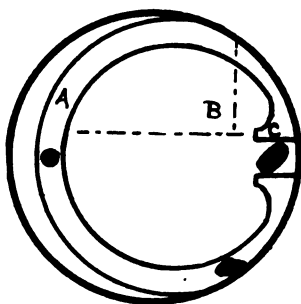


FIG. 2.—SHOWING THE CAUSE OF DECREASED LEVERAGE

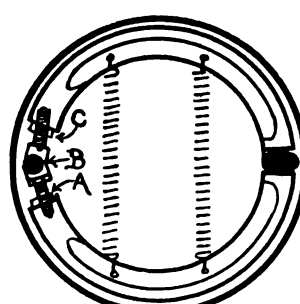
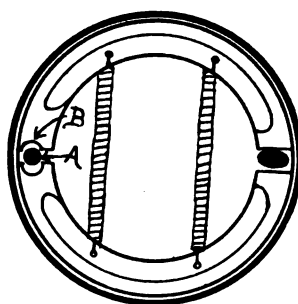
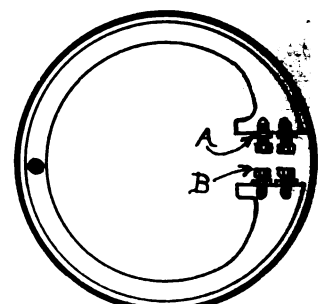


FIG. 3.—TWO METHODS OF IMPROVING THE LEVERAGE



and an inexpensive repair. These remedies will apply to both the metal-to-metal and lined types of expanding brakes.

The internal expanding type, illustrated at Fig. 4, is subject to the same troubles as the types described, and when adjusting the rods in the

same operating method.

In the restoration of the brakes, attention should be given to the clevis pins and linkage of the equalizers as well as the springs maintaining the clearance of the brake bands. These components should be cleaned and lubricated for frequently they

made by taking the car out on the road for a trip of several miles. This will afford an excellent opportunity to ascertain if the linings are dragging. Stop the car and place the hand on the drums. If they are unduly warm, it will indicate dragging or a fault of the adjustment which



should be corrected. Worn or loose wheel bearings should not be confounded with dragging brakes. An instance of this kind came under the observation of the writer recently.

stem is warped, for the warping is likely to continue, or the valve to rotate, and when the trouble is finally located the seat will have been ruined by eccentric grinding.

Driving pins or shafts.—Never drive

tendency is quite unexpected, this point being generally overlooked until discovered quite casually. Sometimes the brake shoes, either on the shaft or rear axle, as the case may be, do not clear when the brakes are released. Sometimes, too, the release

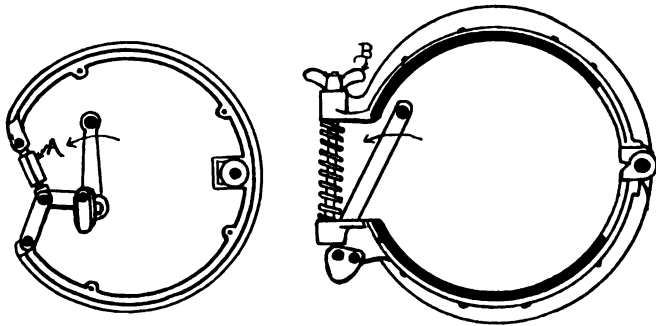


FIG. 4.—THE MEANS OF ADJUSTING BOTH THE EXPANDING AND ALSO THE CONTRACTING BRAKES

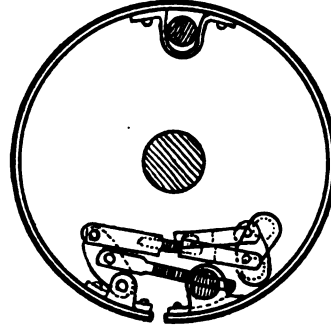
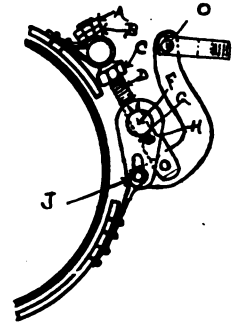


FIG. 5.—SHOWING THE ADJUSTING MECHANISM ON THE MODERN TYPE BRAKE



Both the service and emergency brakes failed to grip properly, and the owner ordered them relined. Although they held when the wheels were jacked up, they failed in the road test which was conducted by the owner. A rigid examination by the writer revealed that the axles were loose in the bearings which were not of the adjustable type, permitting the lining to drag. The fitting of new bearings cured the trouble and a slight pressure on the brake pedal was sufficient to check the motion of the car. This instance is cited to demonstrate that the factors causing faulty operation of the brakes are sometimes overlooked.

in or out a metal pin or shaft with direct blows of a steel hammer, as the metal is almost certain to be bruised or upset, and the difficulty will then become worse instead of better. Lay a piece of brass or babbitt on the end of the pin and strike that, or use such a piece of metal as a hammer if it is heavy enough. Too much care cannot be exercised, as most parts of a motor car are so accurately finished and fitted that a very little damage will spoil them.

Old gaskets should never be replaced when it is possible to avoid it as they are almost sure to leak. If nothing is at hand from which new ones can be made, a coat of shellac should be applied, and is sometimes effective. While there are many special materials made for packing, ordinary heavy brown paper or manila pasteboard may be used with good success.

In replacing spark plugs, two things are to be avoided: one being too tight adjustment in a hot cylinder, which makes it almost impossible to remove it afterward; the other being the breaking of the insulation, if of porcelain, through contact with a wrench. Socket wrenches, if made too narrow in the neck will often cause fracture of the insulator unless held perfectly in line.

Two general causes of a carburetor flooding are dirt in the needle valve and a leaky float. The first named member is actuated by the float and controls the flow of fuel to the float chamber. When dirt or foreign elements are in the fuel, the valve will not seat properly, and fuel continues to flow into the float chamber, flooding it.

The float utilized on the Schebler is cork, and it is possible that the gasoline penetrates the pores of the material, causing the float to become impregnated with the liquid, thereby adding to the weight of the float. The last named is coated with shellac. If the float is suspected of being too heavy, remove it from the carburetor and dry it thoroughly, then give it a coat or two of good shellac. It is a good plan to test the action of a float to note its position in the float chamber changing it if necessary.

It is a good plan now and again to jack up the car and test the rear wheels by hand to see if they revolve freely. It occasionally happens that a good deal of unnecessary friction exists in the transmission gear or because the brakes bind. In the ordinary course of things, such a con-

springs are weak, or one of the connecting rods rub against the frame. Or it may be that the brake shoes are covered with congealed oil and dust, making it impossible to clean the drum. It can easily be seen that the undue friction thus set up causes not only undue wear, but an abnormal waste of power. It is no wonder then that in cases of emergency the brake efficiency is impaired. It is highly important that brakes should be thoroughly examined and cleaned of all foreign matter at frequent intervals. New brake bands should be substituted where the old ones show great wear. Both the band and the drum must be kept clean and free from congealed oil, grease and road composition, in order to insure effectiveness when most needed.

Automobile Troubles in The Arizona Wilds

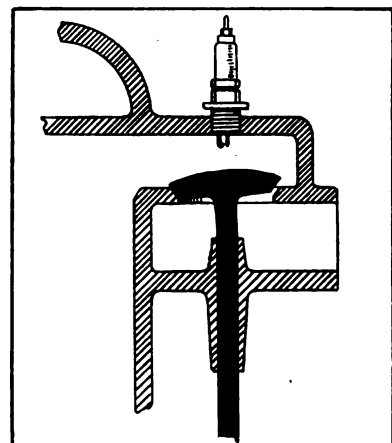
M. A. FOSTER

You people that live back in civilization don't know what auto trouble is. I consider myself some authority on this subject for I have lived back in civilization and have operated different cars back there. The only trouble that I ever experienced back in civilization, was igniting and tire trouble. But since I



The Automobile Repairman

Failure of valves to seat properly sometimes arises from warping of the valve stem, and it is well to see that this is not the case before grinding the seats—or disastrous results will follow. The stem may be warped enough to bind and retard the valve action, even if it does not prevent it from seating, and many erratic performances of the motor are traceable to this cause. Grinding in the valve simply makes a bad matter worse if the



A WARPED VALVE STEM



have become a rover of the jungles of Arizona I have experienced all the troubles that exist for the automobile. I am located 100 miles south of Holbrook, in the White mountains. The nearest railroad is at Rice, 65 miles south of here. To reach that place, we have to climb the Black mountains. A large part of the road is dug into the side of the

the spark and throttle well advanced. When I hit the mud, I went down and then up again, then down, and up and down again. When I landed this last time my engine was dead. I got out again and looked the situation over and saw that I was out of the mud. I looked for breakage of some kind but found none. You see this mud hole had several logs buried

engine too hot and I would find that the next morning it would be all right. But I differed with him. However, the next morning I thought I would convince Mr. Cooley that he was mistaken. I started the engine, which started easily, but when I went to move the car the same trouble resulted; no power. I had been looking for lost compression, but found none. I could not think it was ignition trouble, as the engine would start so easily. However, I took off the water jacket, thinking probably I had some valve valves were all right and I was put-trouble. But I found that the tinging back the water jacket when I accidentally discovered the trouble. And I corrected it in two minutes. Now, guess what it was. Just listen: When I went to the mud hole, which shook the car up and killed the engine, the timer rod became disconnected from the spark lever. While the spark was fully advanced at this time the engine was all right, but as I jolted over the rough road, the timer gradually worked back. This is why the engine was losing power. The timer rod laid in its natural position so I could not detect it being disconnected until I happened to get just the position so that the light was right to discover it.



THE AUTOMOBILE MUST BE A MOUNTAIN CLIMBER AT TIMES

mountain. Going down this mountain, we can coast from 7 to 10 miles, that is, if we have a good brake and can keep our senses long enough. When we climb those mountains, we have to run on low speed, and every few feet we have to climb over a ledge of rock that projects out of the road bed.

Now let me tell you my experience on one trip from Holbrook to Fort Apache. When we leave Holbrook, the first 30 miles is nothing but desert. There is not a house between Holbrook and Snowflake. But this is the best part of the road on the trip. On this trip I made Snowflake in one hour and a half. That is good time to make in the jungles. The next stretch was to Sholow, a distance of 20 miles. A part of this road is known as the Malipi Macey. This is a rather flat road, and the ground is covered with malipi rocks of all sizes. It is a distance of 12 miles across it. From Sholow, we have a heavy grade and pass through heavy pine timber. I had reached near Pine Top when I came to a very bad mud hole. I stopped my car to take in the situation and decided that if I crossed I would have to use all the power that I had. So I started with

in it which were not visible. This threw my car in the air. I finally pulled on the crank and the engine started fine. So I got in and started. The car ran fine and I soon passed Pine Top where the road was somewhat better. But I now saw that my engine was losing power. I now was on a road that I should have made good time on, but my engine kept gradually losing power. I would stop and look it over but find nothing. It would start easily, but when I attempted to move the car the engine had no power. Soon I came to where the mud was about six inches deep and there was no way to shun it. I picked for the best route and started across, I stuck about as soon as I got in the mud and so tried to back out. Well I did after about three hours' work. In every attempt I made to move the car the engine would choke down though the engine would start freely and easily. By this time it was most dark and I left the car. I was about 1½ miles from Cooley's Ranch. When I arrived there I found some Government teams, and I got one of the teamsters to go out and pull my car down to the ranch.

I explained my trouble to Mr. Cooley and he told me that I had the

Now you will see what a small thing will give a person quite a bit of bother. This is the fifth car that I have owned, and I am still taking lessons every day I run it. Here in the jungles we don't have any roads, just an open place that the public travel over. We get up against conditions where we must make a car do twice what it was built to do or otherwise we don't get through. No paved streets in the jungles. Not even graded roads.

Oxy-Acetylene Welding and Cutting Operations

F. W. COLLINS

In presenting to the readers of THE AMERICAN BLACKSMITH our articles on Oxy-Acetylene Welding, we would say that we do not under any pretense claim to know it all. We have had a vast experience in welding and cutting steel and iron, and had a hand in shaping and perfecting one of the most widely known and best welding and cutting torches on the market, but we fully realize that our readers will most likely come in contact with experiences that we would never meet. In view of this we should be glad to hear



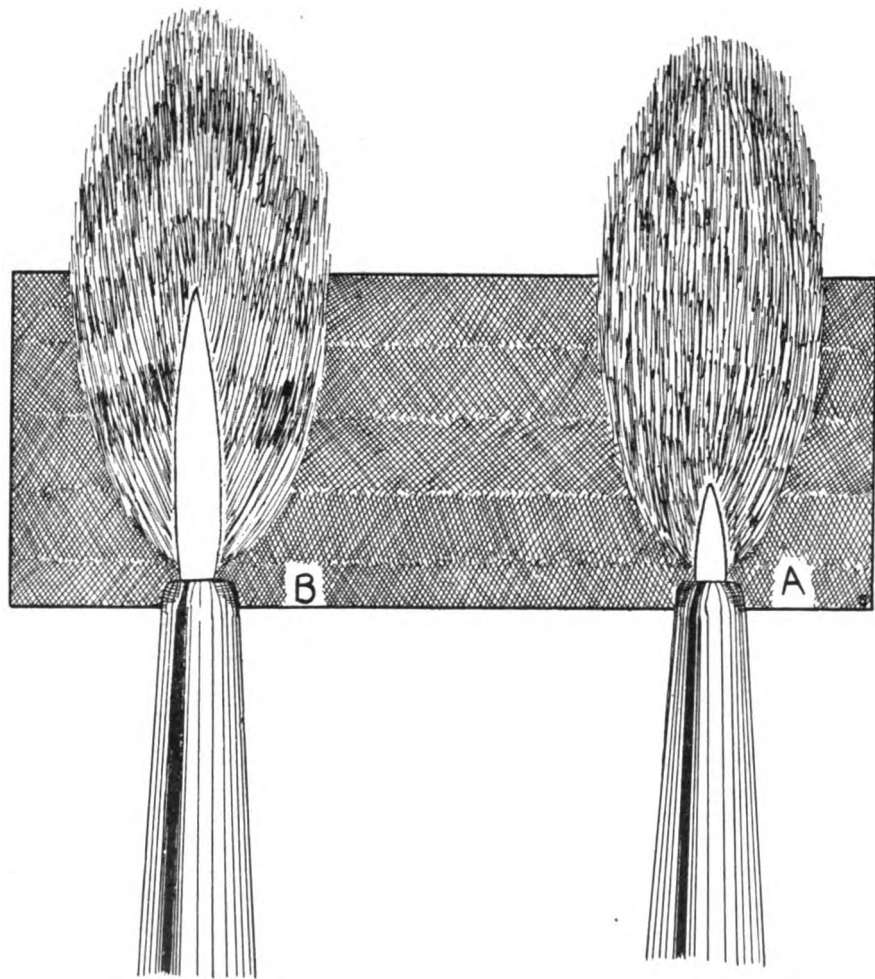
from any of them in regard to their experiences. We would at this time call attention to some things that are likely to mislead and cause considerable trouble.

We often wonder why makers of welding outfits represent in their advertisement a picture of a man, torch in hand, welding the water jacket of an automobile engine. Surely they never had any such experience as they show in their picture! And this leads the novice to believe that he could take his outfit out in a field in the summer time, seek the shade of a friendly tree and sit down and weld a water jacket on an engine or pump cylinder. This is all wrong and misleading, for it has been our experience that it is an impossibility. Simply for the reason that there would be nothing to take care of contraction after welding and if the weld was over three inches long the end first welded would crack before the weld was finished. It would not make any difference how thickly the metal was piled on. The writer having had charge of a demonstrating plant where we have instructed several hundred pupils, has been asked several times why this occurs, no matter how thick the metal is put on where the fracture was?—that it breaks on almost exactly the same lines as the fracture? It would seem strange unless we look closely for the cause, and at the same time use our "thinkers". As a matter of fact, the weld is pulling apart all the time the weld progresses, that is, if we try to weld it while it is cold. This, remember, is in reference to a water jacket on a cylinder. So as the rest of the cylinder is cold, as the torch flame leaves the part that is welded, the cold creeps in, and it begins to contract and consequently pulls apart. But as the metal is hot and therefore elastic, we do not hear that dreaded snap until the metal gets black and solid. In other words, if we are to meet with success with cylinders or any piece with an internal strain we must preheat it and continue to heat it until it gets to its full expansion point. If this is done the contraction will generally take care of itself. But even then the operation must be performed in a closed room entirely free from drafts, and the room should be warm. After the piece is welded it should be left right in the fire where it is and covered over very carefully with asbestos paper so that no cold drafts can reach it. Under no circumstances uncover it until thoroughly cold. Another thing, the paper

should not be thrown over the piece like a woman puts a table cloth on a table, but laid on carefully as any violent movement of a large piece of paper would create a cold draft like a fan, and we have known water jackets to crack from the sudden motion.

So we see it does not do to start welding a piece, as pictured out by some manufacturers who set an object on a table, make a chalk mark on the object and stand a man over it holding a torch in his hand with the tip of the torch touching the chalk mark, then take a picture of him and publish it. We have had to answer a great many letters from people who thought surely a manufacturer would not advertise his

then got out some cards announcing that he could weld anything of brass, copper, etc., cutting of brass, copper, cast iron, steel, etc., anywhere, at any time! He got a contract to cut some heavy sprues from several heavy cast iron pieces and, of course, came away a disappointed man. He came to us for advice and we asked him where he got his idea that he could cut cast iron and he showed us an article which said that the oxy-acetylene torch is very valuable for cutting sprues from castings. There is no doubt that such articles have been the means of a great many sales of welding and cutting outfits, and while they lead to considerable disappointment in the beginning, it is a good thing in the end. For after one



YOU MUST KNOW THE FLAME OF YOUR TORCH TO USE IT EFFICIENTLY

goods that might lead buyers of his outfit into trouble.

Another very bad and misleading feature of the welding business is the practice of some on the subject of injecting matter into their articles that they themselves know positively nothing about. We have in mind one correspondent who bought an outfit, got it installed,

has an outfit he begins to find uses for it that he never dreamed of before. We have yet to come in contact with a person who after using it for any length of time would part with it.

But the most vital part of oxy-acetylene welding and where a great many beginners met with their greatest trouble is in not knowing how to



light the torch properly—in fact, the most of our correspondence is from people who buy an outfit and either do not get an instruction book with it, or do not read it properly if they do get it. One party wrote us that he lighted his torch and it would not melt a piece of steel, $\frac{1}{8}$ inch in thickness, that the soot piled up on the article until it was as a quarter of an inch thick, and that the torch was no good, etc. The fact of the matter was, he did not know how to light the torch. So many are afraid to get enough acetylene going through the torch, then letting enough oxygen into the tip to get the small, white cube so necessary to obtain a good weld.

To light the torch properly, proceed as follows: First turn on a little acetylene and light it, then turn on more acetylene until the flame leaves the tip and still keeps burning, this will be $\frac{1}{8}$ -inch from the tip. Next turn off the acetylene very slowly until the flame comes back to the tip, and turn on the oxygen. Keep turning it on slowly until you get a small, white cone like A in the engraving. This is what we call the first heat, and if it is not strong enough, turn on more acetylene until the small, white cone lengthens out to look like B. You

heat enough, do the same thing again, and every time this is done the heat is increased almost double in quantity. You can do this about three times with each tip and it will be noticed that each time this is repeated the small white cube gets a little longer. When you get to the limit on each tip the flame will blow out on touching the work, so you have to turn off both gases quickly and start over again with the above process. You will soon get so that you can do this very quickly, but we would advise going very slowly until you feel more confidence in yourself, which you will after lighting the torch a dozen times.

If there is anything that is not clear in the foregoing we should be glad to answer any questions that may be asked in this regard in the next issue.

Oxy-Acetylene Machines and Pointers on Weld- ing

NEWT BAGLEY.

No machine has come to our aid in many years has found so great a field for development as has the oxy-acetylene machine. Already welding machine operators are in great

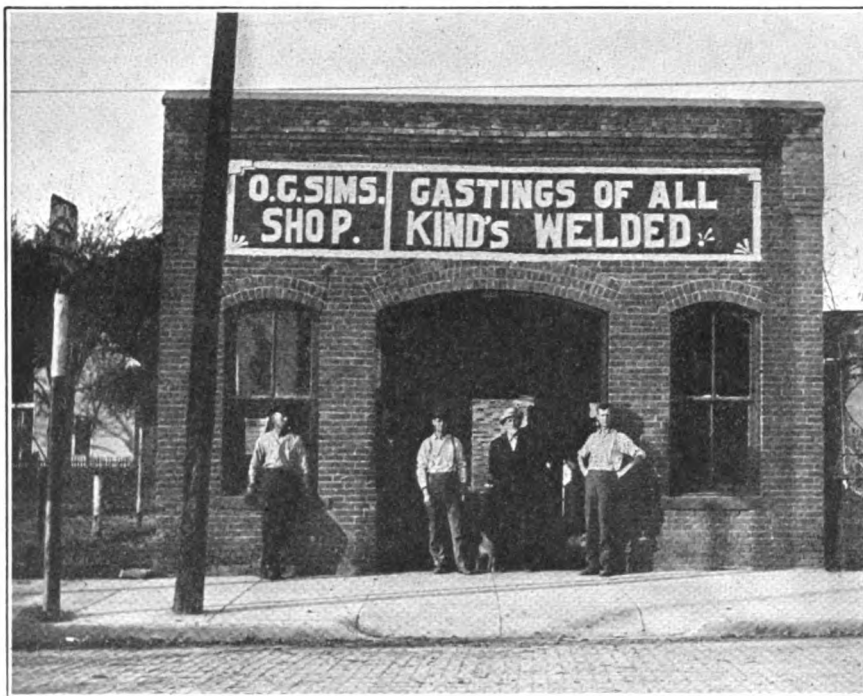
machine and the dollars it means to them. I have not seen or talked with one man, who has had work done by a successful operator, who does not speak a good word for the oxy-acetylene torch. This new device must find a place in every well equipped shop sooner or later, and the first smith to install one will gain a great deal of ground that will be valuable to him as time goes on.

The Kind of Machinery to Buy

This is a hard question to answer. There are a number of good machines on the market backed by responsible dealers and manufacturers. Quite a number of machines have been home-shop-made, but, as the price has been reduced until most any of the factory-made ones are in reach of any one wanting them, I would not advise making them, though the writer has a home-made one which has been in constant use for three years.

For the small shop many like the outfit with the tanks of oxygen and acetylene ready for use, while others prefer those where the gases can be manufactured at home. This, in a sense, is a matter of choice and there is argument on both sides. Of course, at the present time, with the war in progress and as potash is a commodity used in the manufacture of explosives, the price of potash has advanced until the man with the tank exchange outfit is ahead.

The two types are known as high and low pressure outfits. With the low pressure outfit the acetylene is supplied from a low pressure generator which the operator can charge at will and the pressure at the torch is very light. For some reason the insurance companies look upon this outfit with much less disfavor. It is claimed that the oxygen consumption is a trifle greater than that with the high pressure outfit. When we consider the high pressure outfits proper, we should divide them into two classes: First, the plan of furnishing the acetylene supply from a generator which delivers and generates gas under pressure. Second, we have the high pressure system where the dissolved acetylene is transported from the factory to the user in containers and used from the container to the torch, reducing the pressure before reaching the torch by means of a reducing valve. If the reducing valve is not used it would be necessary to release the pressure into a tank, known as an expansion tank, which would only give the same results with more complications. It pays to take no chances



THE WELDING SHOP OF MR. O. C. SIMS, OF MISSOURI.

will notice the difference as you turn on the acetylene; when you get the flame to look like B, turn on more oxygen until the flame comes back again to look like A. If this isn't

demand and will be for some time to come, as the farmer, the automobile owner, the elevator man, the miller and a hundred others begin to realize the usefulness of the welding



with outfits that are not well put up as acetylene gas is extremely explosive.

Cleaning the Parts to be Welded

One of the first and most important points to be considered in

ing point of cast iron is quite a little lower than that of steel, or mild steel. The object of the flux is to control in a sense the oxides that appear in welding as they cannot be melted or blown away, and unless something

the metal is very fragile, or tender at this temperature. It is this low melting point combined with what we call conductivity, that makes the welding appear at first difficult to the beginner. We must, however, consider the high melting point of the oxide as compared with the metal itself in making a successful weld.

To insure a good weld the work must be absolutely clean. Wash the parts in gasoline and after heating over a charcoal fire and removing any grease or dirt that will show up in the heating process. The welding or "fitting rods", as we call them, must be clean, pure aluminum and be free from foreign substances or a disintegration along the line of the weld will be the result. Owing to the fact that the conductivity of aluminum is great it is necessary to use a large flame. The aluminum filler rods are about 88% aluminum and 10% zinc and from 2 to 3% copper. The percentage of zinc varies, however, from 10 to 30%, therefore it is quite difficult for the average man to tell just what rod he should use. There is quite a little trouble in the aluminum castings cracking, especially around ribs, etc., but this can be overcome by cutting the rib and welding it up afterward, which is an easy matter. A good flux should be used to get good results. In pre-heating the casting, care should be taken that it does not become too hot or it will collapse with its own weight and leave the operator in rather an embarrassing predicament. One should practice on pieces of aluminum from time to time before trying a job of value, for a failure is like a running sore, it takes quite a time to heal up so people



THE GENERAL SMITH SHOP OF MR. O. C. SIMS, OF MISSOURI

making a weld is cleaning the parts. The parts to be united with the process of welding must be free from rust and grease. Scaling powder is very good for removing foreign substance from metal previous to flowing the new metal. Where it is possible it is a very good plan to grind the edges to be united, thus removing all grease and rust, leaving a clean, bright edge.

Strength of Weld

Very often we have to answer the question, "Will it be stronger than it was?" and most men ask it in good faith. The thing they want is something stronger than the original and if it breaks they are ready to come back, not taking into consideration that it had broken before. The strength of a weld produced by the welding process is, as a rule, less than that of the original metal. The reason for this is that the filler rod is rarely of exactly the same material as the parts repaired. The fact that most filler rods are softer naturally weakens the tensile strength at the weld. The claim of 100% welds is, as a rule, unsupported, and in most cases 85% will catch the average success attained by the operator.

Flux

It is necessary to use a flux in welding all metals and the flux should be purchased from a reliable concern as on the flux depends much of the success of the weld. The weld-

is used to destroy their disastrous effects the weld will be effected accordingly.

Welding Aluminum

The welding of aluminum offers far the greatest field for development of any metal of which we have to deal. Those who have had no experience and are attempting the work for the first time are apt to become discouraged and give it up as a hard undertaking, but after a few points are mastered, the balance of it will come easily. In the first place the melting point of aluminum is near 625° to 650° Centigrade and

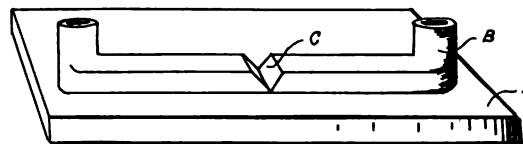


Fig. 1.

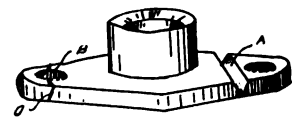


Fig. 3.

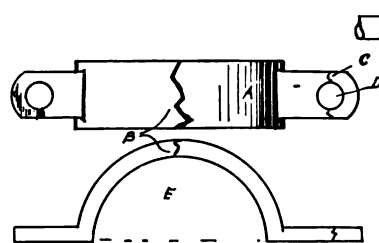


Fig. 2.

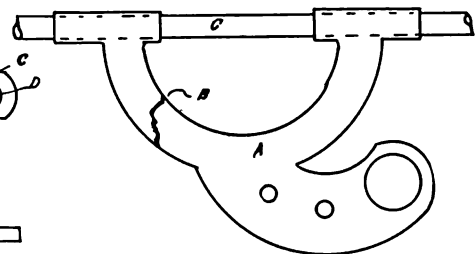


Fig. 4.

HOW AUTOMOBILE PARTS ARE REPAIRED WITH THE OXY-ACETYLENE FLAME



don't notice it. Take plenty of time and go easy would be my advice and get all the information from all the different men applying to the trade; pick out the suggestions that work well and forget the balance and you will profit by the effort.

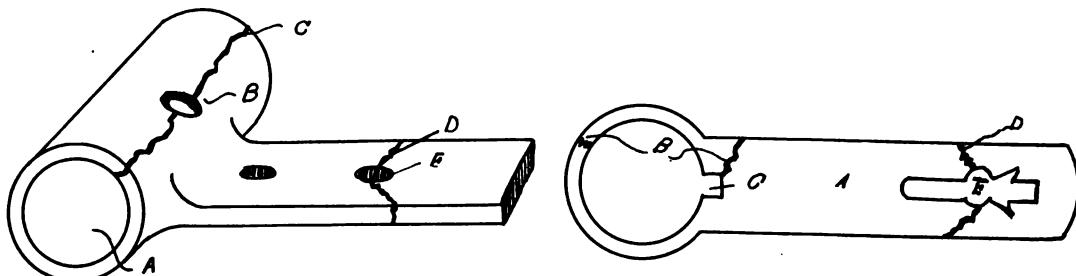
Some Welding Kinks

In Fig. 1, we have a casting, B,

the notches and fill the hole, B, with clay to preserve it. Grind out notches, A and C, and proceed to weld as already described. All castings of this sort should be built enough larger to allow of grinding to shape after welding and still have the casting same size as before.

In Fig. 4, we have something a

repair at D, we do in a like manner. After welding and cooling, remove the carbon, grind the casting up, scratch out the clay from the threads and the job is complete. Even though we have the tap to drill and tap the hole, B, it takes time and time is money and only runs up the cost of the repair, and as the method describ-



FIGS 5 AND 6—SHOWING OTHER AUTOMOBILE PARTS THAT CAN BE EFFICIENTLY REPAIRED WITH THE OXY-ACETYLENE TORCH

broken as indicated at C. The casting must be kept straight so we will lay it on a straight block as A. The crack C, ground to a V, as shown gives plenty of chance to melt in the filler rod without burning the casting. Now if we were to burn through instead of grind, the metal would be overheated and the weld weakened. Build up the surface a trifle higher than the finished job is to be and grind to size and the job is complete. In case the work shows air bubbles or small holes it is a sign that you did not use enough flux or the flux used was not the kind adapted to the work.

In Fig. 2, we have a casting of a different shape broken at two places. Now it is necessary to retain the original shape and save the hole at D. In the first place we will fit the casting over a ball of clay, as shown at E, crowding it down firmly and fitting it carefully into the position it was before broken. Now remove the casting from the mold and grind the V-notch at B and C, and place back on the clay mold. Crowd hole D, full of clay and proceed to weld. After welding with a little excess material, allow it to cool on the mold before removing to grind and it will have the correct shape. In case it is necessary to weld from both sides, remove after cooling and place upside down in a second bed of clax to prevent its changing shape and weld from the opposite side. After it is cool, grind and the job is complete.

In Fig. 3, we have a very common suggestion as many castings, while not exactly like this one, yet the same rule will apply. Lay the casting on a flat surface after grinding

little different and this suggestion will apply to many similar jobs. The holes through which shaft, C, passes should be in exact alignment and the casting is broken at B. The first operation would be to find a shaft that fits the holes. This will hold the casting for welding. Grind the V-notch and proceed to weld. In case the casting is quite heavy it is a good plan to grind from both sides and turn the casting. The casting, A, can be repaired and cooled without disturbing and be perfect so far as shape is concerned. There are a number of castings of this type which can be kept in line with a shaft through a hole or a plate bolted over it in some manner. Too much time cannot be spent in considering a job and making the necessary preparation before making the weld. It is time well spent.

In Fig. 5, we have still another idea and similar things come to the shop every day where this particular idea can be worked to an advantage. We have a casting broken at C, and we wish to save the threaded hole, B, because we have no tap that will recut the thread. The piece is also broken at D, in a like manner and we wish to preserve the hole, E. The hole through A, is $\frac{5}{8}$ -inch, so we will place in it a carbon stick fitting snug and the hole, B, we will fill with wet clay, packing or tamping it in tight enough that the threads are well filled. The hole, E, we pack with the wet clay in a like manner. And now we are ready for the weld. The carbon will not burn so we can melt down to it without danger of destroying the hole and at the same time get a good, strong joint. The

ed is just as good—I find it better to use it.

In Fig. 6, we have a casting with irregular holes to preserve which, no doubt, would take the average man some little time to duplicate in case the space was welded solid. We have a double break at B and a double break at D, and we wish to preserve both the key seat, C, and the fancy opening at E. By packing these with clay, well tamped, the weld can be made, and after cooling and grinding it can be removed and all parts will fit as well as before broken and your customer will wonder how you do it. Just tell him you can do anything and stick to it and make good and business will come your way as if by magic.

Thoughts on Timely Topics

BY THORNTON

THERE ARE FEW PRACTICES in this little old world of ours that get my ruminating, horned quadruped so thoroughly as this "near-silk"—"near-gold"—"near-best" chatter that is handed out to one in all channels of business and life in general. We witnessed a bowling match the other evening. Well the best team won and the losers almost won—they were near-winners. We went into a store to buy what were advertised as "silk socks". But when we looked at the label before purchasing we found the word, "finished", between the word, "silk", and the word, "socks". Needless to say that finished us and we were only near-purchasers of near-silk socks. And so it goes. I have about as much friendship for the words, "almost" and



"near", as an old-fashioned horse-shoe has for automobiles. There's not a city, town or settlement in these forty odd states that can't point out its near-Ty Cobb or its almost Home Run Baker. But the fact remains, there is only one person who is pulling down the money

ford" for purchasers of self-propelled vehicles. And that reminds of the little pun a friend of ours got off some time ago. He said there were two classes of automobiles—the Fords and the Cant-Affords. Of course, this is some more free advertising for Mr. Ford, but you can take it or leave it.

able half-way stand for both sides to take and that has my O. K.

THE SERIOUS PARAGRAPHS now being off our chest we'll now proceed with a matter (in lighter vein, though none the less serious) that has troubled us considerably lately—especially at night. If there is any one thing on this good, old earth that will break the rest of an otherwise peaceful family quicker than the midnight chugging of an automobile outside the front gate, we have yet to know about it. Several years ago B. A. (Before Automobiles) we used to think that the acme, alpha and omega of sleep-disturbers was a sleep-walking moon-braying cur. But the consumptive midnight-auto has the cur lashed to the post. There is certainly something wrong with the gimlet-headed imbecile who will stop his car outside somebody's snooze parlor and try to get his engine to cough up the price of the next two miles from its 60-horse power depths. Of course, there may be some real good reason for stopping a four-lunged, gasoline-exuding cart and making it hack, hawk and cough as though it were in the last stages of slow consumption and asthma, but why in the name of Morpheus doesn't the addle-pated driver put his asthmatic, sleep-destroyer on a scow, have it towed out into the Atlantic and then let'er cough!



THE AUTO-OWNING FARMER CAN MAKE QUICK TRIPS TO TOWN WITH A LIGHT LOAD

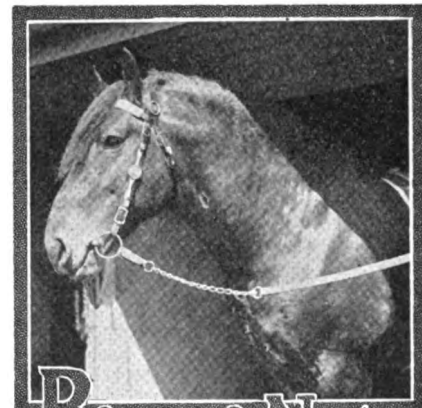
to do the work that Cobb does. And to get right down to brass tacks—there are some men who are near-smiths and almost-horseshoers. They can not quite do the work as it should be done.

IF THERE IS ANY ONE ARTICLE of manufacture on this little, old sphere of ours that has had more jokes told about it and has more fun poked at it, than the Ford automobile, I will give one new spark plug to the person who tells me what it is. Every time I attend a gathering where there are two or more auto-owners I hear at least three new Ford jokes. And at a recent meeting which one lone Ford owner had the nerve to attend despite the presence of fourteen owners of other makes, I heard enough Ford stories to fill a book the size of a small dictionary and slop over into the new edition of the Encyclopedia Britannica. But after all the stories are told and all the laughs have died away, do you notice how someone will come across with: "Well, you never see one stuck." It may be all right to poke fun at the Ford and to make sport of its relationship to certain species of the insect family, but, I notice there is a whole slew of manufacturers making accessories for the little despised model T. And there's not another man in the world that is getting as much free advertising as the chap who put "ford" in "af-

I don't own a Ford nor any other brand, so when it comes to riding I use the poor man's electric—the trolley. So there's no harm done, and if it does Ford any good he is entirely welcome. The fact remains—there's something to think about in this Ford success and the good work Ford is doing.

OF COURSE YOU'VE HEARD about the man who'll rig up his shop with every new fangled device on the market from a straight front horse rack with self-reducing attachment to a gasoline-kerosene-crude oil consuming engine, and then contentedly sit by while his wife attempts to start breakfast on an obsolete, asthmatic cook-stove of the vintage B. C. But we heard of the opposite extreme the other day—a smith who had rigged out his home with bargain counter products of every kind from the piano with self-playing attachment in the parlor to the clothes-washer with wind stacker and laundry shute feed in the basement. And his shop—well, a trip, stroll or walk through it could be head-lined as "A Trip Through the Ancient Ruins of Vulcan's Forge".

I'm not saying a word against getting things for the home, but there is no more reason for a man hogging all of the appropriation for modern equipment to his own bosom than there is for a woman to side-track it all into the home. There is a reason-



Bison's Notes

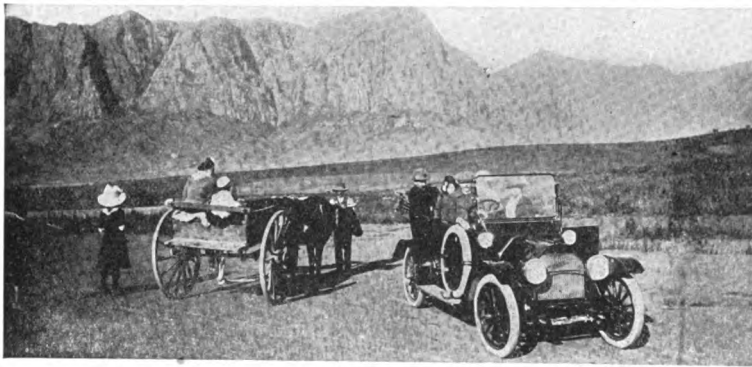
It is becoming evident to those who take note of the statistics relating to trotting horses and their breeding that there has been a pronounced change in the age at which trotting stallions become sires of standard speed performers. A quarter of a century ago it was the exception for a stallion to become a speed sire under twelve or fourteen years of age. Many of the great sires of the period antedating the colt tramping era, which was ushered in about 1880, attained fame only when they had reached the old-age stage—anywhere from seventeen to twenty-five years of age. George Wilkes, founder of the noted Wilkes branch of the Hambletonian family, was past twenty when his first



performers of note appeared and he was dead before the great merit of his family became apparent. Electioneer, head of the other most famous branch of the Hambletonian family, was about fifteen years public attention and he was twenty when old when his get commenced to attract it became evident that he was the great sire of his generation. In those days, preceding the furor for colt training which followed the sensational performers of the colts bred and trained at Gov. Stanford's, then famous Palo Alto Farm in California, few trotters appeared on the turf until they were six or seven years old and they trained on for several years improving their records gradually each season. Goldsmith Maid, 2:14, the champion trotter in the early seventies, was seventeen years old when she made her fast record. Rarus, 2:13½, who succeeded her as champion, was eleven years old when his best record was made. The next three sensational trotters and their ages when they trotted their fastest miles were St. Julien, 2:11¼, at eleven years, Jay Eye See, 2:10, at eight years and Maud

three-year-old record 2:15; Amors McKinney (seven) sire of Baymors, three-year-old record 2:14¾; Colorado E., (seven) 2:04¾, sire of Colorado Belle, two-year-old record 2:17¼; Boavista (seven) 2:16¼, sire of Bilara, two-year-old record 2:18¾; Director Todd (seven) sire of Young Todd, two-year-old record 2:17½; George Todd (seven) 2:07¾, sire of Guy Rea, two-year-old record 2:18½; Baron Nill Tell (six) 2:19¼, sire of Baroness Parmelia, three-year-old record 2:12½, and Richman. (ten) 2:06½, sire of Highbon Lady, three-year-old record 2:09¾; High Ad-year-old record 2:12½ and Richman, miral (eight) 2:07¾, sire of Bessie Ad-half-mile track, and High Jensen, three-year-old record 2:15¼. There are, as before stated, eighty-nine of these sires ranging from four to ten years and sixty-one of them have standard records themselves. Not one of these early-speed sires has other than an ancestry tracing to the best blood lines of today, a fact that taken with their own developed speed, shows how the breeding methods of this era

Axtell, 2:12, by William L. 105,000
 Director, 2:17, by Dictator 75,000
 Dan Patch, 1:55¼, by Joe Patchen 80,000
 Anteco, 2:16½, by Electioneer.... 55,000
 Bell Boy, 2:19¼, by Electioneer... 51,000
 McKinney, 2:11¼, by Aleyone... 50,000
 Stamboul, 2:07½, by Sultan 50,000
 Dare Devil, 2:09, by Mambrino King 50,000
 Hamburg Belle, 2:01¼, by Axworthy 50,000
 The Harvester. 2:01, by Walnut Hall 50,000
 Robert McGregor, 2:17½, by Major Edsall 50,000
 Allen Winter, 2:06½, by Ed Winter 50,000
 Nancy Hanks, 2:04, by Happy Medium 45,000
 Minor Heir, 1:59¼, by Heir-at-Law Directum 1, 1:58, by Directum Kelly 45,000
 Sunol, 2:08¼, by Electioneer.... 41,000
 Bingen, 2:06¼ by May King 40,000
 Major Delmar, 1:59¼, by Delmar Acolyte, 2:21, by Onward 40,000
 Billy Burk, 2:03¼, by Silent Brook Maud S., 2:08¾, by Harold 40,000
 Smuggler, 2:15¼, by Blanco 40,000
 Sultan, 2:24, by The Moor 40,000
 Pocahontas, 2:17½, by Cadmus.. 40,000
 Rarus 2:13¼, by Conkling's Abdallah 36,000
 Antevolo, 2:19½, by Electioneer... 35,000
 Uhlan, 1:58½, by Bingen 35,000
 Siliko, 2:11¼, by Moko 35,000
 Dexter, 2:17¼, by Hambletonian 33,000
 Todd, 2:14¾, by Bingen 32,000
 Peter Scott. 2:07¼, by Peter The Great 30,000
 Baden, 2:05¼, by Bingara 30,000
 Jay Gould, 2:21½, by Hambletonian Cochato, 2:11¾, by Todd 30,000
 Lady Thorn, 2:18¼, by Mambrino Chief 30,000
 Blackwood, 2:31, by Norman 30,000
 Prince Wilkes, 2:14¾, by Red Wilkes 30,000
 Ralph Wilkes, 2:06¾, by Red Wilkes 30,000
 Pancoast, 2:21¼, by Woodford Mambrino 28,000
 The Hangman, 2:28¼, by Robert McGregor 28,000
 Gov. Sprague, 2:20¾, by Rhode Island 27,500
 Patron, 2:14¾, by Pancoast 27,500
 Constantine, 2:12½, by Wilkes Boy 27,000
 Sidney, 2:19¾, by Santa Claus... 27,000
 The Abbot, 2:03¼, by Mambrino King 26,500
 Mascot, 2:04, by Deceive 26,000
 Alcazer, 2:20½, by Sultan 25,800
 Onward Silver, 2:05¼, by Onward. 25,000
 Wig Wag. 2:16, by Wiggins 25,000
 Sterling McKinney, 2:06¼, by McKinney 25,000
 What a part the blood of the Stallion Hambletonian 10 (Rysdk's), has played in the evolution of the light harness race horse is quite plainly shown when it is stated that just five of these high priced horses had none of his blood in their veins, the five being Smuggler, Pocahontas, Rarus, Lady Thorn and Blackwood. Thirty-nine of the fifty-two are descended from Hambletonian in the direct male line while eight others trace to that horse through their dams or the dams of their sires. It is to two sons of Hambletonian that this tables, as do all other tables relating to the breeding-on capacity of his blood point as the greatest lines from that horse, George Wilkes and Electioneer, and curiously enough, each of these horses is represented by thirteen male-line



WHEN THE OLD AND THE NEW MEET—THE BULLOCK CART AND THE AUTO

S., 2:08¾, at eleven years. Smuggler, 2:15¼, holder of the stallion championship for several years, was ten years old when he scored his best performance. With the advent of colt training, however, stallions commenced to enter the list of speed sires at a much earlier period in their lives. Now and then a stallion as young as twelve years would become a sire of a standard performer. After a little a ten-year-old sire would appear occasionally and of late years sires as young as six years have become fairly common. Last season one four-year-old stallion and three five-year-old stallions became standard speed sires and the list of such sires, ten years, old or younger, numbered eighty-nine. The four-year-old was Worthy McKinney (yearling record 2:30), sire of Suldine, 2:24¼, the fastest yearling trotter of 1914. The five-year olds were: Native King, 2:11¾, sire of Native Spirit, 2:09¾, the fastest two-year-old of 1914; the Marque, 2:19¼, sire of Don Marque 2:18¼, the world's champion trotting colt on a half-mile track, and Wilbur Lou, 2:10¼, sire of Fresta Lou, yearling record 2:25. Among the other precocious sires are Justice Brook (six), three-year-old record 2:08¼, sire of Gen. French, two-year-old record 2:10¼; Paronhurst (eight) 2:12¾, sire of Sweetie F., three-year-old record 2:08¾; Burning Star (eight), 2:14¼, sire of Star Kay, three-year-old record 2:15¼; Jim Logan (eight) 2:01¾, sire of Maxine,

differ from those in vogue twenty-five years ago when a large number of the speed sires "ran into the woods" in ancestry back of their first dam.

The recent sale of the pacer, Directum I 1:58, for a price stated to be \$45,000, indicates that the same desire exists today among the lovers of light harness race horses to own a world beater that was in evidence in former years, when a syndicate of horsemen paid C. W. Williams \$105,000 for Axtell, 2:12, when he was the world's champion stallion; when the late J. Malcolm Forbes, of Boston, paid Gov. Stanford, of California, \$125,000 for Arion after he had reduced the world's record for two-year-olds to 2:10¾, and a little later when Dan Patch, 1:55¼, passed to his present owner, a Minnesota breeder, for \$60,000. Since the sale of Directum I, doubts have appeared in print as to the correctness of the price paid for Dan Patch, but his owner has come out with the point blank assertion that he did pay \$60,000 for the stallion and he asserts, moreover, that the great pacer would have been a profitable investment had he cost him \$100,000. The list of trotters and pacers known to have been sold for \$25,000 or more each, is long enough to cause surprise to any but those who have made a point of keeping track of such things. The horses entitled to a place in this list are:

Arion 2:07¾, by Electioneer.... \$125,000



descendants in this list of horses that have been sold for \$25,000 or more. The thirteen descended from George Wilkes are: Artell, Dan Patch, McKinney, Hamburg Belle, Allen Winter, Acolyte, Billy Burk, Siliko, Prince Wilkes, Ralph Wilkes, Constantine, Onward Silver and Sterling McKinney, and the total amount of money brought by them is \$567,000. The thirteen descended from Electioneer are: Arion, Anteeo, Bill Boy, The Harvester, Sunol, Bingen, Major Delmar, Antevolo, Uhlan, Todd, Baden, Cochato and The Abbott, and the total paid for them is \$590,500. This makes over a million dollars paid for twenty-six descendants of just two sons of the horse that William M. Rysdyk, of Chester, Orange County, New York, bought when a suckling colt, together with his dam, in 1849 for \$125.

There is a great deal of talk among persons who take an interest in harness racing about the pacers which wear or wore hobbles in their races and those

that the hobbled pacers have played as great a part on the turf as the free-legged ones will be surprised to learn how far out of the way they have been in their estimates when they look over the two lists. Not only have three free-legged horses paced faster than the fastest one that wore the hobbles, but the records of the ten free-legged horses average 1:59 1-5 (which equals the record of the fastest of the hobbled brigade), while the average of the records of the ten that wore hobbles is only 2:01 1-5. In the light of these figures it seems as though the advocates of a no-hobble rule have everything on their side.

The leading breeders of trotters seem to be quite generally filling their studs with record mares and, moreover, mating those mares with record stallions. Forty years ago there were many controversies between breeders as to the value of development to stallion intended for breeding purposes. Gradually opinion veered toward

2:26 1/4 and Floella, 2:29 1/4, to Oakland Baron, 2:09 1/4.

A. B. Coxe, the leading breeder of Pennsylvania, has named these: Czarevna, 2:07 1/4; Muda Guy, 2:09; Bertha C., 2:10 1/4; Mrs. Stokes, 2:10 3/4; Margaret Prina, 2:14; Jane Jones, 2:14 1/4; Biss, 2:10 1/4; Chimes, of Normandy, 2:16 1/4, and Kenella, 2:22 1/4, to Dillon Axworthy, 2:10 1/4; A. Leading Lady, 2:07; Vonia Worthy, 2:22; Dorothy Axworthy, 2:22 1/4; Nell Worthy, 2:22 1/4; Fruity Worthy, 2:25 1/4 and Nye Worthy, 2:26 1/4, to Peter The Great, 2:07 1/4.

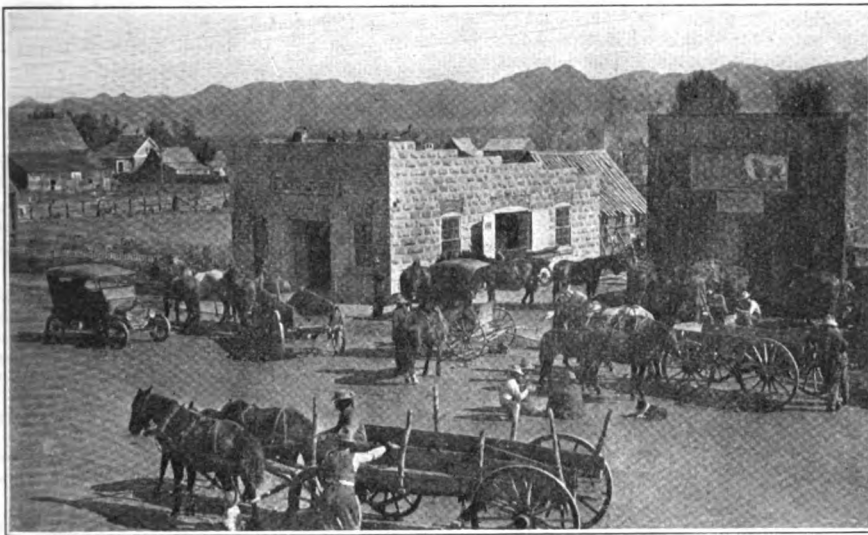
An Illinois breeder, L. E. Brown, probably the most extensive breeder in that State, has nominated these record mares: Miss Adrian, 2:09 1/4; Hydrad, 2:14 1/4; Tramp Bells, 2:19 1/4 and Galtane, 2:29 1/4, to The Exponent, 2:11 1/4; Maybar, 2:25; Countess Watts, 2:29 1/4 and Cabinet's Honor, 2:30, to Trampfast, 2:12 1/4.

Although developed, or record mares have not been used in the stud extensively until within a comparatively recent period, seventeen of the trotters having records of 2:05 or better are out of such mares as follows:

- Hamburg Belle, by Axworthy, 2:15 1/2, dam Sally Simmons, 2:13 1/4 2:01 1/4
- Dudie Archdale, by Archdale, dam Dudie Egmont, 2:13 1/2 2:03 1/4
- The Abbott, by Chimes, dam Nettie King, 2:20 1/4 2:03 1/4
- Billy Burk, by Silent Brook, 2:16 1/2, dam Crystal's Last, 2:27 1/4 2:03 1/4
- Highball, by Dr. Hooker, 2:23 3/4, dam Lena S., 2:22 1/2 2:03 3/4
- Lord Dawey, by Admiral Dawey, 2:03 3/4, dam Extasy, 2:11 1/2 2:03 3/4
- Soprano, by Bellini, 2:13 1/4, dam Operetta, 2:26 1/4 2:03 3/4
- Jack Leyburn, by Alto Leyburn, 2:24 1/4, dam Elsie Leyburn, 2:27 1/4 2:04 1/4
- Joan, by Directum Spier, 2:11 3/4, dam Sarah W., 2:18 1/4 2:04 1/4
- Penisa Maid, by Pennant, 2:15, dam Seneca Maid, 2:20 2:04 1/4
- Sonorna Girl, by Lynwood W., 2:20 1/2, dam Maud Fowler, 2:21 1/4 2:04 1/4
- Spanish Queen, by Onward Silver, 2:05 1/4, dam Elfin Dance, 2:27 2:04 1/4
- Lillian R., by J. T., 2:12 1/4, dam Letitia, 2:18 2:04 1/4
- Admiral Dewey, by Bingen, 2:06 1/4, dam Nancy Hanks, 2:04 2:04 3/4
- Grace, by Peter the Great, 2:07 1/4, dam Orianna, 2:19 1/4 2:04 3/4
- Star Winter, by Ed. Winter, 2:12 3/4, dam, Elsie, B. E., 2:29 1/4 2:05
- Willy, by Wilburn M. 2:14 1/2, dam Fantissima, 2:33 1/2 2:05

That this list will increase with great rapidity during the next decade is a certainty, for now a hundred record mares are bred each season where less than a dozen were bred two decades ago.

These figures regarding the 2:10 trotters out of record mares will cause the minds of many older horsemen to revert to the period when a 2:10 trotter was so rare as to be a sensation. Commencing with 1890 when the 2:10 list received its first trotters, Maud S., 2:09 3/4 (later 2:08 3/4), and Jay Eye See, 2:10, that list has received additions as follows: 1890—2; 1891—5; 1892—5; 1893—9; 1894—10; 1895—13; 1896—8; 1897—18; 1898—20; 1899—18; 1900—16; 1901—12; 1902—29; 1903—27; 1904—31; 1905—32; 1906—31; 1907—33; 1908—44; 1909—30; 1910—55; 1911—50; 1912—52; 1913—62; 1914—76. Total 967. What a wonderful showing when it is considered that it was only 69 years ago that the first trotter beat 2:30.



THE ESTABLISHMENT OF MR. A. W. NORTON, JR., IN UTAH DOESN'T APPEAR TO FEEL THE BUSINESS (?) DEPRESSION

which did not require those unsightly appliances. Off-hand, it is doubtful if one man in five could recall the fastest pacers in each division, therefore a list of the ten fastest free-legged pacers and one of the ten fastest hobbled pacers will be of general interest to readers of THE AMERICAN BLACKSMITH who follow harness racing affairs closely:

The Free-Legged Ten

- Dan Patch, by Joe Patchin..... 1:55 1/4
- Directum I., by Directum Kelly... 1:58
- Minor Heir, by HeiratLaw..... 1:58 1/2
- Andubon Boy, by J. J. Andubon... 1:59 1/4
- Star Pointer, by Brown Hal..... 1:59 1/4
- William (4), by Abe J..... 2:00
- Dariel, by Alcander..... 2:00 1/4
- Evelyn W. by The Spy..... 2:00 3/4
- John R. Gentry, by Ashland Wilkes 2:00 3/4
- Lady Maud C., by Chitwood..... 2:00 3/4

The Hobbled Ten

- Frank Bogash Jr., by Frank Bogash 1:59 1/4
- Prince Alert, by Crown Prince..... 1:59 1/2
- Bolivar, by Wayland W..... 2:00 3/4
- Flower Direct, by Direct's Star... 2:01
- Earl Jr., by The Earl..... 2:01 1/2
- Independence Boy, by Thistle..... 2:01 1/2
- Ross K., by Constanero..... 2:01 1/2
- Citation, by Norvalson..... 2:01 1/4
- Jim Logan, by Chas. Derby..... 2:01 1/4
- Coney, by McKinney..... 2:02

record stallions. Then some two decades ago, the battles over development were fought all over again, but that time it was record mares versus no-record mares that formed the subject of debate. Now, even the tyro in trotting horse breeding looks for the produce of record sire and record dam when purchasing a colt or filly. The leaning towards record mares on the part of the successful breeders is very clearly shown by the entry list to a futurity stake for foals of 1915 recently published. For instance, Hillanddale Farm, where Soprano, 2:03 3/4, Bonington, 2:06 1/2 and many other fast trotters were bred and one of the noted trotting nurseries of the Empire State, has named record mares bred to record stallions as follows: Beatrice Bellini, 2:08 1/2 and Elsa Bellini, 2:25 3/4, to The Harvester, 2:01; Sweet Maine, 2:02; Quite Worthy, 2:16 1/2 and Beatrice May, 2:27 1/4, to Bonington, 2:06 1/2; Minter, 2:14 3/4; Pleasant Thought, 2:21; The Huntress, 2:23 1/4 and Natoka, 2:24 1/2 to Atlantic Express, 2:08 1/4.

Hudson River Stock Farm, at Poughkeepsie, N. Y., have record mares named in this stake as follows: Lula Arion, 2:08 1/4, to Peter The Great, 2:07 1/4; Laureatta, 2:08 1/2; Fancy Colors, 2:18; Faustelle, 2:26 1/4; Miss Dolly Hale, 2:26 1/4; Lady Nexford, 2:27 1/4 and Bingen Maid, 2:29 1/2, to Guy Axworthy, 2:08 3/4; Varon,



Fishin'

W. O. B.

When the sun begins t' git hot on yer back as y' sit out on the stoop these days, —when y' begin t' amell the moist, meller earth, it brings pictures o' other things t' mind. An' then jes' about thet time y' kin look fer a good ol' fashion'd attack o' spring fever. Well, I got it t'other day an' this is one o' the results:

When the fishin' pole's a-noddin'
An' the corks a-goin' down—
An' yev' ketched a-nawful whopper
Thet is pullin' like a houn',
Ain't y' happy when y' land him,
Don't y' smile an' tell of it,
Don't y' get real kind o' chesty
An' jes' swagger 'bout a bit?

When the fish air kind o' skairy
An' they seem a-kind o' shy,
When the line don't show a shiver
An' the big uns float right by,
Don't y' feel jes' kind o' foolish
Like y'd outer hev more sense,
Ain't y' thinkin' thet yer crazy
As y' climb the back yard fence?

An' ain't business jes' like fishin'—
Sometimes good an' sometimes bad.
If thar bitin', why y' ketch 'em
If they ain't, then why get mad?
Why thur ain't no call fer sulkin'
Or fer blues an' black despair
If y' allus do yer very best
Fer results y' needn't care.



Heats, Sparks, Welds

About the best thing for a swelled head is a little sweat.

Loose methods in business often lead to tightness in money affairs.

Ever hear of anyone going beyond the standard they set for themselves?

Did anyone ever hear of a hen stop scratching because the worms were scarce?

If we haven't stirred up your think-box this month we have missed our aim.

When looking for faults, wouldn't it be a good idea to use a mirror instead of a telescope?

For that tired feeling in the Spring the best drink is Adam's sparkling "ale" fresh from the well.

It's a good idea to build air castles, but don't forget the foundations for them or they'll come to naught.

Loaning tools? Would a shoemaker loan a pair of lasts? Charge something and make it worth your while.

Business for European junk dealers must be booming—at least, they cannot complain of a shortage of their goods.

Borrowing ideas is a good thing in business. It broadens your scope and strengthens the foundations on which you have built.

Was the bag of profits for the past year as big as you expected? Do you really get all the profit you expect? If not, something's wrong. Better dig into your business a bit.

The best cheer up motto the smith can have in his shop is a bright smile and a cheerful disposition. And it will get more business and hold more trade than a whole shop full of mottoes.

I met a man carrying a lighted lantern in broad daylight. No, it wasn't Diogenes. It was only a citizen with a badly lamed horse looking for the remains of a state road that had been built two years ago.

Did you ever think what life would be without the motive, the incentive? 'Twould indeed be dreary, empty and barren. So see that your motive is worthy—that the ideal you are striving for is right.

Thirty-nine thousand years is said to be the age of the falls at Niagara, though it is estimated that the full power of the four Great Lakes has only been going over the great cliff for thirty-five hundred years.

Perhaps sum fellars don't want t' know what good failures they are an' fer that reason ain't hankerin' after any book-keepin' t' show them up," says Ol' Si Cology from his easy chair on the sun-bathed porch.

Do you know all about your business? It may be well sometimes to accept a suggestion from one of the men. You hire them for what they know and do. Cash in on their knowledge fully by asking their advice occasionally.

The jockey who stops to congratulate his horse at the three-quarter post never won a race. It's the chap who keeps a-driving the entire course and saves his congratulations till the race is won who has the best chance.

This rule will interest readers generally at this season—the spring painting period. To estimate the number of gallons of paint required to cover a given surface, divide the number of square feet of surface to be painted by 200. This will give you the number of liquid gallons for two coats.

Tom Tardy invested in a horse some time ago, so we hear, but soon sold it again because it was always gnawing the fences. He says that the old horse got some straw for breakfast, more straw for dinner and all the straw it could eat at night. And he can't see what more an ordinary horse could have desired!

Are you asking Subscribers' Service for help? If not, you are missing an opportunity that your subscription order gives you. There isn't very much along smithing and smith shop matters that the Subscribers' Service Bureau cannot help you with. This helpful service is for YOU—Mr. Reader—use it.

A water cartridge for mine blasting has been suggested by an English engineer. The plan is to fill the cartridge with water, insert it into the drill hole and then turn the water into high pressure steam by means of an electric current. It is said

TRUE TALES OF OUR SERVICE NUMBER FOUR

A Kansas smith was having difficulty in collecting his accounts. He had plenty of business but was continually "hard put" for lack of ready cash and had difficulty in collecting his accounts. He wrote to us explaining his difficulties and asked for suggestions. We outlined a method to fit into his case and in a recent letter he says: "Your scheme works like a charm—funny I never thought of that myself".

that a cartridge, made to resist a pressure of 150 pounds to the square inch, will burst one minute after the current is turned on.

According to a government expert aluminum is about equal in strength to cast iron in tension while in resisting compression it is comparatively weak. Under traverse strain this metal is not very rigid but it will bend nearly double before breaking. Its tensile strength is greatly improved by forging and pressing at a temperature of 600° F. and when alloyed with nickel it is considerably stronger than when pure.

Cleaned-up that scrap pile yet? About time, isn't it, to look about a bit and get things into shape for more work? How about the outside of the shop? What of those tires and wheels and gears laying about the lot? Better a neat sign to tell of your business than a lot of junk that has long since passed the stage of value. Do it now—don't wait for the snows of winter to again cover these things from sight.

The motor of a man—the impelling force—is the motive in him. You can draw a toy engine by a string; but there are no strings on the train that makes a mile-a-minute—that engine carries its own fire. Every inefficient man is being pulled along by the string of necessity, that has no connections with his mental machinery. But when a man starts to generate his own fire—then look out!—an express train is coming.

Four hundred million tons is said to be the average yearly consumption of coal in the United States, and yet a government expert assures us that there is still enough coal unmined in the United States—not including Alaska which still harbors some fifteen hundred billion tons—to last for five thousand years. So despite the wintry ravages, assaults and depredations of sundry furnaces and stoves upon helpless coal bins there will be plenty of the black diamonds to pass around for some time to come.

How long must we wait before we receive that letter from you for publication? You've been reading and enjoying the letters of other readers and practical smiths, now, why not give them something practical and interesting from your experience? If we all depended upon ourselves alone the craft would not advance very fast. Suppose others had withheld the information you have gotten out of this issue! Suppose you had to depend entirely upon yourself for new ideas, new methods and new stunts! And where would the craft be today if everyone did the same? This matter of craft advancement means big, broad-minded consideration of the give and take attitude. Again we ask how long before you send in something to help the craft?

Our Honor Roll

JANUARY, 1918 REMOVED

To make room for the additions to Our Honor Roll this month it was necessary to remove the January, 1918, names from the list.

Watch the 1925-class grow. It's easy to get into this group. For example if your subscription expires this month, send a remittance of five dollars (\$7.00 in Canada or 1 £ 14 sh. in other countries), and have your account advanced ten years. Think of the money saving—think of the time and trouble saved—and then too your name is placed on Our Honor Roll. Do it NOW.

Table with 3 columns: U. S. and Mexico, Canada, Other Countries. Rows show subscription terms (2 yrs, 3 yrs, 4 yrs, 5 yrs, 10 yrs) and corresponding costs in dollars and cents.

Send your order and remittance now—today. Don't wait until you forget all about it. You'll never regret it. Our subscription insurance saves you money. The sooner you begin saving the more you save. There is no time better than NOW.

Main list of names and subscription dates. Columns include NAME, Subscription Paid to, and NAME. Lists names alphabetically by name, with subscription dates ranging from 1915 to 1923.

Table with 3 columns: NAME, Subscription Paid to, and NAME. Lists names alphabetically by name, with subscription dates ranging from 1915 to 1918.

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The Horseshoer

More Horses and Mules

According to the information collected by the U. S. Department of Agriculture, all classes of live stock in the United States are increasing in numbers. And it is especially pointed out that the sensational rumors of extreme meat prices and extreme shoe prices, are entirely unwarranted.

The prediction of 50-cent meat and \$10 shoes was accompanied by the declaration that France alone has taken from America nearly 300,000 horses within the last 5 months and that the other countries at war have drawn upon our resources in the same proportion. The facts are that more horses were on the farms of the United States on January 1, 1915, than were a year before, the increase being 233,000 head or 1.1 per cent. So far from France alone having taken 300,000 horses from us, the total exports since the war began have certainly been much less than 100,000 and very likely not over 75,000. Since there are approximately 25,000,000 horses altogether in the United States, the drain on account of the war is scarcely alarming.

It is in fact pointed out by Government statisticians that the market value of farm horses has actually declined to such an extent that the average is now about \$6 a head less than a year ago. This decline is most noticeable in the cotton States and in those States which make a business of breeding horses for sale in other sections. Mules have declined even more than horses, their value being now \$11.50 per head less than a year ago. The explanation is to be found in the depression on account of the cotton situation in the South, which is the great market for mules. An improvement in this respect will do much to restore the demand for horses, so that Government special-

ists, while ridiculing the notion of a horse famine, are convinced that farmers will find it profitable to use good work mares for breeding more stock.

The table showing the numbers of horses and mules on farms and ranges together with their values for the past six years is interesting in this connection. This table is based upon the reports from the department's correspondents and agents and show estimates, except in the case of the year 1910, which is the census report:

HORSES.			
	Total No.	Value per Head.	Total Value.
Jan. 1, 1915	21,195,000	\$103.33	\$2,190,192,000
Jan. 1, 1914	21,962,000	109.33	2,291,638,000
Jan. 1, 1913	20,567,000	110.77	2,278,222,000
Jan. 1, 1912	20,509,000	105.94	2,172,694,000
Jan. 1, 1911	20,277,000	111.46	2,259,981,000
Jan. 1, 1910	18,833,000	108.03	2,142,524,000

MULES.			
	Total No.	Value per Head.	Total Value.
Jan. 1, 1915	4,479,000	112.36	503,271,000
Jan. 1, 1914	4,449,000	123.85	551,017,000
Jan. 1, 1913	4,386,000	124.31	545,245,000
Jan. 1, 1912	4,362,000	120.51	525,857,000
Jan. 1, 1911	4,325,000	125.82	544,359,000
Jan. 1, 1910	4,210,000	120.20	506,049,000

Shoeing the Five Gaited Saddle Horse

LESTER W. SIMS

Having thoroughly discussed the facts pertaining to getting the youngster or green horse gaited, that

which means so much, yet is so seldom understood. Just a moment for comparison; take a look at the green horse, in the raw, as compared with the high class finished product with his splendid shoulder, knee and ankle action in front, with plenty of stifle, straight line There is no swinging in or out of front feet, and no sprawling (too wide) nor crossing in (too narrow) behind. The facts as brought out in this article are the ones that bridge across this broad expanse of difference between the raw horse and the high class finished product.

Now, if we picture in our own minds some of the good ones seen in the show ring or arena, we say it is great yet how true, when we hear a great musician, or see other great accomplishments, how we wish we too could accomplish the same feat. Little do some realize how it was accomplished. How by hard work, study and practice day after day, week after week, year after year, eventually the final result, the reward of success and accomplishment is gained.

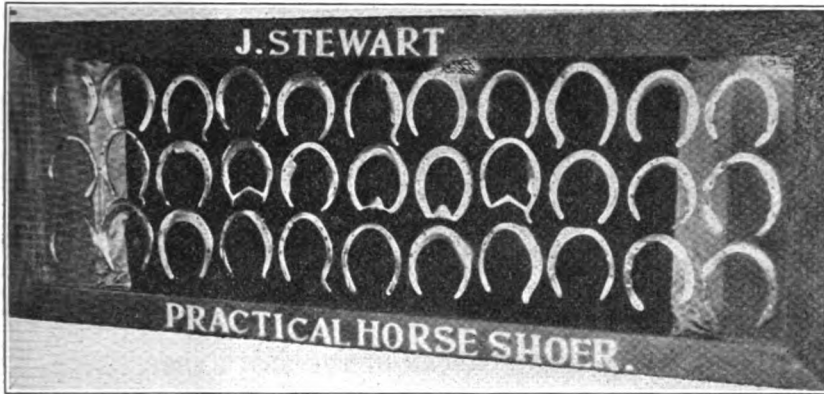
I have been a horse shoe fan all my life. Some might even say,



READY FOR THE RUSH—A PILE OF 526 SHOES CALKED AND WAITING FOR WEARERS. MR. CLAYTON E. MARKEL OF PENNSYLVANIA BELIEVES IN LABOR SAVING EQUIPMENT.

is, to rack, trot, canter, etc, we now proceed, by taking up the subject of developing or building up the action, hock and ankle action behind. He is good at all four corners and in a

crank. At any rate, the crank is the power and a very important thing in this old world. For the mechanical crank drives the machinery, the religious crank drives the religious



MR. JACKSON STEWART OF MICHIGAN IS A SPECIALIST IN SHOERING AND HAS A FINE COLLECTION OF SHOES.

world, the business crank the business world, etc. And if you hope to be successful it is very necessary you be some crank, as in all affairs the amount of success will depend entirely upon the power of the crank; in this case, the ability of the trainer. To do what? Not to handle the reins, and to give the cue for taking the different gaits. The most important of all is proper shoeing. Every one who has any knowledge, will freely admit of there being some remarkable progress made on shoeing in the past 20 years; the material advancement being the outgrowth of experience as it were. Here are some of the lessons: First; the absolute necessity of a thorough knowledge of the anatomy of the foot itself, and its relation to the mode of locomotion. Second; the results obtained by shoeing with long and with short feet with the various degrees of angle, all of which have a direct influence on action. (Note, a short toe with high heels as going down grade, folding higher; a long toe with low heels as up grade, folding up less). Third; that weight in shoes causes exertion which naturally in turn creates action. Fourth; the distribution of weight, as to where it is placed in the shoe having its effect, as does the shapes of the shoes, hence the hundreds of different patterns and shapes, all of which have their merits and advantages when properly applied. At this point the question naturally arises, what is the right thing, in the right place, at the right time? This problem, unlike many other problems of this world, are only learned from that dear school of experience, and as mentioned above, is the result of hard work, study and practice year after year. A little learned here, and a little there, added together, then finally the problem is solved. Now get this if you will, there is a

perfect system to this shoeing game, and it will work just as easy as 2 plus 2 equals 4. Yet we hear men say, one can shoe no two alike, etc. That is only when the two cases are not alike. A lot of shoers need to use their heads for more than mere ornaments, or simply as a hat rack.

In summing up this proposition we find that the amount and kind of action will be determined by the long or short toes (length of feet) with the various degrees of angle. And as to the amount of weight and where it is deposited or placed in the shoe, as well as the shape of the shoe itself. With this knowledge at hand we are prepared to proceed with some lessons that will explain and demonstrate the principles involved herein.

What One Man is Doing for Some Aged Animals.

(MISSOURI)

There is an interesting group of



MR. JACKSON STEWART OF MICHIGAN BESIDE HIS FORGE. HE DOES A GENERAL SMITHING BUSINESS.

aged horses and mules being cared for by Mr. J. W. Tucker at North Fulton, Mo. He has two horses and three mules on his home place. Their combined ages total at least 150 years and they probably form one of the most interesting groups of quadrupeds to be found anywhere in this entire country. Mr. Tucker is quite certain that nowhere can one single group be found whose individual members have a more varied career than the ones he is now fathering in their last days. The writer, after looking them over, predicts that some of them are going to stick around for some time to come, and so as time goes on they will add quite a number of years to this total of 150 years.

The animals are those that have been in the service of the family in days gone by and are spending their last days in peace and contentment, getting their rations regularly three times per day. The kindness being shown them now by Mr. Tucker is a just reward for their faithful services in the years gone by.

Included in the lot is old "Buck", a horse now past 27 years old, that was ridden for years by the late Daniel M. Tucker, and "Buck" looks good for several years to come. The youngest of the group is "Prince", a driving horse, who has seen better days, and is now past 24 years of age. He was a clever road horse and during his career was driven mostly by Roy Tucker, a younger generation of the family.

In writing about the mules, I am reminded to ask, did you ever see a dead mule? If you did, it was neither of these that I am about to mention for they are very much alive and still capable of doing some-

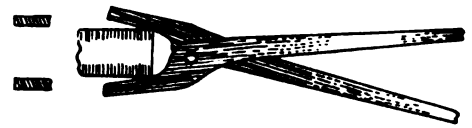


thing. Of the three mules "Sal" is the youngest at 32 years of age, and "Kate" was 21 years old many years ago, as was Trigg", a hybrid, who was old enough to vote for Wm. McKinley. But this is not intended to say he is a Republican, for in all probability, quite the contrary is true, for usually the mules are associated with the Democrats in Missouri.

Mr. Tucker has rejected all bids from intending buyers for his animals, although he has given some animals away at different times to persons whom he knew would treat them right and work them light. But, invariably like the cat, they always came back, so Mr. Tucker has concluded to keep them on the old home place for the remainder of their natural lives, allowing them to eat to their heart's content with the privilege of adopting the Wilson policy of watchful waiting for the summons to the animal heaven.

This story is incomplete without some mention of old Abner, an old negro on the Tucker home place. He has seldom, if ever, been seen off the place in recent years except on circus days. Old Abner never fails to take in the circus and to do some celebrating. Before starting to the circus grounds, old Abner gets his "hip pocket companion", and by the time he gets into the menagerie, he sees more animals and a greater variety than anybody else. After Abner has passed his hand from his hip to his head and back a few times, he becomes the "village cut up", and he is the happiest mortal that graces the face of the earth about that particular time.

The writer asked Mr. Tucker, more than 20 years ago, about Abner's age, and after figuring awhile he acknowledged no way of telling. No



B



HOW ACCIDENTS HAPPEN IN THE SMITH SHOP.

one else living was old enough to know, but he predicted that Abner would live forever and it would be necessary to knock him on the head with an axe on judgment day. Anyone reading this who is aging prematurely, may do well to visit this place of life, but remember, this is no land or horse sale scheme, for you positively can not buy the land or animals for either love or money. The estate is now in possession of the descendants of old Dan Tucker.

stand on the safe side; in this case (C in Fig. 1) on the left side. Many smiths have been injured by the helper carelessly striking on the opposite side.

Short pieces of round iron are often unwittingly left lying around on the floor and cause the men disastrous falls by stepping on them (A, Fig. 2). They are extremely dangerous when left lying around a steam hammer, and the writer knows of a helper being thrown under a hammer from this cause. Tongs play an important part. They should be made to fit the work they are intended to be used for. (B, Fig. 2). The smith who uses flat jaws to hold round iron is taking big chances that may result seriously.

Of course, a little extra trouble is necessary in carrying out a "Safety First" program, but the benefits thereby accrued should prove a sufficient reason why not the slightest item should be neglected. "Safety First" means "Thinking First".



The Machine and Tool Smith

Safety Tools for the Smith Shop

BERT HILLYER.

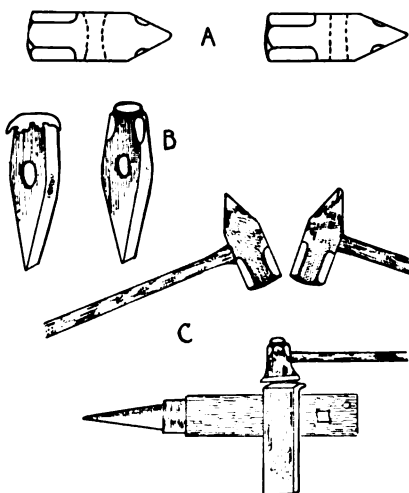
"It's the little things that count" is a phrase that is often heard. This applies emphatically to the "Safety First" idea. The writer has often seen the small, the commonly neglected things cause serious accidents.

Sledges—and all hammers in fact—should have a properly made hole for wedging in the handle. In a straight hole there is no room for wedging and the handle comes out very easily. (A in Fig. 1). Tools of all kinds with battered heads (B) chip off and inflict painful wounds to the operator as well as those in the shop at a distance. A helper, when striking sideways, should always

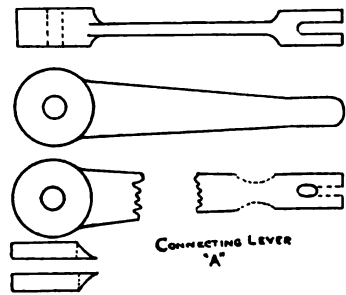
Tool Dressing

H. N. POPE.

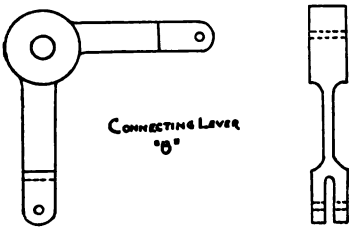
I recently overheard a smith say that there was nothing in the dressing of tools for the machine department, as he could make a diamond point lathe tool at one heat. I did not dispute him as I know it can be done, but would prefer a tool that it took more than one heat to make as in the first place one would have to heat the steel hotter than is good for the steel to be able to get a tool out at one heat. It is my belief to get a good tool it is best to heat moderately and not to use too hard blows with the sledge. If it can not be gotten to shape at one heat, it is no sin to take one or even more. After forging, heat to an even, dark red and lay one side to cool, then reheat and harden. A tool made up in this way will stand up to its work in good shape. Even in cutting off end I believe it good practice to take an extra heat, as often in cutting, if the tool is a



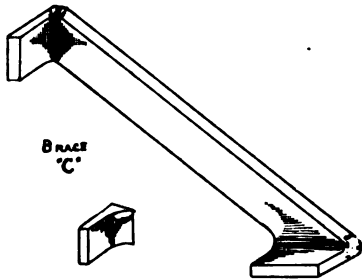
TO DO IT SAFELY, THINK FIRST.



CONNECTING LEVER "A"



CONNECTING LEVER "B"



BRACE "C"

A STEAM HAMMER WOULD SAVE CONSIDERABLE LABOR.

little cool, the edge, instead of cutting clean, will break off, leaving the edge very rough. One may think he is saving time to finish a tool at one heat, but when put to work the man at the lathe has to stop and grind so often that he has lost more time than the smith would have taken to take as many heats as he wishes. So in the long run I believe it pays to go a little slower and get a better article.

Hand Forgings

J. C. LAMON

The accompanying drawings will give the reader some idea of the range of forgings that can be done in an ordinary blacksmith shop where there is no steam hammer. These forgings and many others of different shapes are made in a "contract shop". We have no steam hammer, though it would be a decided advantage to have one. The following description as to how we forge, I trust, will be of some assistance to smiths doing this class of work.

At the outset I wish to say that we are well supplied with fullers, flat- ters, cutters, gauges, and tongs in a wide range of sizes.

Referring to A in Fig. 1 the connecting lever is made as follows: A piece of stock, 2½ by 2½ inches, is taken to make the jaw. First, we drive an eye punch through and drift out at dotted lines with gauge and hot cutters. Next, we take a piece, 1 by 4 inches, upset end where boss is, then get out two bosses with fillet as shown in illustration. Rivet in bosses to piece at dotted lines, then take a good heat in a "hollow fire" and weld up bosses; working the fillets down well on boss. First heat, and after that is finished we weld jaw with ordinary lap weld.

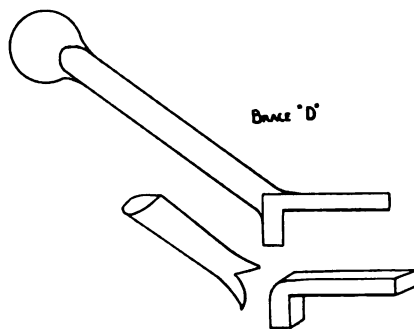
With connecting lever B, proceed as described in making jaws in A. As the jaws are at right angles of boss we forge each piece separately. To make the boss, bend a bar at right angles, then fasten on bosses and weld up in "hollow fire—the trace at C. Have the "feet" welded up with a jump weld; working down fillet thoroughly at first heat.

At D, Fig. 2, is illustrated a method of jump weld we use. For angle plates E, we take stock, 1 by 4 inches, and bend to right angles. It will bend according to dotted lines in engraving. We then split the corner open and weld in a "dutchman"; which brings up corners in good shape.

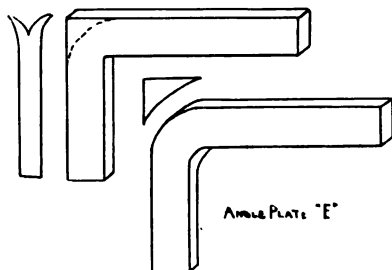
A Strong Socket Swivel

BERT HILLYER.

Socket swivels like the one in the engraving at A are used on wire cable hoists. This style socket is very strong. It is a puzzle to many

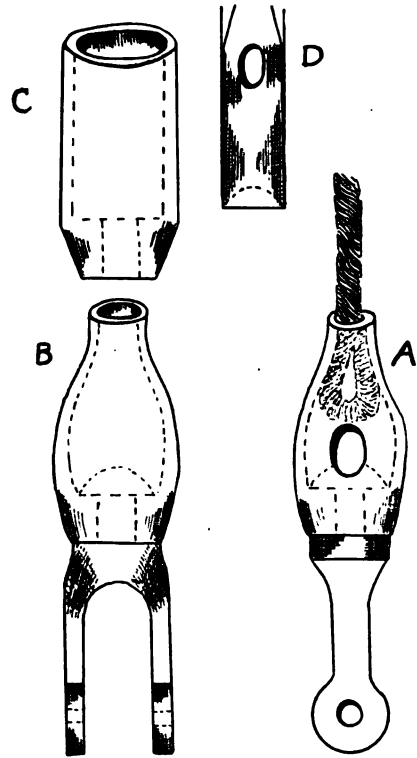


SWIVEL "D"



ANGLE PLATE "E"

THESE PIECES ARE FORGED WITHOUT THE HELP OF A STEAM HAMMER.



THIS STYLE SOCKET SWIVEL IS VERY STRONG.

how a full sized rivet head can be made inside a closed, tapering socket which has only a small hole in the side just big enough to turn the end of the cable back in the socket. Another use for this hole is to pour molten lead in. When this gets cold it holds the cable firmly in the socket. To make the socket, cut a piece of round, soft steel the size desired and taper one end of it. Then have a hole drilled into each end as shown at C. A jaw is made with a stem to go up into the small hole in the tapering end and this stem is left long enough to form a rivet head. The stem is heated to a good heat and placed inside of piece C, the round part inside of jaw resting on horn of anvil. Tool D is then inserted in the large hole in C and a few blows on the top forms the rivet head. Two necking fullers, top and bottom, closes the top so that the hole will be the size of the cable as at B. This part is easily done if good heats are taken. It will be noticed that this socket has no breaking points like the old style with two open sides which often broke at the shoulder.

Well Drilling Methods

L. R. SWARTZ

Some of the ideas set forth in the recent Government bulletin on this subject might be of some use to answer the questions of a delegation of



"The Ladies' Aid Society", but otherwise are of little practical use to the driller who is up against the real thing. Except for 12 or 14-inch bits, tool gauges are not made with $\frac{1}{2}$ -inch clearance to allow for contraction due to the cooling of the bit. Bit gauges of $3\frac{1}{2}$ to 6 inches have 1-16-inch clearance because that is the amount of contraction in the grade of steel used by most drill makers for the sizes given.

Strange as it may seem, shortly after I began dressing drilling tools (over 30 years ago) I discovered that the contraction of a $3\frac{1}{2}$ and a $5\frac{1}{8}$ -inch bit were so nearly the same that the calipers would not show any difference between the sizes.

It is not good practice to apply the gauge until the bit has been spread with the sledge because of the heat in the bit making the gauge too hot, beside being a nuisance in handling the bit while forging. As to the procedure of shaping and tempering the bit the directions given in the Bulletin are, in the main, right. The angle formed at the edge of the bit should be 100° to 110° . It is only in exceptional cases where the rock is hard and seamy that a blunter bit is needed.

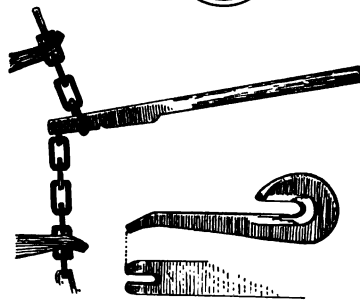
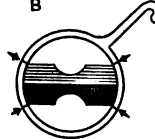
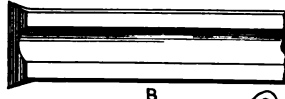
Many drillers have a practice of marking their joints after setting them up good and tight so that a glance will tell whether they are tight afterward. Every time the tools are set up these marks will pass just a little in the direction the screw is turned.

In setting up a new string of tools one should spring up the joints 3 or 4 times a day, using the wrench bar and circle to put the proper strain on the wrenches. This strain must be sufficient to make the wrench handles spring. Chain tighteners are more used than wrench bar and circle in some sections.

The reason why new tools require such close attention is this: It is very difficult to finish the screws and faces of a joint without leaving a very slight unevenness by the lathe tools. If one is drilling in soft material this may not cause trouble, but it is always best to be safe. The strain on the joints in hard drilling have a tendency to smooth out the unevenness on threads and faces of boxes and pins which leaves the joints a little looser than when first set up and the joint may become injured in the well. After the joints have been set up a few times they acquire a fit and are not liable to loosen in service. Too feeble tightening apparatus is the cause of the

usual joint troubles. In using the drilling bits be sure to make each bit take its regular turn in the hole. If one bit is used more than the other the screw on the one most used will become more warm than the other and after a while it will be harder to keep either tight because their bearing on the threads are not even.

It should be remembered that there is at least twice the wear on the threads of the box on the stem that there is on either pin of the bits,



SOME WELL DRILLING HINTS.

for this reason every driller should have a piece of fine grained grindstone or emery-faced up level and grind the face of the box a little every time the bits are changed. This grindstone should be 3 or 4 by 6 inches and kept faced up level. The best way to do this grinding is to hold the box with one hand and with the other dip the grindstone into water and grind the face by pressing upward and giving the stone a rotary motion as in wetting an axe, being sure to make the stone bear evenly on the face. This only takes a minute or two and it always keeps the face in good shape. These grindings wear a little of the metal from the face of the box and allow the pins to go farther up into the tapered box so as to maintain a snug fit all along the thread.

It also largely prevents the tendency of the threads to "fish-scale".

When setting up joints all threads should be clean and the pins should be cool.

Drilling jars are not used for the purpose of saving the drill rope but for the purpose of loosening the tools when they become "stuck" in the hole. Nothing but a rope knife can save a rope when the tools are fast. Every driller of experience knows that when a drill is running clear there is a constant tremor or vibration in the stem caused by the rebound of the tools striking the bottom of the hole. This occurs even in clay or earth and increases with the hardness of the material under the bit. When this vibration stops the tools cannot be loosened until the vibration is re-established. There are two methods of doing this: If the jars are not on, a "bumper" is fastened to the sand line, the drill rope is drawn as tight as it will stand and by means of the rope reel the bumper is run down the hole and a succession of blows delivered to the top of the rope socket. If the jars are on, a little rope is let down the hole to permit the jars to play, the bits set up the vibration in the stem and deliver a strong, upward blow at every revolution of the crank shaft.

Sinker bars are short section-like auger stems used between auger stem and rope socket where deep drilling is done under much water or in formations where there is a very pronounced tendency to stick the tools; they are sometimes added to the auger stem to increase weight of tools. They are not much used and in many localities jars are not in general use. The same is the case regarding temper screws.

The reasons for this are that a good drilling rig will make a straight hold faster without jars and without so much waste of power as when jars are used; also it is much easier to operate such a rig when drilling over the crown pulley. Of course, when more than 200 or 300 feet of drilling has to be done some prefer to use the temper screw.

Not only the edge of the drill but also the corners indicated by arrows as in the engraving must conform to a gauge. The shapes should be adhered to as shown at A and B. The temper is rather a reddish purple for well drill steel.

Editor's Note—Mr. L. R. Swartz is an expert on well-drilling matters and is always glad to answer questions on the subject. Readers interested in well work will find his articles both valuable and interesting.



A Live Credit Plan

E. V. S.

One of the greatest problems with which the smith has to contend, and especially the one who caters to the trade of farmers, is the matter of credits. He has a line of good farmer customers whose trade is desirable. He solicits their trade, sells low, and then in many cases waits — without interest — until harvest season for his money. This is obviously unfair to the smith, but is also unjust to the customer who pays cash.

E. Lewis & Son, were having a considerable number of accounts run-up and saw that this method of doing business was out of date. They decided that if they must borrow money from the banks in order to accommodate their customers, that those who were thus accommodated should pay for the service. So they charged interest on all over-due accounts. This change was a radical one, especially with two live competitors, in the town, who continued on the same old basis. It was, indeed, a drastic measure and many merchants would have hesitated to take such a step.

To acquaint their customers and the public of their plan they sent the following letter printed on their letterhead:

Dear Sir:—

Beginning July 1st, we will charge 8 per cent. interest on all open book accounts carried over 30 days.

We have now accounts on our books that should have been paid long ago. We have borrowed money at the bank to carry these accounts. This we cannot afford to do.

It is a discrimination against the cash buyer.

One customer pays cash, another asks us for time. We want the trade of both customers and will gladly extend credit to a customer deserving it, but we must charge him the cost of carrying this account on our books when it runs over thirty days.

We can borrow money at 6 per cent., but it takes on extra 2 per cent. to pay the bookkeeper, buy day-books, journals, ledgers and other items that make up the cost of carrying these accounts.

The above goes into effect July 1st. In other words, work charged June 1st and not paid for by July 1st will have an addition of 8 per cent. interest charged on the account at that time.

Yours sincerely,
E. Lewis & Son.

To those customers who had accounts with the firm at the time, the following letter was sent out in May, so as to give the customers plenty of time to attend to their accounts:

Dear Sir:

Beginning July 1, we will charge 8 per cent. interest on all accounts carried on our books over 30 days.

Your account now amounts to \$..... If this is paid by July 1, you pay the above amount, but if it is not paid then, we will charge interest from June 1. The reason for this is that the old method is a discrimination against the cash buyer.

We want all the trade we can get, both cash and credit. You being worthy of credit, we gladly extend it to you; but we must ask that you pay us 8 per cent. interest if you ask us to carry your account over 30 days. We pay 6 per cent. interest on money we have to borrow and it costs 2 per cent. of our credit sales to pay the bookkeeper and to buy the necessary office supplies incident to carrying on a credit business. Thus you see, in asking you to pay this interest, we put you on an equal basis with the cash customer. As it has been, the man who got his work charged received a better bargain than the

man who paid cash, because he not only had the work done but he had his money to use elsewhere. Is this fair to the cash customer—is it fair to us? We buy our materials on 30 days' time and have to pay for them at that rate.

You have now three months to settle your account without interest as it now stands. Will you help us with a clean page on our ledger under your name on July 1?

Yours sincerely,
E. Lewis & Son.

The hard part of the plan came, of course, during July and it is not improbable that E. Lewis & Son at times thought they had made a mistake; but they stuck bravely to their program. Mr. Lewis, in writing of the affair, says:

“Our trade fell off \$500 in June, that is, it was that much less than it was the previous year. And it was the only time we know of that a lost customer helped our business, as the talk he made was the finest kind of advertising, and it sent more cash customers than those we had lost. Our trade the rest of the year has been better than evr before, and it has come in as ‘Real Money’ and not ‘Charge It’.

Along in July when the trade began to pick up and people began to realize the justice of the system, the firm sent out a booster circular letter, as follows:

“We are now doing practically a cash business. You know that we can buy cheaper for cash and, therefore, you can.

“We extend credit to responsible people and we know you to be such, but we ask you to pay for this service after the account runs 30 days. And we do this to put the cash customer and the credit customer on the same basis”.

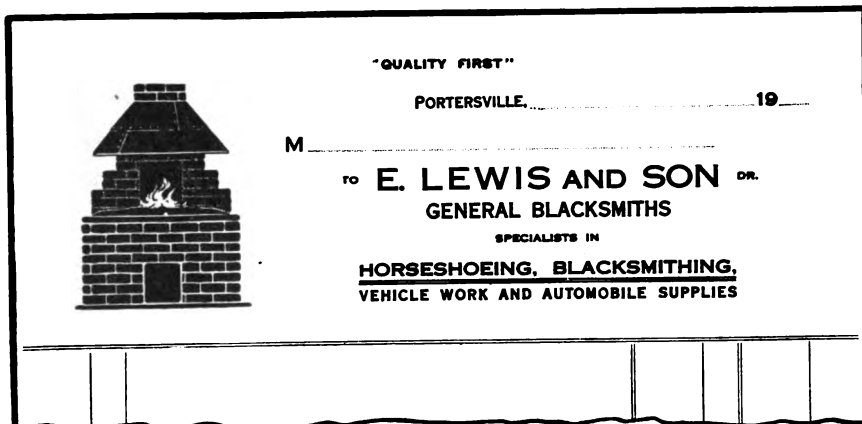
The letter then went on to compare the business transaction of a cash and credit customer and how the increased cost of handling the account and the virtual loaning of money to the credit customer makes the cash customer help bear the cost of the business.

The letter concluded:

“We have been doing business this way since June 1, and the increased cash sales we have is proof that it satisfies our customers. They will tell you that we sell goods for less than our competitors and for that reason they can afford to trade with us.

“It is up to you to take advantage of these prices”.

The firm makes two exceptions to the interest rule in order to properly care for all of its trade. The first is in case of material and work performed for a contractor on building operations, such as ornamental iron work, fences, etc These accounts are considered due 30 days after the completion of the work. The second exception is to the man who wishes credit for an extended time and gives notes for the payment of the ac-



Statements are sent MONTHLY to our customers for the following reasons:
Every jobber we do business with sends us a statement the first of each month. We use these to check up and see if there are any errors in their accounts, as the error is much easier rectified if the deal is fresh in the mind.
These STATEMENTS show us what we owe and have to pay in the next thirty days. We lie this way of doing business and believe you will also.
If you owe us for goods over 30 days we charge 8 per cent interest and WE DO NOT WANT YOU TO PAY ANY INTEREST. All we want is your money to pay our expenses and so We Will Not Have to Pay Interest on What We Owe.

A SPECIMEN STATEMENT HEAD AND WHAT LEWIS AND SON HAD PRINTED ON THE BOTTOM.



count. In this case the firm writes the notes for 7 per cent. interest.

To show how this system has affected the bank account of the firm, we quote from Mr. Lewis' letter:

"On November 1st we had considerably more cash than we did on May 1st. So now instead of paying interest at the bank as we have been for years we are lending our money".

And this was accomplished in a rural community where farmers had had long credits for their whole lives! There is little doubt that this plan, if capably handled, will work in other places.

The Danger of Giving Accommodation Notes

E. J. BUCKLEY

By a peculiar coincidence I have requests from two correspondents, one in Pennsylvania and the other in Kentucky, for an opinion as to whether they can be held liable upon promissory notes which they gave merely as an accommodation. The two cases differ somewhat as to their facts, but the fundamental principle is the same in both. In fact, the real core of both cases is the same, and can be thus stated:

A is a man of substantial financial responsibility. B is a man who has neither financial responsibility nor credit, though his honesty is unquestioned. B, needing money in a business venture, and being unable to raise it, asks A to indorse his

to meet the note, as he expected and promised to do, and when it matures the bank gives A notice that he will be looked to for payment. A now begins to look around for some way of escape. Is he liable on the note? Does the fact that no consideration passed between A and B absolve A from liability?

The above statement of the case fits both of the inquiries which have come to me, and fits many other cases which are constantly arising. The notes which figure here are what are known as accommodation notes, and in some States the law governing them is radically different from the law governing ordinary promissory notes, particularly in one point. In the States mentioned—there are four—the law of accommodation notes is much more severe on the maker or indorser than it is on the maker or indorser of an ordinary promissory note, and I observe that for that and general reasons an accommodation note is a bad thing to make or to give. Unless he simply cannot avoid it, no man should give his note, as a pure favor, to another man to be hawked about the market.

An accommodation note is practically a loan of credit. I ask a man of better financial standing than I am to loan me his written name in order that I may get money or credit that I cannot get upon my own name. When I get that name, in the form of a note, I pass it on to somebody else, who gives me something for it—usually money or the equivalent, or

—to pay every cent. This notwithstanding no consideration passed, and that my friend did the thing merely as a favor. I could not personally hold the note until maturity, however, and then compel the maker to pay it. He could at once get me out of court by showing that I had paid no consideration for the note and therefore had no right to recover anything on it. But when the note passes to a third person the absence of consideration makes no difference—the note has then done precisely what it was intended to do—raised money for me. A third party can collect from the maker, even though he knew when he took it that it was an accommodation note.

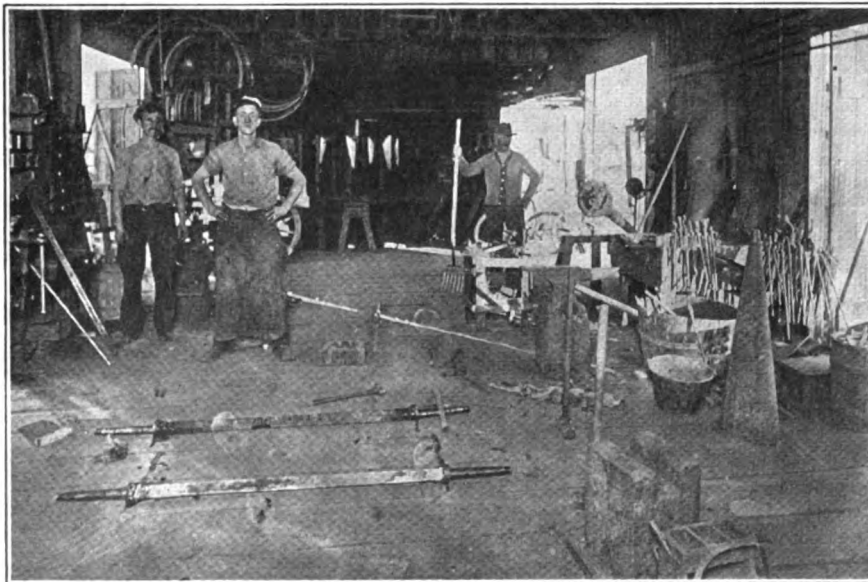
The point in which in some States the law is harder on the maker of an accommodation note than on the maker of an ordinary promissory note, is this:—

Consider a case where A gives B an ordinary promissory note. For some reason or other A finds that he has a perfect defense against the payment of the note, and he decides that when B demands payment he, A, will refuse it and defend on that ground. B, however, before it is due, transfers the note to C, who knows nothing about A's defense against B, and when the note is not paid C sues A. A will now have to pay, because he cannot introduce into C's suit his defense against B, for the reason that C is an innocent third party for value received.

Now suppose B had waited until the note was *past* due before he transferred it to C. In that case A could have made against C the same defense he could have made against B, because transfer *after* maturity opens that door.

But in four of the States the law is different when an accommodation note is transferred after maturity. In Illinois, Maine, Maryland and New Jersey, I, whom somebody has accommodated by giving me a note, can wait until after it is past due, and then transfer it to somebody, and he can collect it from the maker, though I could not have done so, either before maturity or after. Furthermore, he can collect it even though he has express notice from me that the note was merely an accommodation note.

Happily, in all the other States the law is different. There the transfer of an accommodation note, after it is due, is precisely on the same footing with the transfer of an ordinary promissory note after it is due: If the person transferring it after maturity could not himself col-



THE GENERAL SMITHY OF MESSRS. MURRAY AND JOHNSON OF CALIFORNIA.

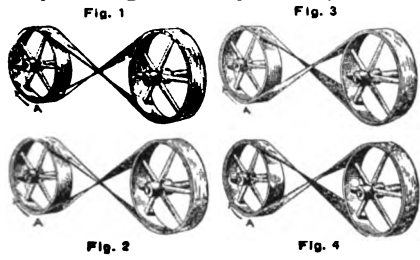
(B's) note or to give B his own (A's) note, so that B can take it to the bank and raise money on it. B pays A nothing for this service—A does it merely as a favor. The note or the indorsement—it makes no difference to the principle involved—is given and discounted. B fails to have the money

credit. This somebody else is then the holder of the note, and if when it is due it is not paid, he can compel the maker—the man who accommodated me with the loan of his credit



lect it from the maker, for any reason, then the person to whom it is transferred cannot either.

Giving accommodation paper is risky enough in any State, but in



CROSSING A BELT MAY NOT BE AS SIMPLE AS IT LOOKS.

the above four States it is so risky that only a very foolish man will do it. It is risky everywhere because it will very likely compel you to pay a debt that you do not owe.

The maker of an accommodation note, or a man who endorses one as an accommodation, can always revoke his act while the note remains in the hands of the person accommodated, and the latter can always be compelled to give the paper back before he has made any use of it. Or it will be revoked automatically by the accommodation maker's or the endorser's death, while the note is still in the accommodated party's hand. If anybody takes the note from the accommodated party, after the maker's death, knowing it was an accommodation note, he cannot collect from the maker's estate. He can collect, however, if he did not know it was an accommodation note, even though he knew of the death.

The law is also different here from the law of ordinary promissory notes. Any third party who gets a promissory note after the maker's death can recover upon it just the same, always provided that the maker gave it in the regular way while he lived.

Crossing the Belt

A writer in the American Machinist, in installing a belt in his shop, had considerable trouble in crossing it. This opened his eyes to the fact that though the crossing of belts is an old chestnut, few mechanics are aware of the proper ways of crossing belts that are correct and applicable under certain conditions.

In this case the belt was crossed, as is generally done in most shops, by one twist, as shown in Fig. 1. The driving pulley, A, ran in the direction of the arrow. The result of this method of crossing was that the belt continually crowded off the driven pulley when the machine was started.

After several attempts the belt man was called, but he could not diagnose the trouble, though he tried to remedy it by recrossing the belt into the reverse twist as at Fig. 3. Then the belt crowded off the pulley in the opposite side. This started a debate on the question; theories and suggestions were advanced; and it was suggested that the shafts were not in line, etc. Master mechanic was then called, but could offer no remedy, arguing that there were but two ways of crossing a belt.

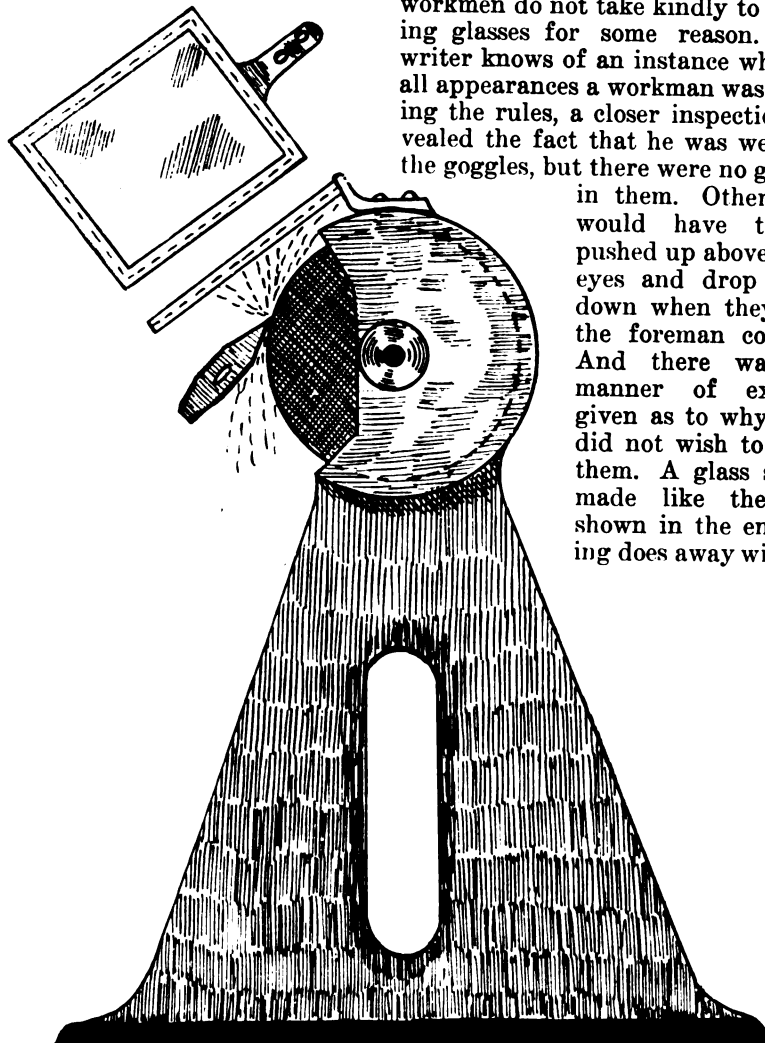
But, if one watches a belt crossed as this one was, he will notice that there is a tendency for the driving side of the belt to flatten out and push the slack side of the belt to one side, crowding it off the pulley. In some cases, conditions are better than in others, due to pulleys being

This was done and found to remedy the conditions. And it brought to light that there are four ways of crossing a belt. Fig. 4 illustrates the opposite method to Fig. 3. This method also prevents the dressed sides of the belt from being in contact with each other.

A Safety Shield for the Emery Wheel

BERT HILLYER

In the general run of smith shops they have an emery wheel for grinding chisels, hacks, and other tools. In a few of them will be seen a sign of warning—"Use goggles when grinding to save the eyes from bits of flying emery and steel". Sometimes this rule is observed, more times not, as the general run of workmen do not take kindly to wearing glasses for some reason. The writer knows of an instance when to all appearances a workman was obeying the rules, a closer inspection revealed the fact that he was wearing the goggles, but there were no glasses in them. Other men would have them pushed up above their eyes and drop them down when they saw the foreman coming. And there was all manner of excuses given as to why they did not wish to wear them. A glass shield made like the one shown in the engraving does away with the



AN EASILY MADE SHIELD FOR THE EMERY WHEEL MAY PREVENT A SERIOUS ACCIDENT.

wider than the belt and a longer distance between pulleys.

However, after watching the belt for a time, the suggestion was offered to cross the belt by bringing it back to back, as shown in Fig. 2.

wearing of goggles and excuses for not wearing them. It gives good protection to the eyes and cannot be tampered with; also does not interfere with the ordinary grinding that is done in a blacksmith shop.



Benton's Recipe Book

In hardening plow-shares, if the share is of soft center steel, proceed as follows: First, heat the whole point to a very low red heat; then turn the share face down with the heel over the fire, and the point in such a position that it is about 2 inches higher than the heel. This will draw the fire from the heel along towards the point, and the whole length of the share will be heated almost in one heat. Be sure to get an even heat for it will warp or crack if it is unevenly heated. When the share has a moderate red heat, take it out and you will notice that it is sprung up along the edge. The share is now sprung down. This is the general rule. but there may be exceptions.

In either case, set it right—though you cannot with any success set it by a table or leveling block as this will cool off the edge and it must be either over or under the square a little. So, use your eye and set the share with the hammer over the anvil. This done, hold the share over the fire until it is a low red heat—like before—and plunge it into a tub of hardening compound. This can be purchased—or, sprinkle the share with prussiate of potash and plunge it into a barrel of salt water.

The share generally warps more out of shape in heating, but will also warp in cooling if the heat has been too high. Poor scouring may come from the lay and mold-board being too soft and thus not taking a good polish, or it may be full of rough hammer marks.

The object of tempering steel. In examining recently a great number of books and articles on the subject of tempering steel, we found that almost invariably the authors stated that the object of tempering was the softening of the steel. They said that steel, when heated to the required hardening temperature and quenched, became too hard, and that therefore it was necessary to draw the temper in order to soften the steel so that it could be used for the purpose for which it was intended. This is an erroneous statement which seems to be accepted by the majority of mechanics, because they fail to distinguish between hardness and brittleness, two entirely different qualities. Hardened steel is tempered in order to make it less brittle, but unfortunately the tempering process also softens the steel to some extent. If it were possible to temper steel so as to produce greater toughness and at the same time retain the extreme hardness, the ideal condition would be obtained. That hardness and brittleness are not necessarily synonymous may be seen in the case of cast iron, which is very brittle but not very hard. On the other hand, there are some alloy steels that may be made very hard and at the same time very tough. The object of tempering steel is to reduce the brittleness; the hardness is simultaneously

reduced, but this unfortunately cannot be avoided.

Lubricant for highspeed bearings. To prevent heating and sticking of bearings on heavy machine tools due to running continuously at high speeds, fill an oil can with a good spring bottom (the "Gem" oiler preferred) about one-eighth full of Dixon's flake graphite, and the remainder with kerosene oil. As soon as the bearing shows the slightest indication of heating or sticking, this mixture should be forcibly squirted through the oil hole until it flows out between the shaft and bearing, when a small quantity of thin machine oil may be applied.

For hardening toe-calks, a Minnesota smith has a little "kink" that he employs at the request of some of his customers who are willing to pay for the extra time and work.

Small pieces of cast iron are placed on the calk after it has been welded to the shoe and with borax as a flux these small cast iron pieces are melted or brazed onto the calk. When removed from the fire the calk is dipped in water which makes it exceedingly hard and also keeps an edge longer than the ordinary method.



Queries- Answers- Notes

Repairing Wagon and Buggy Wheels.—I would like to see an article on the repairing of wagon and buggy wheels. In this part of the country we often have to put in three or four spokes in a buggy wheel and find it a particular job to do in order to obtain good results. We are also asked to down wagon wheels and to make straight the wheels that have become warped and out of shape. Can someone help us out with information and their method of doing work of this nature? I think the exchange of ideas and plans is the best way to "boost" the craft.

A. A. Yost, Missouri.

These Maryland Prices Need Improvement.—I just started in business last year and have been quite successful but could have done better if the trade prices were better. Here is a list of the prices we get down here: 4 plain shoes, 75 cents. When we weld toes on them we get \$1.00, but this is only done in winter when the roads are full of ice. I think this price is far too low in accordance with the price of grain. We get \$2.00 per set for setting light tires and \$3.00 for heavy tires; 2 1/4 by 1/2 inch is about the heaviest we have to handle. For a whole rim on a light wheel up to 1 1/2 inches we get \$1.20, and \$2.50 for whole rim on wagon wheel. For spoke in light wheel 15c, unless the whole wheel is respoked, when we make a slight reduction. For wagon spoke 25c, \$2.00

for wagon bolster, and \$1.50 for wagon bolster, and \$1.50 for wagon tongue. For welding short arms, \$6.00 per set, and \$5.00 per set for new tires on light wheels. This is a list of some of the prices, do you think they could be improved upon? Most of the smiths in this section never consider that they have an overhead expense; if they did I think prices would be better.

W. H. FOGWELL, Maryland.

A Michigan Shop.—I cannot see how any man at the craft can do without THE AMERICAN BLACKSMITH at such a small cost for subscription. The paper has certainly been of great help to me and has proved interesting in the many disputes on hot and cold tire setting. I am not a judge on this subject as I only use the one method, namely, the hot process, and I assure you that at times this stands improvement in regard to labor-saving.

Our prices are fairly good, but in most cases I try to get just as much additional to the list price as possible. I have a fairly good shop as shown in the accompanying picture. It is 46 by 80 feet high with side wing 24 by 40, equipped with power, and a garage, erected in 1913, containing a pit.

The only thing I have to contend with is sickness in my family and one poor competitor who slaughters prices, but I simply let him slaughter because I see he is also slaughtering himself.

OTTO N. BRAUN, Michigan.

The "Water Witch" Again.—Lawrence Johnson, of Connecticut, analyzes the "water witch" or the witch hazel crotch water finder in a recent issue of "The Rural New-Yorker." He says:

"In all operations of "water witching" I have witnessed the operator holds the crotched stick in clenched hands with palms turned toward the body and elbows close together. It is an awkward, unnatural position but necessary for successful "witching." A crotch of witch hazel, peach, apple or other wood as suits the individual taste is used. It should be small enough to bend slightly under the fingers.

"When operated successfully the free end of the crotch commences to vibrate upon approaching the underground stream, then slowly and irresistibly revolves in the grasp until pointing downward, indicating the desired water. Some operators estimate the depth by the bobbing of the twig. At first sight the operations are puzzling, but let us investigate a little.

"Hold up your closed fist palm inward. In closing the fingers tightly you will observe that the inner end of the first (at the little finger) moves downward, while the outer end remain stationary. Now you can see what happens when the "witcher" works, as his fingers' close pressure is applied about the middle of the folks from that downward movement of the little finger. If the crotch is held in a vertical position it does not move, but the spring in the forks causes the upright to vibrate, and as soon as it is out of the vertical



THE MICHIGAN SHOP OF MR. OTTO
N. BRAUN.

a lever is in action, and the crotch will rotate around a line between the two fixed ends. The harder one squeezes to keep the twig from turning in the hands, just so much more pressure is applied tending to turn the end downward. If held tightly the bark will be stripped clean from the twig.

"If some outside force was really acting on the twig, holding the latter loosely in the hands would only allow more freedom of movement, but the twig refuses to work under those conditions. The 'water witchers' I have seen were all honest in their belief that the instrument worked without effort on their part. They are men naturally gifted in ability to locate water, and the belief that water exists in some locality is involuntarily conveyed to the muscles of the hands, causing the twig to operate."

LAWRENCE JOHNSON, Connecticut.

Criticism From Ohio.—I must say that the best articles I ever read in THE AMERICAN BLACKSMITH were contained in the December number, 1914, by Elton J. Buckley and Mr. Morrison. One smithy told me that if he had read Mr. Buckley's article two weeks before, he would have been \$75.00 to the good. So you can see the blacksmith wants to know something else besides how to do the actual work. I don't have much trouble doing my work, yet I don't pretend to know it all either. I have more work than I can do most of the time and my shop speaks for itself. Most of my trouble is along the line of which Mr. Morrison writes. If we could stop these tramp smiths going through the country stealing tools and selling them to other smiths, it would be a good thing for us. Only recently a tramp smith came into my shop with his pockets full of tools and a long story. I have yet to see one of these fellows who was a good mechanic.

Another fault with some people is that when they make a few dollars they want the whole community to know it. We had an icy spell here and one smith wrote up a lie in the paper, saying he and two helpers put on over 400 shoes in one day and took in over \$100 in money. This kind of talk hurts blacksmithing because it gives other people the impression that we are making too much money. I thank THE AMERICAN BLACKSMITH for preaching business. There is where so many blacksmiths are lame.

READER, Ohio.

Shoeing in Kentucky.—It occurred to me that I had never written you anything about my shop or my work, and in remitting for my renewal order I thought a few words would not be out of place.

I came here about seven years ago, and I believe that every horse in this part of the country is afflicted with contracted feet and interfering of the worst kind. The blacksmith from whom I purchased the business learned his trade in a cornfield so you can imagine what the poor horses suffered in being shod. The first thing I did was to pare the hoof as near as nature intended, and trimmed the sole from the frog to the toe as thin as it would bear, taking care not to cut the bars. Then I fitted the shoe to the foot, not the foot to the shoe, levelled the shoe and convexed just a little, say about 1-16 of an inch, put in three nails on the side, leaving the last two nails out. Didn't draw them too tightly, and removed in the course or three or four weeks.

The horses generally are traveling fine now and they don't limp or interfere. I keep about 150 shod all the time, as this country is piked everywhere and they are pretty rough. I do all of my own work,

have about 75 customers and am kept moving most of the time.

HENRY WEYLER, Kentucky.

From a Retired Smith.—Please find one dollar enclosed for my subscription to the paper for the year 1915. I have retired from the blacksmithing business but have been lonesome for the paper. "Our Journal" should not be confined to blacksmiths alone but should be in the hands of every horse owner as well. They need it for the reason that they ought to be taught something about the work they are doing and how to use and care for the horse. There is no animal on earth so abused, and none so true to his master. There is no animal with the power of love as the horse. I have shod horses for 50 years and never received a kick or bite, and I have never struck a horse a single blow during this time. I have my own horse now and her devotion to me is surprising. This is due to the kind treatment I have always endeavored to give the animal.

THE AMERICAN BLACKSMITH is worth more to a reader than he can properly estimate. I am old now and my labor in the field nearly ended, but if I were a young man, ten dollars a year would not stop me from taking the paper. The 1913 numbers were each and all mighty interesting and valuable and I certainly enjoyed reading each issue.

E. K. BROWN, Maine.

open space to allow grasping with the tongs at the cold end of the bolt. The arrangement at D, in the dies operated by two rams and the movable die running true along the two grooves, g, g, is self-explanatory.

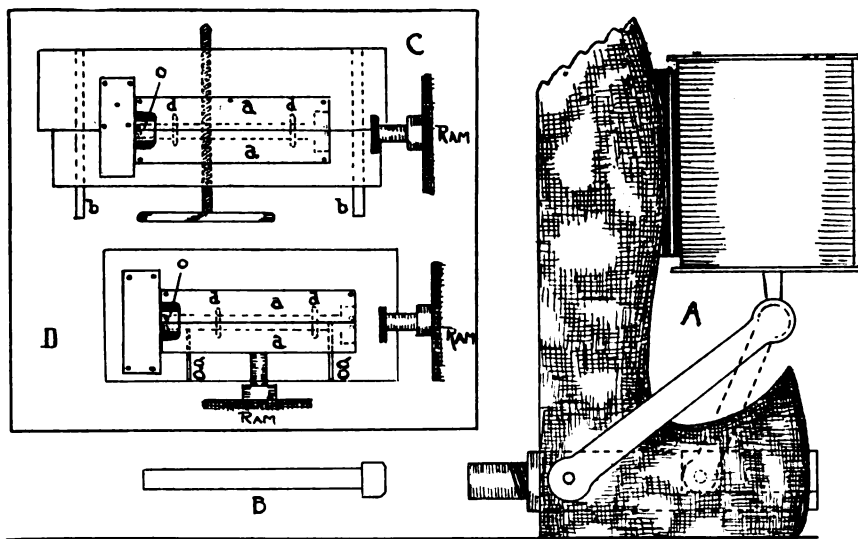
BENTON.

A Well Equipped Illinois Shop.—The following is a list of my equipment: two forges, two hand drills, one bellows and a blower which is run by a 54-horsepower Golloway gas engine, an 8-horsepower Keely-Duplex corn grinder, corn sheller and elevator, a Kerrihard power hammer, a crescent emery grinder, a Wonder disc sharpener, a Western Chief drill, band saw, circular saw, Little Giant screw plate, vise for woodwork. I run two shops here and we have plenty of work all the time. We do all kinds of repair work.

GEORGE WOODS, Illinois.

Prices in Illinois.—I want to say that THE AMERICAN BLACKSMITH is as good a paper as any blacksmith could invest one dollar a year in. There are all kinds of hints in it that a blacksmith can make use of.

My business is good but the prices are not what they should be. For shoeing we get from \$1.50 to \$2.00, that is, \$1.50 up to No. 4. For resetting we get 25 cents a shoe, and plain work is about the same as other places. We get 50 cents for



ARRANGING A RIVETING MACHINE TO DO BOLT HEADING.

Using a Riveter for a Bolt Header.—I have an old Allen riveting machine which I wish to convert into a bolt header. Do you know of some plan that the dies for holding the bolt can be arranged so that they will open and close? Possibly we will have to use another air cylinder or some hand device. J. A. HOLPP, West Virginia.

In Reply.—A, in the engraving, shows the Allen riveter and B, the square headed 1 1/2-inch bolt, required to be made. At C is shown the operation of opening and closing the two halves of the die, a, a, by the long lead screw to which is fastened an iron hand wheel. The movable half of the die is held by the movable table that is table is fastened the screw with its wheel. This iron wheel, with one vigorous turn, ought to carry sufficient momentum to open or close the die. The stationary table holds the ram to give greater stability. The dowels, d, d, insure the exact registration of the dies and o is an

wagon tires and 75 cents for buggy tires. I do all my own woodwork and blacksmithing.

E. W. LAMPE, Illinois.

Pennsylvania Prices.—We get the following prices for work in this locality: For sharp shoeing, horses, \$1.45; mules, \$1.35. Never-slip shoeing horses and mules, \$2.00. Putting on tire, 1 1/4-in. steel, \$1.00 per wheel plus cost of tire; putting on tire, 1 1/4x5-16 steel, \$1.25; putting on tire, 1 1/2x 1/2 steel, \$1.60; putting on tire, 2x 3/4 steel, \$2.00. Putting on rims, 1-inch rims, \$1.00 plus cost of tire; 1 1/4-inch rims, \$1.25 plus cost of tire; 1 1/2-inch rims, \$1.60 plus cost of tire; 2-inch rims, \$2.00 plus cost of tire.

JOHN TROY, Pennsylvania.

Kentucky "Kicks."—I have been reading "Our Journal" for about five years and am not tired of it yet. You said for me to kick hard if I didn't like it. I certainly can say it is just fine and I don't know how any smith can do without your paper.

I am doing a pretty good business. I



put a Never-slip shoe on for \$1.20; to set a buggy, \$1.75; new single tree, 40 cents; a Sarvin patent wheel for \$2.00 and rim it for \$1.50; all tires from 1½ inches, 50 cents each; fill a wagon wheel, \$3.00; front hounds, \$3.00; hind hounds, \$2.50. I make wagon boxes complete for \$12.50.

I have a side line of patent ironing boards that sell for \$2.25 each and also sell hand-shaved axe handles for 25 cents each, \$2.25 a dozen. I guarantee all horses to carry the shoes I put on five weeks and I prevent all ankle striking and cutting.

E. A. SCOTT, Kentucky.

He Weighs His Stock.—I have followed blacksmithing and machine work in shops for a number of years in Illinois, Indiana and Kansas. I have been in this place about three years. I ran a pumping plant the first season I was here. I later bought

tools. I am contemplating putting in a Whistler woodworker's friend and a small power hammer. One thing I almost forgot; I have a small pair of scales and every piece of iron I cut off I weigh. It is one of the best investments I ever made. We all buy our iron by weight. The butcher and grocer weighs everything they sell, then why should we blacksmiths whack off a piece of iron, balance it in one hand and give a guess at its weigh? With best wishes for the paper and every brother smith in this broad land, I am,

JOHN TAIT, Arkansas.

A Neat Shop—A Band Kink.—I have what we call a "country blacksmith shop" but can say with pride that I have the best equipped shop in this part of the country, and can also say that it is kept in the best of shape. There are two other shops in

nal about seven years ago and have used it ever since and taught it to others. Perhaps it will not be out of place to repeat it here for the benefit of some brother smith: Take the diameter of proposed band, add thickness of iron you are going to use, multiply by 22 and divide by 7; the result is the length to cut your iron. I have banded a good many castings for the past seven years and find this rule the best and most accurate of any I ever knew.

G. E. WILSON, Oregon.

Advertising Keeps Him Busy.—I have been a reader of your paper for the past fifteen years and could not get along without it. Like some of the other brothers say, I am always looking for it.

As for the smithing business, I consider it a good business if all would put their shops on a business system. One of the main things to do is to keep it up-to-date, and whenever one sees an opening for a new machine and new work, be on the job and get the cream. Do a bit of advertising, it is money well spent.

I have been working at the trade 15 years or more and purchased a shop when I came to this place. The shop I got was only 20 by 40 and an old worn out set of tools which I promptly discarded. I installed a gas engine and power tools and business began to come my way. I only remained in that shop about a year, then I built a larger shop and continued to install power machines necessary to handle my trade. A year ago last August I lost my new shop by fire which destroyed all my tools and no insurance to help me out. However, I had a host of friends who came forward and shortly handed me a few hundred dollars and urged me to build up again, which I did. Every one was willing to help me get started again and I assure you no time was lost.

My new building is 35 by 50 with a stock room at a safe distance in case of fire. My trade has increased so that I am obliged to build more room. I did a little advertising this winter by writing a personal letter to each of my customers, asking them about the condition of their tools and suggesting that they look over their equipment and have their repairing done during the dull season, so that we could have their tools ready for them by spring, thus avoiding delays in getting their work when they needed it. This advertising proved very effective as they have been bringing in their work and I have not had a dull day this winter.

IRA M. BECKNER, Kansas.

A Good Shop Sign. In the accompanying picture is included the picture of a shop sign which I recently made entirely of wood. The idea struck me one day while I was pounding on my anvil. I got sufficient white pine to make two pieces, 4 feet by 6 inches by 3 feet 6 inches, and screwed the two together (having one side contrary in grain to the other) with plenty of white lead between and joints glued. The horseheads were easy and while I can make a horseshoe that a horse is not ashamed to wear, to draw this big one almost "stumped" me. If you doubt my word just take a pencil and draw a shoe, 3 feet 6 inches from toe to heel. The hammer I made of wood and dolphined it on the anvil.

I am seen in the center of the picture, while on the right is Harry A. Grim and John Heffner on the left. We have some good times here. I try to treat my assistants right and they stick to me.—IRVIN C. MILLER, Pennsylvania.



THREE HAPPY SONS OF VULCAN AND A GOOD SHOP SIGN.

the tools, etc., of a smith who had started in this place. This man was a fairly good smith, but sorry to say, was a great drinker and ran the business down till there was nothing to it. I took the place in February, 1913, and for the first two or three months could hardly make expenses. But by and by business came and is still coming. When I started, I made it a point to deal honestly with every one and promise nothing I could not fulfill. I told them plainly that I had to make a living by my work, that I had no other means of income, and that the shop would be just what they made it if they patronized me. I further agreed to improve and add to my equipment and stock so as to be in a position to take better care of their work. If, on the other hand, they withheld their work and simply gave me what was absolutely necessary, and starved me, they could expect like service.

Well, it has grown from a blower and anvil and a few hand tools, to the installation of a power blower, drill, Easy screw plate, Armstrong Bros. pipe, dies and taps, a 4¼ H. P. Challenge gas engine, a Kerrihard combined saw and grinder and disk sharpener, and a full complement of hand

this little place. I think I get about two-thirds of the trade. I keep good men and endeavor to have all work done promptly for my customers. I see that the shop is kept clean and do not allow piles of scrap or trash to remain in the way. My customers often compliment me on the appearance of my shop and the men working for me.

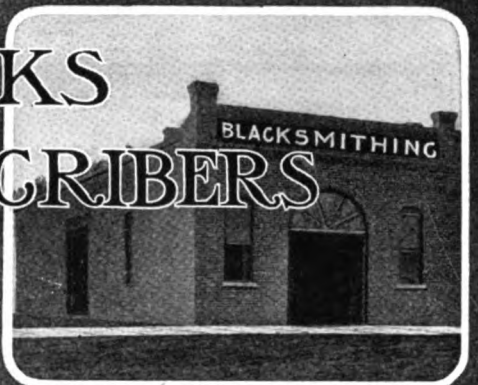
Although my prices are higher than the others, I get the work just the same. I charge \$2.00 for shoeing up to No. 4; Nos. 5 and 6, \$2.50; No. 7, \$3.00, and all other work in proportion. Spokes, 50 cents apiece; fellos or rims, 75 cents apiece; setting tires, \$1.00 and \$1.50, according to size.

I open up shop at 6:30 in the morning, winter and summer, and am always on the job myself. I have an automobile of my own so can travel quickly. I find it very handy for hauling freight and delivering work, besides the pleasure I get out of it on Sundays. I do lots of auto repairing and find this a profitable side line.

As to "Our Journal" I certainly enjoy reading it and get lots of valuable information from it that helps me. The rule for measuring bands I got out of the jour-



TIMELY TALKS WITH OUR SUBSCRIBERS



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We Want To Know

We want to know how you like "Our Journal" as it is being published at present? Can we change it—can we take out anything—can we add anything—can we do anything that will make it more valuable, more interesting to you? We can not hope to improve or better the paper—your paper—"Our Journal"—unless we have your help and co-operation. Therefore, won't you kindly answer the following questions:

1. What branch of the trade are you interested in most?
 2. Are you getting all the information that you want on your favorite subject?
 3. If you want information upon some particular subject, tell us what that is.
 4. Do you read "Bison's Notes"? Do you like them or do you think the paper would be better without them?
 5. Do you read "Thornton's Talks"? Do you like his style and his topics or do you want them stopped?
 6. How about "Heats, Sparks, Welds"? Do you enjoy the little paragraphs or not?
 7. Are "Benton's Recipes" of interest and value to you?
 8. What about the other departments? Tell us which you like and which you do not like?
 9. Give us one suggestion for the improvement of "Our Journal".
 10. What do other smiths say about THE AMERICAN BLACKSMITH?
- Let us hear from you on the above topics. If you kick about "Our Journal" and do nothing to improve it—say nothing to the editor about what your kick is all about, how can you hope to improve matters?

Subscription Agents

When a stranger solicits your subscription to THE AMERICAN BLACKSMITH, or any other publication, insist upon his showing you absolute proof that he is an agent in good standing and is employed by the publication which he represents. Don't, under an circumstances, give the man your money if you are not sure that he really works for the paper he says he does. No matter what the man offers you—no matter what price he makes—no matter what premium he promises to send—DON'T GIVE HIM YOUR MONEY IF YOU ARE NOT SURE.

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Worth Two Dollars a Copy

When readers find THE AMERICAN BLACKSMITH of such real value to them as their letters and personal words indicate, isn't it surprising that there are any smiths at all who are not reaching "Our Journal"? It would seem that all the non-readers would need, would be simply to have the paper brought to their attention.

For example: Mr. N. R. Evans, of Oklahoma, because a subscriber to "Our Journal" about two years ago. In a recent letter he writes:
 "I have been a subscriber to THE AMERICAN BLACKSMITH for two years and I find more help from reading it than from any Journal or books I ever read. I wouldn't do without it for \$2.00 a year, for I have gotten that much worth out of one copy."

And with that letter Mr. Evans sent in an order for a new subscriber. Can anyone doubt testimony like that? Do you know that if every one of "Our Folks" did that, we would have just exactly twice as many readers as we have now? Why not tell your neighbor?

About Temperance

Thornton gave us a timely thought some months ago on this subject. It prompts us to let you read a letter recently received from Mr. T. J. Serson. This temperance matter is, without doubt, a live one today and we are glad to pass this extract from Mr. Serson's letter on to "Our Folks":

"Wages in our shop run from \$3.00 to \$3.50 per d. y. We pay every Friday night and run a strictly temperance business. We allow no liquor around the shop."

The times are pointing toward this more strongly every day. When railroad and other large corporations, after careful tests and analysis, find it to their benefit to rule out the habitual drinker, there must certainly be something more to the subject than the mere matter of being temperate or intemperate. We wonder how many other shop owners have given thought to this matter of temperance in the smith shop?

Judging Draft Horses

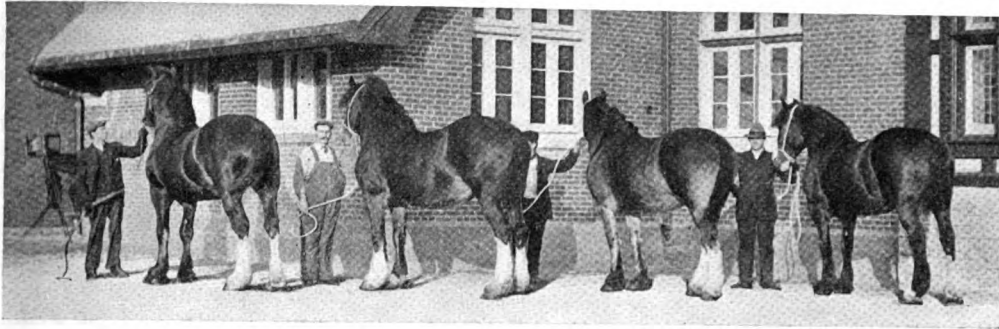
This month sees the beginning of a very instructive series of articles on the above subject. The articles are from a bulletin by the Agricultural Experiment Station at the University of Wisconsin. These articles will run for a series of several installments, all of which the horse shoer and horse fancier will find both interesting and profitable.



A PICTURESQUE FORGE IN HOLLAND.



JUDGING DRAFT HORSES



A. S. ALEXANDER.

The ability to judge correctly the merits and defects of a horse seems to be inborn in some men. They naturally possess the "eye" for the business, and the faculty of quickly and correctly noting all of the points of an animal. On that account they are most likely to succeed or excel as dealers or as judges of horses at local, state, and national shows. Few, comparatively, have the innate powers of observation and criticism, the talent for instant appraisalment of conformation, symmetry, and action, or the love of the work peculiar to the men who become recognized as experts. Nevertheless every student may acquire a fair degree of proficiency and a useful working knowledge of the art of horse-judging by earnest application, proper instruction, and practical experience. The mastery of the art is well worth striving after. Handsome profits are possible from expert buying and selling. Farm work may be made more effective by the selection and use of properly adapted and efficient teams. The trained judge of horses commands the respect of his neighbors, and may aid them materially by counsel and wield a useful influence on the horse-breeding operations of his community and the country.

How to Acquire the Art

The prospective judge should get into the habit of "sizing up" every horse he sees. By comparing one horse with another, he will gain experience and be able to estimate correctly the values of component parts and to judge of beauty, symmetry, correlation of members and adaptability for breeding purposes or

work. After thoroughly familiarizing himself with the names of the various parts of the horse's exterior the judge is equipped to analyze the value of deficiency of each and at length will be able to judge quickly and intelligently of the value of the entire combination of points constituting the individual horse.

A great number of horses must be examined. Then several must be considered together and one compared with the other until each can be placed in its proper position as regards merit and utility. Horses of varying breed, age, type, quality, soundness and serviceability should be used as material for study. Where possible the student of horses should visit horse-breeding establishments, sale stables and shows to continue his studies and round out his experience as soon as a practical knowledge of the work of judging has been acquired.

How to Examine a Horse
Have the animal led out "to hal-



FIG. 1—A CHAMPION BELGIAN—A FINE EXAMPLE OF THIS POWERFUL, BLOCKY, CLEAN LEGGED BREED.

ter" and stood at ease in an open, well-lighted place. Walk around the horse, at a little distance, and view him from all directions. In this way an impression of the conformation, style, character, and "general appearance" of the animal and peculiarities or excellencies of the various members is obtained. The horse may then be moved around, first at a walk and then at a trot, to give the judge a broadside view. This inspection should be followed by a careful study of the animal as he walks from and to the observer and is then led away and back at a trot. The examination may then follow in detail. This analytical work should be done with the help of the score card.

The student should learn to use his eyes rather than his hands in judging. The eye is master of the situation. The hand should only be used as an assistant to the eye. It may be used when the eye cannot unaided determine a question of quality, size, condition or soundness. For example, the eye sees plumpness of flesh, but the hand must be used to decide its depth on the ribs or other part; or the eye detects what appears to be a bone spavin and the hand by feeling corroborates or disproves the suspicion. As a general rule much handling is to be avoided. Excessive handling suggests lack of confidence, experience and mature judgment. It betokens the amateur.

Purpose of the Score Card

The use of the score card in judging teaches the student to analyze the component parts of the horse one by one until he becomes thoroughly efficient in estimating the value of

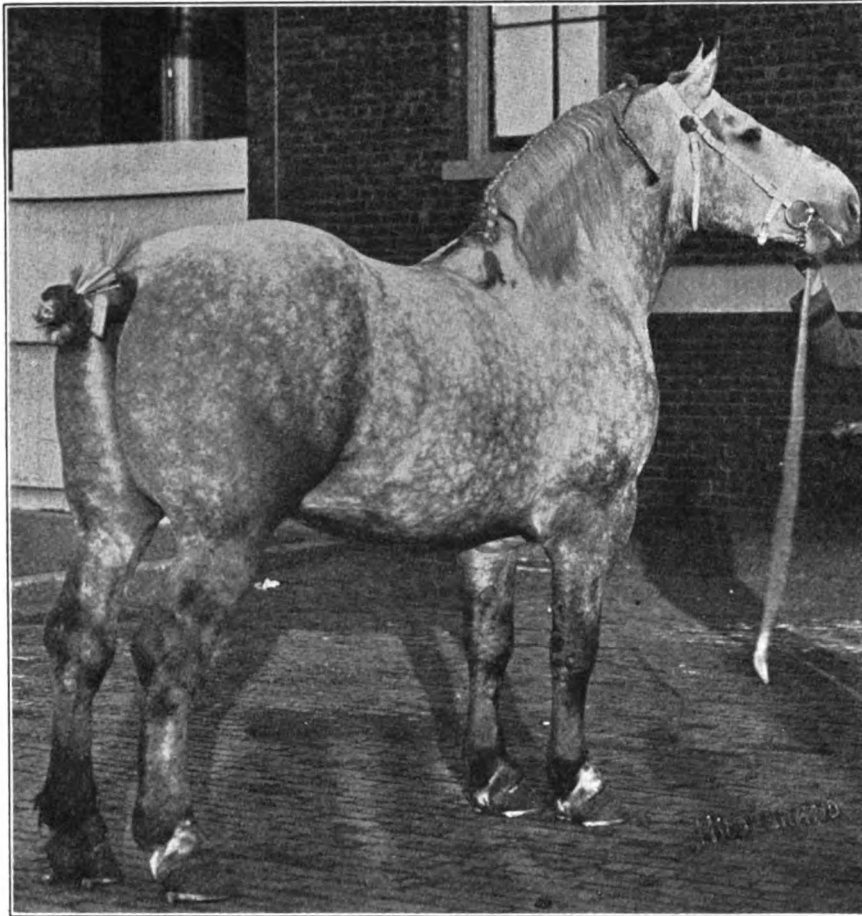


FIG. 2—CHAMPION PERCHERON.—NOTE THE QUALITY, SYMMETRY AND POWER CHARACTERISTIC OF THE LEADING BREED OF FRANCE.

all points combined in the animal. Practice with it will, in time, enable him to look over a horse rapidly, note his good and bad points and arrive at a correct estimate of his value. For the beginner who would become a capable judge of horses it is necessary at first to examine each of the points noted on the accompanying score card. The experienced judge does not use a score card in the judging ring. By long practice he has learned to observe quickly and weigh all of the points of the horse and estimate their relative importance, in placing the animals of a group in their proper positions. Such a judge rarely uses his hand to corroborate things noted by his eyes. The use of the score card trains the student so that in time he is able to judge without its help.

The "points" or parts of the horse, referred to above, are shown in Fig. 4. They should be thoroughly learned. The illustrations show good and bad forms of the more important points mentioned in the score card. They will aid the student to form a correct impression of what should constitute an ideal draft horse. The repeated judging of many widely different horses by the score

card cannot fail to make an intelligent horse judge of the one who earnestly strives to become proficient in this useful art.

Method of Using the Score Card

It will be noticed that on the score card the body of the horse is considered in sections, after study of the general appearance of the animal, which is allowed 30 points as a perfect score. Each section is given a total value—as, "Body—10 points"—and each part composing the section is studied in proper order and weighted according to its relative importance. The student is advised to note first readily observable excellencies and defects or faults. The latter should be first considered and marked off on the score card. If, for example, the horse is notably deficient in body, on account of lack of depth, spring of rib, wealth of muscle or strength of loin and coupling, those points should first be "cut" upon the score card, under head of "Form" and the under "Body" as regards Ribs; back; loins; underline."

Supposing the horse is otherwise admirable in general appearance but woefully deficient in legs and action, these deficiencies should first be deprecated by cutting down the perfect score allowed for each part contributing to the deficiency. The

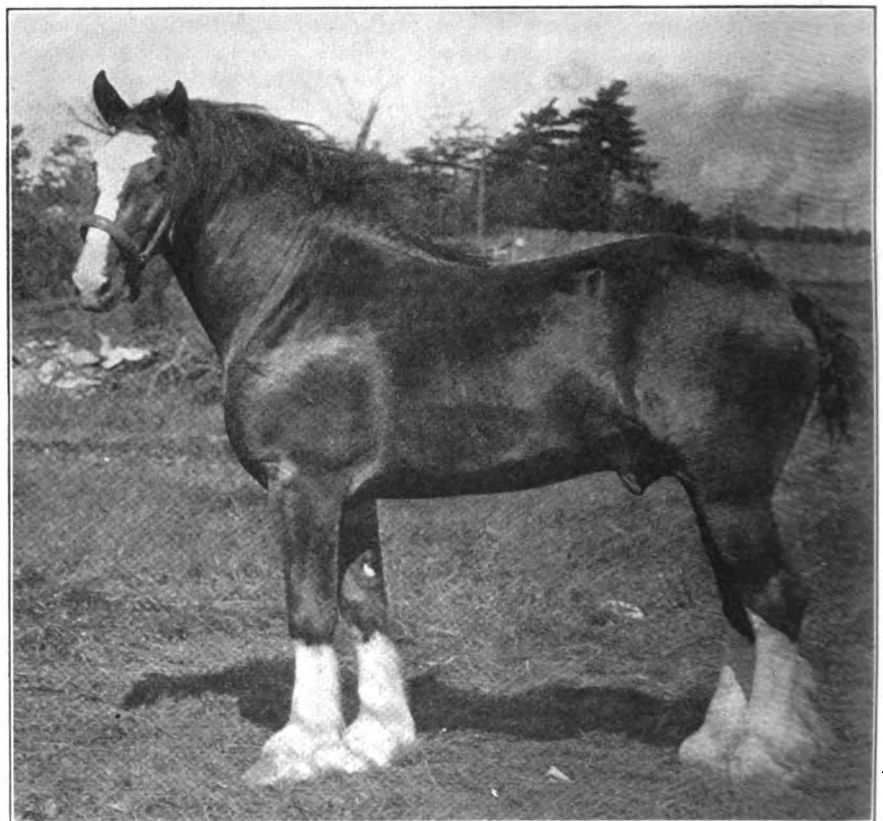


FIG. 3—CHAMPION CLYDESDALE—GRACEFUL ACTION IS COMBINED WITH QUALITY, SYMMETRY AND GREAT DRAFT ABILITY IN THIS SCOTCH BREED.



major defects having thus been noted on the score card, the student may proceed to consider each other point in turn and, wherever necessary, "cut" proportionately according to the degree of each noticeable repair from ideal type.

Rule for Scoring.—In scoring a draft horse by score card the amount cut for any defect should not exceed half of the total number of points allowed for the part under consideration. Neither is it well to make a cut of less than 0.25 of a point. For example, on the head which is allowed two points, do not cut over 0.50 or less than 0.25, if at all. In the case of the feet which are given eight points when perfect, do not cut more than four points or less than 0.25. The scorer must use his judgment in deciding the proportionate score to allow between the limits suggested.

Estimating Matters of Soundness

So far as possible sound horses should at first be studied in score card work. Locate the various unsoundnesses with a sound horse, as soon as intimate knowledge of the various "Points" mentioned on the score card has been

attained. Then actual unsoundnesses may be found on the live animal. In the actual show judging of horses to be used for breeding pur-

poses or when buying such horses, a notable unsoundness of hereditary nature necessitates rejection of the animal, despite ideal value and perfection apart from the question of soundness. In judging or buying horses for work purposes this also would hold true. The judge or buyer would reject or greatly discount in value a blind, lame or "wind broken" horse which otherwise might be well-nigh perfect in makeup as judged by the score card.

When the student has become familiar with the common unsoundnesses of horses he should be able to detect most of them without using the hand. In public judging the hand should be used as little as possible. In the judging ring care should be taken not to draw unnecessary attention to noted unsoundnesses. The judge need satisfy himself alone and that in an unobtrusive manner.

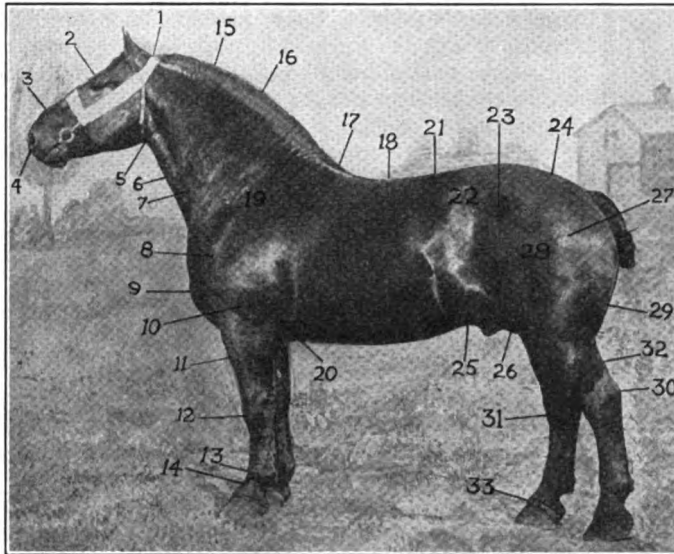


FIG. 4—CHART OF THE HORSE.

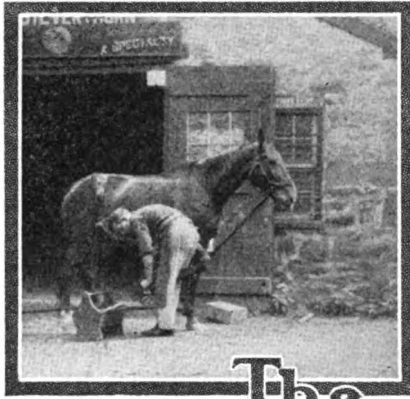
- 1. Poll 12. Knee 23. Hip
2. Forehead 13. Fetlock 24. Croup
3. Face 14. Pastern 25. Flank
4. Muzzle 15. Neck 26. Stifle
5. Throat-latch 16. Crest 27. Hip joint
6. Windpipe 17. Withers 28. Thigh
7. Jugular groove 18. Back 29. Quarter
8. Point of Shoulder 19. Shoulder 30. Point of hock
9. Chest 20. Elbow 31. Hock joint
10. Arm, from shoulder point 21. Loins 32. Gaskin or lower thigh
11. Forearm 22. Coupling 33. Coronet

Editor's Note: The succeeding installment of Prof. Alexander's paper is on "Instructions for Scoring." It comprises full details for examining the horse and what to look for. These articles on "Judging Draft Horses" should prove of almost unlimited value to the practical horse-shoer. They teach the reader how to look for defects in the animals that come to him and thus enable him to more readily see what the animal needs in the way of footwear and what paraclinical system or method of shoeing should be adopted. These articles should enable the reader to apply more scientific methods in his shoeing practice. Then too, the shoer is always considered more or less of an expert in the judging of a horse and a careful reading of these articles and the application of the methods suggested by Prof. Alexander will make the shoer a still better judge of good horse flesh.

SCORE CARD.

Table with 4 columns: SCALE OF POINTS, Possible score, Student's score, Points deficient/Corrected. It is divided into sections: GENERAL APPEARANCE—30 POINTS, HEAD AND NECK—10 POINTS, FOREQUARTERS—20 POINTS, BODY—10 POINTS, and HINDQUARTERS—30 POINTS. A total score of 100 is indicated at the bottom.

THE SCORE CARD ENABLES THE NOVICE TO ARRANGE THE VARIOUS POINTS OF THE ANIMAL PROPERLY AND TO ANALYZE THE COMPONENT PARTS EFFICIENTLY.



The Horseshoer

Use and Abuse of Toe Clips

DR. JACK SEITER.

Every now and then some writer will crop out and have some new excuse in order to condemn the use of the toe clip on our horseshoes. They will go on and tell you that they have been shoeing horses for forty or fifty years, and never had to resort to the use of the toe clip. They will tell you of numerous bad results, diseases and abnormalities of the hoof that are directly traceable to the use of the toe clip and they will generally mention toe cracks, horn tumors and seedy-toe. I have noticed that, invariably, the writers of such articles belong to the rural districts, or are either veterinarians or unpractical theorists who really know very little about the practicable part of horseshoeing. So they delight in finding fault with the little toe clip. Why don't they take the bull by the horns and condemn the entire operation of horseshoeing as being one of the most unnatural procedures imaginable? It's a necessary evil; we have got to protect the horses' feet with shoes in order to make them useful to mankind in his pursuits and vocations. And the toe clip is as necessary an adjunct in keeping the shoe in place as are the nails.

We never hear of any of the men who shoe horses in the large cities condemn the toe clip. They know the value of them and could positively not get along without them. Take it right here in Chicago (as in any other large city) where the streets are paved with stone and there are street car tracks to cross at every street crossing, the grades of the subways and viaducts, and then think of the tremendous strain that is thrown onto the nails as a pair of animals, weighting eighteen hundred apiece, pull five or six tons up a grade, and hold this load back as they go down grade. If some of

our anti-clip advocates had to shoe this class of horses, and shoe them four or five times a month during the winter months, they would soon find out that they would hardly be able to keep a shoe on the foot with only a toe clip. They would be mighty apt to use a side clip—and at times two of them—in order to retain the shoe in place for any length of time. Especially is this the case where pads are used, and our horses are shod with rubber pads or if not, they do wear nail pads on all four feet. There is a certain amount of play between a shoe and the hoof, when any kind of a pad is used, and it is out of the question to expect the nails alone to hold the shoe in place. Most of the nails are about number nine, while, after a resharp-ening or two, they will use a number ten nail. Of course, these nails are driven into the same old holes several times, probably until the animal requires a new shoe again. Then the feet are dressed down and new nail holes are required. By having clips we can use a size smaller nail and also less nails to keep the shoe in place.

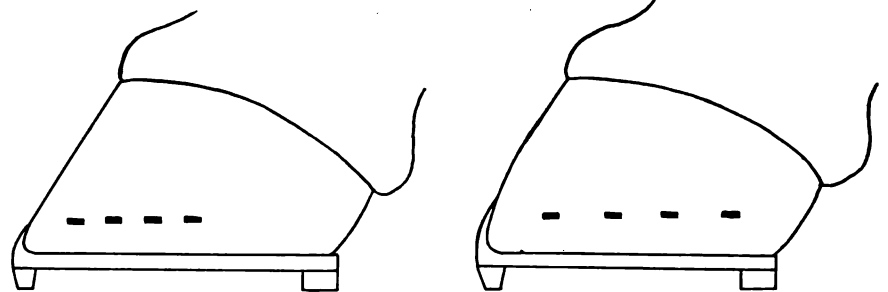
All of our rubber shoes are made with clips on them, and I guess most of them are made by practical men—men who know what is needed in our paved city streets. They are not the idea of one man, but the ideas of the best horseshoers in the country—men who appreciate the fact that the first essential in order to be a successful horseshoer in a large city is to keep the shoes on the feet from the time the animal leaves the shop until it is again returned for another shoeing. It may not mean so much when an animal loses a shoe in the country. They are not dragging such heavy loads there and the pave-

eral tons of stone or coal! The chances are that he would ruin his foot for the time being.

In the country an animal is not shod more than five or six times during the entire year. In the summer they travel over smooth dirt or gravel roads or work in the soft dirt of the fields. They require very little calking, their shoes are light, and there is no undue strain on them as they are not required to pull such heavy loads. A great deal of the actual strain is taken up by the foot directly, as it fills up with dirt at every step.

Thus there is no direct leverage, practically speaking, on the shoe at all. Now reverse the order of things: elevate this animal upon calks that are from one to two inches high, put him onto solid pavement and you will readily see that there is quite a difference in the strain that falls directly onto the nails.

As a rule we shoe the light harness horses without clips—I refer to our trotters and pacers—but they are shod plain. Even if they wear calks they are so small and low that they are hardly noticeable. But when we do get to a track that is hard it is invariably the custom to put clips onto the shoe in order to retain the shoes in place. I have seen many a shoe, that had been just nailed on with a pad between it and the hoof, come in with half of the nails broken right off at the neck. Now what would have been the consequence if there had been no clip there to keep the shoe in place? Why, it would have meant a shifted shoe, a shoe lost and an animal with a badly cut limb, or a broken foot, or at any rate, a lost heat and maybe a lost victory and the money that goes with it.



THE USE AND ABUSE OF THE TOE CLIP

ments are not made out of stone. Their horses are not shod more than two or three times during the entire winter. They have plenty of foot and it is not full of nail holes. Consequently it will not be so apt to have pieces broken out. But imagine one of our city drafters losing a shoe as he is climbing a grade of rough, stone-paved street and pulling sev-

We do not ask the drivers or trainers for permission to use clips if we think they are necessary. It's up to us to keep the feet in order and to keep the shoes on them. So we simply use our own judgment in cases like this. Some of the animals we have charge of are worth thousands of dollars. Their trainers and owners realize that their feet and shoes are



about the most important part of them. And they do not object to clips when they are needed, as there are many times when they are needed in the worst way.

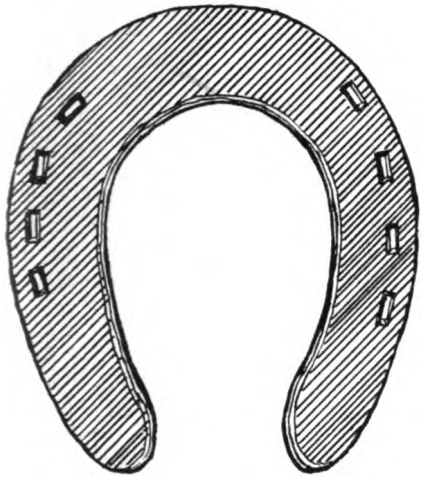


FIG. 1.—A HEAVY EVEN WEIGHT SHOE TO PRODUCE ACTION

It is not the use of clips that injures the hoof at all, but the abuse of them; their ignorant application and faulty construction; the improper manner of fitting them to the foot, and the careless manner in which the average floorman hammers them into the foot.

I have never seen a toe crack or a seedy-toe that could be traced directly to a toe clip. These conditions are brought on mostly by excessively burning the clip into the hoof, and hammering the clip down into this space. A shoe properly fitted to the foot so that it is right flush with the hoof and then a clip turned up on it does not call for the horseshoer to cut a great piece out of the toe in order to fit the clip into it. Did you ever notice how the clips are fitted to the feet of our Clydes and other show horses—great long clips? They do not injure the foot because they are properly fitted. They are not hammered against the hoof, but are fitted in such a manner that they do not require the cutting out of a piece of the horn in order to let it into the hoof. A clip, properly made, requires no more cutting than at most a slight shaving.

Take the average country shoer, who, in the first place, does not take the time or pains to properly dress a foot; he simply cuts down a little of the heel and enough to get some sort of a bearing for the shoe; then he will likely take a shoe that is about one size too small for the foot (in order to save money) and turn up the heels, making the shoe still shorter. Now, in order to have the shoe fit at

the heels he generally takes a pair of nippers and nips anywhere from one-half to one inch out of the toe. Into this weakened part he burns in the toe clip until he is enveloped in a cloud of smoke. Now he nails the shoe on and rasps off the hoof, or rather cuts it off with a hoof knife, so that the foot will fit the shoe. When this operation is finished the ill-fitting toe clip is hammered down into the hoof. The sequel to this can hardly be anything but a seedy-toe or a toe-crack, and it is no wonder that the hoof does not crack at once.

If a shoe is properly fitted to the foot and the clip is drawn out as it should be, on the edge of the shoe, and not take up half of the material in the toe of the shoe, I do not see how we can have any bad results. I repeat that I have never seen a toe-crack or a case of seedy-toe when the work was properly done.

Some will tell you that by punching the nail holes back toward the quarters more, we will be able to keep the shoes in place without clips. One so-called authority even goes so far as to advocate this manner of nailing, claiming that by driving the nails well back into the quarters we would stop the foot from contracting and expanding at each step. He claimed that this was the cause of the shoes becoming loose at the heels, the friction between the shoe and the hoof wearing away the horn. He is a man who wants to put the hoof into a vise in order to prevent it from wearing itself out at the heels and thereby becoming loose. In other words he wants to rob the hoof of its most important function, a function that the whole science of horseshoeing is based upon, a function that nature provides and that the foot can not live without and remain healthy. Deprive the foot of this important duty and you will have contraction, which, in turn, leads to side-bones and ring-bones, and to the dreaded navicular disease. We should do this in order to do away with the toe clip!—simply because its use is not properly understood and therefore abused by them to such an extent that they, through their ignorance and near-sightedness, have brought on such conditions!

Years ago, long before I ever had any notion of attending a veterinary college, I went to work for a large artificial ice concern. They worked from two hundred and fifty to three hundred draft horses, each weighing in the neighborhood of sixteen hundred pounds, and the loads they had to pull weighed on an average of five

tons. They were kept calked up well at all times, and when I took charge of the shoeing department they had four men working there. These men had all sorts of trouble keeping shoes on their horses, and some of the feet were almost beyond redemption. So I made it my business to take hold of the worst footed ones and to spend a little extra time with them. I ordered every shoe to be clipped at both the toe and also at the outside quarter. I put leather pads under most of the shoes and packed them well with pine tar and oakum, in order to get all the growth possible. Inside of three months there was not a foot in the barn that was not as near perfect as it was possible for them to be. There was not the least sign of either a toe-crack or a seedy-toe on any of them. When we got their feet in good condition we had hardly one-half of the work on our hands that we had to do before, and then I went to work and shod the majority of them with bar shoes and pads. I dare say that we had the best feet on our horses of any large concern in Chicago. When others had ten or fifteen animals in the hospital with bad feet, quittors and corns, we would probably have only one or two, and these were some that were accidentally calked in backing up a heavy load.

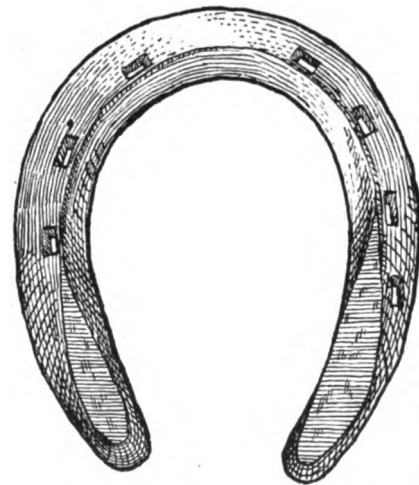


FIG. 2.—A ROLLING MOTION SHOE MUCH USED ON GAITED HORSES.

I have visited most of all the large teaming stables and horse-shoeing shops in this country, and I can safely say that ninety-nine per cent. of them would not think of sending out a horse unless he was shod with shoes that were clipped—and most of them are clipped at both the toe and at the quarter, too.

Because someone tells you that he has shod horses for forty of fifty



years and could never see the use of toe clips, and that they are injurious to the foot, that is no criterion. He probably never worked where it was necessary to use them, and it is a safe bet that if he were to run a shop in Chicago, or any other large city, or even went to work in one of our custom shops, he would surely change his mind—or he could not do business. Anyway, the average country shoer and the shoer of the small towns, does not realize the difficulties encountered by the city shoer. We can hardly proclaim him as judge of what is right or wrong when it comes to shoeing the heavy draft horse, considering the number of times they are shod during the year, the heavy shoes they are required to carry, the calks they are armed with and the condition of the streets they drag their heavy loads over.

Shoeing the Gaited Saddle Horse

L. W. SIMS

The Use and Distribution of Weight

For the first subject we have an animal that has never been shod. He has a naturally well-balanced action, but not enough of it. To produce more action, simply use an even-weight shoe. The more weight the more action it produces. Now we note two important facts essential in this case, in order to retain balanced action we must grow more toe or use an extension toe shoe as we add weight. For this reason: simply adding weight causes the limb to fold higher, but the long toe causes the action to be extended, thus the action of folding and extending is kept balanced; see shoe, Fig. 1. Often, one shod in this manner, i. e., long toe and weighted shoes, will go "laboring gaited", when, it is only necessary to shoe with the full rolling motion shoe, Fig. 2. The roll affords an easy, quick, break-over, and therefore prevents laboring, and it is for this reason that the rolling motion shoe is so much used on the gaited saddle horses.

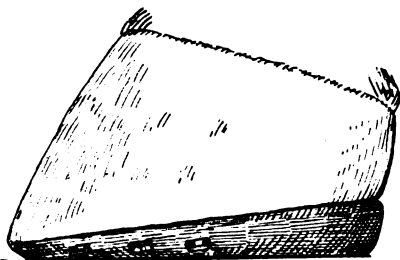


FIG. 3—A WEDGE SHAPED SHOE WITH ROLLED TOE

The second subject is one of those long-striding, low-going, pointed-gaited animals. To cause one of this type to break over, to shorten and quicken the stride, and to fold up higher, it is first necessary to shorten the toe by taking off all the surplus hoof at this point, and if the heels are low—to save them. Often we find it necessary to build up the heels, which may be done by the use of side calks or a wedge-shaped shoe, Fig. 3, or to build up with leather under the heel of the shoe.

To make the shoe shown in Fig. 4, take any machine shoe of the proper weight and square the toe, making it a box toe. To make it still more effective, roll the toe down to a feather edge and use with or without side calks.

The heel weight shoe, shown in

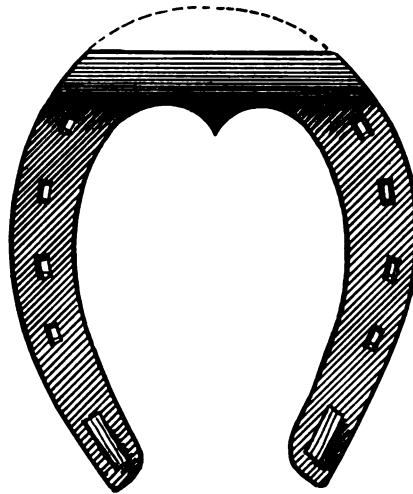


FIG. 4—THE TOE OF THIS SHOE MAY BE SQUARED OR ROLLED —THE HOOF IS RASPED SO AS NOT TO TOUCH THE GROUND

Fig. 5, is very effective in producing the action of folding high, while the heel weight shoe in Fig. 6 is even more effective in producing the high folding action. These shoes may both be made in a number of ways to have varying degrees of difference in effect. For example, first the plain, flat shoe, then the box toe and then the full-rolling motion toe. These three styles may also be made in the wedged shaped shoe and again, with or without calks. It is well to state here that the rubber pad may be used as a heel weight with good results.

The next subject is an animal extremely high going. He does not extend action in front, but is "climbing gaited", i. e., has too much up and down in the same place. Remember, at all times, it is not good policy to make any very radical

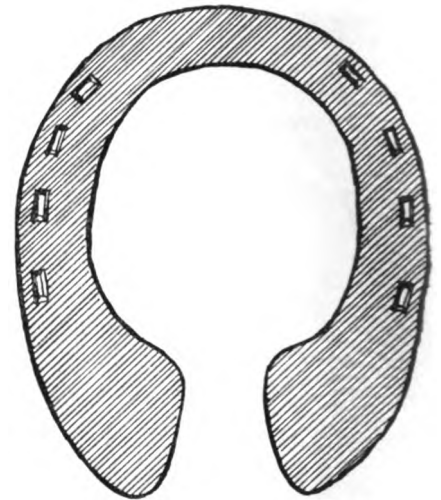


FIG. 5—A HEEL WEIGHT SHOE TO PRODUCE THE HIGH FOLDING ACTION.

changes quickly but changes should be brought about gradually. If we find our subject to have high heels, lower the heels and save the toe; if the toe be very short it is well to use an extension toe; Fig. 7. This shoe, properly made, combines two features that are favorable in that it lengthens the ground-bearing surface, the resistance in the break-over causes the foot to be extended and the weight is placed at the toe. A good toe weight shoe carries the foot well to the front. Remember not to load one of this type with weight, for the more weight the higher he goes. After the foot has grown and been dressed to proper shape, we have a large variety of shoes to draw from to reduce folding high and causing action to be extended. The most effective shoe is a very light one with sharp grab calks; Fig. 8. Next is a rim shoe, Fig. 9. A toe weight shoe with or without grabs, Fig. 10, may also have good results.

With reference to producing and

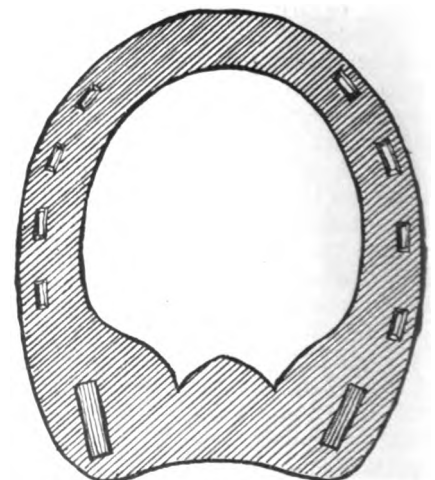


FIG. 6—ANOTHER SHOE TO MAKE THE HORSE FOLD HIGH

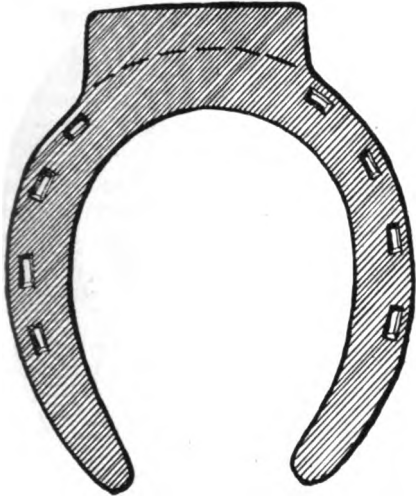


FIG. 7—THIS SHOE MAY BE USED WITH GRAB CALKS OR PLAIN—IT CAUSES EXTENDED ACTION

reducing action behind the principles are the same; the shorter the ground-bearing surface, and the more weight, the higher the action. For this reason the Memphis bars are the most effective in producing hind action. And the lighter the shoe and longer the ground-bearing surface, the lower and closer they go to the ground. Horses shod for the purpose of being properly gaited, should not be used on long, tiresome road trips as they will not improve or work right if the muscles are sore. Short, brisk work is preferred in order to develop action.

The Course in Horseshoeing at Cornell

The next course for practical horseshoers at the New York State Veterinary College, at Cornell University, Ithaca, N. Y., will begin May 1st.

Horseshoers who wish to take the

course should apply in writing to the Director of the New York State Veterinary College, Ithaca, N. Y. The number that can be accommodated at any one time is limited.

All inquiries concerning the details of the course should be addressed to Prof. Henry Asmus, New York State Veterinary College, Ithaca, N. Y.

The tuition for residents of New York State is free. For those living outside of the State a tuition of \$25 will be required. A fee of \$10 to cover the cost of material will be charged all who take the course.

The object of this course is to offer the horseshoers an opportunity to acquire a more thorough knowledge of the principles of horseshoeing. In addition to the setting of shoes, it is important that they should be familiar with the anatomy and physiology of the horse's foot and the danger of certain infections such, for example, as tetanus or lockjaw.

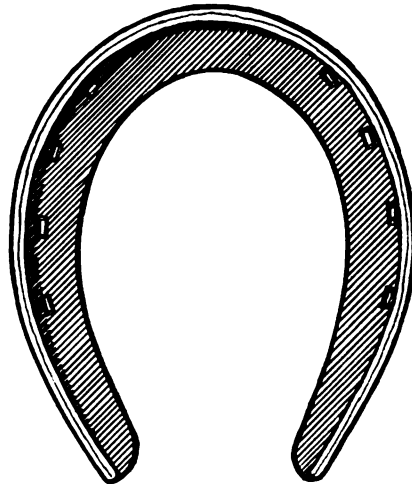


FIG. 9—THE RIM AROUND OUT SIDE FORMS A GRAB TO PREVENT HIGH FOLDING

The course will consist for the greater part in practical work in the shop under the immediate supervision of Prof. Henry Asmus. Two hours each day will be devoted to a lecture or demonstration by some member of the Veterinary College faculty on anatomy, physiology, infection and morbid conditions of the foot.

The Horseshoer and Wagon Smith in the European Conflict

J. Y. DUNLOP

It is surprising how little thought is devoted by the general public to the silent services of the army farrier and blacksmith. There is little or no reference made to them in the

news from the battle fronts, though the fact of their doing tremendous service on both sides cannot be doubted. And that this service has, in many cases, much to do with the success or failure of the movement of troops and supplies or even of actual engagements, is beyond argument.

The smith and farrier must keep the transport service in repair. Horses must be shod and wagons must be kept in good condition. Tires must be repaired and wheels fixed as in the illustration. Then, springs will break, especially on bad roads. And the roads are usually bad where the fighting is hardest. But food must be carried to the fighters and ammunition to the guns and without horses and wagons or motors, how is the army to be kept in the field? And without smiths and farriers, what can be done?

Then, too, each corps of cavalry must have a farriery department. There must be a farriery shop at the base from which the cavalry is operating. The fitting of a shop of this character is the simplest possible—a forge or hearth, an anvil, a water trough and a vise comprise the equipment with, of course, the necessary hand tools.

The army farrier, as a rule, makes no horseshoes. The shoes are all made up in stock sizes and sent to the base in a finished state. And the work of the farrier at the front simply consists of the removal of old shoes and the setting and fitting of a new set.

Of course, the farrier and smith, while not actually engaged in the business of fighting, are subjected to all the regulations and requirements of the regular soldier. When, with the army at the front, he must be ready to move at a moment's notice. He must do his work quickly when

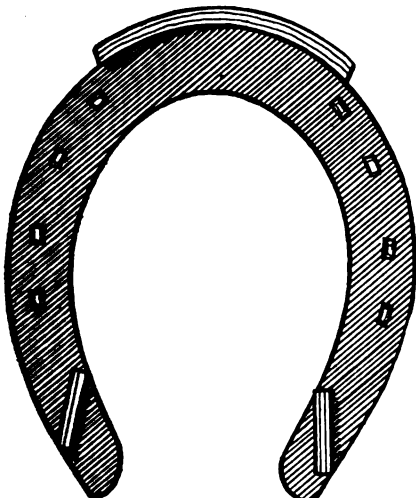


FIG. 8—SHARP GRAB TOE AND HEELS TO PRODUCE EXTENDED ACTION

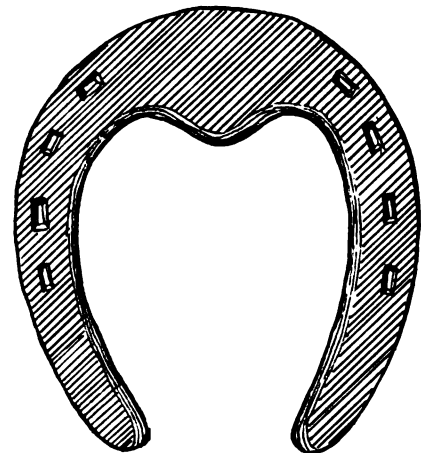


FIG. 10—A LIGHT TOE WEIGHT SHOE WITH WEIGHT IN POINT OF TOE



WITH THE ARMY FARRIER IN FRANCE

necessary and be ready to do anything from the fixing of a loose shoe to the repair of a wagon transport.

The engravings shown herewith are from photographs of army smiths with the fighting forces in France.

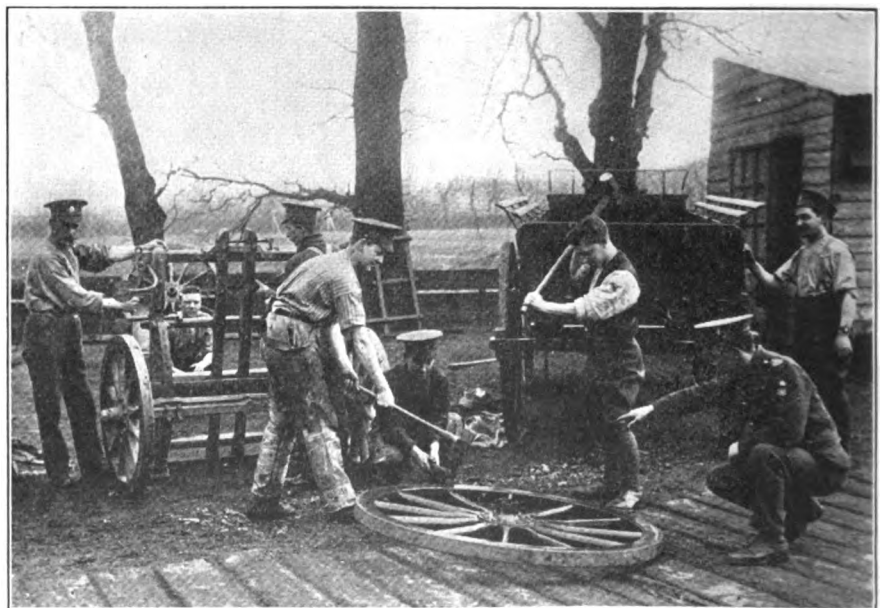
Wood Work in General and Wheel Work in Particular.

M. W. ABTS.

Wood work generally gets a pretty rough going over in the smith shop and it seems to me that a good plan to follow; for instance, on a wood part for a wagon or buggy to be duplicated, would be to round the part and finish it as near like it was at the factory as possible. The factory makes finish a study in order to sell their product against competition. We have seen wood pieces, turned supposedly to duplicate factory parts, that were very much lacking in finish. Observation and good reasoning would teach us much, but our conceit and seeming satisfaction of doing things different than the other fellow has us standing in our own light and thus hindering our progress. When we go to the shoe store to buy a pair of shoes we expect them to match up, and if they don't, it's pretty sure you will not make a deal with the shoe man, for he is trying to "hand you something". So let us be careful what we are trying to hand our customers.

In putting felloes on narrow tread wheels we use the rough stock. Our main reason for doing this is that the finished felloes seldom have the proper curve to fit the wheel for which they are intended. Should

you put them on, when the job is done the wheel will be slightly six or seven sided, as the case may be. If trimmed down till round you rob the felloe of its stock near the joints. In using the rough felloes we make a pattern of the inside circle of the felloe, saw the same with band saw and then after being placed on wheel, we plane it down and round it out. Now turn wheel over on wheel horse, mark circle to where it is to cut off—which we do with the band saw—then go back to wheel horse, plane down to the desired width, round out and the job is done—with not only a workmanlike appearance but serviceable also. You have almost a perfect circle and the tread is correct.



THE WAGON WORKER IS ALSO IN DEMAND IN THE ARMY

Why the Blacksmith Uses Water on His Fuel

The Atlanta (Georgia) Constitution explains the problem of the watered blacksmith coal in the following manner. It will no doubt interest our readers and particularly those who followed the recent discussion on the subject in our columns. The item in the Atlanta Constitution is as follows:

"When the blacksmith desires the intensest heat of which his forge is capable he invariably throws a little water upon the coal. The same course is pursued by the stoker who would get the utmost from his boilers.

"And the poorer the quality of the coal the more imperative the necessity for wetting it.

"It seems paradoxical, for from the beginning all people everywhere have regarded water as the one reliable agency for extinguishing fire. Such, indeed, it really is, if used in proper quantity, as experience has amply demonstrated.

"Chemistry explains the paradox very simply, however, when it informs us that water is composed of oxygen and hydrogen in the proportion of two to one. That is to say, in every molecule of the fluid there are two atoms of the former and one of the latter.

"Now, oxygen is the chief agent in combustion. Oxydization is a synonym for burning. The rusting of iron, the corrosion of silver and the burning of wood are identical processes, all due to the agency of this powerful element which is so widely distributed through all nature. To feed oxygen to flames is greatly to intensify them, therefore. This is exactly what is done, in fact, when they are fanned.

"Hydrogen, on the other hand, is a gas which burns readily and with the most intense heat.

"Very evidently if water is separated into its constituent elements, the oxygen and the hydrogen, no longer bound together, are able each to perform its



natural functions. The former adds greatly to combustion, and the latter not only burns readily but materially intensifies the heat.

"This is precisely what occurs when a small quantity of water is added to the coal fed to the flames. There is not enough of the fluid to extinguish the fire. Instead the fire acts upon the water, dissolving the bonds which unite its component gases, thus setting the oxygen free to accelerate combustion and converting the hydrogen into fuel of tremendous heating power."

Thoughts on Timely Topics

By THORNTON

Caustic Censure and Cheery Comment

THERE SEEMS TO BE A FLOOD of nailless horseshoe inventions recently. I've counted several more than I've got fingers to count on and still they keep a-comin'. Reminds me very much of the scourge of horse pad and breakfast food invention that swept o'er the country some years ago. About every evening we'd find another new style rubber pad announced in the paper, and every morning there was certain to be some new fangled breakfast food. And this constant race between the two classes of inventions caused one wag of those days to suggest that possibly the inventors of unsuccessful hoof pads were grinding up their "brain children" and serving them as "Eat-a-bit-a Hunka" and other euphoniously named and mysteriously compounded mixtures in gaudy pasteboard boxes and selling them through grocery stores instead of "iron stores." But to return to the subject in hand, namely, the nailless horseshoe—the claims made for this product of the horseless, wireless age include almost everything from the cure of fallen arches to the prevention of ingrown nails and outgrown feet. Like most all inventors, the nailless horseshoe inventor thinks his little attachment is going to revolutionize the world, solve the fourth dimension and bring the European conflict to a happy end. There'll be no more trips to the horseshoer. All the horse owner need do is to grab up a couple of the nailless shoes, put in a couple of store bolts and with the aid of a hair pin, an old pocket knife and couple of side combs, Dobbin is good for a trip to town and back. When the family mare is again stabled, the shoes are removed and placed on the parlor mantle where they serve as ornaments until again needed on the road. Thus the poor, poverty stricken farmer secures at exceptionally low cost not only serviceable shoes for his horses but he also beautifies his home.

FUNNY HOW SOME OF THESE EATING FADS get folks that ought to know better. One chap I know met me on the street the other day and said he was on the way to the doctor's again. "Same old trouble with my stomach again," he said. In reply to my question as to what he'd been eating, he said he'd been dieting for the last two years but it didn't seem to do any good. So I lit into him and while I don't think there are many blacksmiths that are troubled in the same way, perhaps a little of what I handed to friend Dieter will do some one else good. If more doctors would prescribe good, solid

city backyard. And I've been going to say something about 'em in one of these talks for some time—been just waiting for an idea, so to speak, and I got it the other day when a stranger dropped into my shop. Said he was from some town out Indiana way and was in the east on a little visit. When I asked him about business, started right off. And I'm going to give you his story as near as possible just as he told it. He began: "Say, if y' don't want a lot o' trouble don't take on auto repairin'. Long 'bout the spring o' 1914 a smart Aleck came along an' sold me one of them there pesky oxe-sety-



THE MISSOURI SHOP OF W. B. TAYLOR AND SON WITH A FORD AND A TAYLOR IN THE FOREGROUND

meals for their patients there would be fewer long faces among their waiting room habitues. When a chap arises in the morning and attempts to lay the foundation of the day's work on a glass of water and an apple, something's got to suffer—either the work or the worker. And when the whistle blows at noon, a schooner or two of the foamy-colored amber and a stripped free lunch won't prove good hard pan for the afternoon shift. Of course, I don't mean that every man should eat a side of bacon and a couple dozen eggs for breakfast and then tuck away a couple of good sized steaks at the dinner hour, but when you see a man with a hopeless look, a dulled eye and a sagging stomach you can pretty near cinch a sure thing by betting that what he needs most is a good, hot meal of man's size with lots of gravy and a big hunk of pie.

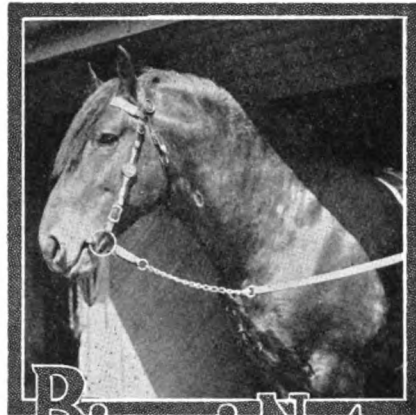
OXY-ACETYLENE PLANTS are springing up in all parts of the country about as plentiful as dandelions in a

lean thing-a-majigs an' say, do y' know I ain't had a real good daylight nap sence I got it. The gosh-danged thing hes kep' me so blamed busy I ain't had time to take a drink, hardly. Why, last fall, 'long 'bout September when the circus struck town I was so busy I couldn't go—an' I ain't missed a circus in nigh onto forty years. Then at Thanksgiving we allus go up t' my wife's folks for a week an' blamed if I didn't have too much work in the shop to go. So I had t' stay home. Well, then at Christmas time the folks allus come down t' our place and I usually close the shop for a few days t' give 'em a good time. An' blamed if I didn't hav' t' work on Christmas morning t' get some jobs out with that dangled oxe-sety-lean thing. Wel, jes' as I thought it 'bout time t' take a little needed rest after a busy season, don't the plant of the national company there in our town burn down and I got the job to cut up the wreck so they could rebuild right away. My oxe-sety-



lean plant and Tom Hoover's is the only ones in the county and we worked purty near night an' day t' get that burned twisted wreck of machinery out o' the way. Well, I'd no sooner got that job done when the farmers began bringing in their machines fer repairs so's t' be ready fer spring. An' so I ain't had a chance yet t' get rested. An' jes' before we started away I noticed there's two inches o' dust on the seat o' the old shop arm chair. An' that's the way it's been ever since I got that consarned oxesety-lean plant. It's kep' me restin' about as easy as a man with the seven-day itch, t' say nothin' o' the shoe leather I've worn out hikin' t' the bank. I tell y' them here oxesety-lean machines is all right fer the feller what wants t' keep a-goin' an' a-workin' all the time, but there ain't no rest with 'em for the lazy. 'Seems as tho' everybody in town's got some kind of a job thet y' kin do with the oxesety-lean outfit except the undertaker an' he ain't been in town long." When I asked my visitor how it happened that he was now away from home and business, he said: "Well, y' see I kep' gettin' bussier and bussier thet the wife begin t' complain about it an' so after I finished the addition to the shop an' got a man thet could handle the oxesety-lean plant, I put the boy in charge—he's twenty-four now—an' the ol' lady an' myself are takin' thet weddin' trip thet's been delayed fer so long. We're on our way t' New York. An' say, if y'r ever in Snoozetown, Indiana, jes drop in an' see me."

DOES POWER PAY?—asks a reader who seems to have a great deal of mistaken faith in my ability to solve smith shop problems. Power pays all right if it is installed and used right. But a make shift power shop with the engine on any old excuse for a foundation and tucked in where it will make a resting place for every cloud of dust and soot that floats about the shop, won't pay. To pay power must be used. And if used you must get your money for what it is used for. It makes no difference whether you use the power for washing the dishes of the village hotel or to curry the feet of the quarry horses, you must get your money for its use. An engine in the shop is a good investment, but it's got to be kept busier than the proverbial bee or it won't earn as much salt as the village loafer. The more work you give it the more money it will give you.



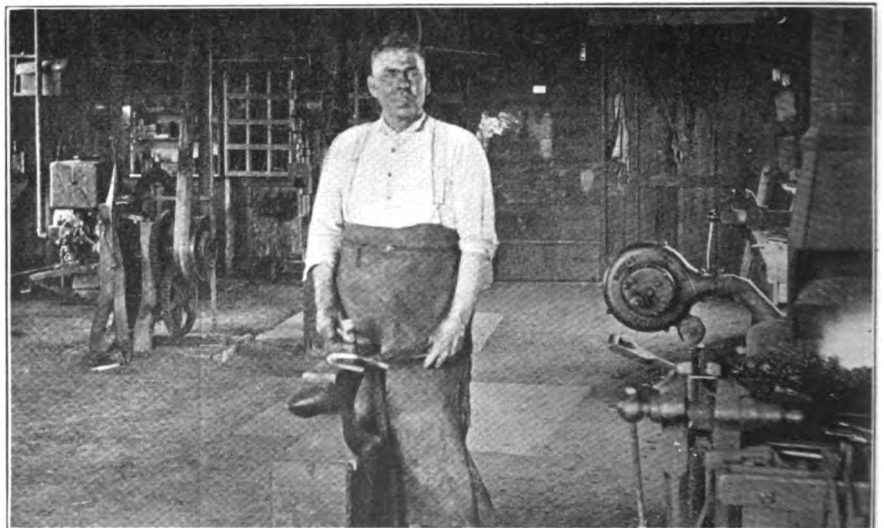
Bison's Notes

Persons whose knowledge of harness racing is confined chiefly to the racing news as given in the columns of the daily press get the idea that the Grand Circuit is about all there is to this form of racing sport. Never was a more erroneous opinion formed for many times the number of horses that follow the Grand Circuit are raced each season in the half-mile track circuits and the horses that race over the two-lap tracks are not by any means of an inferior class. It is not at all an uncommon occurrence to see some half-mile track trotter or pacer dodge into the Grand Circuit and administer a beating to the mile track stars. Some trainers who, as reinsmen, can hold their own in competition with the best of the big ring trainers, confine their racing quite closely to the half-mile tracks for the reason that they can make a larger stable earn money on those tracks than on the mile tracks. In other words if they decided to race on the mile tracks they would have to reduce their stable to small proportions, whereas, on the two-lap tracks they are able to earn some money with most of the horses they have. And a campaign over the half-mile track is very much less expensive than one down the line of the Grand Circuit, where the long shipments and entry fees to the big purses rapidly count up into the thousands of dollars. It will be rather surprising to many readers of THE AMERICAN BLACKSMITH to learn that the trainer

who won more races than any other in 1914 is not one of the number who followed the Grand Circuit, but one who raced exclusively on the mile tracks. It will be more surprising to them to learn that of the twenty-five trainers who won twenty or more races in 1914 only three followed the Grand Circuit and that only five of the other twenty-two raced at all over mile tracks and three of the five only struck the mile tracks twice. The trainer that headed the list of race winners is Herman E. Tyson, of Newark, Del., who drove the winners of forty-six races, all over half-mile tracks. The three Grand Circuit trainers who won twenty or more races each were Thomas W. Murphy, of Poughkeepsie, N. Y., with forty-two winning races to his credit; Walter R. Cox, of Dover, N. H., with thirty-four, and Edward F. Geers, of Memphis, Tenn., with twenty-seven.

Those trainers who raced over the half-mile tracks almost entirely, with the number of races each won are: Herman Tyson, Newark, Del., forty-six; A. B. Martin, Ticonderoga, N. Y., thirty-nine; Nat. Ray, Toronto, Can., thirty-four; Marvin Childs, Pleasanton, Cal., thirty-two; Daniel Allerman, St. Paul, Minn., thirty; John Case, Marlin, Tex., thirty; I. W. Pottle, Portland, Me., twenty-seven; Fred Jamison, Washington, Pa., twenty-seven; S. F. Palin, Russiaville, Ind., twenty-six; C. E. Pitman, Trenton, N. J., twenty-five; Ben. White, East Aurora, N. Y., twenty-five; B. W. Whitehead, Murfreesboro, Tenn., twenty-five; Guy Rea, Lexington, Ky., twenty-two; Harvey Thomas, St. Joseph, Mo., twenty-two; H. H. Stokes, Urbana, O., twenty-one; W. E. Miller, Washington, D. C., twenty-one; Edward Allen, Libertyville, Ill., twenty; W. B. Beggs, Middletown, Del., twenty; W. O. Foote, Bonham, Tex., twenty; Daniel Leary, Westchester, Pa., twenty; H. J. Jamison, Radford, Va., twenty.

It will be still more surprising to the persons who look upon the racing in the Grand Circuit as about the whole thing in that field of sport to learn that among the trotters and pacers that have won \$10,000 or more each during the last fourteen years, thirty-two raced almost exclusively over the half-mile tracks, only four or five of them having been taken to the mile tracks for an occasional race. These big money-winning half-mile track pacers, their records, the number of races won by



MR. B. A. VAN BEBBER IN HIS KANSAS POWER SHOP



each and the amount of money won are as follows:

	No. of winning races	Amt. of money won
Castlewood, 2:09¼	68	\$22,689
Jenny W., 2:04½	36	20,710
Rob Roy, 2:05¾	43	17,463
Bland S., 2:03½	31	16,992
Francis J., 2:08	14	15,775
College Gent, 2:06	20	15,258
Ralph Wick, 2:13¼	42	15,100
Charles Simmun, 2:07¼	48	14,777
Allerdow, 2:09¾	29	14,495
Beaut Kennedy, 2:08¼	54	14,053
Bill Barleycorn, 2:08¼	37	14,000
Pat Ford, 2:10	30	13,402
Blackbird, 2:11¼	36	13,155
Nelly G., 2:08¼	21	13,105
Ella M., 2:04¾	45	13,037
Major Gantz, 2:08½	37	12,737
Hal Boy, 2:06¼	17	12,080
Roy Wilkes, 2:08¼	36	11,915

of them started twenty-five or more times during 1914. It would not be so remarkable if most of the horses that started in twenty or more races were in the slow class division for then it would be evident that the clip they were asked to race at was not very fast, but, as a matter of fact, thirty-five of the fifty-one have records below 2:15, twelve of the lot being below 2:10, which shows plainly that they must necessarily have raced at a very fast clip in most of their contests. These fast record horses that started twenty or more times during the year and the number of starts each made are as follows:

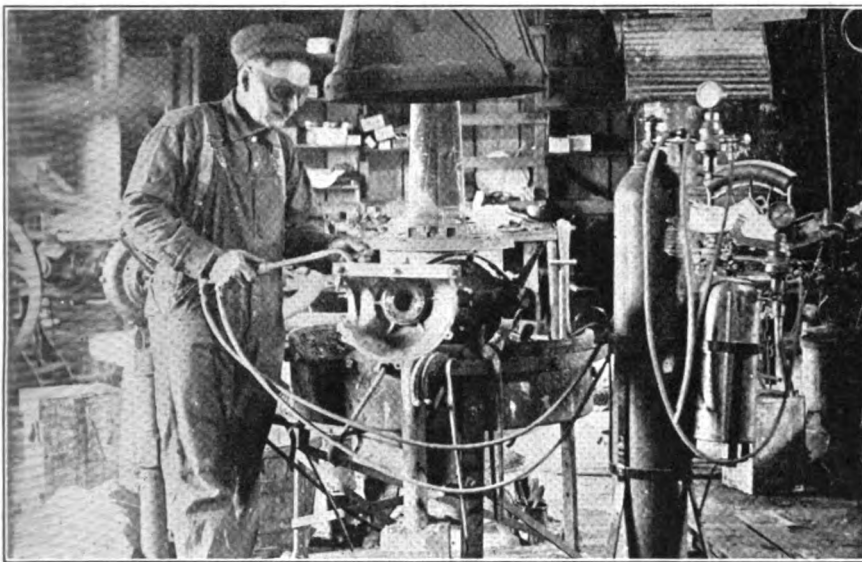
Started in 27 races—Rouses Point Boy, 2:10¼; Alpha Dell, 2:14¼; Monarchal Lady, 2:14¾.

Started in 25 races—Little Alfred, 2:05¾; Nellie G., 2:08¼; Grattan Boy, 2:09½.

Started in 24 races—Merry Direct,

Nothing more truly indicates the state of the demand for well-bred, young trotters and the prices the public will pay for them than the results of a public sale. The last big sale on which to base judgment in this respect was held in New York in March, in which all the yearling foals of two noted breeding farms were put up for the public to bid on. From Walnut Hall Farm, in Kentucky, forty-seven yearlings were sent to this sale and they brought \$17,385, an average of \$369.89 per head. From Curtis Neck Farm, in Virginia, nine yearlings were sent, which brought \$4,185, an average of \$465 per head. It should be understood that while technically yearlings, these youngsters were mostly less than ten months old. None of them had been broken to harness and in case of the lot from Curtis Neck Farm, they had been only halter-broken and no attempt was made to show them at speed; they were simply led out before the auctioneer and sold as they stood. In the face of unsettled financial conditions caused by the European war, close observers of everything connected with the breeding interests, regard the sale of these yearlings at the prices paid for them the most encouraging happening of the past fifteen years in the trotting horse breeding world.

While the blood of the stallion, Harold, that sired the first trotter to beat 2:10—Maud S., 2:08¾—has not been prolific in the production of championship performers in this country, almost every champion trotter or pacer of recent years in Australasia has carried the blood of that horse. Baring Maud S., 2:08¾, the only other champion directly descended from Harold in this country was Kremlin, 2:07¾, that, for a brief time, held the stallion championship. In Australia and New Zealand the present holder of the champion records for that continent, with just one exception, trace directly to Harold through two sons of that horse taken to the island continent years ago from this country, Childe Harold and Vanleve. Emulator, 2:17 1-5, the champion trotting stallion of Australasia, was sired by Osterly, son of Childe Harold. Jessie Palm, 2:18, the champion trotting mare, was sired by Rothschild, son of Childe Harold. Fritz, 2:13, the champion gelding, was sired by Vanleve, son of Harold. King Cole, 2:08¾, the champion pacing stallion, was sired by Ribbonwood, son of the American stallion, Wildwood, but his dam, Kola Nut, was sired by Childe Harold, son of Harold. Emeline, 2:08¾, the champion pacing mare, was sired by Rothschild, son of Harold. The champion three-year-old trotter, Lucid, 2:25¼, has a double cross of Harold blood, as she was sired by Bonnie Chief, a grandson of Childe Harold, and her dam was by Vanleve. Lucap, 2:15¼, the champion three-year-old pacer, also gets a cross of Harold blood, through her dam, a daughter of Vanleve. So generally do nearly all the fastest trotters and pacers produced in Australia and New Zealand trace to Childe Harold that he is frequently referred to in that country as "the Hambletonian of Australasia." To the breeders of this country, where the Harold family occupies only about a fourth-rate position, it is difficult to understand the prominent position which this strain of Hambletonian blood has taken in the production of trotting and pacing blood in Australia and New Zealand, where harness racing is rapidly assuming a most important position as a national sport.



THE OXY-ACETYLENE PLANT AT THE CORRELL SHOP

Joe Boy, 2:06½	44	11,820
Don, 2:06½	25	11,807
Hokola, 2:14¼	34	11,769
Knight of Strathmore, 2:03¾	27	11,650
Charm P., 2:10	23	11,395
Ruth D., 2:06¼	21	10,972
Miss Sherbet, 2:12¼	18	10,875
Long John, 2:11¼	40	10,830
The Indian, 2:09½	23	10,345
Ella Penrose, 2:07¼	10	10,191
Bill Bailey, 2:08¾	23	10,185
Heartwood, 2:13½	13	10,0255

These figures will show plainly that the half-mile track divisions of harness race-horses is far more important as a feature of a sport that last season was responsible for one thousand and four hundred race meetings, at which twelve thousand and six hundred and seventy-three horses started with purses aggregating \$3,228,618 in value. It is also safe to state that ninety per cent. of these meetings were held over half-mile tracks.

Of the trotters and pacers out racing last year fifty-one started in twenty or more races each. Almost any horseman would think one of his horses had put in a pretty fairly busy season if it finished the year credited with a dozen starts and it will be a genuine surprise to lots of them to learn not only that as many as fifty-one started in twenty races but that eight

2:06¾; Elbonio Belle, 2:10½; Jim O'Shea, 2:14¼.

Started in 23 races—The Climax, 2:07¼; Majesta, 2:11¼; Baronwood, 2:11¼; Ethelgo, 2:13¼; Crystal Louis, 2:13½; The Moose, 2:14.

Started in 22 races—Mary Ellen, 2:09¼; Ethel Direct, 2:11¾.

Started in 21 races—Peggy Jim, 2:07½; Dean Swift, 2:08; Fred W., 2:08¾; Jim Hill, 2:09¼; Tredell, 2:10¼; Myra Bell, 2:10¼; Directomes, 2:10½; Ham Patterson, 2:11¼; Gambrule, 2:12¼; Layton P., 2:12¼; Rosebud McKinney, 2:12¼.

Started in 20 races—Red View, 2:07¼; Susie M., 2:08¾; Prince Rupert, 2:11½; Billy Ogy, 2:12¼; Greatest Heart, 2:12¼; King Charley, 2:12¼; Gray Eagle, 2:13¼.

Nothing could better illustrate the wear and tear qualities of the light harness race horse unless it might be the further statement that Monarchal Lady, 2:14¼, and Frank S., 2:15¼, were twelve years old; Directneer, 2:10½, and Nellie G., 2:08¼, eleven years old; Rouses Point Boy, 2:10¼; Ethelgo, 2:13¼, and Fred W., 2:08¼, ten years old, and Alpha Dell, 2:14¼, and Susie M., 2:08¾, nine years old last season when they raced so many times.



The Prices

Why are the prices high?

Nobody seems to know;
But here's one reason why

They keep on climbing so:
The man who sells his hay
Or his labor by the day

Or his anything, is charging all
The other man will pay.

It's "Let the public hang,

And soak it to them twice;
Why should we care a dang
So long's we get our price?"

But you and I, my friend,
Are the public when we spend;
And so we're raising prices on
Our own selves in the end.

Still, there's no stopping place,

It's soaked to me and you,
And to keep up the pace
We have to do it, too.

It's all a whirligig,
And we dance a lively jig
As we shove it 'round and wonder
Why the prices are so big.

And, as the thing goes 'round,

Some folks get on and ride;
Then we upon the ground
Must quicken up our stride.

And then, besides, you see,
They're charging you and me—
These ornamental people are—
For letting them ride free.

WALKER G. DOTY,
in Farm Journal.



Heats, Sparks, Welds

The shoer who sets a shoe correctly also sets a good example.

The chap who hustles for business will soon have a business hustling for him.

A guess usually results in a miss. In business a guess means a miss in profits.

You can't capture much business with war talk, so why not cut out the war talk?

"Folks generally like t' trade with a feller who is stuck on his job"—ses Ol' Si Hearsay.

How's your herd of Pink Buffaloes? Don't allow your stock to get low. Use them freely and ask for more. They mean much for you.

Ford says: "When there is contentment in the factory there is good workmanship in the product."

The road on the hill of life is full of bumps but they bump the hardest when you're coming down.

There never was a result without some cause. Certainly there is some reason for your competitor's success.

If you put good thoughts into your think tank can you get anything but good thoughts when you tap it?

"A silver-mounted harness won't help y'er horse much ef he ain't shod right." said Sam Hill to a rich customer.

The Book Department is offering some big bargains. Look up the announcement in this number and then save some money on your craft books.

Socrates said: "Everyone is the architect of his own fortune." Why not "smith of his own fortune?" Doesn't it require more hammering than planning?

Tell your Customer to keep a little bran in the feed room. It's a good investment where colts or in-foal mares are kept and is excellent for the idle horse.

Haven't you yet taken advantage of Our Long-Time Rates? They mean a real saving and save time and bother. Really you should jump at the chance.

You are not expected to agree with everything said in "Our Journal," but when you disagree with what is said we would like to have your side of the story.

When you hear a man say he's sorry he ever learned the smithing trade, you may be sure there's something wrong with the man, for surely its not the trade that's at fault.

Where do you stand on the oxy-acetylene plant question? Put one in yet? The chaps who'll profit most in using these machines are the fellows who install them first.

Do you know any smith who does not know THE AMERICAN BLACKSMITH? Let us know who he is and where, we want to get acquainted with him. Drop us a post card—we'll do the rest.

"You'll never need to crowd a customer too hard if you've made the proper investigation before granting him credit. And if you're investigated properly you'll not regret your decision."

A Brick bat or a Bouquet—which? We want you to hand us something—either a brick bat or a bouquet. Which will it be? See the "Timely Talks" page and then let fly with what ever you think we deserve.

A typewriter fifteen feet high and twenty-one feet wide is one of the wonders of the Panama-Pacific Exposition. It is said to have cost \$100,000. It is nearly two thousand times the size of an ordinary typewriter.

There are more reasons why a man should reach a good trade journal than he can count on his fingers and toes, and yet we come across smiths every day who have to be convinced of facts that seem to be most apparent.

Friend Tom's a humorist of the first water. We ran into his shop the other day, for protection during a passing shower, and noting that there were several places in the roof that did not leak, we jokingly asked how it happened. "Well, you see I got a souple o' waterproof mortgages on the place," replied friend Tardy continuing his pumping at the squeaky bellows.

TRUE TALES OF OUR SERVICE NUMBER FIVE.

A Utah smith with a modern oxy-acetylene plant was considering the welding of a crack in a large school bell. He asked if we could give him some advice on the job. We turned the question over to one of our contributors—an expert on oxy-acetylene matters—and in a short time had the required information in his hands with instructions as to just how to go about the job.

Pretty hard to get your money when your slow pay customer leaves town and a bill behind. Keep eyes and ears open to the movements of delinquents and then insist upon immediate settlements when conditions warrant.

We can read continuously from childhood to old age, but if we do not think in our reading what will it profit us? To get the good of our reading we must think—to get the full value of what is in "Our Journal" we must think about what we read in it.

Good news comes from Indiana, saying that Governor Ralston has signed Bill 353, which gives blacksmiths liens upon animals they shoe and upon vehicles and implements they repair. Some day there'll be such a law in every state.

Did you ever see a quack medicine, fake mine or other questionable advertisement in "Our Journal"? THE AMERICAN BLACKSMITH believes in protecting the interests of its readers. Fakers can't buy space for love or money in these pages.

Running a smith shop without the aid of THE AMERICAN BLACKSMITH is like going from New York to San Francisco on foot—it's possible and it's being done, but it's a whole lot easier going by train. And you'll find the business going easier with "Our Journal" as a smith shop companion.

Boost the trade for all you're worth. Join the Boosters' League. Don't let the knocker's words go unchallenged when you hear unkind things about the craft. A knock unanswered is as good as an admission and surely you cannot afford to take that stand! Boost and the craft will boost you—Knock and you'll fall alone.

Work alone doesn't make your business a success. Getting your money after you've done the work counts most. You must keep account of your accounts. If you don't you may as well go out of business. Read the accounting articles and the business items that appear in "Our Journal." Then do the work and get your money.

Ever consider just what opportunities can be found in the advertising pages of "Our Journal?" or the actual worth of a copy? Just look through the pages of this number. Notice the numerous valuable trade catalogues you can secure by simply writing to the advertisers—catalogues of real practical use. Then there are the samples of various compounds and products that are offered by advertisers. This issue is worth more than an entire year's subscription in the advertising offers alone, to say nothing of the valuable reading matter. Why not tell your neighbor?

Our Honor Roll

THAT 1925 CLASS.

Does your subscription expire this month? If it does—send in your renewal for ten years and save money. It will put you in the 1925 class,—save you trouble, bother and money—and put you right up among the leaders on Our Honor Roll. Do it NOW!

Table with 4 columns: U. S. and Mexico, Canada, Other Countries, and Subscription details (years, cost, savings).

Send your order and remittance now—today. Don't wait until you forget all about it. You'll never regret it. Our subscription insurance saves you money. The sooner you begin saving the more you save. There is no time better than NOW.

Main subscription list table with columns: NAME, Subscription Paid to, and dates.

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Ornamental Ironwork in Scotland

JOHN DUNLOP

Wrought ironwork in Scotland is of many types, the earlier forms being manipulated with the hammer only and the results obtained were rude and wanted refinement. The maturity of wrought ironwork was reached when the file, the saw and the chisel were brought into use and the mouldings, tracery and other features which necessitated more cultivation in both designer and smith were introduced. The earliest forms were the strap hinges, the shapes of which are well known, and the mansion house gate which, in many cases, are formed of several tiers of long balusters and enriched by leaf work, forged and curved out of solid iron.

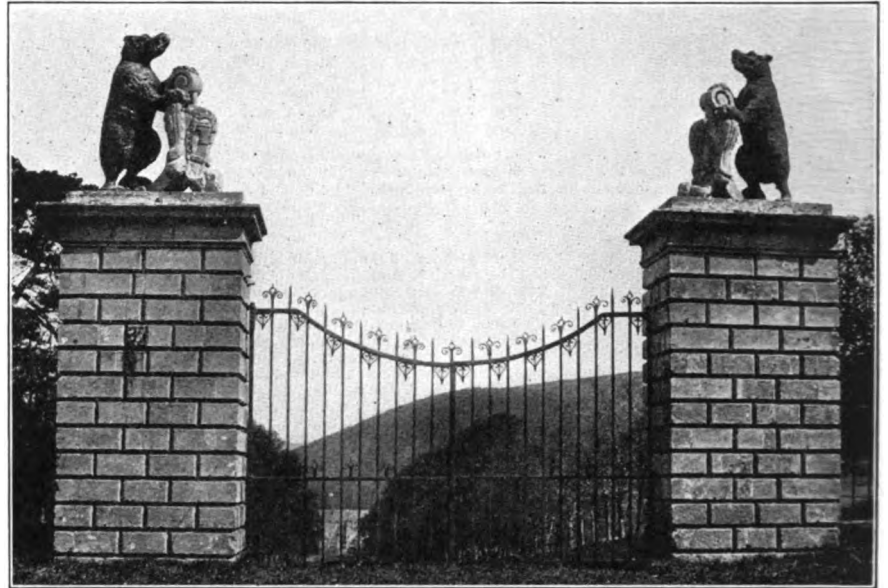
The great merit of our ironwork is that there is nothing in its design or execution which a good smith cannot carry out, while in a good many of the later examples its reticence and simplicity are such that it draws one's attention away from the architecture in conjunction with which it is placed. In them are to be recognized the tendency to concentrate the richer parts and ornament setting it off with broad interspaces of plain bars. It is this reticence and severity of design which is necessary to give effectiveness to wrought iron work and it is this respect that the work of these later smiths bear favorable comparison with that of English ironwork.

The plain gate with its open, set bars and decorated balusters is so familiar to us that we seldom stop to think of its harmonious completeness as a design, and yet it is the proportion of the whole rather than the elaborate detail of the decorative leaf which produces the satisfaction we feel. And it is precisely these qualities which can be obtained in the work of the local smith in almost any country district. Most of the examples in Scotland are the work of the local blacksmith who, in most cases, make good gates, railings and lamps, and the people are beginning to learn that a revival of the craft can only be brought about by putting suitable work into local hands.

In the smithy, dark and grimy, the art as practiced now can differ but little from that of the far off days and the tools used in the construction of the gate in the illustration hardly differ from those of the present. The gateway at Traquair House is an interesting example of sixteenth century work and consti-

tutes a portion of the addition to the Mansion House, carried out under Charles, fourth Earl of Traquair. It is the entrance gate to the avenue which extends about half a mile to the southwest of the house. The gate is shown closed and to all appearance has not been used for a long

Then again a smith sometimes has a piece that can not be carried in lime, such as a long, bent shaft that is to be straightened, red hot, in a lathe. In many places the time consumed in getting the shaft from the smith shop to the machine shop leaves it at a black heat and in a



AN EXAMPLE OF GATE WORK IN SCOTLAND

time. Tradition states that the seventh Earl closed the gate after the death of his wife and expressed the wish that it should not be opened until there was another Countess of Traquair. No others have borne this title and the gates remain today with the meeting rails riveted together.

When Work Has to be Kept Red Hot

BERT HILLYER

Oftentimes a smith has a forging or patch that has to be fitted up while hot on some machine that is quite a distance from the smith shop, such as shrinking bands on cracked hubs and the like. To keep the band red hot while traveling for any distance from the forge fire is a problem that has puzzled many smiths. The best way the writer has found out is to take a pail of fine, air-slacked lime. Heat the lime up by putting a large, red hot piece of iron in the centre. Then heat the band to a good heat. Take the iron out that was used for heating the lime and put band in its place, making sure it is all covered with lime to hold the heat. It is surprising how long a piece of iron will stay red hot this way.

scaled up condition from the air striking it. The next time the reader has a shaft to straighten, try this method: As the shaft is pulled from the fire have ready a piece of thin sheet asbestos and wrap this around the hot part and bind up with small, soft wire. A piece properly wrapped up in asbestos stays hot for a long time. It is not always necessary to take the asbestos all off when straightening, as a small piece can be taken from the centre to see how the shaft runs.

The Punch and Its Uses

H. N. POPE.

The handle punch is one of the handiest of tools in a smith's kit, also one of the most used. Many smiths do not know how to use it in order to get the best results. They make it straight and square on the end and drive clear through a piece. The result is that the end of the punch is upset and will not come out. The trouble begins right here for after pulling and twisting till the handle is broken, the refractory tool is usually removed with another punch.

There is a little kink in removing a punch that some know and some do not. Set punch over the back of anvil and give a light blow against the body of punch where it is drawn

down and it is sure to come. If one cannot hit the tool, place a small fuller against it and then a light blow will start punch out. Unless for some special use, a punch should taper just a trifle all the way to point, and end should be rounded slightly. A punch for punching eyes should be tapered all the way to the point and of oval shape rather than blunt so that it will force the stock to one side instead of cutting it. Where it is practical I prefer to drive the punch clear through when punching out an eye, because in punching from both sides one is very apt to run by the first hole leaving a lap in the stock which is sure to weaken it. A little dry, soft coal dropped into a hole when punching will prevent the punch from sticking.

There is another very handy tool not often seen, and that is a half-round chisel made in several sizes. To make one, proceed as in making a punch except, after drawing out, drive into a swage and flatten one side, then with chisel cut a rather short bevel. For cutting out corners, this tool has no equal.

A Unique Blacksmith Making Unique Things

H. WINSLOW FEGLEY

When the oldest building was torn down in Reading, Pennsylvania, it happened to be the old jail. From it were taken a number of old locks, the majority of which were made by blacksmiths located either in Reading or in Berks county towns. These locks were taken to the rooms of the Historical Society of Berks county and one day, while showing these locks to a number of school teachers, the custodian informed the teachers what rare locks they were, and that all the old blacksmiths who formerly made such locks, and especially who were able to make barrel locks, had answered the last call.

One of the teachers, examining the lock closely, turned to the librarian and said: "I think you are mistaken in your assertion that the last of these lock-makers is dead. We have an old blacksmith in our town who makes just such locks today; and besides, he makes many other old things that his customers still prefer to factory-made goods."

This little incident prompted the writer to discover Berks county's unique blacksmith who makes unique things out of iron and steel. He is George Schnoke, the village blacksmith at Bethel, Berks county, which place was formerly known as Millers-

burg. George Schnoke is today the only blacksmith in the county who is able to make these barrel locks. He has been making them for almost two score years.

The history of the barrel lock is quite primitive. It is not known whether the Chinese, who were the first lock-makers, made a lock upon this principle; or whether it was the Egyptians who are quoted as having made locks over four thousand years ago. Probably the first barrel locks of any importance were made by Joseph Bramah, an English



GEORGE SCHNOKE THE LOCK MAKER

engineer and inventor, who was born on a farm near Stainborough, Yorkshire, England. Before he was eighteen years of age, he sustained an injury while assisting in some farm work, and broke his ankle, so badly, that thereafter he did very little farm work. He then became a cabinet maker and while employed at this trade, with the assistance of his apprentice, Henry Maudsley, they made the first real barrel lock. In 1784 Bramah secured a patent, and this lock became known in the trade as the "Bramah Lock." Later it received the name of "barrel lock," on account of its shape and pattern. This lock consisted of an outer barrel, with a revolving barrel on the inside. The inner barrel was held in place by a steel disk. This disk could not be moved, except by the operation of the pin-like key, which would fit between the disks, release the springs and allow the inner barrel to be removed.

Hundreds of these locks were made in England during the first few years after the inventor was granted a patent, and thousands later on, both in England, Germany and other places of Europe. Some time prior to the Revolutionary War a good many locksmiths came to America, from England and Germany, and during the latter part of the eighteenth century they patterned a lock after Bramah's style, and in the counties of Pennsylvania where the Pennsylvania Germans settled, the locks were made in great numbers.

In Reading, Pennsylvania, seventy years ago, there were a dozen lock-makers who could make these locks and who made it a trade to place them on the market. At that time and until about thirty years ago, almost every one of the older blacksmiths used to make them, until one by one death claimed them, leaving George Schnoke the only survivor in Berks county.

George Schnoke, today, is making these locks, not as a novelty, for they would be too high-priced as such, but for actual use. It takes a full day's work to complete one and when Mr. Schnoke finishes one, he gets \$2 for it. This veteran blacksmith learned his trade in the town in which he now resides. He was born at Pinegrove, Schuylkill county, Pennsylvania, in 1854. First, he worked on a farm, just like Bramah, the inventor of this barrel lock. In fact, he stayed on the farm until he was the same age as the inventor, when he became a cabinet maker. Schnoke then became an apprentice in the shop of Emanuel Houcker, of Bethel. Here he worked six years as apprentice and journeyman. He next opened his own shop in the same town and ever since he has been doing all kinds of blacksmith work, and especially unique work.

One day, early in his career, a rich farmer, Peter Marshal, now deceased, entered his shop with a barrel lock. It was the first Schnoke had ever seen. He asked Schnoke if he would attempt the work and make half a dozen. Schnoke looked over the sample again and again, and finally said: "Yes, Marshal, I will, providing you will be willing to pay the bill without a protest." "Go ahead," said Marshal. "Thieves have been visiting my farm from time to time, and the only lock on the premises that they were not able to bust was this old-fashioned barrel lock, and I wish to feel my own goods safe." The burglar's kit of that time did not have nitro-glycerine



and steel augurs; but instead, the crow-bar and the pick were used and against this even this old-time lock seemed pretty safe. Schnoke made the locks and got fifteen dollars for the six and the farmer was well pleased that hereafter his chickens and his corn would be safe.

Since that time Schnoke has been making many of these locks. He has been the genius of the upper end of the county in the blacksmith trade. Nothing has ever been too tedious for his ingenuity. He is the only blacksmith in the county today who completes these long augurs, which the old pump makers used to bore the holes through trunks of trees that may measure from 10 to 20 feet in length. These pumps are familiar landmarks on many farms among the Pennsylvania German settlements and the old town-pump in Schnoke's native town was bored by one of the augurs he made. Then he makes the old-fashioned iron ladles, which the Berks county farmers use when they butcher and make the famous "scrapple," that is known from one end of the country to the other. He is hardly excelled when it comes to the point of edging tools. He makes axes, butcher-knives and gun-locks, and, in fact, has a miniature machine shop of his own, right in his little blacksmith shop.

He is still able to do a full day's work, and during the winter when the streets were covered with ice, resembling a mirror, he sharpened the shoes for twelve horses between breakfast and supper. He is the father of two sons and ten daughters, —all living. Among these is a blacksmith, who if necessity demands, will continue to make barrel locks, and do some of the other critical blacksmith work. Schnoke, however, is not a worn-out man and he says he never gets tired, which is proved, because he is always on the job with a pleasant smile for all.

Notes on the Theory and Practice of Hardening Steel

T. WEST
in *E. M. & W. of S.*

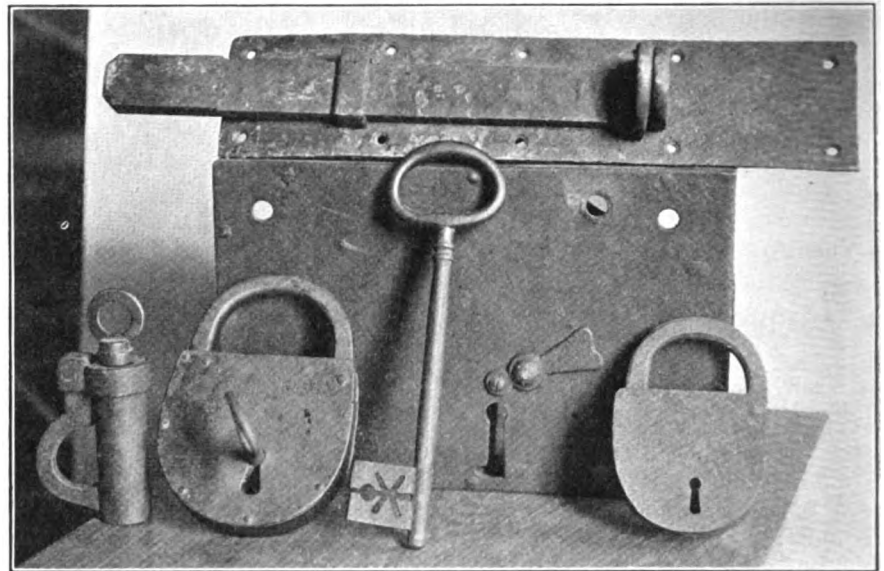
Steel is composed of iron and carbon (with other bodies combined with these—when it is a "special steel"—that largely affect the combining of the carbon with the iron). Carbon steel is composed of iron and carbon only, the carbon being present in various degrees, from $\frac{1}{4}$ per cent to 2 $\frac{3}{10}$ ths per cent. Above the last percentage the iron becomes cast iron, and cannot be tempered or forged. If the carbon percentage is less than $\frac{1}{2}$ per cent the steel scarcely hardens at all. According to

the purpose for which the steel is intended, the percentage of carbon is proportioned within the limits stated.

As a youth, I badly wanted to know "what happened inside the steel" when hardening took place; but nobody could tell me. I formed a theory of my own that the sudden contraction of the metal, when rapidly cooled, compressed the mass closer together. Presently I learned that a ball of steel that would just pass through a hole in a steel plate when annealed, would not go through it when hardened. In other words, the steel expanded slightly on being hardened. Then I was quite at a loss to explain the mystery. I also found that in tempering steel I also frequently tempered myself for the results in hardness and toughness varied so greatly, when (apparently) the conditions were exactly the same under which the steel was treated.

Within the last few years German patience of investigation discovered "what

is iron and carbon. At different temperatures the carbon forms with the iron different chemical combinations having different properties. When carbon is present in the iron in excess of the proportion that will chemically combine with the iron when solidified (although still red-hot, on the iron becoming solid, the excess of carbon is segregated in very fine plates very equally all through the mass and this is not steel, but cast iron. A familiar illustration of how a liquid will hold more of another body when hot than when cold is found in mixing a glass of hot grog. Whilst it is hot it will hold in perfect solution a larger quantity of sugar than it will when cold. This is easily seen, for as the grog cools, sugar will settle on the bottom of the glass in a solid state. To use this simile further: Suppose it was possible to very slowly freeze the glass of grog whilst it was hot enough to hold the whole of the sugar in solution; the sugar would probably be held in flakes in the



LOCKS TAKEN FROM THE READING, (PA.) JAIL BUILT IN 1770. AT EXTREME LEFT IS A "BARREL LOCK"

happened inside the steel". (A great pity that people had not confined their efforts to the industrial employment of steel, in which they certainly were advanced).

Good quality in carbon steel is really the (practical) absence from the iron of which it is made of any impurity, such as phosphorus, sulphur, arsenic, silicon, and other bodies not wanted and the presence of carbon in the right proportion for the purpose for which the steel is required. A steel good for one purpose may be a bad steel for another. Forging, rolling, and pressing the steel during its manufacture increase the specific gravity of it, and reduce the coarse crystalline structure always present under the first processes, and the grain is made finer, thereby increasing its strength. The greater the percentage of carbon in steel the lower the fusion point; hence it is that in welding a piece of steel the greater its carbon, the lower heat it will weld at. The less carbon there is in the steel, the higher heat it will stand without being burnt. Cast iron, having more carbon than steel melts at a still lower temperature than the highest carbon steel. The highest carbon steel will give the greatest degree of hardness, and the least degree of toughness.

"What happens inside the steel" in hardening is this: As before stated, steel

ice, as it would not have had time to collect itself into larger portions. The carbon does this in the iron when slowly solidifying from its molten state in cast iron. The carbon thus formed is named graphite. Another portion of the carbon content, under certain conditions, may form "annealing carbon". Graphite and annealing carbon are not affected by quenching in water when red-hot so we will not consider them further in these forms. But if the molten cast iron, with its large proportion of carbon, be suddenly chilled in casting, by coming in contact in the mould with some substance capable of rapidly depriving it of its heat, the carbon in solution in the liquid mass has not got time to change its form into graphite, but becomes fixed in the iron in its form of chemical combination with it, and is called "chilled cast iron", and has a very great hardness. The same effect is produced in steel on being quenched, but under certain modifications, which I will try to make clear later. In annealed steel the carbon is present in the form of "carbide of iron". This is composed of about 6.67 per cent of carbon to 93.33 per cent of iron, and preserves this proportion irrespective of the percentage of carbon in the whole mass of the steel. Carbide appears to be iron saturated with carbon at the critical



one, and for the new wheel supplied the smith has the old one he has taken off, which he can work on in odd moments, and then he will be in the position similar to that when he has malleable castings or wrought irons ready to apply to a hurry-up job. Another short cut to service and to the good will of the customer.

(to be concluded.)

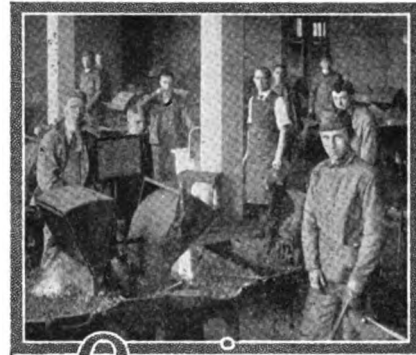
one portion of the paper, it may be ripped right off.

Painting problems seem to be the order of the day just at present. This is the season when the old, discarded vehicle, that we vowed last fall would be replaced with a brand new one this spring, is hauled out from its dust and hayseed-laden bower and made to do for another season. And it becomes a problem just how much and how little to do to put the rig into presentable shape at the least expenditure. This work and the way the smith shop painter does it determines whether the paint shop pays or not.

To remove old enamel, in reply to L. C. S., of Ohio, my book says: "Prepare a concentrated solution of alum and lay the enamelled articles in this and then boil them. The quantity of solution should be just enough to cover the pieces. In from twenty minutes to a half-hour the enamel will fall away. The article may then be polished with fine emery."

A silver-white paint is wanted by J. H. M., of Massachusetts. To make it, take ten pounds of pure white lead ground in oil, 1-10 oz. of lampblack in oil, 4 to 5 ounces of dry ultra marine, one quart of linseed oil, one quart of turpentine and one pint of japan. This recipe will make one gallon of paint.

Black paint for iron—in answer to G. F. Frederickson of Utah, who wishes such for quickly dipping a quantity of channel braces—would not linseed oil burned in the iron answer the purpose? This is accomplished by allowing the iron to cool to a black heat and dipping the piece into the oil; then removing and allowing to cool. Of course, in using this method, the object must be evenly heated and whether this is the condition at the completion of the forging and also if this method will be efficacious with the size of the channel braces, we have not the necessary information. However, here is a good recipe for black varnish adapted especially for cast iron and forgings: ¼ lb. lampblack, ½ lb. 1 lb. asphaltum, 1 quart turpentine and a small quantity of linseed oil. The lampblack is first rubbed up with the linseed oil, no more oil being used than is necessary for



Queries— Answers— Notes

To Head Bolts—In reply to Mr. C. P. Grut, of New Zealand on heading bolts: First take two pieces of soft steel about 1-inch square and about 5-in. long. Have them straight and smooth so they will lay together tight. Next take a piece of spring steel 2 by 5-16-inch and about 18-in. long

Heat about 5-in. of one end and place in the vice and turn ½-inch over so it will look like a piece of angle iron. Do the same with the other end. Then rivet a piece of the 1-inch square steel on each end on the side away from the flange that was turned over in the vice. Heat the spring steel in the middle of bar and bend around so that the 2 pieces of 1-inch square come parallel with each other. Then place a piece of iron about 3-32-inch thick between them and drill holes along line the exact size of bolts you wish to make. Bend the spring steel so that the jaw of the tool will stand open a little. Place the tool in vice, push the bolt rod up through the proper sized hole and screw up in vise. Now pound down iron same as you would a rivet; of course you have your iron hot.

It takes a lot of space for me to explain this but I can assure, Mr. Grut, that it is not near as much of a job to make one of these heading tools as it seems and he will find that he can make very nice bolts in it.—S. W. WALLACE, N. Y.

A Few Illinois Prices:

Common shoes, per horse.....	\$2.00
Steel plug shoes, per horse.....	2.50
Never-Slip, per horse.....	3.00
Resetting, per horse.....	1.00
Bar shoes, per pair.....	2.00
Hand-turned, per horse.....	2.50

CLARENCE STEWART, Illinois.

On Hanging Sleighs: In reply to query regarding rule for hanging sleighs would say that I know of no definite rule for hanging sleighs although I have ironed a large number of them in my time. But since the question has been brought up however, I have measured a number of sleigh runners, and find the beam a little back of the center of the wear of the shoe, and this would seem the proper method. Taking into consideration the influence of the load on the runners, and the friction caused by coming into contact with the snow or ice, there would be a tendency for them to root or turn forward like the wagon wheels, if hung too far ahead. I also believe it a good practice to have the draw hold below the level of the beam as a further precaution to prevent them turning, certainly never higher than the beam. As to the cause of these particular sleighs slewing to one side or the other, it is my opinion that the trouble must be looked for elsewhere, for instance if the



Benton's Recipe Book

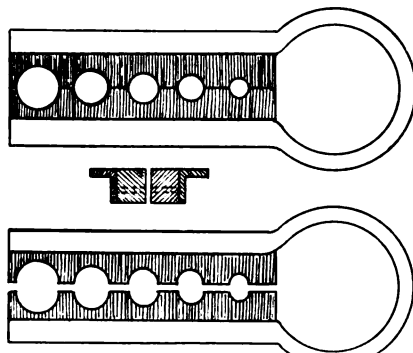
To weld and work mild steel like iron, take three parts of good sand and 1½ parts of air slacked lime and mix thoroughly. When ready to weld use this freely. There is nothing to equal it and nothing so cheap, says T. T., of South Australia.

For a nail prick, Mr. H. C. Walker of Texas, recommends the following bath: ½ oz. oil of cedar; one oz. of turpentine and one ounce of iodine.

Softening putty that has become hard on account of laying exposed to the air seems to give many workers serious trouble. One of the best ways of softening the hard material is to cut the putty into small pieces with the knife. Then draw the knife blade over the pieces until the material is well pulverized. Now add a few drops of kerosene oil and work hard. Add kerosene in small quantity until putty is of proper consistency.

Shop salves are always good to have handy. The chances for slight injury are great in every shop and five minutes spent in attending to a wound immediately after the accident occurs may save serious consequences later. One shop salve that comes well recommended is made as follows: One part swallow oil; 2½ parts petrol wax; one part eucalyptus and one part beeswax.

A cement for attaching emery paper to grinding disks is asked for by an Illinois reader and the following is suggested: Melt together 5 parts paraffine, 4 parts beeswax and 1 part rosin. When cold, cut into blocks, and apply evenly on the revolving disk until it has a thin coat over its entire surface. The emery paper should then be pressed on the disk while it is still revolving, thereby slightly heating both the disk and the paper, and causing the cement to spread in a thin layer all around the disk. The belt should then be shifted onto the loose pulley, so that the paper may be pressed closely to the disk. The corners may then be trimmed off with an old file. It requires a little practice to perform the job successfully, but the method is much superior to removing the disk and gluing the emery paper on in a press. The worn-out paper can be more easily removed, it being only necessary to wait until the disk is cool, when, by taking hold of



AN EASILY MADE BOLT HEADING DEVICE.

this purpose. The other ingredients are then mixed thoroughly.

This varnish, or at least, a very similar kind, can be purchased ready mixed for \$1.00 or 75 cents a gallon. There is a brand called "Newport Asphaltum" that is especially prepared for iron and is applied either by painting or dipping.

There are several other methods of blackening iron, but the one given seems to be the quickest and most economical way.



shoes are curved or bought shaped on the bottom, or if the pole is so loose that any little obstacle will cause the sleigh to skid, but never because they were hung too far back.—NELS PETERSON, Nebraska.

California Prices—Metal Harrows. We have read lots of other magazines but none which comes up to THE AMERICAN BLACKSMITH. We believe if more of the smiths and horse shoers would read the paper of all papers, they would profit by it.

We are doing a very good business. We work three men in the winter and five in the summer. The principal work in the winter is plow work. We set lots of plows, and do lots of share grinding and pointing. We get very good prices for this work. Below are some of the prices:

Grinding share.....	\$.20
Pointing and sharpennig shares...	1.00
Setting 4 gang plow.....	10.00
Sharpen steel share.....	.25
Tire setting, per set.....	4.00
New spokes.....	.50
New felloes, single.....	.65
Machine work, per hr.....	1.00

In addition to this work we make angle iron harrows. There is not a single piece of wood on the harrow. We sell a great number every fall and spring, they use them with teams or engine. If anybody would be interested in this kind of a harrow we would like to communicate with them.

H. T. MILLER & SON, California.

A New Idea in Sleds.—I am not a good hand at writing but will try and give you a new idea on sleds.

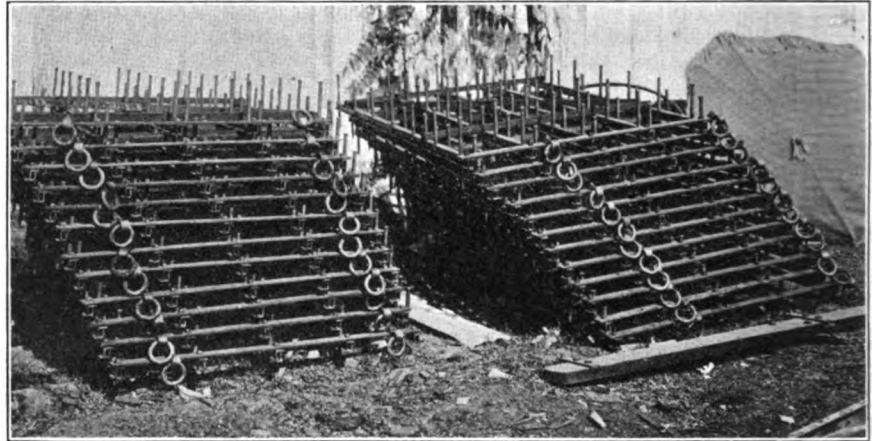
We get hold of an old wagon, most any size according to what the sled is to be used for, and narrow the axles up to sled track. We then cut all of the spokes out of the hubs and flatten the hubs on two sides, opposite each other. Then we bore two holes through the hubs, one on each side of the boring for start bolts. We then make a runner about 4-inches deep and 2-inches wide. Then between the hub and the runner we place a block 5-inches high. Use the rear hound bolster and axle, let the reach slip loose in the hounds and avle, but have a roller and short tongue in rear bobs. This has an eye bolt with a long link which goes through the reach with a pin for coupling.

On the front axle you have a small sand board, a wearing plate and a circle of iron 1/2 by 1 1/2 by 18-inches in diameter. The front bolster has the reach fastened solidly to it with a couple of strap bolts and a brace on the bottom of the reach to the end of king bolt to take off the strain. The tongue is from the points of

the runner same as all sled tongues. Am making one of these sleds now to carry over for next winter. The price we get depends on the time and amount of material in them, usually from \$35.00 to \$65.00.

way I can do is to take it by the job. How is that?—D. W. MURPHEE, Texas.

On Wheel and Tire Work.—It looks like a simple job to "run" a tire, upset it and put it back on the wheel again. In the



H. T. MILLER AND SON OF CALIFORNIA SPECIALIZE IN HARROWS.

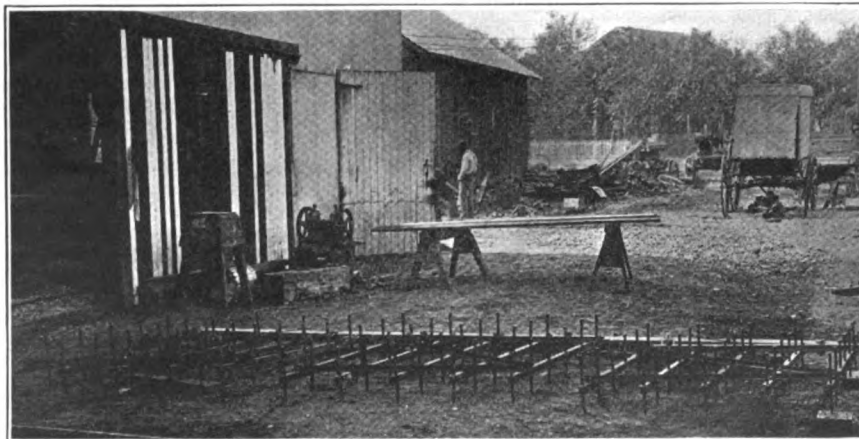
Oxy-Acetylene Work and Charges.—I have enjoyed THE AMERICAN BLACKSMITH'S visits to my home for some ten or twelve years and will say that I always read its columns with pleasure and always feel well repaid. It keeps one posted with the progress of the craft, also with all the new and useful tools which come into the market, and one can always get what he wants in the way of addresses of manufacturers, firms and worlds of other good and useful information. You want to know in what way we as a craft think you could improve the paper, I will say that I think about the only way for you to improve it will be to get more help and make it just about as large again as it is. That would improve it some in size but probably not in quality.

I have an oxy-acetylene welding outfit and I think it is one of the greatest of modern inventions. I have had it only about four months and I can tackle most anything that comes my way. I have met with pretty good success with it in all cases. I had to learn to use at first, of course but that didn't take long, you know. I weld cast iron with success and can guarantee the job.

While I am on that subject I want to ask some of the brothers to tell me how they charge for the work.—About the only

first place there is a place where a tire should be upset. I always upset in the loose place, that merely takes up the slack without drawing the tire around so all the holes have to be bored over.

In setting the tire on a rim-bound wheel I cut all that is necessary off of one end of the rim at one joint. Then I upset the tire between the joint hole and the next one to it on the half rim where I do the cutting. This only necessitates boring for the joint bolt as the rim and tire are shortened in the same place. It saves a lot of work boring holes and leaves the rim in better shape. It also makes a better looking job, which is a good advertisement for the shop where it is done. We also find a good many spokes put into Sarven without removing the rivets. Generally as soon as the tire is loose the spoke is then loose also. We always take out the rivets before driving a spoke, and in case of an accident to a first-class wheel we take out the box, do our repairing, and cut the ends off the new spokes and reset the box, that gives all the tenon we can have. My opinion is, too many bolts spoil lots of wheels, for a tire cannot expand any before it is pulling the spokes out of the hub or the rims off the other end of the spokes. With one half the bolts a tire would expand so it would be an eighth of an inch off the rim and still the spokes would stay in both hub and rim. When good timber is as scarce as it is now, it is worth while to make an effort to find how to save wheels. To much wheel repairing is done by men who have not served time to learn a trade and most of such mechanics are too busy and conceited to read a trade journal. It is surprising to see how many shops one can visit and not see a trade journal of any kind. We take three journals and find time to read them all and some parts of them we read a number of times. Would like to see more in the journal in regard to doing work in the country. Horse shoeing and repairing of all kinds of farm implements. The most of us can learn some by reading, and I find I can learn a good deal by watching other men work. It is quite a habit with me to visit other shops and watch how other men do their work. — THE VILLAGE BLACKSMITH, Michigan.



THE MILLER HARROWS ARE MADE ENTIRELY OF METAL



A Letter and Price List from Minnesota.
 —My blacksmith shop is 30 by 40 feet with a woodworking shop 20 by 30 feet. In my smith shop I have a Little Giant trip hammer, a Edwards Shear, a disc sharpener, a power drill, an emery stand, a tire up-setter, with all the other necessary hand tools. All machinery is run with a 7 horse-power gas engine. In my wood shop I have a 12-inch planer, a circle saw, a band saw, a boring machine and lots of other hand tools that are needed on woodwork. In this place of business I enjoy myself from morn till night, and once each month for the past 8 years I have been visited with a copy of THE AMERICAN BLACKSMITH, which I always take time to look over. I will never know it all. I learn something good every time a new copy comes to the shop.

I like to read articles on horse shoeing. I will tell how I shoe interfering horses. First of all level the foot so that it is straight and then fit a light shoe that will fit the foot, nail it on feet nice and smooth, and the horse walks and trots without interfering. I don't believe in side-weights on a shoe with a crook here and a crook there, a calk here and a calk there and the foot pared down on the outside and high on the inside. A level foot and a straight shoe for me and the horse won't interfere.

I also send you prices list of different kinds of work:

Common shoes each.....\$	.50
Side calk, extra.....	.10
Steel plug, extra.....	.10
Resetting shoes, each.....	.25
Plugging old shoes, each.....	.35
Bar shoes, each.....	1.00
Never slip shoes.....	.50 to .85
Sharpen share.....	.50
Sharpen and repoint.....	1.00
Land side bar.....	1.50
Land side plate.....	1.75
New share, 14-in.....	3.50

Pole, old hounds.....	3.50
New hounds, each.....	.75
Pole circle.....	3.00
Spokes, each.....	.25
Setting buggy tire, each.....	.50
Buggy felloe or rim.....	1.25
Buggy pole, old circle.....	3.50
Buggy circle, new.....	1.00
Buggy spokes.....	.25
Straightening buggy axle, each.....	2.00
Buggy top socket, each.....	1.25
All other work accordingly.	

I figure to get 50 cents per hour and then charge according to stock that I use.
 NAPOLEON TROMBLEY, Minnesota.

On Figuring Profits.—I am writing to thank you for the article "The Right Way to Figure Profits", which appeared in the January number of your magazine. I think I have derived more benefit from that one item than anything else that I ever read in THE AMERICAN BLACKSMITH and that isn't to be taken as meaning that I never realized any benefit from it before.

Besides showing me a better method of figuring profits (and costs), the right way, than I had been able to devise for myself, it called to my attention the fact that I had been short changing myself for years on the small items such as paint and bolts, and it is for this mainly, that I thank you.

I have only one fault to find with the article in question, (and none with the method it elucidates) and that is that it placed the earning power of capital a little too high, and that of labor too low. The profit earning capacity of the stock carried is too great compared with the profit earning power of the smith's muscle and skill. If I work all day and along with my labor I pass out twenty-five or thirty dollars worth of material, I have done pretty well, figuring by the schedule in question; but if my day's business is all labor that profit is going to look pretty small if these same figures control it.

In these days of catalog house competition it is my theory that we smiths should be careful to keep our profit margins down to the lowest decent limit on the goods we sell. This we can do, perhaps better than any other merchant if we are always careful in our buying, and extra careful not to omit or underestimate the overhead expense.

On the other hand, the smith, if he is really skilled in the work he undertakes to do, is meeting with less and less real competition every year. Here, as everywhere, the woods are full of country smiths and jacklegs, but I do not know of one whom I would acknowledge as a competitor in any of the branches of the trade in which I claim to be proficient. (In this vicinity I mean).

For these reasons I contend that this schedule would be much improved by a material increase in the per diem rate for labor or a higher per cent of profit added thereto, and a small reduction in the per cent of profit charged on material.

I am not writing for publication, Mr. Editor, but more in response to your oft repeated invitation for criticism of The A. B., but if you think that by so doing anyone will be interested or wish to carry this discussion further, you are welcome to use any portion of this letter you see fit.

In regard to The A. B., I think it is getting better; not so much dope from fellows who try to tell you how to do a thing when they don't know WHY they do it that way themselves. Anything suits me that gets right down to fundamentals in elucidating any problem. Give us the

science of the thing, not "Rule-o-thumb" methods.—A. S. JOHNSON, Colorado.

Editor's Note: Mr. Johnson's letter is an excellent one. His suggestion regarding a discussion of this matter is right in accord with our oft-stated ideas on craft matters of all kinds. The only way in which we can hope to get all there is in these articles is to discuss them. We will gladly grant space to any letters discussing this matter referred to by Mr. Johnson.



The Automobile Repairman

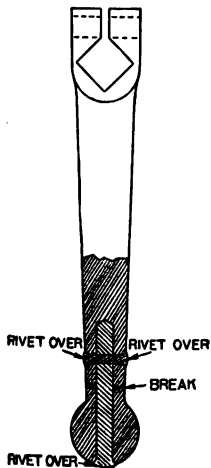
Beeswax makes a good substitute for enamel on rims. After heating the rims with a blow-torch, it can easily be applied. It will spread easily over the rusted surfaces.

Before assembling a dismantled engine, it will be found a good plan to rub flake graphite thoroughly into the surfaces of the pistons and cylinders. This will result in smooth running, good compression and improved lubrication. The effect will endure for some time.

Few repairmen apparently know how to bend a split pin. A good object lesson can be obtained by locking at the pins on such parts of a locomotive as the connecting rods of the driving wheels; there the ends will be found bent just the slightest degree outward. The usual, but the wrong, way is to bend the ends over at about right angles, without thinking that some day they may have to be removed.

Enameled leather tops that have been soiled by dust and rain should be washed with soft water and castile soap. Apply the water with a sponge and then rub moderately with a stiff brush; rinse with clean water and dry with a chamois. Never apply any kind of oil or top dressing without cleaning the top leather first. Very good qualities of top dressing can be bought ready made, and if applied evenly they will improve the appearance and quality of leather.

A broken steering lever may be repaired quickly and effectively as shown in the engraving. The lever broke near the ball end. The parts were put together and drilled for a suitable-size rod. This was pressed into the pin end of the lever, and a hole drilled through both, after which a rivet was driven in place, uniting the two. The ball end of the lever was then pressed over the projecting rod, which was then securely peened into a countersunk hole in the ball, completing the repair.



A QUICK REPAIR TO A STEERING LEVER.

New share, 16-in.....	4.50
Straightening plow beams.....	3.00
Setting 3-in. tires with bolts, each.....	1.00
Setting 3 in. tires without bolts.....	.75
Setting 1 1/4 tires with bolts.....	.75
Setting 1 1/4 tires without bolts.....	.50
3-in. felloe, each half.....	1.25
1 1/4-in. felloe, each half.....	1.00
Axles front or hind.....	4.00
Bolster front or hind old stakes.....	2.50



Many of the bolts on a car are valuable and it is of importance to know how to save them, whatever be the injury they may have sustained. If a bolt is slightly twisted it may be straightened by gently compressing it in a vise. Although it will not be rendered as perfect as it was before, it will be at least made available for

there and used for no other work. Most auto work is not of the standard size and therefore requires different wrenches. The man who tries to use a wrench that does not fit snug but twists the edges off the

to know of the smith how long it will take to get him on the road. The smith states what he thinks would be the time, but this will not do. Can't it be done quicker? The smith tells him he has a new spring of that make which he could get under the car much quicker than he could repair the old one. The man jumps at the chance and tells the smith to get at it and get it on as quickly as he can. The exchange of springs is quickly made and the traveler, pleased to be on his journey, does not consider the cost. The smith is also pleased with the price of two springs in his pocket, and now the thing for him to do is to get the broken spring repaired, for with a coat of paint on the old spring, he is ready for the next job of the same kind.



THE FARMER FINDS OTHER USES FOR HIS TRUCK BESIDE THAT OF HAULING HIS PRODUCE.

subsequent use. If its threads are injured they may be restored to a proper state by the skilful use of a triangular file, or even of a burin. No attempt should be made to renovate them by screwing on a nut, since the damage done thereby would be irreparable. If the threads are flattened, there is no remedy therefor.

The noises of an automobile may be profitably studied by the repairman. The repairman with an "ear for noise" will be surprised how quickly he will become an adept at diagnosing the peculiar and out-of-the-ordinary noises of an automobile or motor. The regular hum of the motor is familiar to everyone, but when that hum is interrupted by other sounds, it is a business asset for the repairman to know what the trouble is. And every case attempted, in which the irregular sound is carefully noted and the cause found, just adds that much more to the repairman's experience and his expertness in telling by sound just what is the trouble. Of course, an irregular sound may be caused by any of the several hundred parts of the entire vehicle, but by noting the sound carefully, and then its location, the repairman must indeed, have a poor ear who cannot, after some experience, tell something merely by listening to the noise.

nuts is not up to his job. Another tool that needs especial attention is the jack. One should have more than one and be sure they are the best and in good order. After jacking up a car it is good practice to block it up with some blocks cut for the purpose. Be sure the wheels are properly blocked. I have seen jobs let down from neglect of this.

There are a few standard cars. It is good practice to keep supplies of

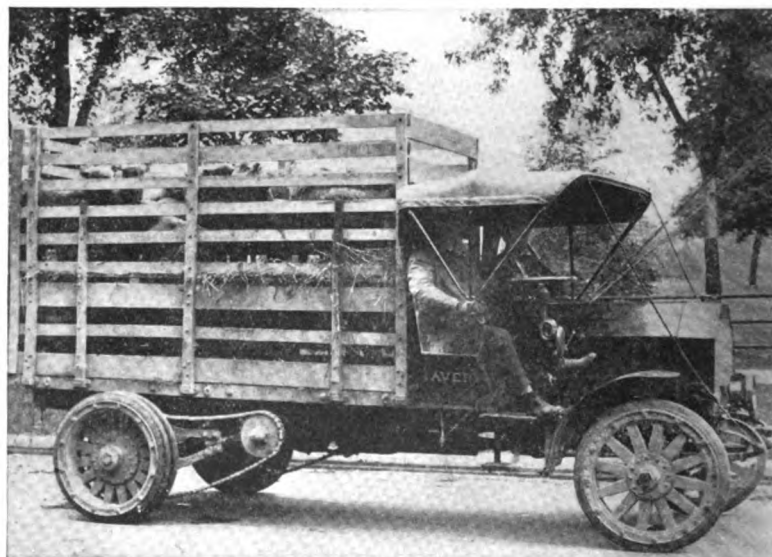
There are a few things one should get in the habit of not doing. One is using fenders, seats or even the running boards as tool racks. Fenders scratch easily, seats do not look well with greasy tools on them and there has been many a good tool lost by being left in the car and carried away. If this should happen you need not expect to see it again.

There is no one thing more useful or one that will pay more dividends than a good welding plant. The work that can be done on one of these is without number. Many a part would have gone to the scrap pile but for one of these welding machines. It saves both time and money. If you

The Smith and the Automobile

H. N. POPE

Automobiles are here and here to stay, and like all other vehicles, if used, they will wear out and break down and, therefore, must be repaired. It is up to the smith of today to see that he gets his share of this work. A shop should be fitted up so that auto work would be kept separate from the regular wagon and shoeing departments, also the tools should have a place and be kept



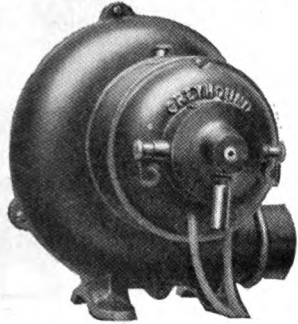
CATTLE ARE QUICKLY TRANSPORTED BY THE AUTO OWNING FARMER

these as one can many times replace the broken part quicker than one can repair. Take the man with the broken spring. He is in a rush to get to his journey's end, and wants

have had poor success with one of these machines, don't blame the machine. Get thoroughly acquainted with it, follow the directions and you will have no trouble.



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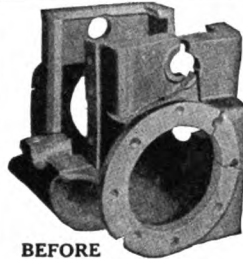
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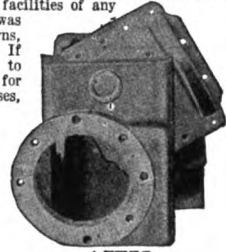
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Yours truly,
THE FAETH
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Kansas City,
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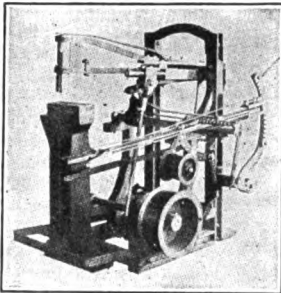


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Besides this, it will make shoeing much easier for you—the flies won't even stay in the building.

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FOR SALE—Blacksmith shop, general work. Work for two men year round. Will sell stock and tools, rent shop or will sell shop, with stock and tools. Good shop new, been built 8 years, size of shop, 28 x 80 ft. with machine room for emery stand drill, saw pulverizer, lay LITTLE WONDER and basement for coal, iron, lumber, etc. I have a garage in connection with my blacksmith shop and I wish to sell one of the businesses. We are in a good dairy country, 100 dairies come to town every day; bottling factory handles 40,000 pounds of milk daily. **G. M. HOLBROOK, Elburn, Ill.**

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Continued from page 11

tural Company, 7008 South Broadway, St. Louis, Missouri, and mention **THE AMERICAN BLACKSMITH.**

Oxy-Acetylene Welding and Cutting by C. H. Burrows. 130 pages—84 illustrations—cloth, price \$1.50—published by the Vulcan Process Co., Minneapolis, Minn.

This is the third edition of this book, which is announced as "a text-book on welding and cutting metals by the Oxy-Acetylene process." It is intended principally for purchasers and users of Vulcan Plants with which it is furnished free.

The book, beginning with chemistry and physics, takes up metallurgy and then explains their particular application to autogenous welding. Oxy-acetylene plants are explained in general with special reference to the Vulcan plant and then directions for doing both welding and cutting are gone into quite thoroughly. A chapter on Carbon Burning and one of Useful Tables close the book.

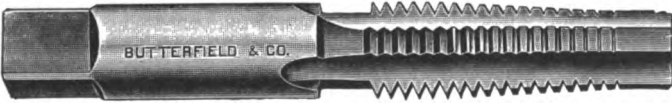
How one western Blacksmith built a new power hammer is told in an interesting advertisement of The Northwestern Power Hammer Company in this issue. Although this Smith had worked in shops from Kansas City to Winnipeg, he was not satisfied until he brought out his own hammer, which is now being manufactured by the Northwestern Power Hammer Company.

By equipping this hammer with a two way lever and using an anvil of the ordinary Blacksmith type, it is claimed that a great gain is made in the amount and variety of work that can be handled. The two way lever permits guiding the blows to any spot on the anvil, while the strength of the blows can be regulated as desired.

Continued on page 40

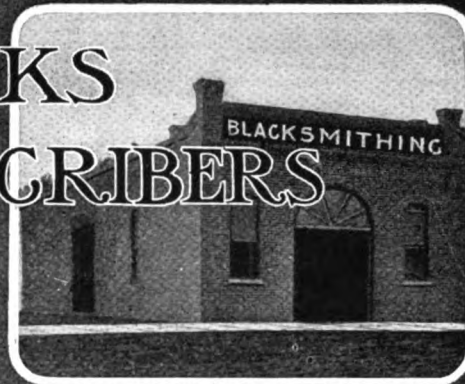
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This Issue

This number, as will be noted after a glance through its pages, is a special business issue for the business smith. We have tried to touch upon a number of topics of vital interest to the business smith, in this number, and believe we present in this issue, a paper that will be of intense interest and of practical value to every shop owner

From the subject of advertising for business to the collecting of accounts, you will find this number featuring every phase of the business end of the shop. The advertising of bad debts is a serious problem for the business smith. Mr. Buckley's article treats the subject from the law standpoint and tells how the smith shop owner may safely offer his bad debts for sale.

The feature article tells how a simple one-book system can be used to keep track of smith shop business. It's practical and workable for both the large and small business. And one big advantage in this simple system is the fact that it can be expanded and enlarged as the business grows.

Another feature of special interest in this number is the answers to the question of cutting prices. These answers are all unique—some will surprise you.

We Want True Stories

A great many of "Our Folks" are handling agencies for various side lines, are selling machines, supplies and materials that are somewhat out of the line regularly considered as strictly within the zone of the general blacksmith. And, naturally, there are many good stories connected with the sale of these articles. How you sold Farmer Brown a manure spreader, or a cream separator, or an automobile or any one of the hundred other things that the modern smith is selling today, would make interesting reading for other smiths. Tell how you made a sale to some locally well-known "hard customer". Tell about disposing of the articles that you specialize in. We want true tales of business sales. We want to know what you said and what the customer said. We want to know how you met his arguments—how you "put the sale over". Get your pen or pencil to work right now. You are the man we want to hear from—not the other fellow.



IS YOUR "BIRD" BIG ENOUGH?

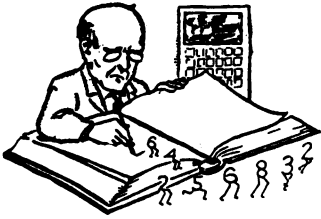
When you invite a couple of friends in to dine you usually have enough to place before them so no one will go hungry. Why not practice the same in business? When you make a price on anything see that it is big enough. Remember that what you really get out of it is what is left after the Cost of Material and the Cost of Doing Business are taken out. And what is left on the platter of Selling Price after serving your two guests is what you get. If it isn't anymore than will keep a hungry man from starving better get a bigger bird. There is altogether too much skimping along on a small margin to suit the needs, wants and actual requirements of a hungrey bank account. If you cannot satisfy your guests—both costs—with smaller portions, get a larger bird. You certainly cannot starve yourself. Take a lesson from this picture and run your business accordingly.



Keeping Smith Shop Records

in One Book

J. W. STAFFORD



NO one has ever accused the smith of being over fond of his book-keeping. Yet the keeping of accurate records in the smith shop is just as necessary as in the dry goods store or large departmental establishment. In any business, records must be kept in order to do business intelligently. For some reason, however, the bookkeeping end of the business has never been a popular one. Some smiths will let the merest excuse interfere with the regular and systematic keeping of their records. And yet without intelligent records a smith shop owner may as well go out of business as far as his chances for any considerable success are concerned. If a smith is in business for money, then it is certainly most important that he keeps track of his money. And that is just what his business books are for.

Having in mind the points referred to above, i. e., the average smith's disposition to let the bookkeeping go unattended and the real need for the keeping of intelligent business records, we endeavored to plan a simple record system that would take a minimum amount of time, require just as little attention as possible and yet include all the records that a smith should have in order to get an intelligent idea of how his business and finances stand, by looking over his records. This sounds pretty much like striving for an unattainable ideal, yet we have at least in a measure, we hope, succeeded in planning a bookkeeping system that will meet the above qualifications.

An Elastic System

The system consists of one book. This book is made on the loose leaf principle and thus the user is enabled to include practically any number of forms in the one book. For example, the one book, by the use of the different forms serves as a day book, a ledger and for as many other accounts as you want to carry. Then, while one book may be suitable for all forms in the case of the small and medium sized business, the system may be expanded to as many books

as may be necessary in the keeping of records for a larger business. Or should the smith desire to use a separate book for the day book because of the ease with which the book is likely to soil when constantly and repeatedly handled between jobs at the forge, the cheaper book usually used as a day book may be used. In any event this system is elastic enough to permit of its use in practically any smith shop business. The basic principles of its actual working are applicable to the small shop, the medium business and to a large trade. And if the smith shop bookkeeper will simply bear in mind the basic rules of accounting he will have no difficulty in keeping his records accurately and intelligently.

And right here we are going to suggest something that we haven't seen recommended before for use in the smith shop. We have seen a few in use but have yet to find it suggested in a smith trade journal. And that is a cash register. Why shouldn't the smith use one, especially if he has an establishment of any size and is sometimes away from the shop? Of course, if a smith is working alone he will really not need a cash register, but where more than one person handles the cash of the

shop a cash register will help in the shop accounting. The advantages of a cash register are really too numerous to need lengthy explanation here. Suffice it to say that with a cash register, much of the otherwise petty detail is taken care of automatically. And while a new register is of course best if the smith can afford it, used registers can sometimes be purchased at a considerable saving.

The One Book System

While no one particular make of loose leaf book is absolutely necessary to the working of this system, we planned ours on the Moore loose leaf system. The book takes a sheet 5 by 8 inches in size, and sheets are printed in a number of different forms. For example, for the day book entries, we use a regular unruled form and divide the sheet into two by running a rule down the center of the sheet as shown in Fig. 1, and run a rule just below the top of the sheet. On these pages is entered every transaction made during the business day. These pages are really a business diary. They show exactly what was done all through the day. When a job of shoeing is done it is entered on this sheet. If it is a charge the name of

Apr. 21-1915	Apr. 22-1915 127
R. H. Williams 4 New shoes - Tom - \$2.50	Billings Paid Wagon Reps. - \$14.00
L. H. Jones 2 front - new - \$1.25	Johnson Repair buggy - \$7.50
2 reset - .60	Cash Repairs to Auto - \$10.00
\$1.85	Paid Water bill - \$5.00
Cash 2 reset shoes - \$60	Paid Jackson Iron Co \$22.50
\$1.85	

FIG. 1.—FOR DAY BOOK ENTRIES, AN UNRULED SHEET IS USED



the customer is put down. If for cash simply write "Cash" in place of the customer's name. In this day-book form several changes can be made if desired. For example, one smith we know of has a day-book form ruled as in Fig. 2. He makes his entries in the usual way and then places his amounts in the columns at the right of the page according to the nature of the transaction. For example, it will be noted that the page has three columns at the right. The first column is for amounts paid out, the second for the amounts of credit transactions and the third for cash taken in. In this way a quick and easy footing of the three columns will tell the smith just how much business he did each day and tell him just exactly how his cash and credit business proportions.

From the Day Book

Having a complete daily record of all business transactions, the next thing to do is to transfer these records to the ledger accounts and to carry the daily totals over so that a monthly total can be obtained. If the day-book record is kept as suggested in Fig. 1, it will be necessary to pick out the various items, such as the cash paid out, credit and cash received. For it is well to keep your monthly records separate on these items. In case you keep your records as per Fig. 2 your daily totals in each column will give you the required figures immediately. Fig. 3 represents a sample page from the monthly records. Here it will be noted that each page takes care of the daily totals for two years. The page should have at least thirty lines and then six vertical divisions.

APRIL - 1914 -			APRIL - 1915 -			
APRIL	Pd. Out.	Credit	Cash Rec.	Pd. Out.	Credit	Cash Rec.
1	4 10	11 00	7 25	10 00	6 00	4 38
2	10 60	14 20	11 48	4 82	7 50	8 70
3	2 00	3 75	25 00	7 93	12 40	10 40
4	2 48	1 65	8 00			
5				1 00	1 00	7 28
6		2 25	5 40	4 00	2 40	9 32
7	1 23	3 00	7 00	2 40	7 15	4 00
8	2 35	7 00	4 15	1 10	2 20	33 80

FIG. 3.—THIS SHOWS HOW THE DAILY TOTALS ARE ARRANGED IN THE MONTHLY RECORDS

In this way a very quick and easy comparison can be made at a glance of just what you are doing in a business way.

Some smiths carry these totals along to another page and in this way get a record for the year, taking the monthly totals along and thus getting a quick comparison of each month of the year as compared with other years.

To the Ledger

An analysis of the daily records must show the need of carrying them along in some more tangible form than merely a jumble of transactions. So we must go over the day-book entries and enter the charge items on the ledger pages under the proper names. Fig. 4 shows a specimen sheet from the ledger pages of our one book system. Here, as shown, we have the customer's name at the top of the page, with any little details of information we may want to put down, such as his general stand-

ing, his mail address, when he usually pays bill and matters of like nature. Then below we find a summary of his account. These details are entered from the day book and at the month's end the customer is billed accordingly. To make the details of the ledger entries perfectly clear it may be necessary to explain that the nature of the entry summarized as shown will often make it unnecessary to refer to the original day-book entry when a dispute or misunderstanding arises. The column showing the page numbers, are the numbers of the pages on which the original day-book entries appear. And as the pages of our book are all loose leaves they are numbered consecutively for the entire year, starting with number one for the first page used in January. In other words, the pages of our loose leaf books are not numbered consecutively from the front to the back of the book, but each section or division is numbered, the day-book sheets starting with one on the day the system is started, while the first sheet in the ledger division also starts with one.

Other Accounts

Of course, there are still some items left uncared for in the day-book at this stage. For example, if we keep records of all daily transactions, as we should, we will have expense items that are most important matters and which must be cared for and considered in our accounting. We accordingly open ledger accounts for the jobbers and others from whom you purchase supplies and all goods and stock purchased are entered here. Other purchases, such as stamps, books, and other items incident to the operation of the shop and business, are recorded in another account called "expense account". This account should show what it costs you to do

FIG. 2.—ANOTHER DAY BOOK PAGE IS SHOWN HERE. THIS SIMPLIFIES THE WORK AT THE DAY'S END



business, and any error made in keeping record of this account will show up when you come to check up what you *should* have in the bank and what your actual bank account shows.

This may to some seem a great deal of work and "red tape" to get a few figures, but if you really want to know where you stand in a business way; if you want your books to really tell you "what is what", then you must keep at least the records we have mentioned.

The Expense Account

The record of expenses is really the most important account in the business. It shows up the real condition of the business, if correctly kept. And needless to say, that unless kept accurately and correctly, the account had best be abandoned entirely. For an incorrect expense account is misleading to the owner of the business. It is therefore most important that a very carefully and very accurate record is kept of expenses. Items that enter into the expense account are: rent, salary, light, heat, telephone, water, insurance, office supplies, advertising and all other expense necessary for the carrying on of the business. Remember, the cost of stock and goods and items that enter into their cost, are not listed under the expense account, but are entered in the ledger accounts with the firms from whom purchases are made.

And right here is an item that is usually overlooked—at least it isn't usually considered in the cost of doing business. This is business losses. Losses from any source enter into the cost of doing business. Unpaid accounts, lost stock, stock stolen, allowances made customers, work done over, cost of collecting must all be charged up to the expense account. A specimen sheet from the expense account is shown in Fig. 5.

At The Year's End

The real value of carefully kept

1915		Expense Account	
Apr.	1	Stamps for bills	60
	3	Tele. bill pd	2 50
	3	Elec. " "	3 25
	5	Cigars for office use	2 00
	5	Salaries	45 00
	6	Note Book for office use	25

FIG. 5.—THE EXPENSE ACCOUNT IS REALLY THE MOST IMPORTANT IN THE BOOK

records is never more apparent or never more forcibly impressed upon the business smith than at the business year's end. Then, with totals showing the amount of business done, the amount of credit and cash business, the expense of carrying on the business and the amount spent for stock, the real value of figures and records becomes immediately apparent.

For example, without complete records carefully kept how can the smith possibly know what his percentage of cost of doing business really and actually is? With a complete record, take the sum of the total amount of business done and divide the sum representing the total year's expenses by it. For example, suppose the total expense for the year to be \$1,000.00 and that the year's business done totaled \$4,000.00. To learn what the percentage of overhead is divide 1,000 by 4,000 which will give you .25 or 25%. Thus you know that when figuring on a job, in addition to the cost of all materials actually used on the job you must add 25% for overhead and then another 20 or 25% for your profit. Of course, there are some smiths who are merely guessing upon this matter of overhead. They do not know whether their cost of doing business is 5% or 75%, so they take some other fellow's word for it. But a smith shop

owner keeping records accurately and intelligently as suggested in the foregoing will *know*. He need not guess. He need not wonder. He need not grope about like a man in the dark. He **KNOWS** and it will be a great satisfaction to him.

Why I Do Not Cut Prices

A SYMPOSIUM

EDITOR'S NOTE—We asked five smiths why they did not cut prices and give here their reasons. These items are especially timely and appropriate for this business number.

Reason No. One

"I do not cut prices because I do not believe in it. I have educated my trade to look for quality. And I in turn look for quality trade only. My business isn't a great big one, but with the aid of one good helper upon whom I can depend, I do all that I can take care of and take care of right. When a man kicks on my prices he is told politely just why the prices are what they are and then he's invited to take his work elsewhere if he isn't looking for the best that can be done. My books show that overhead is taken care of correctly and then too there's a neat sum left over called profit. I do not believe the average price cutter can say the same."—A. B. W., New York.

Reason No. Two

"When I finished my apprenticeship some years ago, old Pop Johns, as he was known—my employer—said: 'Boy, yer startin' out in a trade in which if the laborer is at all worthy of his pay, the smith certainly is. When yer in business for yerself y'll be tempted to meet the prices o' others. But jus' remember the advice of an old chap who's seen forty years o' experience an' then stick to yer prices. It'll be hard some times, but stick.' And that little sermon of my old employer, under whom I served an old-fashioned and strenuous apprenticeship, is perhaps the best reason I

1915		George A. Mills		P.O. # 3 from Trenton	
		Page	Debits	Credits	
Apr.	10	To Shoeing	276	2	50
"	13	To Misc. Repairs on buggy	298	11	20
"	26	To Overhaul Wagon	307	18	00
"	29	To Misc. Merchandise	347	7	50
May	6	By Check	398		89 20

FIG. 4.—HERE WE HAVE A SAMPLE LEDGER PAGE



can give for not cutting prices.”—L. H. G., Ohio.

Reason No. Three

“I don’t cut prices because I’ve never had to. I really do not know what I would do if a real competitor got into my town and neighborhood. Of course I have had competition but none that was ever serious. Competitors have come, probably lured here by the good prices I get, but their work in no case stood up against mine and so they have passed on again as ships in the night.”—A. C. F., Massachusetts.

Reason No. Four

“A customer taught me not to cut prices. That may sound strange, but it is so nevertheless. Originally I was alone in this town as far as the smithing trade was concerned. There was a smith about four miles out at a cross-roads, but he and I were on excellent terms and had this section pretty much to ourselves until the Price-Cutter came. My cross-road friend and I had several talks when Mr. Price-Cutter came to town and we decided to meet his prices and to fight him to the wall. Mr. Price-Cutter located just up the street from me a short ways and when he put out his handbills announcing his coming and a set of cut prices, I followed suit and met his prices. Then it was that an old farmer customer taught me not to cut prices. The farmer in question came in a couple days after I had put out my handbills. He asked for his statement and after paying his bill, he said: ‘I see yer prices air goin’ to be a good bit lower than they’ve been. Well, I guess if y’ kin a’ford it, y’ must a been makin’ a heap o’ profit out o’ us fellers when we didn’t have no other place t’ go.’ And that was the last time he was in my shop. It taught me a lesson and I haven’t cut a price since for anyone.”—L. M. B., Indiana.

Reason No. Five

“I do not cut prices because, to quote a one-time popular song, ‘My Wife Won’t Let Me.’ You see, this is the way I figure it: I keep a record of my costs and I know what I must get for my work to break even. Well, I’m not in business for love any more than the steel trust is, so I must get enough to break even and then a little more. You see I’ve got a wife and family and the wife needs money to feed and clothe that family and—well, I’ve got to bring in the necessary masuma, that’s all there is to it. And I can not do it with cut prices—I know because I’ve tried it.—C. S. W., Missouri.

A Few Business Suggestions for the Business Smith

W. O. B.

Here are a few suggestions for the owner of a smith shop business.

If you are a horseshoer use a bill-head as shown in Fig. 1. Horse owners never like to see their horses abused by some one else, no matter how they may abuse them themselves at times, and a bill-head like Fig. 1 will have a strong tendency toward gaining a reputation for gentleness with animals that are brought to your shop. The bill-head should be just as simple and plain as possible.

If you are a general smith why

The Horse

Every horse deserves a square deal:— a good stable — good food — clean water — good shoes properly put on — and kindness.

Play fair with this loyal worker that asks no pay except kindness.

For following up the slow payer, a series of collection slips would be excellent for the smith. After billing the customer in the regular way and failing to get any response from him, send him a collection slip similar to that shown in Fig. 3. These slips can be printed all ready for use, simply needing the name of the delinquent customer, the date and the amount of his bill. The second slip in the series is shown in Fig. 4. The type matter for the slip is arranged a little different, while, it will be noted, the line “to Bill Rendered” is set in type somewhat larger than in the first slip. The third slip is shown in Fig. 5, and is

Aurora, N. Y.....

M.....

To JOHN W. JONES, Dr.
HORSESHOER,
OGDEN ST.

FIG. 1.—SHOWING A SIMPLE BILL-HEAD SUGGESTION FOR THE SHOER

wouldn’t the suggestion shown in Fig. 2 work out with credit to yourself and the craft in general? The general lines of the bill-head in Fig. 1 should be followed; simple, plain and clear. And right along this same line of thought—doesn’t it occur to you that with bill-heads, letter-heads and other literature along the lines suggested by Figs. 1 and 2 that the public in general would be forced to regard the smith and shoer in a better light? A persistent bombardment with literature of this caliber by every smith in the land would soon force the respect of people generally where now, in some quarters, at least, there is a feeling bordering on contempt. Of course, this feelnig is slowly but surely disappearnig.

arranged in still another way, while the “Bill Rendered” line is set in capitals.

This series of collection slips should enable the smith to better his collections, as it presents an easy and simple means of bringing your bill to the customer’s attention, and, what is most important, in a manner that will not offend the good customer.

Readers who are interested in using slips of this kind should communicate with Our Subscriber’s Service buerau. If a sufficient number of “Our Folks” are interested in securing and using these collection slips so that we can print them cheaply, we will gladly furnish them at cost through Our Subscriber’s Service.



The Blacksmith

Solomon—the wisest King of all time, honored the smith. Today the smith is the keystone of mighty industries. He is the very foundation of the steel age. Without metal what can man do? Consider the smith—he is worthy of your esteem.

Aurora, N. Y.

M

To JOHN W. JONES, Dr.
BLACKSMITH,
OGDEN ST.

against another, both in a sense intangible. There is no question that he can sell a claim against a customer for goods sold and delivered, and he can do it whether judgment has been gotten on it or not. It is nevertheless always best, for reasons I will explain, to first get judgment and advertise that, rather than the mere claim.

In every case where a merchant creditor has been sued by a debtor whose debt he advertised for sale, the dispute has arisen because the debtor contended that he owed nothing or owed less than the amount charged against him and therefore should not have been advertised. Until the claim has been reduced to judgment, there is always danger of such a defense being made, and if it is true, the creditor, who advertised a man as owing him when he did not, is in a bad position. To say publicly that a man hasn't paid his debt to you—which is a direct reflection upon his credit—is, if untrue, a libel.

No matter if a debtor has never come forward and disputed your bill, he may nevertheless have a perfectly good defense to it, or at least to part of it. As a matter of fact, the better his defense the less likely he is to bother himself about it unless he is forced to. Suppose then you advertise your simply claim against him for sale and he proves that you either have no claim whatever, or that the only reason it hasn't been paid is because of an honest dispute in which he was right and you wrong.

This is the danger of advertising claims for sale. Understand, a claim that is absolutely and unquestionably correct can be advertised just as legally as a judgment, but the only perfectly safe and sure plan is to enter suit before a magistrate, alderman or justice of peace, get judgment on the claim and then wait until the period of appeal has passed. You can then advertise the judgment for sale in absolute safety, provided you do it properly. In Pennsylvania the entire legal procedure outlined above can be put through within about twenty-five days, at small expense.

When a debtor is sued, notice is served upon him that at a certain time his creditor will present a certain claim against

FIG. 2.—ANOTHER SIMPLE BILL-HEAD WITH A SUGGESTION FOR THE GENERAL SMITH

Advertising Bad Debts For Sale

E. J. BUCKLEY.

The editor sends me a copy of a letter from a Michigan subscriber, describing how he wrote to twelve delinquents, whose accounts were so old that they were almost hopeless, telling them that if they did not pay by a certain date he would advertise their accounts for sale. All paid but two, and those were advertised; with what result is not stated. An indirect result of the plan was that several other slow customers settled up or arranged to do so, in order to avoid the same fate.

This case shows the efficiency of a threat to advertise the accounts for sale, but of course has no bearing on the question itself.

Another letter, which the editor also sends, shows the general feeling toward the advertising method, which I have always believed was the most effective possible. It is from Saginaw and reads in part as follows:

“At a recent meeting of our local I brought the matter of advertising old accounts for sale before them, but an objection was raised that this is a direct violation of the law; that is, the making public of information relating to the credit of the persons who refuse to pay.

“As you maintain a department treating the legal phases of the business, will you kindly advise the attitude of the courts in a matter of this kind?”

The delinquent debtor who has withstood all effort to make him pay is not likely to have the face to object when the claim is advertised for sale, so the merchant who does it is not likely to get into trouble through it, even though he has done an illegal thing. It is always unsafe, however, to base one's hope of safety on the belief that nobody will do anything. Can bad accounts be advertised for sale in

such a way as to make the advertiser safe, even if somebody does object?

They can without a doubt, but the thing should be done with the utmost care. If done carelessly or improperly, the injured debtor can sue and may recover large damages, as in such cases the jury's sympathy is always with the man who was wrongly published as in debt.

It is fundamental that a man who owns a piece of property, whether real or personal, tangible or intangible, can sell it to another person. For instance, he can sell the good will of his business, or his claim

IF YOU FELL INTO DEEP WATER and couldn't swim, you would call for help—wouldn't you? I am in "Deep Water" and simply must call for help. Can I count on you?

M 19

To JOHN W. JONES, Dr.
BLACKSMITH,

To Bill Rendered, \$

FIG. 3.—THIS IS NUMBER ONE OF THE DUNNING SLIPS



IF YOU WERE DROWNING— went down for the second time and no one answered your cries for help, your chances would be pretty slim, wouldnt they? This is my second call for help, wont you come to the rescue?

M..... 19.....

To JOHN W. JONES, Dr.
BLACKSMITH,

To Bill Rendered, \$.....

FIG. 4.—NUMBER TWO OF THE SERIES IS A LITTLE STRONGER IN TONE

him. If he has a dispute, that is the time to present it, and if he ignores it—as such debtors almost always do—the time to dispute and deny is gone. Always provided he fails to appeal.

A judgment obtained like that can be advertised by circular, handbill or in newspapers, as legally as sugar or salt. But the creditor needs to remember not to indulge in any slurs or side remarks about the judgments he is offering, for those of themselves may be libelous. I advise nothing more than a heading like this: "The Undersigned Offers the Following Judgments at Private Sale":—this to be followed by the names of the debtors and the amounts. Libel can be committed by innuendo in cases like this. For instance, I knew a creditor who advertised a \$250 judgment for sale for \$5, the direct implication of course being against the financial worthiness of the debtor. Of course that was libel, and it is always best to say nothing more than I have said above.

(Copyright by Elton J. Buckley.)

What's the Matter With the Business—Is it the Craft or the Craftsman?

L. M. A.

A certain smith in Indiana was doing a fair business. He advertised, was quite busy, collected a fair proportion of his accounts, and had a fairly well equipped shop. The automobile came along and he prepared for it. He put in a lathe, a vulcanizer, an oxy-acetylene machine and prepared to get hold of some of the autoist's good coin. He had to increase his force, his shop was enlarged and everything looked good to Mr. Indiana Smith, but just as things looked brightest in a business way the smith's grand structure began to

tumble. He found himself financially embarrassed. In an attempt to force things his way, he got out after business. He solicited trade with a will, he advertised and went after business "hammer and tongs". Of course trade improved but he still found himself without the necessary funds to go on. He worked hard. He let one man go, then a second and then a third. He drove his remaining help hard in an attempt to turn the tide, but the crash came and the sheriff tacked his card upon the door.

If you ask that smith what was the matter he will tell you that it was the automobile trade that did him up, and he will back up the statement with the fact that before he went into the automobile repair end, and before he ever handled a pint of gasoline or a tire wrench, he was making a living—not getting rich to be sure, but he was playing safe and getting along.

But it wasn't the automobile that caused this smith's business to skid. It wasn't the auto repair end that put his business in the ditch; nor was it advertisnig, nor more business, nor more work that his business needed. What this smith needed was more knowledge about his business, not his trade, mind you—but his business. He tried to keep his business in his head.

There is a smith in Iowa who until about two years ago had just an ordinary small smithing business. He wasn't really making any money, he wasn't really going ahead. Like most smiths who are not successful, he had a lot of petty troubles, in the way of bills which were quite annoying at times. One day he began wondering if all smiths were hard up. When a smith gets to feel that way he is on the road to learn something—if he is not a dead one.

This smith nosed among the smith shops of Iowa and soon came to the conclusion that some of the smiths were forging ahead—making money. When he found this out he asked himself why the successful ones were successful.

As he investigated further he

IF YOU WENT DOWN FOR THE THIRD TIME in deep water, your friends would have to do some quick work to save you. This is my Third Call—Don't drown a good friend.

M..... 19.....

To JOHN W. JONES, Dr.
BLACKSMITH,

To Bill Rendered, \$.....

FIG. 5.—THIS IS THE THIRD APPEAL. IT IS STRONG YET NOT OFFENSIVE



found that the average smith doesn't usually know so very much about his business, that he doesn't know for sure just where he stands. That the average smith runs his business pretty much on guess.

He found on the other hand that the most successful business men had complete information on their business, their purchasers and their expenses. And when he learned this he decided to eliminate guess work from his business and to provide himself with the information which the successful business men provided themselves with. He made an outline of all the information he knew any successful business man was getting. Then he went to the books he was keeping and tried to get the same information out of them about his business, but the information was not there. His bookkeeping system would not give it to him, though he had thought that his system was about the real thing. His accounts, however, did not account.

Then he decided he would have a bookkeeping system that would give him information he needed, but he did not know how to get the system. Of course, he knew that the public accountants were employed by larger firms, but his thoughts along this line were tempered with visions of enormous charges for this service.

One day he mentioned his problem to a salesman friend. The salesman liked the idea and promised to help the smith out. Together they worked out a system exactly suited to this particular smith's business. The smith insisted upon a complete system. He wanted to know all there was to know about his business. He wanted to know how much profit he made, how much money he lost and a lot of other things.

At last they got the system in operation and the smith had accounts that would account, but the system immediately plunged the smith and his two sons into a mass of work that made them all work nights. This naturally presented another problem, for the strenuous activities of the smith do not cause him to look with favor upon any considerable work after the regular shop hours. This new problem was solved by training one of the boys to handle the bookkeeping, and within a few weeks the smith was getting the information he wanted and he was feeling the effects of that information upon his ability to make his business pay. He put in paying side lines, he put in an auto repair department, he enlarged his shop. His business system enabled him to know without doubt what lines and what

work were profitable. He specialized in that work which assured him of a reasonable profit, and he handled agencies and acted as selling agent for only such lines as showed a balance on the profit side of his ledger. He wasted no time at all on unprofitable side lines, and devoted only as much time on unprofitable work as was absolutely necessary, as was needed to back up his arguments for complete smithshop service.

In two years that smith increased the volume of his business 300 per cent.

Here are two examples: one of failure, one of success. The lack of business knowledge caused the



AN IOWA GENERAL SHOP OPERATED BY MCGINNIS AND LAMB, WHO ALSO RUN A GARAGE IN CONNECTION

failure, the use of the same thing caused the success. There is a business moral to this, but it is hardly necessary to point it out of you.

It costs a little money to keep proper tabs on your business, but when you really know, you will find that it costs more NOT to know what you should know about your business. The time is coming when every smith will need to know all about his business in order to safeguard himself against competition that is even now making itself felt in the smithing trade. And naturally the smiths who receive the greatest benefit from the new order of things are the ones who size up the situation first—the ones who can read the signs of the times and will be guided accordingly.

If every smith could emulate this Iowa smith the greater value, importance and the betterment in the craft would be overwhelming. But thousands of smiths of real ability and real life are slumbering, beacefully satisfied with the little dust they can scrape from the golden lode

which is deeply worked would enrich bountifully.

Two Pieces of Advertising from the Correll Shop

Some of the literature of the Correll Shop in Illinois, is already familiar to many of our readers. The accompanying examples of advertising is very evidently some of Mr. Fred Correll's good work. The first example was printed in the shape of a handbill. It read as follows:

The Correll Shop and Store.

We try to be reliable men,
Men with tongues that are true:
We won't promise to do any more than we can,
But we'll do what we say we will do.

We admit we're not clever, that sometimes we're "blunt",

That we have neither "polish" nor "air",
And altho' it's not "in us" to "put up a front",

When you need us you'll agree we are "there."

So count us as men on whom to rely
Who are building for lasting success:
And we'll pray that your species may ever increase,

That your shadow may never grow less.

The second example from the Correll shop is a little envelope slip announcing terms on implements and hardware. The idea is a good one and right in accord with the policy recommended from time to time. But, why not include smith work too, Correll? Let us have a discussion on this. Here is the Correll "Terms of Sale" announcement:

Our Terms of Sale, on Implements, and Hardware, are either Cash or a "Bankable Note".

Your credit is good, if you'll "arrange the paper" so we can get the money on it if we should wish to do so.

I think you will agree that it's only a "matter of good business" that we adhere strictly to this policy.



Why Wagon Builders Are Busy

Many of the accidents in our large cities to wagons, trucks and drays are unavoidable, but because of accidents and hard service and the increase of traffic, the business of horse wagon and motor truck repairing is assuming large proportions.

A horse wagon or motor truck requires naturally more repairing than a carriage, because of its rougher

Repairing demands call for immediate attention, and those shops which are best fitted up for quick work enjoy the best repairing trade.

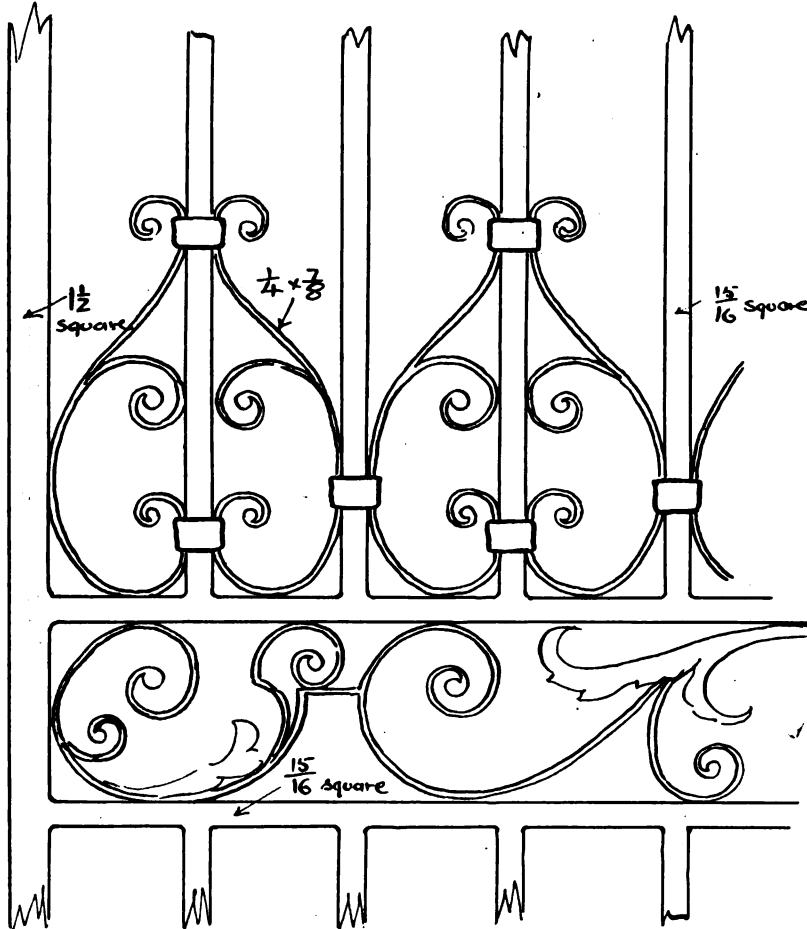
A College Gateway in Scotland

JOHN Y. DUNLOP.

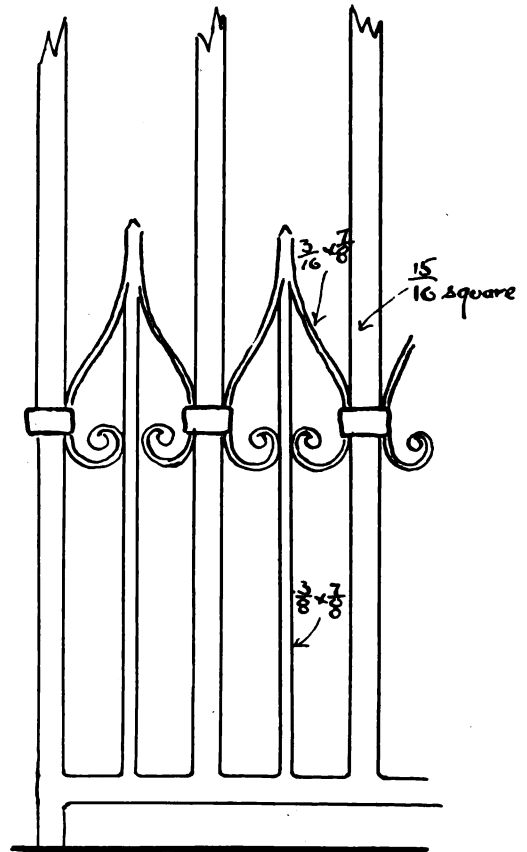
The modern revival of taste and the appreciation of the ornamental part of the smith's work has continued to make progress since atten-

The smith is now able to get his bars or rods of iron from the rolling mills. But this metal lacks the homogeneity which repeated forging gave to the ancient metal, which gained greatly in both tenacity and ductility.

In the accompanying half-tone illustration the gate shown is over 200 years old and as far as can be seen has been designed with an open wicket, which is an unusual departure in an entrance gate. It is a simple but beautiful example of Re-



MID RAIL



BOTTOM RAIL

DETAILS OF THE COLLEGE GATE, SHOWING SIZES OF BAR AND SCROLL PIECES

usage and in some cases because of less attention and improper care.

It seems that new wagons are not in extraordinary demand, but in general the repairing of all kinds of vehicles is on the increase, a condition which can be relied upon to continue.

No matter how carefully wagons and trucks are built, they are constantly put to such a strain that they wear and break and call for repairs, which must be done quickly; for the owner needs his wagon to do the hauling, while the horses and driver will be idle in the meantime and no other wagon may be at hand to replace it.

tion has been called to the artistic possibilities of wrought iron.

At the commencement of the present century the iron founder ruled supreme, with the result that tasteless rows of monotonous palisades and knockers which were the masterpiece of malformation and metal monstrosities of all kinds met the view everywhere. But the art of the founder, whatever be the metal in which he works, can never hope to command the highest homage of a cultivated taste which owe their fitness and beauty to the skill of the hand. The application of artistic ironwork is now to be seen in gates and railings and hinges and grilles.

naisance work, which we can only conjecture as to how it was produced. In all likelihood it would be designed by the architect of the college as the charm of the scroll work is very marked. The design of the gate is made up of those long series of lines which are so common to this class of work, and the weight to the lower part is obtained by the addition of a series of short, spiked, vertical balusters with a double scroll.

At the middle, horizontal rails and open scroll work panels with leaf ornament are inserted, while immediately above is a row of vertical scrolls in which the arcs of the circles of which they are formed,



glide imperceptibly into one another as though they were one curve. The forming of these easy curves, which are nothing more than a cunning arrangement of regular forms, have gone a long way to make wrought iron work beautiful. Of course, upright and vertical lines are to the smith lines symbolic of permanent and equal construction.

In the line drawing of the college gate the ornamentation is shown in horizontal and vertical treatment. The horizontal band has several leaves in hammered iron in positions which are in opposition to the laws of design, which, in decorated art, is that things must never grow upside down. Still in these old examples of this work many floral decorations are arranged according to the space which they occupy, and the patterns of the ironworker rely more often on radiation alone for their line of position. This whole matter depends upon the point of view of the designer, who may recognize the laws of growth or who may be content with a beautiful treatment set within the limits of the ironworker's art.

Immediately above the open wicket is another row of scroll ornament, while immediately above is the highly decorated top of the gateway. This is executed in wrought iron throughout, while the plate bearing the college arms is embossed on both sides. In front of the gateway a circle lamp support is formed which is made with 15-16 of an inch square iron, filled with scroll ornament, which supports the square rest for the lamp. The gate is hung on stone piers filled in with red brick, and the intrinsic merits of the design is greatly enhanced by its charm of position and beauty of surroundings.

For Kansas Craftsmen

Pres. Buckley of the Kansas State Association Addresses an Appeal to Every Craftsman of the State

The officers of the Blacksmiths', Horseshoers and Wagonmakers' Association of Kansas, have started a membership campaign; we have set the goal for FIVE HUNDRED new members by the time of our next convention, which will be held at Independence, Kansas, Nov. 10th & 11th, 1915.

This will be the biggest campaign that has ever been attempted by the Association. And if we are to succeed, we must have the help of every member and craftsman in the State. The officers of the Association have worked hard this year, to raise the

standard of the trade, and bring about a better feeling among the craft, but it is impossible for the officers to carry on this campaign

of our meeting in November we will have 75% of the Counties in the state thoroughly organized. "ARE YOU WITH US?"



THIS SHOWS THE COLLEGE GATE WHICH FITS INTO ITS POSITION MOST ARTISTICALLY

alone. If you will give us your earnest and hearty co-operation, we will reach the 500 mark with ease. Just think what a power we will be, if we can make the report at our next convention that the Association is 1,000 strong. If we do this, it will open up the way, and by the time

Success comes only by hard work, and the work of building up a great and powerful organization, the influence of which shall spread not only over the beautiful state of Kansas, but over the whole United States, depends upon the "LOYAL AND ACTIVE" support of the



members of the Kansas Association.

I have granted a special dispensation: Anyone sending ONE DOLLAR to the secretary, Mr. Austin English, of Hutchinson, Kansas, will receive an official receipt for membership, and dues paid up to Jan. 1st, 1916.

Now is the time to make application for membership, as this will probably be your last chance to get in at this price. Do not delay, but send in your application at once.

With the very best of wishes, I am

Yours for 500,

PERRY R. BUCKLEY,
President.

Thoughts on Timely Topics

By THORNTON

Caustic Censure and Cheery Comment

THE FARMER who wants thirty-five cents a dozen for eggs when you can get 'em at the store—same quality—for thirty cents and then kicks like Sam Hill when you charge him two bucks for a shoeing job, is one of the afflictions with which the smith has to contend. To listen for five minutes to the bewhiskered son of the soil's yapping upon the easy profits in smithing, one would imagine that there was about as much overhead expense in the smithy as there is in a patch of dandelions. Whenever a big, pop-eyed yap hands you a long line of tongue-product on the money-grasping tendencies of the smith and your intention of getting rich quick, just grab him by the chin strap and then hand him some of his own medicine. We heard one of the alfalfa chewing and growing fraternity dilate upon the money-grasping smith, and you can bet three used Victrola needles against a busted spark plug that we handed the noble soil scraper some hot shot right off the fire.

IS THERE A TIGHTER PROPOSITION on earth than the smith who squeezes all the youth out of his boy's life by tying the boy's nose to the bellow's handle or the drill crank? If there is, we'll give two last season's baseball tickets for further information. If there is anybody on this little old earth of ours that deserves a chance it is the youngsters, and it's up to the oldsters to see that they get it. Some fathers get about as much comfort out of the pleasures their young ones wiggle out of life as a nervous woman does on a visit to the dentist. Some of these grouches seem to think that natural tendencies in children must be firmly suppressed upon all occasions and that laughter, especially childish laughter, is the language

of the devil and the song of the iniquitous. Some one has truly said: "That man will bear watching whose dog hides under the house when he comes into the yard." And how well the same might be said of the father whose presence puts a damper on the children's play. The lop-earned grouch who throttles the children's play the minute he comes home, and the joy-killing yap who ties his boy to the smith shop at school age, are one and the same person. You simply meet up with them at different stages of development.

ABOUT THE SICKEST man we've seen in a long time is one who sold a good York state smithy to invest in a California orange grove, which upon investigation proved to be a treeless, trackless waste with everything on its sandy stretches but vegetation. And the man he sold out to got a good business at a low price because a greasy-tongued stranger operated upon the York state hollow-head only too well. Of course, the former York state smith is a California land owner, but—well, he's got plenty of sand—on that California plot.

WHEN A HOME TOWN GIRL gets too uppish to marry a man with a concrete shop and two helpers simply because he wears a leather apron and has callouses as big as quarters on his palm, you can bet two worn-out screw calks that she's either a tango fiend or a slit-skirt enthusiast and that she'll probably hook up with a ribbon-counter platter-face with a charming tango dip and a head full of vacuum. We'd sooner be tied up for life to a man who wears a leather apron and knows how to weld a spring leaf than to go mincing through life with some misguided father's half-baked son who dances divinely, smokes incessantly and sleeps in the day time.

Horse Vehicle Business is O. K.

American vehicle manufacturers and dealers are commencing to realize that the horse-drawn vehicle industry has not been affected by the war, crops and politics in any greater degree than other staple lines of business, such as food, clothing, etc. They know that on January 1, 1915, the horse population of this country was 21,195,000 (not including the Missouri mule), at an average value of \$103,33, meaning an increase of 200,000 head for the year.

This would indicate that there is room for both the horse and the automobile in the general scheme of life.



Bison's Notes

The recent death of Charles H. Nelson, at Waterville, Me., where he had made his home since boyhood, removes a remarkable character from the ranks of the men who have gained fame in an unusual degree in the harness racing world. Like C. W. Williams, the Iowa man who brought out first Axtell, 2:12, and then Allerton, 2:09½, both champions, Mr. Nelson, bred, raised, trained and drove a trotting stallion to the world's championship. This stallion was his namesake, Nelson, a horse bred in lines different from any other champion trotter, lines that were not of the fashionable sort, but that, nevertheless, produced in Nelson a horse of the utmost attractiveness so far as individual qualities were concerned and one that was not only the pier of any trotting stallion of his day in speed, but in race horse quality as well. It was in 1890 that Nelson drove his namesake to championship honors when, at Kankakee, Ill., he gave the horse a record of 2:11½, replacing the record for stallions which Axtell had placed at 2:12 in 1889. Two weeks later the stallion lowered his record to 2:11¼ at Terre Haute, Ind., and then on October 21 at Cambridge City, Ind., he placed it at 2:10¾. The following season C. W. Williams brought out his second great stallion Allerton, and reduced the record to 2:10. Two weeks later Nelson equalled the performance at Grand Rapids, Mich., but later in the season Allerton became undisputed champion when he placed his record at 2:09¾. Nelson's mile at Grand Rapids, however, is still a world's record in one respect for it was trotted to high wheel sulky and no other totting stallion has ever drawn a sulky of that kind as fast. Nelson, the man, was a peculiar fellow. He was much overweight and it is likely that his handsome stallion could have taken a record two or three seconds below his best recorded performance had he turned him over to the great trainer of that period, Budd Noble, for then the horse would not have been handicapped by extra weight, but the Maine man never for an instant considered any suggestion that some other man drive the horse. When Nelson—the horse—was at the height of his fame, his owner turned down a cash offer of \$50,000 for the horse with apparently not the shadow of hesitation. He bought a grandly bred collection of brood mares and placed Nelson at their head on his farm at Waterville. He had several opportunities to let the great stallion go to Kentucky, where he would have had access to the best brood mares in the world and where the horse's get would have had the best of opportunities, but he turned all such chances down point blank. When the famous stallion became a prey to the

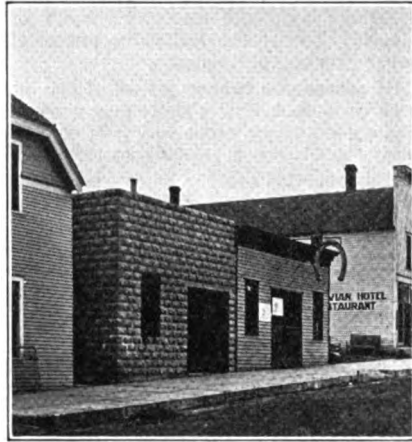


ravages of old age and his owner saw that he was suffering, he, himself, fired the bullet into his head that gave him relief from his sufferings. A few years ago Mr. Nelson lost his sight and his possessions melted away. During the last two years of his life his mental powers became badly impaired. There is no doubt but that, at one time, he could have sold his great stallion and seven or other near relatives of that horse for upwards of \$100,000, but he refused to consider the big offers that poured in on him, and finally the man whose name was once as familiar in the harness racing world as is that of Ed. Geers today, died poor, and almost a forgotten.

That greatest of all futurity classics for colt trotters, the Kentucky Futurity, is a very fair barometer to indicate breeding conditions in various parts of the country. That rich and long established stake has just closed for mares to foal in 1915 and the nominations show that many of the men who have been among the largest nominators to the event in other years have made fewer nominations this year. Whether this is due to a reduction of mares bred by these breeders or to bad luck—mares failing to get in foal or losing their foals, is a matter on which there is a difference of opinion. Throughout the country at large, while there has not been any great outbreak of contagious abortion among the brood mares, there have been an unusually large number of reports of mares losing their foals. Whatever the reason, however, there are eighty-eight fewer mares entered in the classic stake this year than were entered last year, the total number being 850, nominated by 261 individual owners. As usual Kentucky furnishes the greater number of entries, 319, New York being second with 118, but if the 188 nominations credited to Kentucky, but made by New Yorkers who own farms in Kentucky, were taken from the Kentucky list and added to the New York list the Empire State would lead by more than sixty mares. The other states which furnished twenty or more entries are Massachusetts with 68; Pennsylvania with 56; Ohio with 50; Illinois with 50; Indiana with 25; Michigan with 21; Virginia with 20. Breeding farms making 20 or more nominations each were: Walnut Hall Farm, (Kentucky), 82; Patchen Wilkes Farm, (Kentucky), 80; Allen Farm, (Massachusetts), 30; Hudson River Farm, (New York), 23; Curtis Neck Farm, (Virginia), 20. Twenty-four sires are represented by ten or more mares bred to them as follows: Peter The Great, 2:07¼, with 62; Peter O'Donna 2:08, with 43; J. Malcoln Forbes, 2:08, with 40; Manrico, 2:07¼, with 36; San Francisco, 2:07¼, with 34; Axworthy, 2:15½, with 31; Bingara with 30; Moko with 27; The Harvester, 2:01, with 23; Azoff, 2:14¼, with 20; Walnut Hall, 2:08¼, with 18; The Northern Man, 2:06½, with 16; High Admiral, 2:07¼, with 15; Justice Brooke, 2:08¼, with 15; Binjolla, 2:17¼, with 13; Lord Dewey, 2:03¼, with 12; Guy Axworthy, 2:08¼, with 12; Mainsheet, 2:05, with 12; Siliko, 2:08¼, with 12; The Exponent, 2:11¼, with 11; Gen. Watts, 2:06¼, with 11; Morgan Axworthy, 2:17, with 10; Dillon Axworthy, 2:10¼, with 10; The DeForest, 2:22¼, with 10. The classic stake for foals of 1915 will be worth \$21,000, divided \$5,000 for two-year-olds to trot in 1917, \$14,000 for three-year-olds to trot in 1918 and \$2,000 for three-year-olds to pace in 1918

Even the persons so deeply interested

in harness racing as to keep close track of the breeding of the notable performers, will be surprised to learn how great an advance has been made in breeding circles relative to doubling up the blood of developed sires and dams until the first six ancestors in a pedigree are all in the category. It was, comparatively, only a few years ago when the first performer so characterised was



THE MICHIGAN SHOPS OF MR. RASMUS LAURSEN

noted and for several years no other joined him. Last season there were no less than twenty-two performers that took standard records or that reduced records made in 1913, each of which had record performers for the first six ancestors. These remarkable illustrations of progressive breeding are as follows:

Trotters

Lee Axworthy, (3), 2:08—Sire, Guy Axworthy, 2:08¼; Dam, Gaiety Lee, 2:16¼; Paternal grandsire and grandam, Axworthy, 2:15½ and Lillian Wilkes, 2:17½; Maternal grandsire and grandam, Bingen, 2:06¼ and Gaiety Girl, 2:15¼.

Harry J. S., 2:08¼—Sire, Admiral Dewey, 2:04¼; Dam, Dorcas Moore, 2:20½; Paternal grandsire and grandam, Bingen, 2:06¼ and Nancy Hanks, 2:04; Maternal grandsire and grandam, Milton S., 2:08¼ and Alice C., 2:27¼.

The Temptress, 2:08½—Sire, The Exponent, 2:11¼; Dam, B. T. A. M., 2:29¼; Paternal grandsire and grandam, Bingen, 2:06¼ and Iva Dee, 2:12½; Maternal grandsire and grandam, Tempter, 2:16¼ and Allen Maid, 2:16¼.

Panama, 2:10¼—Sire, Kiney Lou, 2:07¼; Dam, Diona, 2:07¼; Paternal grandsire and grandam, McKinney, 2:11¼ and Mary Lon, 2:17; Maternal grandsire and grandam, Eros, 2:29½ and Gracie S., 2:22.

Nightingale, 2:13¼—Sire, Barongale, 2:11¼; Dam, Primrose, 2:13; Paternal grandsire and grandam; Baronmore, 2:14¼ and Nightingale, 2:10½; Maternal grandsire and grandam, Falrose, 2:19 and Mischief, 2:22¼.

Mattie Custer, 2:15¼—Sire, Ed. Custer, 2:10; Dam, Little Louise, 2:10½; Paternal grandsire and grandam, Baronmore, 2:14¼ and Marble, 2:14; Maternal grandsire and grandam, Billy Wilkes, 2:29½ and Nettie Fields, 2:23.

Miss Actell, 2:16¼—Sire, Actell, 2:18¼; Dam, Ellorita, 2:28¼; Paternal grandsire and grandam, Axtell, 2:12 and Sylvia, 2:29¼; Maternal grandsire and grandam, Allerton, 2:01¼ and Maywood, 2:29¼.

George Guy, 2:16½—Sire, Guy Axworthy, 2:08¼; Dam, Owaisa, 2:06¼; Paternal grandsire and grandam, Ax-

worthy, 2:15½ and Lillian Wilkes, 2:17½; Maternal grandsire and grandam, Bingen, 2:06¼ and Improvidence, 2:12.

King Ideal, 2:17¼—Sire, The Beau Ideal, 2:15½; Dam, Birthday, 2:23¼; Paternal grandsire and grandam, Dare Devil, 2:09 and Nettie King, 2:20¼; Maternal grandsire and grandam, Actell, 2:18¼ and Lady Hank, 2:21¼.

Spalding, 2:19¼—Sire, Barongale, 2:11¼; Dam, Primrose, 2:13; Paternal grandsire and grandam, Baronmore, 2:14¼ and Nightingale, 2:10½; Maternal grandsire and grandam, Falrose, 2:19 and Mischief, 2:22¼.

Ridgemark, 2:20¼—Sire, Wilask, 2:11¼; Dam, Eolite, 2:17½; Paternal grandsire and grandam, Wilton, 2:19¼ and Alaska, 2:27¼; Maternal grandsire and grandam, Prodigal, 2:16 and Eoline, 2:14¼.

Woodford Spier, 2:20½—Sire, Directum Spier, 2:11¼; Dam, Esthel Woodford, 2:12¼; Paternal grandsire and grandam, Directum, 2:05½ and Lulu Campau, 2:26¼; Maternal grandsire and grandam, Pilot Medium, Jr., 2:08¼ and Miss Woodford, 2:09¼.

Lady Henrietta, 2:21¼—Sire, Peter O'Donna, 2:08; Dam, Town Lady, 2:11½; Paternal grandsire and grandam, Peter The Great, 2:07¼ and The Prima Donna, 2:09¼; Maternal grandsire and grandam, Wilton, 2:19¼ and Kadijahi, 2:28¼.

Great Guy, 2:23—Sire, Guy Axworthy, 2:08¼; Dam, Lady Caleta, 2:15¼; Paternal grandsire and grandam, Axworthy, 2:15½ and Lillian Wilkes, 2:17½; Maternal grandsire and grandam, Peter The Great, 2:07¼ and Miss Caleta, 2:29¼.

Azoff Pasha, (3), 2:23¼—Sire, Azoff, 2:14½; Dam, Jessie Grattan, 2:18¼; Paternal grandsire and grandam, Peter The Great, 2:07¼ and Dolly Worthy, 2:27¼; Maternal grandsire and grandam, Grattan, 2:13 and Jessie Dhu, 2:17¼.

Fanny C., 2:25¼—Sire, Marston C., 2:19¼; Dam, Miss Fanny Delmar, 2:20¼; Paternal grandsire and grandam, Piedmont, 2:17¼ and May Queen, 2:22; Maternal grandsire and grandam, Del Mar, 2:16¾ and Miss Fanny Jackson, 2:30.

Pacers

Contention B., 2:10—Sire, Copa de Oro, 2:01; Dam, Bonnie Ailsu, 2:08½; Paternal grandsire and grandam; Nutwood Wilkes, 2:16½ and Atherine, 2:16¼; Maternal grandsire and grandam, Faustino, 2:12¼ and Ailsie Mediumi, 2:27¼.

Zorene, 2:10¼—Sire, Zolock, 2:05¼; Dam, My Irene S., 2:28¼; Paternal grandsire and grandam, McKinney, 2:11¼ and Gazelle G., 2:11½; Maternal grandsire and grandam, Petigru, 2:10½ and Johanna Treat, 2:24¼.

John Dewey, 2:13¼—Sire, Admiral Dewey, 2:04¼; Dam, The American Belle, 2:12¼; Paternal grandsire and grandam, Bingen, 2:06¼ and Nancy Hanks, 2:04; Maternal grandsire and grandam, Americus, 2:11¼ and Beautiful Chimes, 2:22¼.

Times Square, 2:17¼—Sire, Todd, 2:14¼; Dam, Rex Adibel, 2:29½; Paternal grandsire and grandam, Bingen, 2:06¼ and Fanella, 2:13; Maternal grandsire and grandam, Advertiser, 2:15¼ and Beautiful Bells, 2:28½.

The Aim, (1), 2:18½—Sire, The Exponent, 2:11¼; Dam, Grattane, 2:29½; Paternal grandsire and grandam, Bingen, 2:06¼ and Iva Dee, 2:12½; Maternal grandsire, Grattan, 2:13 and Roxane, 2:12½.

Patchlock, 2:21—Sire, Zolock, 2:05¼; Dam, Angie Duryea, 2:17¼; Paternal grandsire and grandam, McKinney, 2:11¼ and Gazelle G., 2:11½; Maternal grandsire and grandam, Patchen Wilkes, 2:29½ and Angie D., 2:07.



A Collection Poem

ADAM T. WIBLE

A few weeks ago I composed a poem which was published in our county paper, for which I write. It was the means of my collecting about \$150.00 in a short time after the verses appeared. Perhaps some of your readers may enjoy it.

The Country Blacksmith

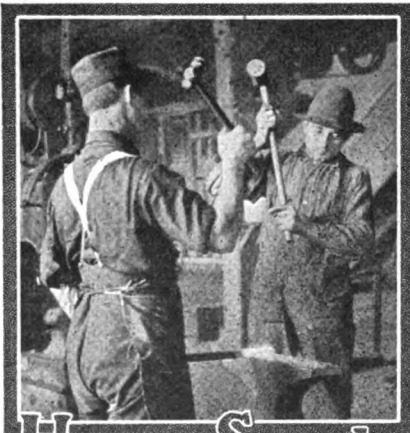
The blacksmith shop on a country road—
The blacksmith stands within;
You see his forge's glowing flame
While you hear his anvil ring.
And as you see him swing his sledge
And watch the sparks fly high,
You hear him sing his favorite song
Of the good old days gone by.
And so you see him toil each day—
To toil with main and might,
'Till rest he finds beside his hearth
And family then at night.

He's always ready, never cross,
He'll fix your buggy an' shoe your "hoss";
He'll repair your cart an' mend your plow
And you need not wait for he'll do it
"now"

He is always ready and with smiling face
He greets each man who enters his place.
He makes no enemies, has hosts of friends;
For he fixes up breaks, repairs and mends.
And when he's done and you're so bold
As to say: "Just wait 'till my crop is
sold"

He'll turn to his desk with a smiling face,
And charge the job in the proper place.

But don't forget he has to live,
Must pay for stock and tools,
So when he sends a bill to you
Don't act like sixteen fools.
But with your purse just seek the smith—
The man who's been so true.
And pay the sum you're owing him
And he'll think more of you.



Heats, Sparks, Welds

Funny, isn't it—that the keener the smith the less he is inclined to cut.

Some smith shop owners are still doing business just as though there was no such thing as overhead.

It's a good idea to keep so busy at your own business that you haven't time to attend to any one's else.

Ever hear of any business house gaining success because they knocked their competitors? Neither did we.

Wonder if any smith has given much thought to the one-price system as applied to the smithing business?

Sounds like poor business to pay help good money and then not ask their advice and talk things over with them.

How often are the things thought impossible being done by the ignorant folks who didn't know they couldn't be done!

A trade journal can do a great deal, but it cannot help the man who won't help himself. To get the full value out of this paper you've got to dig.

Of course you cannot get all of the business to be had, but is there any reason on God's good green earth why you shouldn't try to get all you possibly can?

If you believe in advertising advertise—if you don't believe in advertising, advertise your business for sale.

The smith who gets full value out of his power equipment gives his power plant and power accessories more than an occasional "look and a swipe". And it pays him.

Lots of troubles that we see coming down the road and headed for our place will hustle right by if we pay no 'tention to them. Keep busy and you won't have time for troubles.

Hard work alone never brought anybody success. One must work brain as well as brawn. Equal parts of gray matter and muscular fibre make the greatest combination in the world.

Some men carry so many worn out troubles that they look like walking gloom factories. Forget it and smile—nothing is so healing for body, brain and heart. FORGET IT AND SMILE.

David Harum said: "It ain't a bad idea, in the hoss business anyway, to be willin' to let the other feller make a dollar once in awhile." Ain't a bad idee in other business either, say we.

A leather apron and a muscular arm do not make a blacksmith anymore than a splash of color and a leaf or two will make a rose. There's lots more to both than mere outward appearance.

Of course you're going to take a vacation—if only for a few days, it will enable you to work better and more willingly. And don't forget the missus and kiddies—they need a change, too.

Surely you excel your competitor at some point or two. Then keep harping on that point of excellence, and if you keep harping long enough, loud enough and back it up, you'll surely win out.

Doesn't take much business ability to cut prices—most anyone can do that. But it does require the keenest kind of a business head to do work at a profit in the face of hard competition, and stay in business.

You must make a careful study of both ends of the business. It's hard, sometimes, to get trade and then hard to get the money. Both ends are important—study them. Your solution means your success.

Ever notice how really rank and poor is the service of a business house that has no competition? Then think about that and thank your lucky stars that you have a competitor or two to put some real "pep" in you.

Ever stop to think what a big business builder a smile is? Smiles make friends,—friends make trade—the more smiles the more friends—the more friends the more trade—the more trade the more profit. Smiles mean profit.

Economy isn't merely the saving of

TRUE TALES OF OUR SERVICE.

Number Six.

A Missouri smith desirous of subscribing to a number of different magazines sent in a list of five publications and asked us for our best price including his renewal to "Our Journal." We quoted him a price that netted him a saving of \$1.10; our price being juts \$1.10 less than the total regular cost of the papers had he ordered them individually direct from the publishers. And this to say nothing of the time and trouble saved by writing one letter to us and getting but one money order.

money. If it were, misers would be the very personification of economy, while they art actually extravagant. Real economy is the saving of what you get for the money you spend.

A zone for smith shops has been established in Sacramento, California according to recent advices. An ordinance, adopted by the city commission, permits blacksmith shops to be installed only in certain sections of the city.

If a peddler sells a smith a few ounces of some "magic" welding powder for two dollars—which he could have made for thirty cents a bushel if he had spent a dollar a year for THE AMERICAN BLACKSMITH, isn't he actually losing money by not reading "Our Journal"?

The good old days—do you wish them back? Would you return willingly to the days of few tools, poor tools and back-breaking methods? Still some smith shops look like a peep into the days of our great grandfathers. Grey-haired tools must give way to brown-haired equipment these modern days.

Don't give up the craft. If it's not paying you—raise your prices. If the work is too hard—install power. If trade is poor—advertise and go out after some. If the location is poor—move. But, don't blame the craft. Skilled craftsmen are getting scarcer every day and wages and profits must rise accordingly. So stick.

Wouldn't "Our Journal" be just about twice as valuable, if each reader considered himself a reporter and reported once each month on smithing matters in his own town? Wouldn't it make "Our Journal" a stronger and bigger factor in the betterment of smithing trade conditions? Won't it start the ball rolling by sending in your item now?

If you must extend credit, do so in a business-like way. Don't trust every Tom, Dick and Harry who cares to come into your shop. Ask the book customer where he's been trading, if you don't know him, and then look up his record. If he hasn't been paying his grocery and butcher bills you can almost gamble on his not paying for smith work. And when you do find out whether a would-be customer is good credit or not, let your answer to him be accordingly.

Persistency, determination and will—what a combination! With these liberally mixed into a man's make-up, can he possibly fail? When you work, work persistently with determination and will. When you play, follow the same formula. Don't do anything half-heartedly. When you work, in heaven's name, work, WORK, WORK. When you rest—REST. But whatever you do—do it thoroughly, honestly—determinedly. And—then, do you think any force on God's green earth can keep success from your door?



The Machine and Tool Smith

The Structure of Steel

What Steel Is—Its Grain—Restoring Steel
—The Magnet as a Heating Guide
—Forging and Hammering

J F SPRINGER

Roughly speaking, cast iron and steel are composed of the same substances—iron and carbon. There is a great difference, however, between ordinary cast iron and steel in the way the carbon occurs. In the first place, the cast iron contains a good deal more carbon. One hundred pounds of cast iron will have within it 3 or 4 pounds of carbon; while an ordinary tool steel will hardly ever have more than 1 or 1½ pounds of carbon to the hundred pounds of metal. That is to say, cast iron will have about 3.5 per cent. of carbon and tool steel, 1 or 1.5 per cent.

In the steel, however, there will be none of the carbon by itself. You may break open a piece of tool steel and examine the fracture with or without the microscope, but you will not be able to find anywhere a particle of carbon. You may look ever so searchingly at a drop of water under the strongest microscope, but you will not be able to locate a particle of hydrogen or of oxygen, and yet, water consists of these two gases. In steel, the carbon has become so united with a part of the iron that we have a new thing altogether, neither iron nor carbon. This new thing is called *cementite* (sem-en-tite) or *iron carbide*. Now cast iron contains cementite too. In fact, it contains as much or more than ordinary tool steels. But cast iron contains carbon that is not united to any iron. This carbon is in the form of *graphite*—the material used in making lead pencils. It is considered proper to speak of cast iron as a mixture of steel and graphite. You may break open a sample of pig iron and brush one of the surfaces with a good stiff

brush. In this way, you will succeed in brushing away some of the graphite. The rough metal remaining is steel. Cast iron is weak because graphite is weak. You could not expect cast iron to be as strong as steel when it contains a lot of little pockets filled with graphite, any more than you could expect concrete to be strong when it has within it a lot of cavities filled with nothing but sand.

Steel is strong largely because everything in it is strong. The iron that is by itself is good and strong; the iron and carbon combination—that is, the cementite—is also strong. The hardness comes from the cementite.

Let us go on now and consider just how cementite occurs in steel. And by steel, I mean the unhardened metal—steel in its natural, everyday condition. All steel contains cementite. The less there is, the weaker and softer the metal will be. Further, there is nothing else in steel besides iron and cementite, if we forget about the impurities (silicon, sulphur, phosphorous, manganese).

Now the cementite is not scattered evenly through the body of the steel. The microscope has revealed the great fact that the cementite occurs in little flakes alternating with other little flakes of pure iron. The layers are very thin—a pair, one of iron and one of cementite—may be only 0.00004 inch thick or even less. That is, 25,000 pairs of layers would be required to make up the thickness of an inch. So there is no use trying to find them with a pocket microscope. The mixture of layers of cementite and pure iron has been given a name—*pearlite*. Remember, please, that pearlite is a mixture. You may use a very high magnifying power and search out the layers. But cementite is not a mixture; it is what the chemists call a combination. You may bring the very highest magnifying power to bear on a combination and you will not discover the things of which it consists.

What Steel Is

Now we come to two large facts. First, I speak with regard to steels which have less than 0.90 per cent. of carbon—that is, with regard to steels softer than tool steel. All unhardened ordinary steel of this character consists of a mixture of pure iron and pearlite. The proportion of iron may vary from nearly the whole to nothing at all. The more iron, the softer the steel. When the steel has 0.90 per cent. carbon, there is no iron at all, except of course the lay-

ers of iron in the pearlite. The pearlite occurs in grains or crystals. In between the grains is the iron. The condition of affairs is very much like that in concrete. We may consider that concrete is made up of pieces of stone with a filling of mortar made of cement and sand. If we imagine the pieces of stone to be grains of pearlite and the mortar to be iron, we shall have a pretty correct idea of conditions inside the piece of steel. Of course, in the concrete things are on a large scale. In the steel, the grains of pearlite may be very small, but not necessarily extremely minute. Now we can hardly expect that the mortar in concrete should diminish to nothing. But this very thing sometimes happens to steel since, as already stated, the proportion of unmixed iron may drop to nothing at all. With the steel, we have great strength, despite the fact that there may be nothing but a mass of pearlite grains.

The second large fact relates to all unhardened, ordinary steels which have more than 0.90 per cent. of carbon. These are tool steels. Tool steel consists of grains of pearlite surrounded by cementite. It is a kind of "concrete" in which the pieces of stone are grains of pearlite and the mortar is cementite.

Grain Size Increases With Heat

It is a very curious fact that even with the same piece of steel the grains may not always be of the

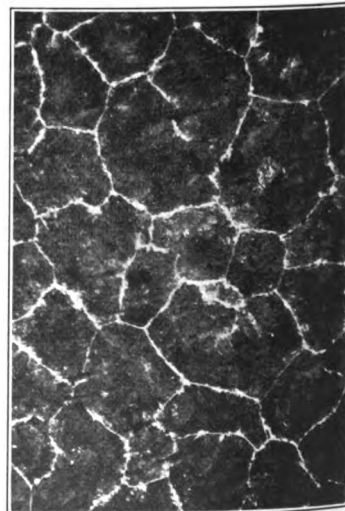


FIG. 1. — THIS STEEL CONTAINS ABOUT 1.25 PER CENT. CARBON. THE WHITE "VEINS" ARE CEMENTITE; THE DARK PORTIONS, PEARLITE. THIS VIEW IS 100 TIMES LONGER AND 100 TIMES WIDER THAN THE STEEL IT REPRESENTS.



same size. I do not mean, however, that they change without reason. If you will heat up a piece of steel to a point where it is about to pass from light yellow to white and then allow it to cool, you will find upon breaking it open that it is coarse grained—very coarse grained, in fact. If such a piece of steel be tested before and after heating to this high temperature, the effect of the heating will be found to be quite marked with respect to strength. The steel after it has been highly heated will be comparatively weak.

Now for quite a range of temperatures below light yellow there will be various sizes of grain—the higher the temperature, the larger the grain. Also, the strength will correspond more or less closely to the size of the grain; the larger the grain, the weaker the steel. It is evident, then, that the question of grain size is very important, indeed. The strength of a piece of steel turns upon the temperature to which the blacksmith or other workman heats it.

There is a temperature for each kind of steel at which its grain is smallest. This grain size, we must assume, corresponds more or less closely to the very strongest condition of that particular kind of steel.

This matter is so very important practically that it will be well to dwell a moment at this point. Consider a piece of tool steel that contains just 0.90 per cent. carbon. It is all pearlite. Let us heat it up to a dark cherry red. The grain size is still unaltered. But if we continue on up to a full cherry red, we shall start to get bigger sizes of grain. And so on up—the grains keep on getting bigger. If we should stop a little before reaching the cherry red, we should have the smallest size possible. And we should also have the best condition of the steel when cooling had taken place.

Now if we take a much softer steel and heat it up in the same way, we shall get the grains starting to grow at about the same heat; but the best condition of the steel is not reached until we get a little higher yet. Similar remarks apply to tool steels having more carbon than 0.90 per cent.

Restoring Steel

Some one may say at this point: Well, the blacksmith will have to spoil a lot of work, because he can't work his steel without heating it. But this is, fortunately for the world, not the case at all. The blacksmith will not necessarily have to spoil the steel with which he works.

If he does not actually *overheat* the steel, it is generally possible to restore it. Suppose for example that in welding together two pieces of 0.50 per cent. steel, the blacksmith has had the work at a pretty high heat, but has not actually overheated it at any point. All the parts that have been highly heated and have not come under the influence of his hammer will have big grains. These parts will be more or less damaged.



FIG. 2.—THIS STEEL CONTAINS ABOUT 0.85 PER CENT. CARBON; SO THAT IT IS ALL OR NEARLY ALL PEARLITE. THE DARK PORTIONS ARE PURE IRON (FERRITE); THE WHITE PORTIONS, CEMENTITE (IRON CARBIDE). THIS VIEW IS 400 TIMES LONGER AND 400 TIMES WIDER THAN THE STEEL IT REPRESENTS

Suppose now the blacksmith lets the work cool down to a dull red and then heats it up until it is a little hotter than a full cherry red. The effect on the steel will be to restore the grain size to that corresponding to this particular heat. He has restored the quality of the steel. It is very simple, but it is also very effective. If the steel should have still less carbon in it than 0.50 per cent., he should cool it as before to a dull red. He will, however, have to heat it up to a higher point in order to effect the full restoration. But no matter how little carbon the steel contains, the heat of restoration will

not require a heat higher than orange.

If the steel with which the blacksmith has been working is a tool steel—that is, a steel containing more than 0.90 per cent. of carbon—then it will not be possible perhaps to give it back quite all its quality. If the carbon content is not too high, he may restore it to a very good condition. The blacksmith should, as before, cool to a dull red and then heat up to a little below a full cherry red. It will probably do no harm to go all the way to this latter color.

In all these cases with various steels, it is highly important that the cooling preliminary to the final heating shall be done and done to a sufficiently low point. Dull red is the point; but it does no harm to cool further. In fact, the work may be allowed to cool off to the temperature of the shop. It makes no difference.

I will now arrange in the form of a table the information necessary for restoring carbon steel (that is, ordinary steel) that has been highly heated, but has not been overheated. The treatment varies with the amount of carbon. The first column in the table specifies the percentage of carbon.

P. C. of Carbon in the steel	Heat to which to cool	Heat at which final heating should stop
10	Dull red or lower	Orange
30	Dull red or lower	Light red
50	Dull red or lower	Hotter than full cherry red
70	Dull red or lower	Full cherry red
90	Dull red or lower	Not quite full cherry red
90 and over	Dull red or lower	Not quite full cherry red

The Horseshoe Magnet

Now it so happens that the blacksmith may get for 5 or 10 cents a splendid instrument for determining the proper temperatures reach. It is often difficult to tell how far to the interior the smith's blow penetrates. If the temperature is pretty high and the metal soft, it probably does not reach far in any very effective way. When the metal cools down, he has to be careful, because there is a point below which the steel will probably be injured if the blacksmith keeps on hammering. The effect of his blow is also probably affected by the form of the work. At all events, we may be sure that there are many cases—perhaps the majority—where forging will fail to restore all the steel that has been highly heated. Consider an ordinary weld. There is apt to be a place back of the joint on either side that gets pretty highly



heated up and which the smith hammers but very little. His mind is intent on effecting the weld itself. Besides, the parts away from the welding point to either side may be more or less difficult to get at and be made to feel sufficiently the blows of the hammer.

When to Stop Hammering

Scientists who have been working to find out all that is possible about steel have, so it would seem, not fully settled the question as to the exact heat at which steel should no longer be hammered or forged or rolled. It is undoubtedly injurious to continue working steel after it has pretty well cooled off. Probably we ought to stop when full cherry red has been reached or at least soon afterwards. A good rule seems to be never to hammer steel that will be attracted by a magnet. If the steel is very soft (containing less than 0.40 per cent. carbon), it will do no harm perhaps to continue at which to stop the final heating. This is the ordinary horseshoe magnet. Cold steel is attracted by a magnet; but very hot steel is not. There is a point of temperature, which varies for different steels, when the steel loses its capability of being attracted. The capability passes away pretty suddenly. For all steels having more than 0.40 or 0.50 per cent. carbon, this point is the very point at which the final heat should be stopped when restoring the quality of steel. For all steels, except those that are pretty soft, accordingly, all the blacksmith has to do is to see whether the steel has fully reached the point when the magnet will no longer attract it. He should then stop heating the steel; the restoration has been effected. For the mild steels having less than 0.40 per cent. carbon, the smith must continue the restorative heat a little beyond the point at which the magnet ceases to cling. He will be close to the proper heat and so should at once become alert when the magnet stops clinging. Light red and orange are the colors for which to watch—light red if the steel is fairly soft (0.30 per cent. carbon) and orange if it is exceedingly soft.

Effect of Forging

There is another way to restore steel whose grain has gotten over large, provided it has never been really overheated. The blacksmith's hammer, properly used, has the effect of breaking up the big grains and facilitating the formation of smaller ones. Similar remarks apply to rolling, drawing and other methods of working steel. But it has no effect, of course, where the shock

of the blow does not last just a little longer.

Best to Depend on Reheating

While hammering done at the right time no doubt improves the quality wherever its influence reaches, still it seems best not to depend upon it, because we can hardly be sure how far the effects have gone. In all cases where practicable, all steels which have been heated hotter than the heats indicated in the last

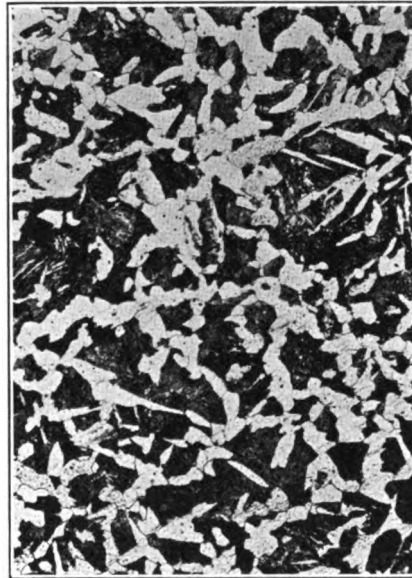


FIG. 3.—THIS STEEL CONTAINS 0.50 PER CENT. CARBON. IT HAS BEEN MAGNIFIED 100 DIAMETERS. ACCORDINGLY THE GRAINS IN THE PHOTOGRAPH (GRAINS OF PEARLITE), ARE 100 TIMES LONGER AND 100 TIMES WIDER THAN IN THE STEEL ITSELF. THE WHITE PORTIONS ARE PURE IRON (FERRITE)

column of the table, should be given a reheating to restore the grain. Thus, for example, if a 0.30 per cent. steel has been heated for the blacksmith's work to a point where a lighter color than light red has appeared, this steel should be allowed to cool to a dull red or lower and should then be reheated until light red appears. The smith should not let the steel get any hotter.

Slowness Needed

Now this reheating should not be done as quickly as possible. It should be carried out rather slowly, especially at the end. The main reason is this. The reheating serves to break up the big grains and make smaller ones out of them. A moment's thought convinces us, though, that this effect can only be expected where the heat really is. If there are big grains in the middle of the inside of the work, we can only expect them to be broken up when the restorative heat gets to them. We

must exercise care, accordingly, not to be misled by the color on the outside. If we are going to reheat to a light red, then we should keep on until we are sure we have a light red all the way through. Now if we reheat rapidly, we are apt to have the outside a good deal hotter than the inside. When a light red has been reached on the outside, the interior will fall short. If we go on, the outside will get too hot; if we stop, the inside will not get hot enough. About the only way to prevent this condition of affairs is to avoid rushing the heating, especially at the end.

When the exterior is approaching the finishing color, which we have found to vary for different steels, the heating should go on gradually, in this way making the inside and outside keep pretty well together. The thicker the work, the more slowly the final heating should go on. Another reason for slow heating is this. The breaking up of big grains and the rearrangement of the internal structure of steel undoubtedly require time. I do not know that anybody knows just how much. It is best, then, to go slowly and allow time for the desired changes.

A Final Word

The conscientious blacksmith should not let any steel work go out of the shop, unless he has made sure that whatever reheating is necessary has been done. Nearly always a reheating will be needed. The best plan is always to apply it and thus be certain. The smith may not know just how much carbon a given piece of steel contains. He may, however, form a rough judgment by noting the hardness. Hardness follows closely the amount of carbon. Steels having 0.80 and 0.90 per cent. and more are tool steels. In order to train himself, a very good plan would be to get samples of steels having various known percentages of carbon, and then to note their various resistances to a file.

The Engravings

The three engravings accompanying this article are from photographs made by Sauveur and Boylston, Cambridge, Mass. In all three cases the steel was a hot rolled metal. It was heated to about 1830 degrees Fahrenheit and cooled slowly. Explanations of the various photographs appear under the engravings.

A Punch of Cheap Steel Specially Heat Treated

J. TAYLOR

The punch is forged at a bright yellow heat from cheap rock drill

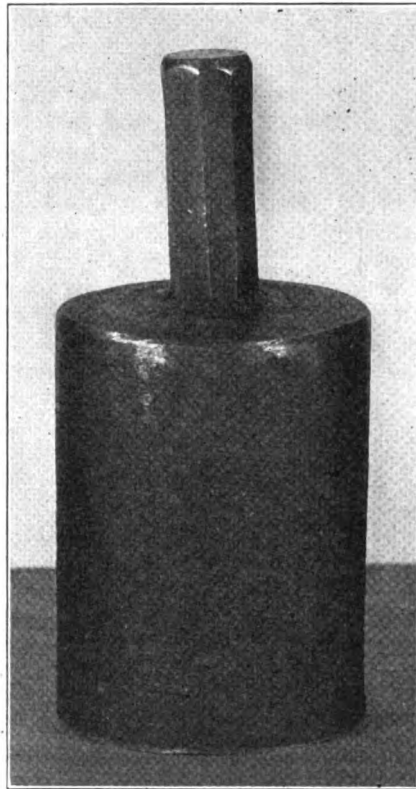


steel. After forging to shape, the heat is raised on the whole punch as evenly as possible to about 100° F. above the hardening heat. It was then allowed to come down in the open air to about 400 degrees F. and then dipped into machine oil. After the oil it was dipped into water for quick cooling. The film of oil is now wiped off and the punch filed to shape and smoothed and then placed in a clean, well-coked fire and brought to the hardening heat or a very few degrees above the critical change (decalescent point). It was then quenched in clean water until cool enough to handle, polished and tempered all over and the color drawn on the head to a pale green and the point to first pale blue. Then it was dipped into water and out again as soon as possible, just to check color where you want it, and then laid aside to cool to room temperature when it is then ready for work.

The block into which the punch was driven was sawed from a bar of machine steel. Holding block on the anvil with a pair of tongs and the punch with another, the striker using a 12-pound hammer struck a true light blow until the punch was started straight. He then increased to hard blows until the points just pricked through, keeping point well oiled. As steel becomes non-magnetic at the proper hardening heat, I used a magnet to determine the heat for hardening.

or take it into our own shops and re-bore and fit with larger plungers, but we have found that the cost is greater that way. So we order worked-over cylinders fitted with oversized pistons and put them back into the car. We could get new parts, of course, but they would stand us and the customer, perhaps, \$50, while the re-worked or re-built parts of the engine come at the rate of \$30 for each cylinder. This is our special car, of course, but the proposition would be similar in other cases. We get quicker action, we can make a better price, and we give service which is thoroughly satisfactory."

Here is another short cut to the



THE BLOCK IS MACHINE STEEL—
THE PUNCH IS CHEAP CARBON
STEEL

finished job and to a price which will mean that the shop will be kept busy and service given at a cost to the customer which will mean increased satisfaction with the truck he is using. Attention to short cuts at the beginnings of the automobile building and repairing work, which is bound to show constant increases as the years pass, will tend to establish methods of handling that character of business with the least possible waste, something much to be desired. So far as that is concerned, in much of the body-building work that is developing in all parts of the country, both in the cities and smaller towns,

there is much opportunity for making short cuts by use of some of the irons that are ordinarily reserved for use on wagons. Any progress that can be made by the shops which handle this work in the way of using standard pieces will represent a gain.

Standardization is the word. Developments in the direction of uniformity or realization of uniformity mean short cuts. That is why the big factories can turn out their products as cheaply as they do; that is why the Ford Motor Company can make as many cars and make them as good and at the same time as cheap as it does. Standardization means a short cut, for the reason that one plan will do for all.

In hand work, such as the blacksmith does, standardization cannot be minute to the degree attained in a factory. It can, however, be made of real importance to any shop, no matter how small, and is the short cut of all short cuts. All other manifestations of the short cut are either in the direction of standardization or are made possible by reason of it. Big shop or little shop, this is the thing to keep in mind, for it will provide short cuts and they mean money.

A Pointer on Welding for the Young Smith

H. N. POPE

Happening to be in a shop not long ago I saw a smith trying to do a job which was giving him a good deal of trouble. He was only trying to weld some 1/2-inch round pieces, but try as he would, he could get them to stick only on the top side. Now here is where he made his mistake and the point I wish to bring out, he got a good heat but after sticking the top lap he failed to turn the piece. He kept hammering away on the top lap and when he turned it over the under side was black. It did not stick because the anvil was so cold that it chilled the bottom lap. If welded on the face of the anvil the piece should be quickly turned and the bottom lap welded.

My way of doing a job of this kind is to have the helper place the under piece so that the end of the scarf will hang over the edge of the anvil. I then stick the top lap and turn quickly and the heat is still there and the bottom lap will surely weld up. Still another way I often do is to weld on the horn of the anvil. One does not get so much surface and the rounding top of the horn helps to do the job.

Standardizing Blacksmith Work

PART II.

G. D. CHAIN, JR.

Getting around to the automobile repair work which the smith is going to come to sooner or later, if he has not done so already: in this character of work one of the first requisites is a stock of parts. This has to be, for the reason that none but the very highest-grade machine shops are prepared to turn out the kind of work that automobiles must have. But in repair work and in replacing parts there is frequently a chance for a short cut that will mean money saved for both the customer and the smith. The manager of a shop in a certain Middle Western city the other day illustrated this point when he was speaking of overhauling trucks which were brought in to him.

"After those engines have been run for a time, the cylinders and the pistons wear, of course. Now we can send the engine to the factory



The Horseshoer

Curing a Case of Horny Tumor

FRANZ WENKE

Not very often but once in a while we run across an ailment in a horse's foot called a "horny tumor". I ran across one of these some time ago. On every fresh shoeing, especially with toe calks, the mule would go lame on her left fore-foot. On close examination I found a hard nodule in the coronary band, which was pressing directly on the pyramidal process, and was sore on pressing it with the thumb. On rasping the bearing surface of the foot I found the hoof inclined to seedy toe. The front of the wall of the hoof was crossed with transverse cracks and looked scally. As I never had had a case of this kind before I was really stumped for a while. At last I decided to cure it, and succeeded first rate. I fitted a shoe with heel calks only in the ordinary way, but gave the toe a good rolling motion. Before driving the shoe I cut a space on the toe about $1\frac{1}{2}$ inches wide, so as not to rest the shoe immediately below the tumor. The outside of the hoof below the ailment I rasped smooth and to some extent thinned the wall. Above and around the tumor I put on a cantharides (Spanish fly) blister. After two shoeings all the lameness disappeared. Now I am able to shoe the animal in the ordinary way, even using toe calks, without having her coming back on me, although I still do not put any pressure on the toe. The outside of the foot has now the regular appearance of the rest of the foot, minus the people.

Judging Draft Horses

PART II.

A. S. ALEXANDER

Instructions for Scoring

Height.—A horse's height is measured in "hands" of 4 inches

each from the summit of the withers to the ground. See that the horse "stands down squarely" on a level place. A typical ideal draft horse stands over 16 hands (5 feet 4 inches) and under 18 hands high. Tall, leggy horses, if deficient in weight, width and quality, are undesirable. Such horses are often found affected with St. Vitus' dance or Chorea. Exceptionally tall horses, (much over 17.2 hands), are difficult to match in pairs and therefore may not meet with ready sale on the market. Such horses are chiefly used for single work or as the middle horses of three-horse teams. Numerical values are not given to height on the score card. The student must learn to use judgment in estimating height and approximating its comparative value for the special purpose of the individual horse. He should know the correct use of the hand stick or hippometer.

Weight.—A draft horse should weigh 1,500 pounds, or more, in ordinary flesh. Perfect score, 6 points.

Weight in a draft horse is absolutely necessary for the hauling of heavy loads. It enables the horse to derive full benefit from the strength of his muscles, adds to the effect of his motions, and gives him a firm grip upon the ground. Heavy weight is a useless burden when not associated with adequately developed frame and muscle. It should be accompanied by vigor and energy.

In a draft horse, additional weight over the average adds greatly to the selling price. For practical purposes the great weight of a draft horse should be made up of compact frame,

large bones, and powerful muscles. Fat should be discounted in buying a draft horse for work or breeding and, in judging, one should note the development of muscle rather than fat. A perfectly developed draft colt should weigh close to 100 pounds for each month of age at 12 months old. A horse is mature at five years old, but should attain practically full weight a year or so earlier, and if pure-bred, weight 1,500 or over at three years.

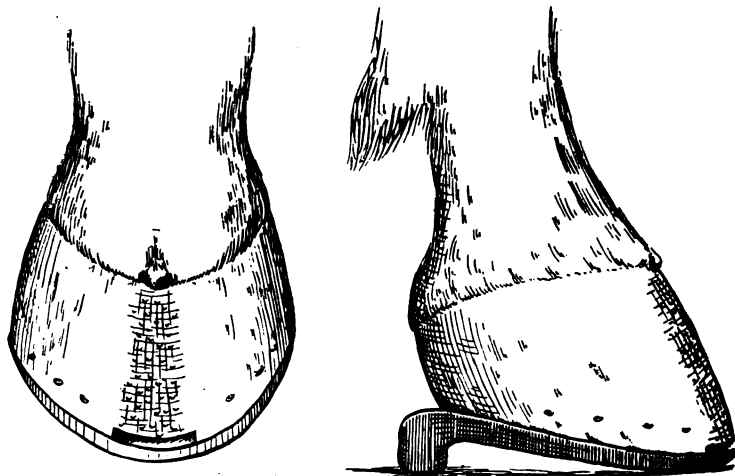
In scoring mature draft horses reject those under 1,500 pounds in weight. Cut immature draft animals for lack of development with respect to age. A young animal, not yet mature, should weigh proportionally to the mature one and be cut of markedly under weight for age.

Form.—The form of the draft horse should be broad, deep, massive, evenly proportioned, and symmetrical, the entire make-up suggesting great strength and weight. The body should be blocky, and compact, with short, broad, clean, well set legs, showing fine skin and hair, large joints and prominent tendons. Perfect, 6 points.

The entire appearance of the draft horse should be indicative of strength for heavy hauling. A massive body, set squarely on sturdy legs, is required. Discount the horse for marked departures from such form.

Quality.—Good quality is shown by fine, bright, silky hair; soft, pliable skin; clean well defined tendons, smooth, well developed muscles; strong smooth bones. It usually is associated with style, spirit and intelligence indicative of breeding. Perfect, 6 points.

The term quality is applied to the



A HARD NODULE AT THE CORONARY BAND AND THE FRONT WALL WAS SCALLY AND CRACKED



evidences of refinement, as opposed to coarseness, grossness and sluggishness. Symmetry, high spirits, lively action and endurance, should all be observed. Quality is plainly evidenced when the legs are free from meatiness, appear broad, flat, and when showing "feather" the long hair under the knees and hocks), this springs as a silky fringe from the rear of the tendons. Quality is the opposite of grossness, combines grace with great weight and power, and usually denotes good breeding. Excessive quality may denote weakness, slimness, narrowness and lightness of bone. It is then highly objectionable. The highest quality is imperative in horses intended for speed, saddle and fashionable harness work. In draft horses quality should tone down undue coarseness and give endurance and vigor, but not be so pronounced as to indicate weakness, or excessive nervousness, or be present at a material sacrifice of weight and power.

Action.—The draft horse should walk spryly, with regular, straight steps and elastic tread. The action when trotting should be free, springy, and straight. Perfect walk, 6 points; trot, 4 points.

A draft horse does most of his work at the walking gait. It is therefore important that he should be able to walk fast without tiring. He should be able to walk four miles an hour with a load. To do this the action must be perfectly regular, straight and level. Joints must be quickly and fully flexed; feet must be advanced and set down without deviation from a straight line. The soles of the feet should turn up and show the shoes plainly as the horse moves away from the observer, at both walk and trot. The feet should be lifted quickly, and evenly, and be set down squarely and firmly.

There should be no "padding", "dishing", or "winging" in or out, cutting or interfering, the forelegs should not swing out or "roll", and the hindlegs should not be carried too close together or too far apart. In judging of the action the observer must note the movement of each leg and foot, the handling of each joint and the carriage of the entire body, as the horse walks and trots. Watch closely for lameness. The hocks should be carried well together when in motion. Hocks too far apart are a most common and highly objectionable fault in draft horses. Rolling, or waddling in front is due to too great width of chest. Knee and hock action should both be free and com-

paratively high. Perfection of action at the walk is of highest importance in the draft horse.

Temperament.—The draft horse should show a vigorous, lively, energetic disposition, yet be docile, tractable and intelligent. He should not be sluggish, irritable or excessively nervous. Perfect, 2 points.

them, this is in regard to slipping, because horses shod in this fashion slip as badly on macadam roads as if shod with a flat shoe. And on soft ground they are unnecessary because a light, flat shoe will last a reasonable time without them.

To prove my statement, if you examine a calked shoe after it is half

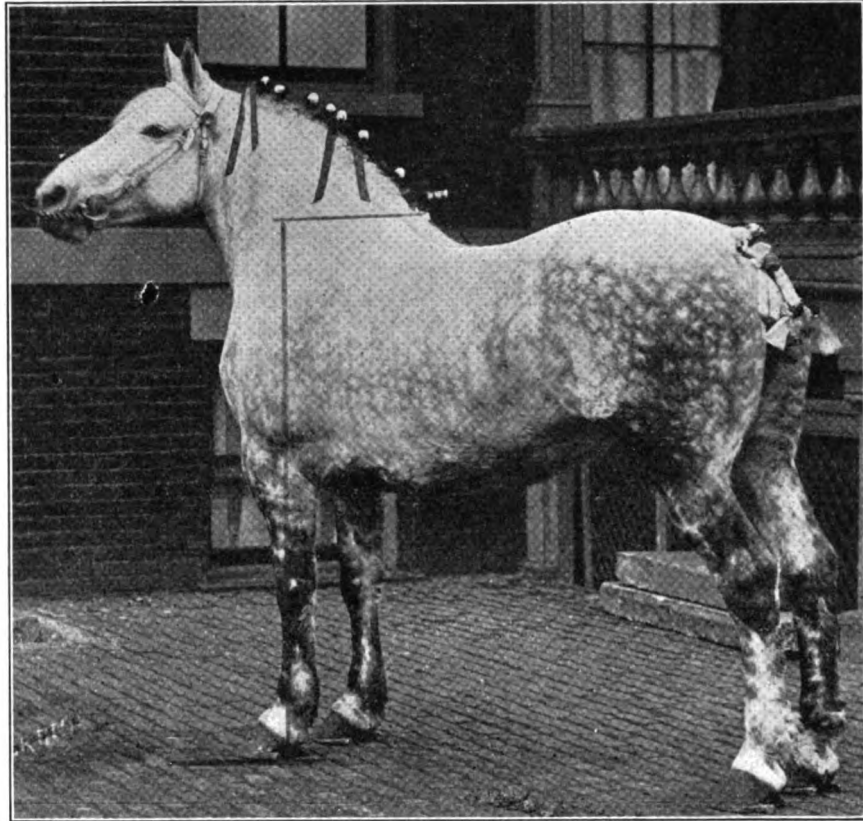


FIG. 5.—ESTIMATING HEIGHT—MEASURE FROM THE SUMMIT OF THE WITHERS UNDER THE LEFT HAND TO THE GROUND

Noticeable vices, as cribbing, wind sucking, weaving, tail switching, shying, biting, kicking and head shaking are undesirable, and a horse showing one or more of these habits should be cut sharply. Sluggishness associated with fat should be avoided, as it induces disease. Stupidity, clumsiness, meanness or excessive nervousness are objectionable and objectionable and should discount the animal.

Editor's Note:—Prof. Alexander's next installment is a continuation of this very interesting subject of examining the animal minutely.

The Evils of Shoeing With Calks

THOMAS NORTHWOOD, A. F. C. L., England.

In my previous article I dwelt upon the advantages derived from the system of flat shoeing. It is now my intention to point out some of the evils that result from the practice of shoeing with heels and toe calks. In the first place calks do not possess the special advantages claimed for

worn out, in many cases you will find it perfectly flat; yet the same horse is not shod for some considerable time after. He will still draw the same loads over the same roads and never fall down; therefore, the idea that a horse cannot stand to draw on flat shoes can be dispensed with.

On the other hand, a horse shod with calks is much more liable to lameness as the calks are one of the chief causes of sidebone because of the placing of unequal strain at the coronet and soft tissues of the foot. Often the outside toe and heel get worn off, first leaving the foot in an unnatural position. They also encourage contraction by preventing the frog from taking a bearing on the ground and as a consequence the frog is thrown entirely out of action. While the frog, if allowed to take a bearing on the ground, prevents slipping and also by its continuous movements assists the blood circulation and keeps the foot in a more tough and reliable condition.



The frog also acts as a cushion by preventing concussion of the joints above. None of these functions can be properly carried out with calked shoes. The result is horses go groggy on their front feet long before their time. Flat shoes keep the limbs in a more natural position and are better for the horse, the leg bones and the farrier.

Old-time methods die slowly, but time and education work wonders and slowly but surely the old-time methods are giving way to the new. I sincerely hope the social standing of the farrier will at the same time be improved and he be allowed to know something of the particular structure he has to work upon.



Benton's Recipe Book

Case hardening seems to be the problem of an Iowa reader. We suggested the following: A ladle containing cyanide of potassium is heated red hot and after heating the stock the iron is placed in the red hot cyanide and left for several minutes. After soaking the stock is cooled in cold water.

For hardening iron a dipping solution was suggested to N. J. S. To make the solution take one pint of oil of vitriol, one bushel of salt, one pound of saltpeter, two pounds of alum, $\frac{1}{4}$ pound prussic potash, $\frac{1}{4}$ pound cyanide potash and dissolve these in three gallons of rain water. The iron is heated to a cherry red and cooled in this solution.

An Aluminum Solder may be made as follows: Melt together one pound of block tin, four ounces of spelter, two ounces of pure lead and three pounds of phosphor tin. This mixture is recommended by a man who has used it. He suggests cleaning the work thoroughly with benzine or gasoline and then applying the above solder with a heated copper bit in the usual way.

A hack saw hint that may be of value when cutting soft metal is to place two blades in the saw frame, one set the usual way and the other reversed with the teeth pointing backward toward the handle. With the blades arranged in this way, the saws cut on each movement, and as one saw is also dragging the other saw is thus prevented from cutting too deeply at any one thrust.

To cool steel without hardening it, is sometimes required. If the steel is plunged into a pail of soapy water it will be found quite soft enough to cut with a tool, after it has cooled.

A hardening preparation for which a glib-tongued fakir was getting a big price from Indiana smiths, is made as follows: Take one part of ordinary wheat flour, two parts of salt and four parts of water

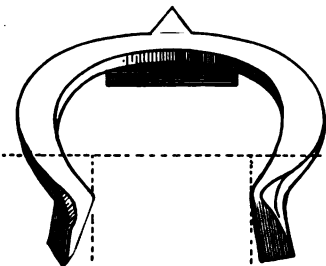
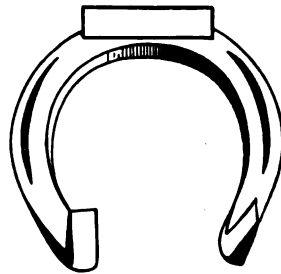
and mix thoroughly. Heat your steel slightly and coat it thoroughly with the mixture. Then heat to a cherry red and plunge into soft water. This will make the steel harder than if merely dipped in the ordinary way, but there is no reason for paying an oily tongued stranger any big price for a little flour, salt and water.

The Meanest Mule in Missouri Dead

H. E. KERNEK

The meanest mule in Missouri—in other words the meanest animal in the world—is dead. This animal was owned by an ice and fuel company and was known as "Devil" which name was most appropriate. "Devil" was the best known mule in Missouri. His fame as a kicker was second only to that of "Maud" the Sunday supplement performer. "Devil" was a good worker so long as let alone, but when requested to do anything that was not in accordance with his strict rules of mulish procedure, his heels came into action with tremendous power. One powerful shoer with a reputation for his death-defying attitude toward Missouri's well-known animal product was placed in the hospital after a session with "Devil", while a brand new set of stocks was gathered up and placed on the scrap heap.

"Devil" when taken sick refused to be comforted and for two days



ON FITTING THE SHOE

continued to kick until he breathed his last. If there is a hereafter for mules let us hope that "Devil" finds it and a much needed rest after

eighteen years of a most strenuous earthly existence. May his bones rest in peace.



Queries— Answers— Notes

On Fitting the Shoe.—In reviewing my article on page 147 of the March issue I find that the artist made a mistake in the engravings. The article speaks of hot rasping and rounding off the heels, but the engraving does not show it. Then too, the side calk is not welded on as shown in the engraving, but is simply drawn up. I am therefore sending revised drawings to correct this so that your readers may get my article right.—M. W. ABTS, Nebraska.

Pointers on Plow Pointing.—Here in our country the point drills off or wears off so short and quick that it is a job to point one. The best way we all find is to take a cold rolled bar $1\frac{1}{2}$ by $\frac{1}{2}$ inch and beat it out in such a shape as to fit what is worn off and then have some to trim. After we have finished that way we have a neat job. New shares come in without any point whatever. I also find many shares warp in sharpening and that by pounding on each side keeps them straight. In cooling I have a wooden trough 2 inches wide, deep enough, and 29 inches long, a little deeper at one end for points. This helps out; try it.—E. D. PENDLETON, Ohio.

Tightening the Box in the Hub.—I have been taking THE AMERICAN BLACKSMITH for a good while. I am well pleased with the paper. I noticed in one of your back papers that a subscriber told how to babbitt a box in a wheel. His way is all right but it is quite expensive and takes up a lot of time. If he will plumb his box and get some sulphur and melt it and pour it in around the box he will find he has a better and cheaper job. The sulphur will stick to the box and hub both and babbitt won't stick to either one. I have been working at the blacksmith trade all my life, but I find lots in the paper that I didn't know and find lots of information that helps me in my business.

S. J. MINARD, Texas.

Polishing the Automobile Body.—I have followed the articles on auto-painting and have gained a good many good pointers from them. A car is not finished, however, after the last coat of finishing varnish is on—it needs polishing or rubbing down with rotten stone or polishing powder. I would like to have some pointers on the mixing of polishes that can be used with rotten stone or polishing powder.

W. J. QUINN, New York.

In Reply.—A common mixture for polishing varnished surfaces is rotten stone and crude oil. This mixture may be used with a polishing pad of felt, though many



polishers use the bare hands especially on very fine work, requiring a highly finished surface. The rotten stone and crude oil are mixed as used and of such proportions as best suit the operator.

To Temper Mill Picks.—I would be glad if some one would tell me how to temper mill picks so they will stand to sharpen French stone burrs.

T. E., New York.

E. B. HUNT, Missouri.

In Reply.—My experience of mill picks is that the forging is responsible for a number of breakdowns. Careful, thorough heating and working and hammering on the flat with the finishing heats evenly on both sides, are essential. If the cutting edge fans out wider than the stock, grind the sides almost off and level the edge slightly, thus clearing the stock. If the edge is left wider, the corners have no backing, but do not hammer the sides in. Harden at a cherry red, in:

6 gallons clear soft water with chill taken off.

2 ounces each of alum and saltpetre
1½ ounces of salt.

½ ounce sal-ammoniac. Mix all thoroughly, and draw no temper.

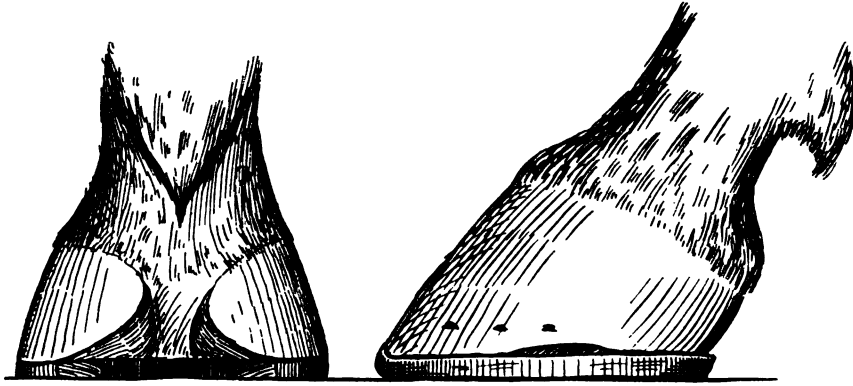
T. R. GERRON, Eng., in a back number.

Repointing Shares.—In repointing plow shares we use 1½ by ¾ inch hammered lay steel, point made as shown in the engraving and of proper size to fit the job. We take our first welding heat, with the point and share apart, and weld to bottom of landside with share bottom-side up. In this way you can see just where it should be. The next heat is taken at throat piece. Before this heat is taken one should be sure that there is no coal or dirt between the laps. We think it best to have it clean and get the welding compound under the lap. It pays to have the work free from dirt, then you are sure of it welding down perfectly, saving time in the end. Next take a heat, drive onto the corner of anvil, as shown. This causes a weak place and the point may be doubled back on the top of share very easily. After closing down nicely take heat, remove from fire, raise lap up having it clean of dirt coal, etc., place plenty of good welding compound under same and close down again. Now you

are ready for the big heat, using plenty of borax on outside of work. If this method is followed out, this last heat properly worked will almost invariably weld it down perfectly. Now you are ready to give it treatment under the power hammer. We claim an advantage

place should never rest too hard on the shoe on any horse.

Never fit the shoe too wide at the toe, but always have it wide enough at the heels. Then there will be little danger from contracted heels or lame horses. I have shod horses for the last six years



TO SHOE FOR CONTRACTION FIRST CUT OUT THE BARS AND TRIM THE HEELS

of using steel ¾-inch in thickness over the ¼-inch steel, for this reason; many shares, in this part of the country at least, come in worn back quite short, and the ¾ steel when double gives a thickness of ¾ of an inch, where ¼-inch steel would give only ½-inch.

By this method and the use of a power hammer I have known our plow man, Mr. H. A. Gatewood, to point and sharpen one 16-inch lay and sharpen another 16-inch lay in thirty minutes and the job was done right.

M. W. ABTS, Nebraska.

Prevention for Contracted Heels.—My way of shoeing contracted feet is to trim or cut out the bars and cut the heels so as to get a slant toward the frog and let the outside of the heel rest solidly on the shoe. Most of the smiths cut the heel so as to give it a little spring; this I find is wrong. If a shoer studies a foot right he will find the toe the strongest part on the foot. The next strongest place are the heels and the weakest point is between the toe and the heels, so this

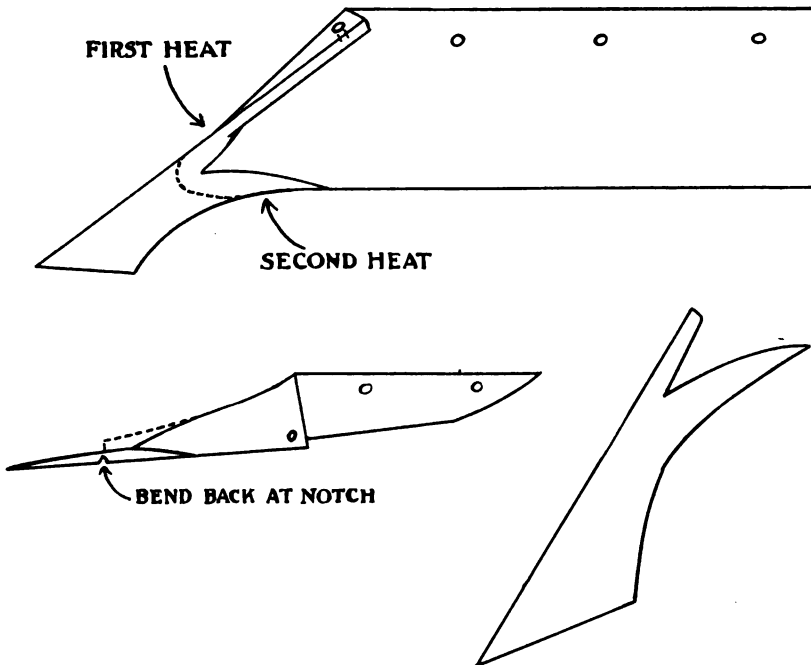
and never had a case of contracted heels in any of the animals I shod regularly. But I have shod horses that came in my shop that were contracted from indifferant shoeing. I can say that I shod them and in a few days I had the foot spread over the shoe. The foot can be spread as much as you wish it to spread at the first shoeing, if you judge right of how much you must cut out of the bar and the pitch of the heel toward the frog. Sometimes the heels are cut so short by other smiths that it is a little hard to do much the first shoeing, but it will help the horse anyway to cut it this way.

As to Brother R. F. Walker, I will say his way might be all right or he probably has shod horses a good deal longer than I have, as I am young at the business; but I get all the crippled feet from miles around and even veterinarians will send horses from other towns to my shop to have me fix the feet in my way. But I shall not brag. I too can learn. I give this method because I never saw one like it. Try it out, if it is done right you will have the best of results. One thing I should draw attention to in Mr. R. F. Walker's letter is his statement that when you start nailing a shoe it is wider than it is after you have driven the nails tight and clinched them. I shall not contradict him, but he surely must use a very weak shoe. And he says that after a shoe is nailed the foot can't spread, but it is necessary to spread the shoe. I will say, if there is anything left of the heels and if the foot is cut right, it will spread more than an eighth of an inch in two days. And about fast shoeing I will say I can go with the fastest one if I just give myself a try out, but for all around shoeing I take my time.

A. GREENHORN, Minnesota.

Water Finding—Drop Sole—Maine Prices

—As I have been a subscriber to your valuable paper for several years and a devoted reader of "Queries, Answers, Notes", I take the liberty to write a few lines in answer to Mr. Lawrence Johnson, of Connecticut (in the April issue), on the subject of "water witching" as he calls it. He claims, in his article, that the way the stick is held causes it to turn whether the operator is over a vein of water or not. That is certainly incorrect in my case, for I have tried it repeatedly. It will not turn



IN REPOINTING PLOW SHARES USE HAMMERED LAY STEEL



unless a vein of water or a hidden spring is underneath. However, on the other hand, if there is a vein of water I cannot prevent the stick turning. The size of the stick makes no difference whatever as I have taken a scrub oak (and that is a good stiff wood), over one inch in diameter at the small end, and could not hold it alone, (I weight over 230 lbs.), so I called upon a friend who was present and both of us could not hold it. The only way I can explain the stick turning, is that if a person has enough electricity in their body the stick will turn, as I think the water running in the vein generates a certain amount of electricity and the ground, being a good conductor, causes the stick to bend. A dry stick will not bend, it being a non-conductor. I have located a good many wells and never yet failed that I know of. It seems to me that Mr. Johnson is not very liberal minded; because he cannot locate water himself he thinks no one else can.

To prove there is something in this way of finding water, let two persons having the power take hold of a stick at the same time and it will not turn. But if one has



AN EXTRA STORAGE SPACE ON THE AUTO

the power and other hasn't, and the one having the power has his hand nearest the crotch, the stick will turn.

Should any one wish to know a good way to cure dropped sole I will gladly tell them of the way I cured a bad case.

Business is very good here and I get more for shoeing than those around me. I get \$1.25 for set for new shoes Nos. 1-2-3. \$1.50 for Nos. 4 and 5. \$1.75 for Nos. 6-7-8, and 65, 75 and 90 cents for resetting the corresponding sizes. I get \$2.00 per set for resetting buggy tires and more for larger ones.

FRANK M. HALL, Maine.

From A Louisiana Reader.—THE AMERICAN BLACKSMITH is a great book for young blacksmiths. It has done me lots of good and I advise every blacksmith in my location to read it. I am a young man at the blacksmith business and I wouldn't work another day in my shop if I couldn't get my copy anymore. I have been reading THE AMERICAN BLACKSMITH for four years and I am always as proud when it comes to me as I can be. I would not do without it.

I have a nice shop here in our little town and I get all the work I can do. I have one helper and he is a reader of "Our Journal". My shop is 26 by 36 feet. I have plenty of light and that is what every blacksmith needs in his shop, for lots of times a piece of work is turned out rough on account of a dark shop, and then the blacksmith is blamed when it is not his fault altogether. If my shop was not so I could get plenty of light I would move or rebuild. I have a modern set of tools and expect to put more in my shop a little later on.

JIM WORLEY, Louisiana.

It is a mistake for the average repairman to ever try to correct an apparent fault in a coil. There are no reasons for a coil to refuse to work that can be remedied by an ordinary mechanic, except it be some outside connection. If the coil is so that a current will not pass through it, either the primary or secondary part, it is always due to burning out, and calls for a new coil at once.



The Automobile Repairman

To recover nuts, cotter pins and other small metal fittings from inaccessible places into which they have a habit of dropping at the most inopportune moments, a horseshoe magnet, tied to the end of a stick, will be found useful. Or lacking the magnet, make a cloth swab on a stick long enough to reach into the space and after moistening the cloth with rubber cement or some other very sticky substance, the small metal part can easily be recovered.

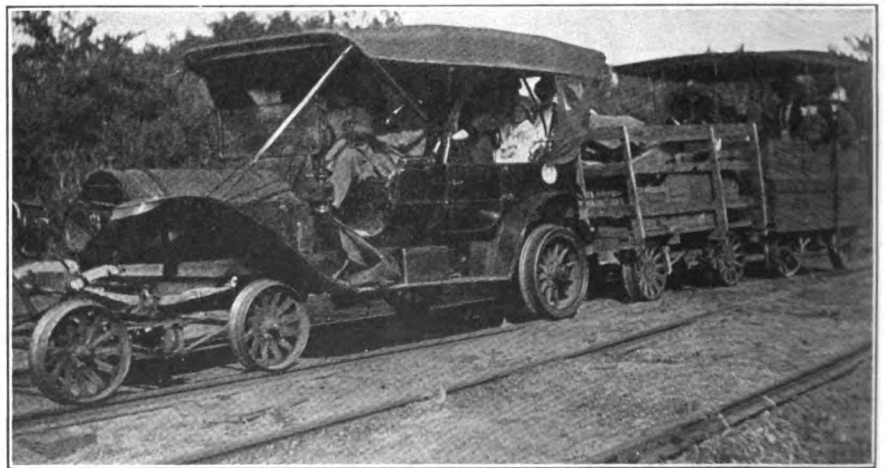
Extra storage space for the motorist who tours can be very conveniently arranged for under the floor of the tonneau. One Eastern smith has fitted up several cars in this way. The space available for this purpose, of course, depends upon the arrangement of the mechanism beneath the floor of the car. Usually, however, considerable space can be found beneath the floor on the side opposite the muffler. Here the floor of the car can be cut out and a box of such size as will clear all under parts of the car may be fastened. The box should be stoutly made and well painted. It may be best fastened to the under floor by means of straps of light iron

the shape of the dash is often a difficult task. The result is that instead of resting securely all around, it will bear only on the high places, making a tight fit impossible, and cause the squeak. The trouble may be remedied by placing a strip of felt between the baseboard of the shield and the dash.

Graphite in the lubricating oil is suggested by an experienced motorist. He says that a teaspoonful of each pint of oil will build up even the most microscopic irregularities on bearing and wearing surfaces of pistons, rings and cylinders, resulting in better lubrication in cylinders, better compression and a saving of oil. He recommends flake graphite.

After taking up lost motion in a bearing take care in making the final adjustment that the strain of the bolts does not come on the journal, but on the faces of the bearing lines or bushings

To remove lime deposit from the radiator walls the vigorous action of hydrochloric acid (in popular terms "spirits of salts"), is unquestioned. No one need be frightened at handling this acid; it is not the most dangerous by any means, but it is desirable to be careful in using it and to keep it from coming in contact with wood, cloth or leather, and, of course, the fingers. A considerable quantity of the acid would be required, but it is quite inexpensive. The commercial variety, which is quite suitable, can be obtained for a small sum from any dealer in chemicals. There is no reason why the same supply should not be used quite a number of times, as its solvent power will not be reduced to any serious extent. This scale which forms in the circulation system has such a serious effect on the running of the engine, and is so difficult to remove by the soda treatment, if there is any quantity present, that there need be no hesitation in using the acid. There is no doubt that circulation troubles do sometimes arise from accumulations of grease in the system, and a strong alkali, such as soda, is equally as effective in dissolving it as the acid is for dissolving scale; therefore, to make a thorough job of cleaning the system, both the alkali and acid process should be applied. The formation of rust



AN AUTOMOBILE EQUIPPED FOR A RAILROAD TRACK BY MR. W. H. WYATT

stock, as shown in the engraving. The removed floor then acts as a cover for the storage space.

A squeak that is very annoying and sometimes hard to locate is that made by the base of a windshield rubbing on the dash. The cutting of the base of a glass front so that it will conform exactly to

in the cylinder jackets must also be kept in mind. In some cases rust and precipitated matter, if allowed to go on collecting in the lower part of the jackets, which it does in the form of mud, will in time seriously reduce the effective cooling area around the cylinders. The acid treatment will make short work of this rust-mud.



A Railroad Automobile

W. H. WYATT

The accompanying engraving shows the railroad automobile which I equipped to run on a railroad track. The car is a Mitchell Six. I built the truck for the front end and the two driving wheels for the rails. This car runs on a branch road that connects our town with the main line of the Union Pacific. This branch is nine miles long and the car shown is used to transport mail and passengers. We have a locomotive for hauling carloads of freight.

How to Time the Valves of the Motor

C. P. SHATTUCK, M. E.

The subject of valve timing and improvements to be obtained by an alteration of the original setting have been discussed from time to time in motr vehicle publications, but, as a rule, the discussions have been written to interest the designer or trained engineer and do not provide practical information for the mechanic who is frequently called upon to fit new timing gears and to retime old motors, the flywheels of which are not marked with the opening and closing points of the valves.

The correct timing is important, and the writer is of the opinion that the majority of old motors are run-

to enter the intake pipe, and to the exhaust gases not being completely expelled before the intake opens, a condition due to too short an exhaust period or too late an exhaust valve opening. Loss of power at high speeds is due to the cylinder not being filled with the mixture and caused by too brief an intake period or too late an opening or closing point. The last named trouble results in counter currents in the intake branches and are caused by the piston that has completed the intake stroke and is compressing, forcing a part of the charge back. With too brief an exhaust period or too late an opening, the gases occupy space in the cylinder that should be filled with the fresh mixture. As the exhaust gases consist largely of water vapor, nitrogen and carbon dioxide, the presence of the last named not only prevents rapid flame propagation but decreases the energy of the expansion of the charge. From this it will be seen that the mixture should not be permitted to burn during the power stroke, which should be given over to the expansion of the gases which produce the impulse, and that accurate timing is essential.

Although the timing of the motor varies greatly, in practically every case the intake valves open and close late, while the exhausts open early and close late. High speed motors

rim of the flywheel is not marked, and the timing cannot be obtained from the maker, an average timing for the type of motor must be tried and varied to suit its characteristics.

To retime a motor not having a marked flywheel, the periphery or rim must first be marked off. Spaces of two degrees will serve for a large flywheel and four degrees for a small one of about 14 inches for example. The distances between the marks are found as follows: Multiply the diameter of the flywheel in inches by 3.1416 and divide by 180 for two degree spaces and 90 for four degrees spaces. There are 360 degrees to the circle.

A simple method is to take a piece of stiff paper of the same width as the rim of the flywheel, and in length equal to the diameter multiplied by 3.1416. Divide and mark the paper into four 90-degree spacings, or two 180-degree spacings, and attach the paper to the rim of the flywheel with glue or paste. The next step is to obtain the top and bottom dead centre lines. If possible mount the flywheel and crankshaft in a lathe, and by means of a square or spirit level, or a plumb line, place the four crankthrows in a vertical plane. Use the plumb line as shown at Fig. 1, B, and where it touches the rim of the flywheel, top and bottom, will be the dead centre lines for the crankthrows

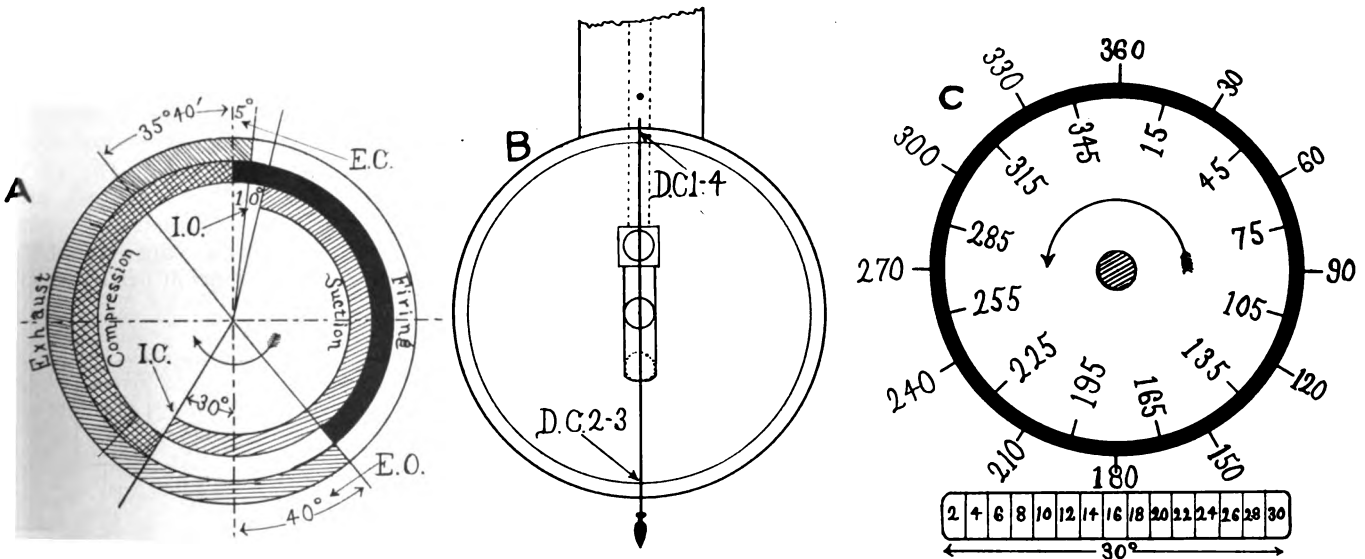


FIG. 1.—RETIMING MOTORS—A, DIAGRAM FOR MEDIUM SIZED ENGINE. B, OBTAINING THE TOP AND BOTTOM DEAD CENTERS WITH A PLUMB LINE. C, HOW TO LAY-OFF FLYWHEEL IN DEGREES

ning out of time, due to wear, an error in assembly or the fitting of new timing gears. Incorrect valve settings are responsible for the following defects, particularly at high speeds: Poor carburetion and induction, caused by the intake, valve opening too early, allowing the exhaust gases

have different timing from those used on touring or commercial cars, having longer valve periods and more lead.

The timing of a motor having a marked flywheel, even if the timing or camshaft gear be not marked, is not a difficult matter, but when the

of cylinders 1 and 4 and 2 and 3. If the lathe be provided with an arrangement for dividing off, the flywheel may be marked off in degrees without the use of the paper.

It is a good plan to mark the crankcase or cylinder as shown in the engraving, or better still attach a



pointer under the base of the last cylinder. It must be so adjusted that it will be exactly over the 360-degree mark or dead centre when the crank-throw of the No 1 cylinder is exactly vertical. In making marks on the flywheel scribe them deep.

Having obtained the dead centres mark the paper, beginning with 360 for the top dead centre of the crank-throw 1 and 4, and 180 for the centres of 2 and 3. Number or mark the other division in 30-degree spacings around the flywheel and in a clockwise direction or contrary to normal rotation of the wheel. Begin with 360 and mark 30, 60, 90, etc., to 330, or divide and mark as shown at Fig. 1, C. Here the flywheel is divided into spaces of 15-degrees. As a space of 30-degrees, subdivided into two-degree markings is shown, one should be able to time within very close limits.

If the motor be of medium size and operates between 800 and 1,500 revolutions a minute, the timing diagram shown at Fig. 1, A, will give good results. The intake valve opens 10-degrees past top dead centre and closes 30-degrees after bottom dead centre. The exhaust opens 40-degrees before lower dead centre and closes five-degrees after top dead centre. The ignition timing or spark advance is from 35 to 40-degrees before top dead centre, as indicated in the engraving.

For small and high speed motors set the intake to open from 12 to 15-degrees after top dead centre and to close at from 25 to 30-degrees after bottom dead centre. Adjust the exhaust to close from 10 to 12-degrees after top dead centre. With large and slow speed motors the intake should open from five to 20-degrees after bottom dead centre. The exhaust should open from 30 to 40-degrees before bottom dead centre and close from 0 to five-degrees after top dead centre. Medium speed motors have an adjustment between these points. In experimenting with valve setting it should be borne in mind that advancing or retarding the camshaft gear by a single tooth may make a difference of 10-degrees on the flywheel. This, however, may be easily ascertained when the flywheel is laid off in degrees.

The duration of the intake and exhaust periods cannot be altered without changing the contour of the cams, nor can the opening and closing points of the intake and exhaust valves respectively, be changed in relation to each other in a motor having a single camshaft such as the L head type. The T head, however, having

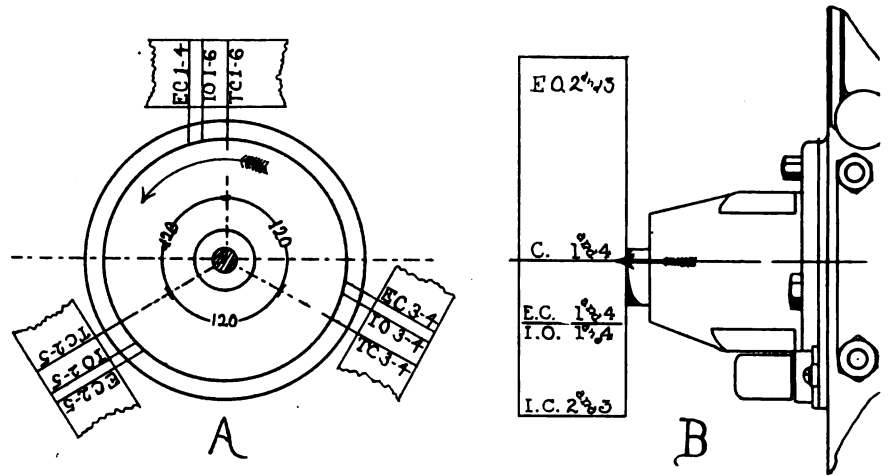


FIG. 2.—FLYWHEEL MARKINGS OF MULTI-CYLINDER MOTORS. A—SIX CYLINDER AND B, FOR FOUR CYLINDER

two camshafts, permits of changing the opening and closing points, making them earlier or later on one or both. It should be remembered in attempting to improve the operation of a motor having a single camshaft that with the exhaust opening five degrees earlier than the maker's setting that the intake will also open five degrees earlier. It is not always practical to vary the maker's setting without introducing new defects.

When the maker's timing is known or the flywheel is marked, the work of timing is simplified. Fig. 2, A and B, shows the markings of a four and six-cylinder motor respectively. To replace a camshaft and time under such conditions is not difficult even if the gears be not marked. To replace the unmarked camshaft, rotate the flywheel until the mark I. O. $\frac{1}{4}$ registers with the pointer, indicating the opening of the intake valve of the first and fourth cylinders. Move the flywheel backward a slight distance so that the tension of the spring will not have to be overcome, and so mesh the camshaft gear with that of the crankshaft, that the

intake cam of the first cylinder will start to lift the tappet or pushrod. If properly meshed the valve will start to lift when the mark I. O. $\frac{1}{4}$ registers with the pointer.

After overhauling or grinding in the valves of a motor it is an excellent plan to check the valve openings and closings by the flywheel marks which indicate the opening and closing are easily interpreted. I. O. and I. C. indicate the opening and closing points of the intakes and E. O. and E. C. the opening and closing points of the exhaust members. If these marks pass the indicator before the valve starts to open or close, it indicates too late an opening or closing which should be corrected. As the tappets are generally adjustable, it is a simple matter to lengthen or shorten them as may be required. Under no circumstances should the adjustment be so made that the tappet will touch the valve stem when the valve is seated, and in making a fine adjustment with the motor cold, allowance must be made for the expansion of the metal when hot.

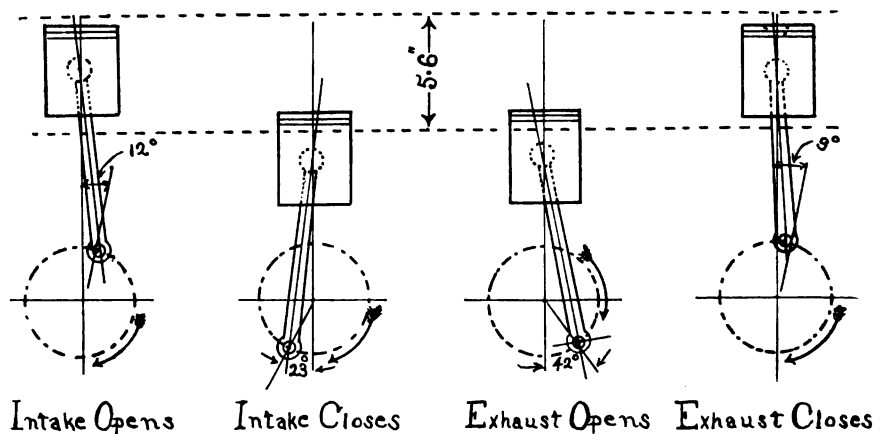
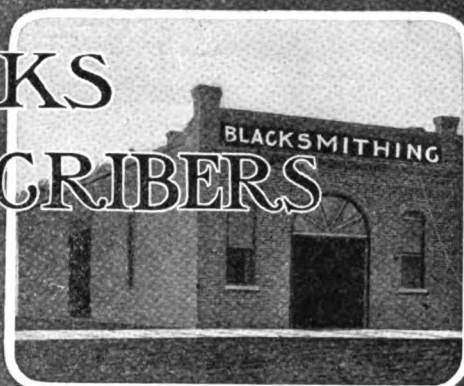


FIG. 3.—DIAGRAM SHOWING POSITION OF PISTONS IN AVERAGE VALVE TIMING



TIMELY TALKS WITH OUR SUBSCRIBERS



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Did You Answer?

In the May issue of "Our Journal" we asked several questions about "Our Journal". We wanted to know what YOU think of THE AMERICAN BLACKSMITH. A good many of "Our Folks" replied. Told us just exactly what they think of "Our Journal". But—we haven't heard from all readers. There are some who have not yet answered those questions, and we want to hear from every one of "Our Folks". If you haven't answered those questions—write right now. And if you want one of those blacksmith pictures in colors ask for it when you answer those questions and we will send you one to repay you for your favor.

DO IT NOW—PLEASE.

The Oxy-Acetylene Machine

The oxy-acetylene machine, torch, equipment or whatever else you may call it, is the most important item of smith shop equipment that has been placed on the market in years. It is changing things about in the smithing business and is bringing new business to the smith—business that he could not possibly secure without the o-a flame. The oxy-acetylene torch is a most important factor in the smithing field. We have devoted considerable space to the subject. And for September we are planning a special issue of "Our Journal" devoted to that subject. Whether you are interested in oxy-acetylene work or not you will want to read this special issue and to see what can be and has been done with the double gas torch.

Subscription Agents

When a stranger solicits your subscription to THE AMERICAN BLACKSMITH, or any other publication, insist upon his showing you absolute proof that he is an agent in good standing and is employed by the publication which he represent. Don't, under any circumstances, give the man your money if you are not sure that he really works for the paper he says he does. No matter what the man offers you—no matter what price he makes—no matter what premium he promises to send—DON'T GIVE HIM YOUR MONEY IF YOU ARE NOT SURE.

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This Number

And again comes the time for the Shop Number. Look through this number carefully. Get the shop helps in it. Get the new shop ideas, the new shop plans, the new shop methods. In this issue you will surely find some things that are new to you, some things that you can use profitably in your shop. The description of Mr. Abt's shop and business contains many suggestions. Some may be old to you but certainly there is something of value for you in the feature article. And then the other articles—surely you'll want to keep this issue on your shop desk for some time so as to work out some of the new ideas it suggests.

Next Month.

Next month comes another issue featuring horseshoeing. We are mentioning this now because several very interesting features will be found in this number. Every horseshoer will want to read the excellent articles in the August issue—excellent articles by authorities on their respective subjects.

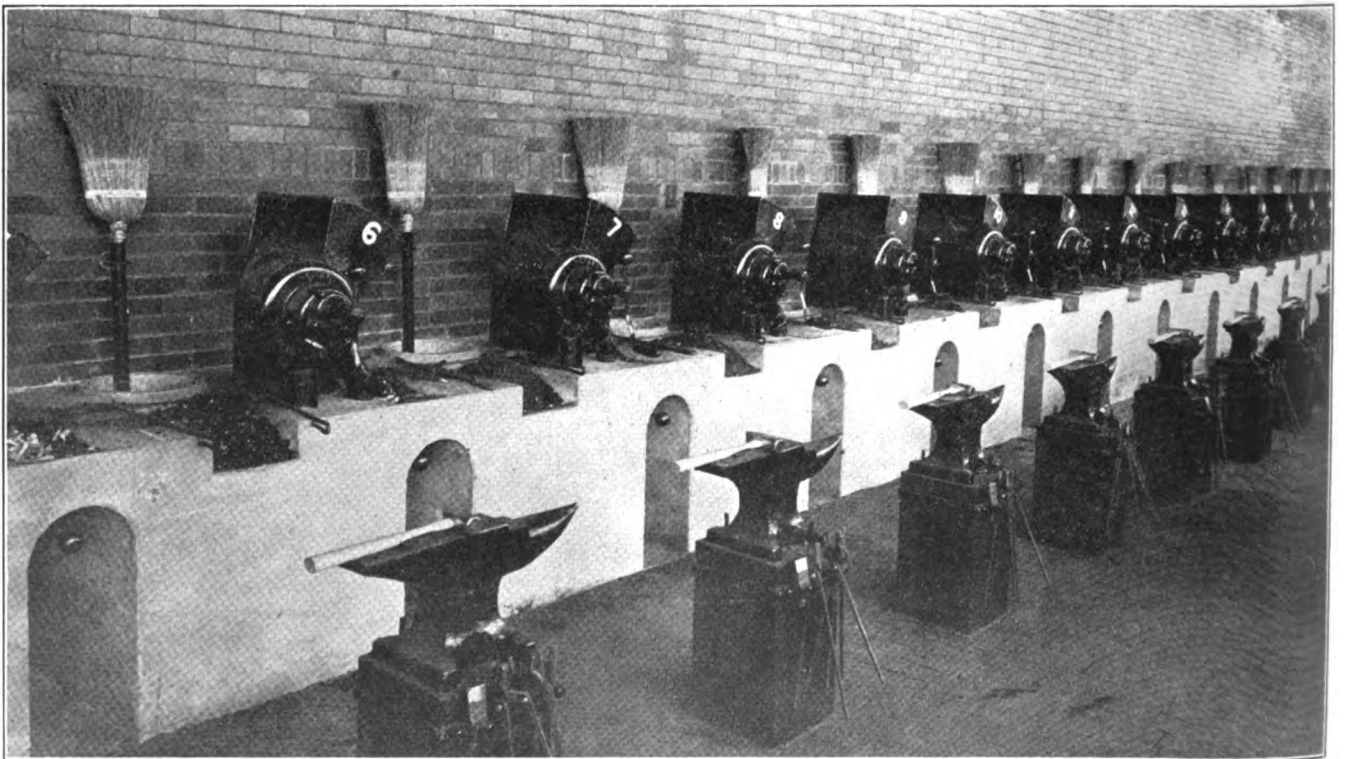
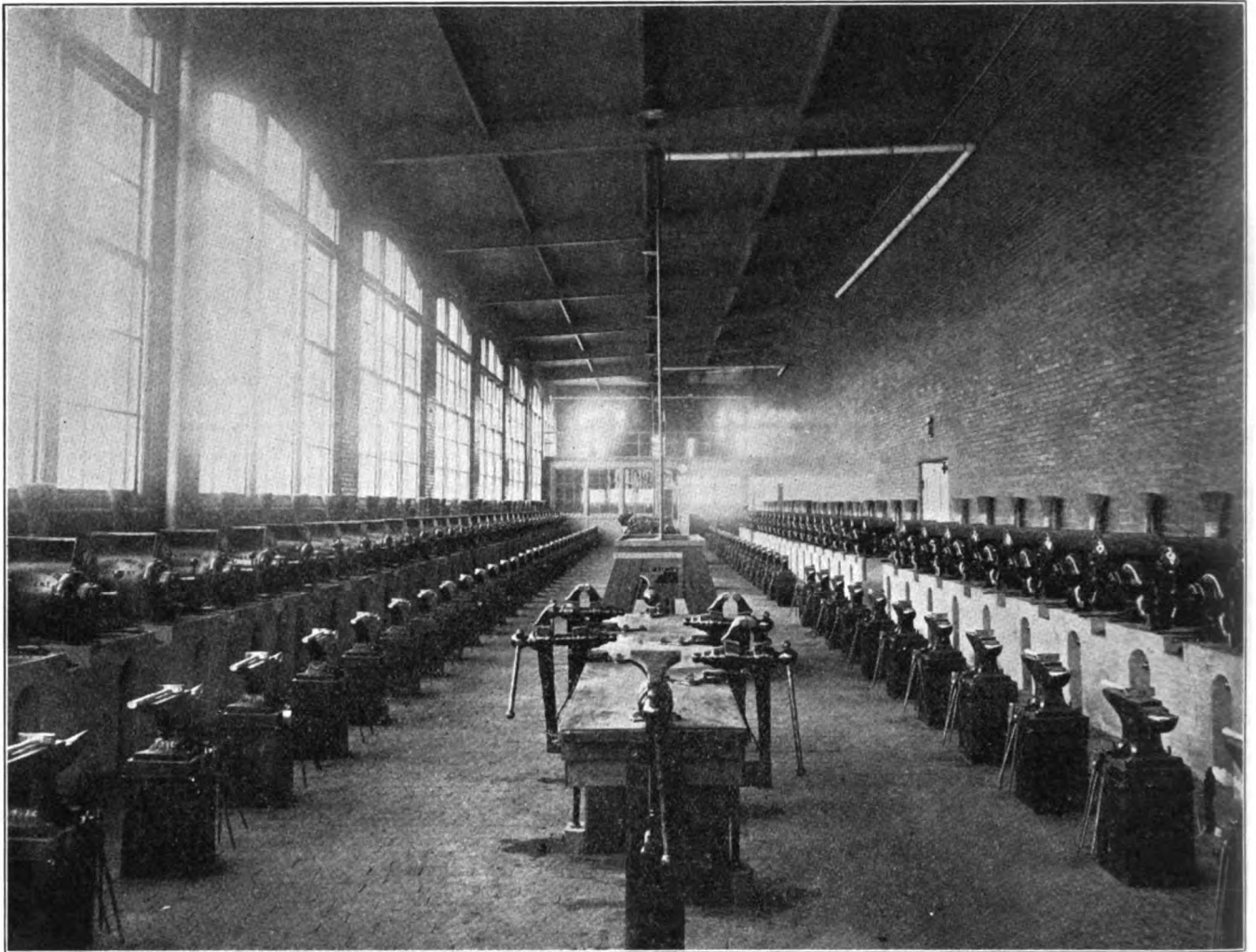
For September

If present plans carry the coming September issue will be a special oxy-acetylene number. The coming of the oxy-acetylene torch and its perfection for use in both large and small shops has been the greatest change and improvement in the smithing field in recent years. And with readers and users, so vitally interested in the matter, the subject of oxy-acetylene welding and cutting operations, is worthy of a special number of "Our Journal". You'll want to read every word of this oxy-acetylene number—you'll want to keep up with the times. And you cannot unless you read this coming September number.

Our Automobile Department

We had quite a compliment the other day on our auto section. One of our good friends sent in a subscription order and wrote: "This new subscriber runs a garage. He was in my shop the other day and I showed him my latest copy of "Our Journal". After looking it over he said: 'Better send in my name for a year, there's better information in that on auto work than in the regular auto papers that I get.'"

Isn't that characteristic of THE AMERICAN BLACKSMITH? "The Leader in Its Line" would be a good slogan for "Our Journal". What say you folks?



THE NEW BLACKSMITH SHOP AT THE MINNESOTA AGRICULTURAL COLLEGE

This shop contains seventy-five forges and was designed by Prof. A. D. Johnson of this college. The upper picture shows the general arrangement of the forges while the lower picture shows the details of each unit.



A Nebraska Smith Shop

Mr. M. W. Abts describes his shop and some of his business methods

UP in the north-western corner of Scotts Bluff county, in Nebraska, there is a town called Morrill. It isn't a town of large population—it isn't a great metropolis—but it contains a blacksmith shop that would be a credit to any city.

The shop of Mr. M. W. Abts is shown in the accompanying pictures, with views showing both sides of the interior. The floor plan shows the shop laid out with the forges, four in number, arranged down the center. This arrangement is excellent for a general shop, and, as shown, Mr. Abts' activities range all the way from automobile work to shoeing and plow work. As Mr. Abts puts it: "We believe in mixing in the puttering jobs—as some call 'em—just to keep busy and out of mischief".

And so to know something of Mr. Abts, his shop, his business and the success he has made, just listen to what he has to say of these things.

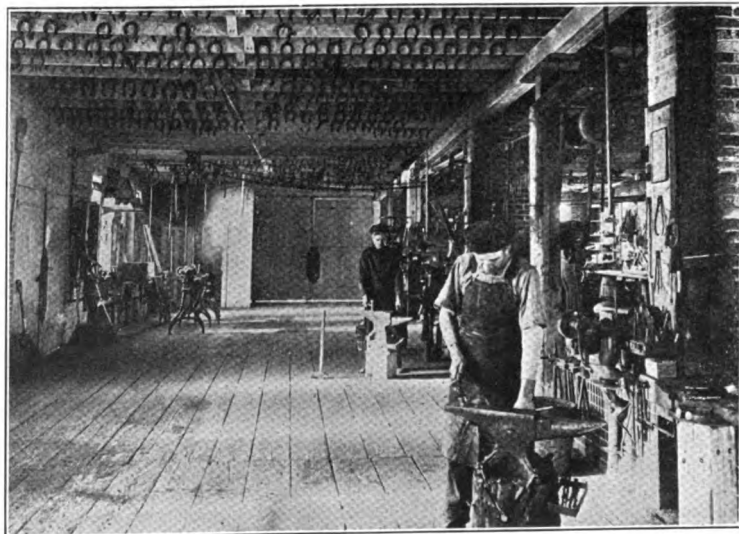
"For power we have a 6-horse power Fairbanks-Morse Kerosene engine", say Mr. Abts. "This not only give good staisfaction in the way of developing adequate power for our needs, but it operates on cheap fuel. The engine does not carbonize and require cleaning nearly as much as one might imagine, from using dirty fuel. Kerosene naturally does not burn up as completely as gasolene, yet we used our engine one year before we found it necessary to clean the cylinder. The emery stand is arranged with a friction clutch. We think this is handier and more economical, than to have a jack shaft and it is much easier to keep in repair. Friction clutches are not very expensive and are very easily thrown in and out of gear by simply pulling the lever. Our disc sharpner is a Monarch which though an inexpensive machine, does the work very satisfactorily. The

cold roller disc sharpeners are highly praised, that they do the work with good satisfaction, etc., but there is not enough of this class of work in this country to justify putting the extra money in a cold roller. Our board-saw we consider ot be one of the most useful machines in the shop. It certainly saves time and the hard work. We use the buzz saw for straight ripping, this does the work in a hurry and much easier than by hand. The planer head comes handy for anything that requires touching up, such as wagon reaches, in fact anything with straight surface. We have a Buffalo portable tire shrinker which we find a handy tool. In this county we have heavy wide tires to shrink and with the portable shrinker you can shrink the tires right at the fire doing away with the necessity of carrying the tire to the shrinker that is fastened to the wall somewhere in the shop. The portable

shrinker saves us lots of time and hard work. This shrinker may be used to upset anything straight such as axles, etc".

"The power hammer, located between the two double forges, places it in the most convenient place in the shop; handy to all four fires and facing west makes it a little handier to fire No. 3, which is the plow fire. This fire has a Thompson extension fire pot. This is a good idea for plow work. You are thus able to secure long heats on plow shares or in fact on most anything requiring such. The convenience of the extension tuyere may be shown here when I say that I have known my plow man to dress the point of 14-inch lays, then take a long heat and finishing same sharpen the share in two heats; this time saving is what counts when you are busy.

"The power blower is over head and has a capacity for four fires.



INTERIOR OF MR. ABTS SHOP, THE SHOEING AND AUTOMOBILE FLOORS



The down pipe is five inches in diameter. The distributing system is under the floor and branches to the four fires which are equipped with the necessary levers to open and close the blast gates as required to regulate fires.

"We have three solid box vises and seldom have to wait for any one of the helpers to get through with a job at a vise. Of another wishes to use a vise we usually find one on hand ready to be used.

"Each fire is equipped with a set of hammers (of these in all we have 30), tongs, punches, chisels, etc. We try to keep our punches of regular shape in their own respective place

never accumulates but is always used up. When we find stock getting low or used up, we put it down in the 'Want Book' and when we wish to order we know just what is needed.

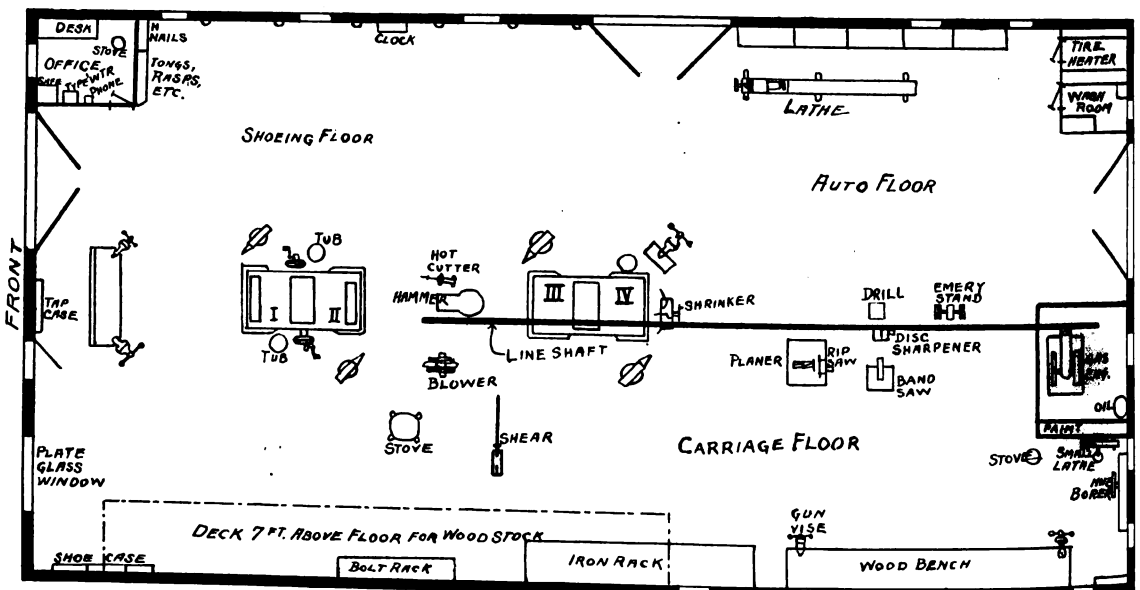
"The tire heater inside the shop is a very convenient means of handling this work. No matter what the weather is outside, you are always prepared to set tires and this is easily worth what is asked because of the convenience.

"Our wash room helps us to keep clean and respectable. When you go home to dinner it is not necessary to show your neighbors that you are the chap who put the black in blacksmith. A wash-up before you go out

Wagon bolsters	3.20
Wagon poles	4.50
Wagon Spokes .....	.25
Wagon felloes .....	.30
Cut down wagon narrow tire	12.00
Wagon sand boards.....	3.25
Wagon hind hounds.....	2.00
Wagon front hounds.....	1.50
Welding sickles.....	.75

There are several lessons to be learned from Mr. Abts' shop, his prices and the description of his establishment; study the floor plan of his shop, and note the efficient layout and arrangement. Mr. Abts' entire idea seems to be efficiency, thoroughness, and ease of operation.

As Mr. Abts says: "The old scrap



FLOOR PLAN OF MR. ABTS SHOP SHOWING THE EFFICIENT ARRANGEMENT OF MACHINES AND ALL EQUIPMENT

in the rack, so that when a punch of a certain size is wanted one can immediately put his hand on it, and it is ready for use. I have found that keeping several punches of the same size on hand in one rack any old place you can seldom find what you want for special punches, chisels, etc. We have a rack on the north wall of the shop which we use for reserving punches, key drifts, etc. We absolutely refuse to let any scrap iron accumulate in piles on the floor anywhere. We keep the short pieces of flat and round bars in the rack where the long bars are kept. Then if a short piece of iron is desired, you need not finger around in a pile for it, but when you have it in sight you can put your hand on it in a moment. That not only saves time, but it saves expensive material as well. Scrap handled in this way

of the shop is good for mind, body, soul and trade.

"Oils the paints are stored in the engine room".

Some of the prices charged by Mr. Abts are as follows:

New shoes up to No. 5, each..	\$.50
New shoes—5-6-7, each.....	.62 1/2
Calking and setting old, each..	.40
Trimming feet—all around.....	.25 to .40
Bar plates .....	.75
Bar shoes calked.....	1.00
Setting wagon tire.....	.75 to 1.25
Buggy tires.....	.75
New solid stubble lays.....	3.50 to 4.00
New solid alfalfa lays.....	4.50 to 5.00
Pointing and sharpening....	1.00
Sharpening only from.....	.25 to .35
Pointing cultivator shovels..	.50
Welding auto spring, 1st leaf..	1.00
Each leaf thereafter.....	.50
Labor on autos, etc., from....	.75 up.
Wagon axles	5.00

pile blacksmith shop is passing. Let's not be the last fellow to clean up. Plenty of good tools in their places when not in actual use, a clean floor and fair treatment of your customers are some of the essentials toward success. We are going to be more progressive and get all we can out of the business by putting more into it".

And again Mr. Abts says: "As a rule it pays to do a thing right and to that rule the smithing business is no exception".

Is there any wonder or surprise at Mr. Abts' success in the smithing business? Do you find in this story of his shop, his equipment and his sayings anything that tells you the reason for his having effectively chloroformed the business-going-to-the-dogs bugaboo?

And as a final business hint Mr.



Abts says: "We don't let anything get away except the fellow who won't pay".

Two Answers to the Forge Fuel Problem

G. D. CBAIN, JR.

Earliest recollections of most of the men who work at forges day by day, as well as of the master smiths themselves, are of the task to which they were put every morning, that of charring the coal to be used for

tainly owes it to himself to inquire into what the market has for him before he decides against improvements in this direction. It isn't necessary to point out to the experienced blacksmith that there is more involved in the proposition of the right coal to use than the mere gain in the expedition with which he can work his irons. He knows as well as anybody that though he may turn out a piece of work that looks all right, if the conditions under which it was performed were not as they

are lost, making a double loss for the proprietor, a loss in time and a loss in heat contents of the fuel. Even with the highly efficient new equipment available this manner of preparing fuel is not what it ought to be. Besides the loss, there is the soot and the smoke and the gas which escape into the shop and these probably are what put the "black" in blacksmith.

There are various highly approved fuels for smithing purposes. The coal men all have



THIS SHOWS THE CARRIAGE SIDE OF THE SHOP WITH THE STORAGE DECK, STOCK RACKS AND BOLT CABINET

the rest of the day on the forge. In thousands and thousands of the shops of the country, the blacksmith's helpers are still doing the very same thing, in much the same way as was done a generation ago, and, as can be established, using often the very same equipment that was in use in the same shop thirty or forty years ago. No one will claim that this is progress; no one will contend that the smith who is willing to follow outworn methods and use antiquated machinery is abreast of the times.

And in this day when there are high grade and efficient smithing fuels available, the smith who doesn't use them, and who sticks to old methods of preparing his fuel, cer-

should have been, the permanency of that piece is not to be depended on. The kind of fuel used plays an important part in making these conditions good or in making them unfavorable to good and lasting work.

It is not that the time-honored method of charring coal for the forge does not produce a fuel that gives the very best results. It does, and the coal so charred is most excellent to work with for the purposes of the general shop; it gives the smith the character of fire he wants and it responds to any means for creating the blast that happens to be at hand. But it is a time-consuming proposition, and it means, further, that all the gases and carbon that go up the flue while the charring process is on

particular brands for the made, and there are several brands which are known and thoroughly approved all over the country. Some of the smokeless and highly efficient smithing coals which are to be found in mining sections in numerous parts of the country are well worthy of the high reputation which has been given them in long usage. The trade knows these coals and has reached its estimate after much handling of them. Those who operate the forges have learned exactly how wet they should be kept, whether they need soaking to get the sulphur out, whether they have to be charred a little in addition, how fast to run the blowers or how hard to pump the bellows, according as to whether



they want a quick heat or a slow heat.

But there are other things than these coals. One of them is crushed coke, when that material, of the right consistency, is available. In a certain



MR. JOHN W. LAWSON'S WASHINGTON STATE SMITHY

Middle Western city is a wagon-maker who after many years of experiments has settled definitely on coke as the best fuel. Just at present he is looking for a coke that will take the place of a coke he had used for nearly twenty years, but which he can get no longer because the gas-manufacturing plant which produced it has been superseded by natural gas. Just now he is using another crushed coke, mixed in proportions of half and half with a popular smithing coal in his section, finding the coke that is available too hard for satisfactory use.

"When I opened up my shop here about twenty years ago", said this wagon builder, "I used the same coal that everybody else was using. I had been accustomed to it, and had thought nothing else would do the work. I prospered and found that I was going to need more room. I put in a steam engine to operate some of the woodworking machines, and then one of the men suggested that I throw out the old bellows and put in blower fans operated by steam. The forge room was crowded, and at length I did that very thing. That one improvement enabled the shop to get out work more quickly than anything I had ever done. At the same time there was considerable complaint from the wagon shop, which was overhead, about the gas fumes which came up from below and from the smoke, which the men did not like.

"The answer was coke. I found that right in my own town. The gas company, which was using a high-grade coal, was making a coke that I liked the looks of. It was clean and rich, and the screenings were cheap and with the power blower there was no trouble in getting the fire. There was no gas at all, not a trace of sulphur, not a puff of smoke, and this coke formed almost no clinkers.

The best of all, however, was the fact that we got a hot fire just when we wanted it, with none of the effort that otherwise we would have had to make. Work that used to take hours was reduced to fractions of the original time. The blacksmiths could put all their time in working the iron, finding that heating required a much shorter time.

"I believe that use of this fuel with the power blower saved me the wages of one smith and the cost of a new forge during the fifteen years or more that I used coke. At first the other men in the city were inclined to question my change over to coke, but before I had been using it very long all the other big shops in the city which were able to put in power blowers followed suit. Then came electric motor-driven blowers, with sufficient power for all purposes; the house that came around with them first did a good business, and the trade took to coke like a duck to water. Then the gas house coke makers sold out to the combine, the combine piped natural gas to the city and the coking plant was closed down. Now we are all looking for

the journeymen working for me know anything but coke, and when they leave me they have become so strong for coke that they will go almost anywhere to work if they can have coke to work with, rather than go back to the old plan of charring their own coal. The freedom from gas, from smoke, from any difficulty as a result of sulphur and the quick results that can be had from coke as a fuel make a world of difference to them. I would advise blacksmiths located where they can get gas house coke of a character that will meet their requirements, to put in a power-blower where they haven't already got it, and to take to coke for their work. It will more than pay them and they wouldn't have to wait very long to get their money back".

This same smith pointed out that the half and half proposition is better than the ordinary coals, charred on the smith's own forge, though he argued very strongly in favor of selected smithing coals. In any case he contended that a power-blower is the best investment of many that the smith can make, where electric service is available. Even if he still



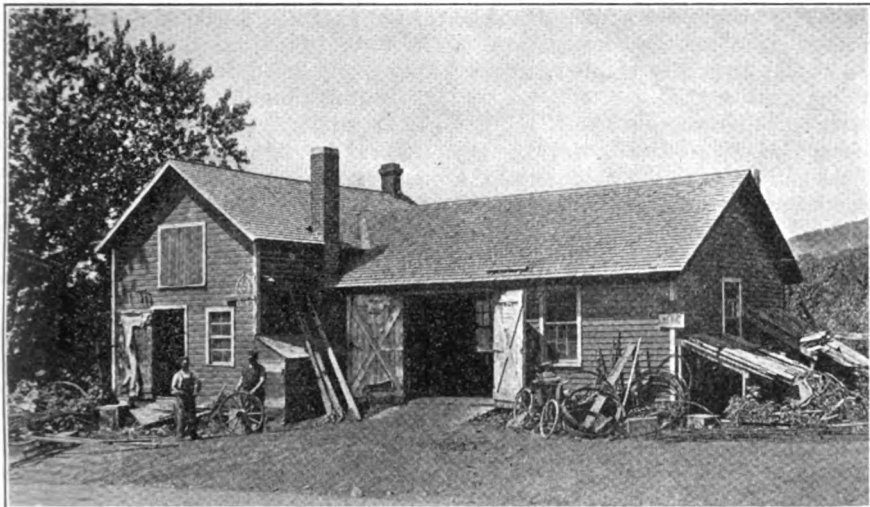
MR. G. BISH AND HIS WORKING FORCE BEFORE THEIR FIJI ISLAND SMITHY. MR. BISH IS STANDING FOURTH FROM THE RIGHT WHILE MR. MORRISON, CLERK, STANDS NEXT TO HIM

some more coke like that, but have not found it. We have discovered, however, in our shop, that the softest coke we can find, mixed half and half with a well-known, screened coal, gives us the nearest approximate return to the same results that we got from coke.

"But there is nothing in the old-fashioned way of handling the fuel proposition. I have finished with charring coal so long that none of

practices the old plan of charring his own coal, which is nothing more than making his own coke, the blower will expedite that process and leave the smith and his helper free to turn their attention to other things.

But the proper kind of fuel is one of the vital questions the blacksmith has to solve. All the points of this proposition work out in favor of a smithing coal or coke, carefully selected and carefully treated. If the



A TYPICAL COUNTRY SMITHY WHERE ALL KINDS OF SMITH WORK IS DONE

mill and who have tried all manner of means for heating the irons they work. They both hold to the use of specially prepared smithing fuels, one believing that coke, with its particular advantages serving his purpose better, and the other believing that a high-grade smithing coal is the best from the standpoint of the general shop owner. Both agree that the blower, power-driven, is worth more than it costs, and that equipment of this character strengthens the arm of the smith. One has proved his belief by the success that has attended him; the other by his choice from among all manner of fuels of the one that best suits his purpose.

Keeping Accounts in a Small Shop

H. N. POPE

As the shop of any size will have its regular bookkeeper and system of keeping accounts there is not much to say to such a shop. It is the smaller shop where the man who works also keeps the accounts. The first point I wish to urge is a system of keeping a cash account, one that is strictly adhered to. If one goes out to buy stock and perhaps add a little pleasure to the trip, all money expended should be charged up. If this is not done there is no chance for the accounts to balance correctly. I do not mean that every article one buys must be charged up as so much paid for this or that article. One may place the expense under different heads, such as shop, house and personal expense with a page for any unusual outlay. If this done and strictly carried out, there should be no trouble in making a balance and

smith wants a slow fire, he may be able to get results that suit him best from coal alone. If he want a fast fire and a hot one he can still use it and speed the blower up a peg further.

The angle a smith working in the private shop of one of the large retail coal concerns in the Middle West has got on the coal question ought to be interesting to the trade. He is located in the center of the coal yards, and when he wants fuel, all he has to do is to go out and get it. He has access to virtually any kind of coal he wants, several brands of crushed coke, screenings and smithing coals being his merely for going after them. And he has tried them all, time after time, and has selected a smithing coal which the company is offering to the trade—the same coal incidentally that the wagon shop master makes use of.

“It has scarcely any sulphur, makes little smoke and burns with a very small amount of ash and clinkers”, he said. “I moisten it with a few cans of water when I put a fresh supply on the bed of the forge, and it is already to be raked right on the fire. I never have moved my blower lever past the second notch, and I get as quick a fire as I ever want, and a fire that is free of sulphur as any I have ever worked with.

“The company sells a great deal of this coal to the smiths here and they all seem to like it and I cannot see why the country trade still continues to order the same old coal that they used when I was a boy. I don't like coke for a general purpose shop. It may be all right in a big wagon-working establishment, but I don't need a blast furnace here. I will give a tip to those blacksmiths who use

the old-style coal, and that is if they will soak it in water before putting it on their forges they will get rid of most of the sulphur it contains”.

But he insisted that for convenience, for expedition, for freedom from sulphur and smoke, a well selected smithing coal, clean and of high heat efficiency, has everything else crowded off the boards. It means freedom from clinkers and freedom from sulphur, which in the old style way of handling the fuel proposition made any amount of trouble for the trade; it means that the work that looks good is surer of being good than when the forge-charred fuel is used, and it means that instead of buying a fuel most of which goes up the chimney in the form of gases and smoke, the smith is buying what he will get returns from and buying a fuel that is all fuel.

Here is the testimony of two smiths who have been through the



MR. A. E. HAIDY'S KANSAS SHOP IS FULLY EQUIPPED WITH POWER TOOLS AND AN OXY-ACETYLENE MACHINE



there must be just as much care taken in putting down each cent or dollar as there is in taking in money. One leak in accounting, and it is no small one at that, is forgetting to put down cash when received. The smith is busy, some one hands him a sum of money and he slips it into his pocket and thinks no more of it. When night comes and he tries to square accounts, there is some money he cannot tell for the life of him who gave it to him or for what it was. It is a good plan to have a pad or small book handy and to stop work long enough to mark plainly the amount and what it was for and whether received or expended. There is another point and a good one to remember, that is, always in paying a bill ask for and be sure you get a receipt. Have a file and put the bills on it where they will be safe and easy to get at, as the holding of a receipt often saves one many dollars and lots of trouble. Another good thing to look after is collecting; no matter how good a workman a smith is or how much work he has, if he does not look after collections he will surely get into a hole.

Practical Shop Hints for the Practical Shop Man

H. J. BROWN

Here are some practical hints gathered at various times and places through an experience of some years at the craft. These hints include some for the woodworker as well as the metal worker and seem especially appropriate for the shop number.

It is often necessary to lock a wood screw into place after it has been "driven home" and an easy way is to drive a little staple over the head of the screw in such a way so that the top of the staple will enter the slot of the screw when it is driven tight.

In the case of a wood bolt with a square head, staples can be driven over two opposite corners of the bolt head, or even driven down alongside two of the flat faces, will keep the bolt from turning.

A simple stunt for holding work on the drill-press table when the work persists in slipping and sliding about in spite of clamps and holders, is to place a piece of emery cloth or paper between the work and the table. This will enable you to hold the work steady.

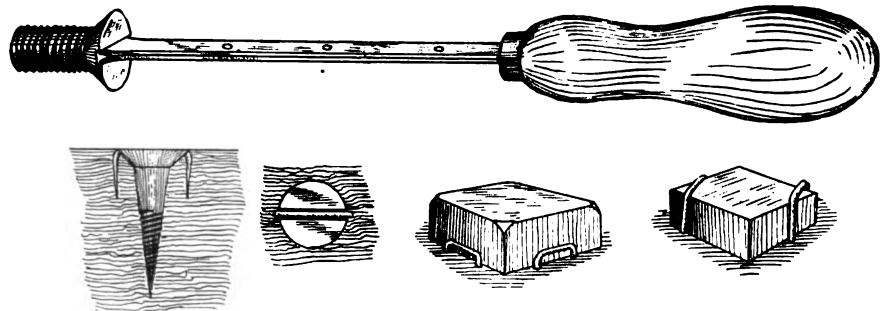
When cutting thin tubing or when working on it in anyway where it is necessary to hold it in a vise, you will be able to hold it more firmly and without injury if you will insert a steel rod in the tube at the point

where the vise jaws grasp it. The average shop usually has rods of a size to fit into the smaller, frailer tubing.

An excellent labor and temper saving tool is one the writer saw an Ohio smith use in assembling a machine that has been brought in for repairs. There were a considerable number of screws to be run into holes that were all but inaccessible. While wondering how the smith was going to get these screws into their places, the smith took up a little device made of two pieces of clock spring rivetted together as shown in the engraving. The springs were wedged into a handle and the free

An excellent safety first precaution to follow on the emery wheels generally used in the smith shop is to mount them between rubber washers, so that a piece of rubber is placed between each flange and the emery wheel. This precaution will prevent the pieces from flying, should the wheel break in operation. It is, of course, not so effective a preventative on large wheels as on the smaller ones.

A clever stunt recently witnessed by the writer was the straightening of a bent shaft by a middle Western Jack-of-all-Trades. The shaft had become bent in an accident that happened in the mill in the morning and



PRACTICAL SHOP HINTS FOR THE PRACTICAL SHOP MAN

ends bent at quite a sharp angle away from each other. By means of this simple device the smith started his screws in all manner of inaccessible places and then turned them home with a long handled screw driver. For a long tool of this kind a thin flat piece of stiff rod will perhaps be necessary to give the tool the necessary rigidity.

Here is a suggestion for the man who has only an occasional job of painting to do and is troubled with his brushes drying out hard and stiff between jobs. When finished with painting don't wipe the brush out as usual but leave a fairly good quantity of paint in this bristles. Then take several sheets of paper, newspaper will do, and wrap the brush carefully in the paper, tying it and lay the brush on its side on a shelf. The next time you want to use it, you will find it soft and in good shape.

While on the subject of paint and painting it may be well to give a simple paint-removing stunt that will come in handy to every smith at some time. Take a cupful of common washing soda and dissolve it in a quart of warm water. When dissolved take a stiff brush and scrub the paint you want removed with this solution. When paint has been removed, rinse the cleaned surface with clear water and allow to dry thoroughly before repainting.

in trying to get things into running order as quickly as possible friend Jack-of-all-Trades worked tooth and nail. The accident hadn't broken up machinery as much as it had knocked things around, so friend Jack with the help of the mill men soon had things in fairly good shape. But when they attempted to operate, a long shaft was found with a slight but decided bend in it. So Jack took it down with the help of several mill men and had it out in the mill yard in short order. Then he carried his forge out into the yard and with the shaft raised to the height of the forge he heated the shaft carefully at the bend. After heating he removed the forge, rolled the shaft over on the horses supporting it until the bend or bowed part was up. He then poured water on the heated part cooling the upper side first, thus causing it to contract and to stretch the lower side until the shaft was reasonably straight. The shaft was tested for straightness with a long straight edge and when fought right the entire heated part was quickly cooled with water.

Reaping a Reward From the Old Scrap Heap

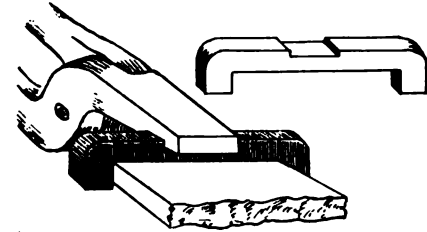
H. WINSLOW FEGLEY.

Farmers crowd the blacksmith shops in the rural districts on rainy days. This keeps the blacksmith



busy, but what about the blacksmith, while the farmer is making hay when the sun shines?

That question has not puzzled Amandus Moyer, a blacksmith, as well as a farmer in the Oley valley, Berks county, Pennsylvania, who



A SUGGESTION FOR HANDLING WIDE FLAT STOCK WITH AN ORDINARY TONGS

keeps himself busy whether the sun shines or if it rains. He is a young man who does not chase the gold in rainbows, because he believes that persons can pick up diamonds right at their own homes, if they feel like hunting for them. He is picking diamonds and gems, commercial ones at least, from scrap heaps and by adding two and two together, he has done some wonderful work.

He has a large scrap heap of his own, and while not so many horse-shoes get on top of this heap, he begins to get parts of automobiles and gasoline engines on it. The other day, a farmer brought part of an old mowing machine to his place and when he had removed several parts to be used on another machine, the rest of the refuse was sheltered on his heap. Nearby, a farmer had abandoned a four and one-half horse-power gasoline engine. He got this engine for the asking.

So when his neighbors were busy planting corn, he began to assemble the wheels of the mower to the gasoline engine. He spent a day at the task, and besides the value of this labor and about 27 cents worth of bolts and screws, he completed a farm-tractor.

Probably this tractor would not bring a fancy price, if competitors come along with up-to-date tractors, but for his own use on his own farm that he conducts in connection with his little blacksmith shop, it answers the purpose. The drive of the tractor is by a belt arrangement attached to the gearing at the rear axle. The steering arrangement is by a chain and sprocket system. There is also a clutch that responds whenever demanded to do so. Mr. Moyer uses the tractor to haul a farm wagon loaded with manure, lumber or whatever the occasion may demand. The wagon, he gears to the rear of

the tractor. He also uses it for other purposes, wherever his fields are not too highly elevated.

He has his own automobile and being a master mechanic he does his own repairs, and whenever his neighbors get into trouble with their steering gears or otherwise with their engines, Moyer seems to be the "resurrection" man of the community. In this way, he keeps his smithy busy, and does not care whether there are less horses in the community to shoe or not. He is sure that automobile repairing does not endanger limbs; because, he says, they can't kick like the unruly horse.

Fire Insurance and Gasoline

E. J. BUCKLEY.

Insurance, particularly fire insurance, is a subject which probably touches more business men closely than any other. I have written more at length on various phases of the law of insurance than upon any other topic, and shall continue to do so whenever a phase of the subject arises which has not been fully covered.

I have before me now an Appeal Court's decision in a case which involves the enforcement of a clause that appears in practically every fire insurance policy now in existence in this country. All companies have uniformly used it for years. I refer to the clause making the policy void if gasoline, illuminating oil or gunpowder are kept upon the insured premises.

but almost all insurance companies attempt to enforce it in arbitrary and oppressive ways. The case before me illustrates one of these. Happily the company was defeated and the holder of the policy got his insurance money. Nevertheless the case supplies another illustration of the need I have so often urged—of knowing thoroughly the requirements of your fire insurance policy and carefully following them.

In the case referred to the insured conducted a large general store, and both stock and building were insured under a policy which contained the "gasoline, illuminating oil or gunpowder" clause. The building was completely destroyed by fire, and the insurance company refused to pay the insurance money on the ground that the storekeeper had for a time kept gasoline upon his premises, thereby invalidating the policy under the clause which provided that the policy should be void if gasoline were kept. There ensued prolonged litigation, but in the end the Appeal Court gave the decision to the storekeeper, on the ground that while the policy did say that it should be void in case gasoline was kept upon the premises, the fairer interpretation was that the policy should merely be suspended while gasoline was being kept. When the storekeeper ceased to keep it on the premises—the evidence was that he had not had it as a part of his stock for two years before the fire—the policy was automatically revived, particularly as premiums were regularly paid, and at the time of the fire it was in full force. There was also ample evidence that the fire was not started by gasoline.

Obviously this is the only sane view. It would be absurd and outrageous to forfeit a policy long after gasoline ceased to be



FARM TRACTOR MADE FROM SCRAP HEAP SUPPLIES BY MR. AMANDUS MOYER

There is a perfectly good reason for including this provision in a fire insurance policy, for obviously the man who keeps such things upon his premises increases the risk of fire, and if fire occurs by reason of them, it occurred because of his own carelessness and he should not be able to recover damages from the company.

The provision itself is unobjectionable,

kept on the premises, and when the fire was not caused by gasoline. Nevertheless, the insurance companies have invariably contended that that was the proper interpretation of the policy, and there are quite a few cases that have upheld them in it. The decided weight of authority, however, is the other way.

This decision rested in some degree up-



on the fact that gasoline was a customary part of a general merchant's stock. Nevertheless the ruling would likely have been the same if it had not been, provided it was kept for some small legitimate use, such as fuel for motor delivery wagons, was not stored on the premises at the time of the fire, and did not cause the fire or contribute to it. The court on this point said:

"The policy was not absolutely forfeited by keeping the prohibited articles on the premises, even if they had not been a part of the stock of merchandise in the store, in which event another rule would apply, but the policy at most was only suspended during the time the prohibited articles were so kept, and was revived by the discontinuance of the prohibited uses and by what subsequently occurred between the contracting parties. * * * The weight of authority is to the effect that the use of an article prohibited by the printed clauses of the policy will not void it if the prohibited article is a customary component part of the goods insured, or is in customary use in carrying on the trade or business conducted in the insured building. * * * If the prohibited articles were employed by the assured (the storekeeper) in the conduct of a particular business, and the use of such articles is a necessary incident to the conduct of such a business, the parties will be presumed to have contracted with reference thereto, and at the time the insurance policy was issued, the company will be presumed to have had in contemplation the use of such articles by assured (storekeeper) when it assumed the risk, and under such circumstances will be presumed to have waived the condition under which the use of such articles would render the policy void."

In this case the gasoline which was claimed to be in violation of the policy had not been kept on the premises for some time before the fire. In case gasoline was on the premises at the time of the fire, the question would be, how was it there. If as a part of a stock in trade, or for domestic use, such as cleaning, or possibly—in small quantities—as fuel for motor vehicles used regularly in connection

with the business, it is probable that no court would hold the policy void, particularly if the fire came from other causes. If, however, the insurance company can show that gasoline, kerosene, or any other prohibited article was kept on the premises in a way clearly prohibited by the policy, the fact that it did not cause the fire would make no difference—the policy would still be void.

This shows the importance of the subject. Almost every business man keeps gasoline or kerosene, especially the former, about his premises to-day, in spite of a positive prohibition against it in his fire insurance policy, which in most cases has probably not been waived by the company. What a dangerous situation for men whose fire insurance is often their sole protection!

Sometimes, if a fire occurs, it is possible to slip through without avoiding the policy by invoking one of the excuses which I have been discussing. But this is always risky and many times unsuccessful. Take this as a good general rule for this and all other similar situations: Where you are doing something which even seems to conflict with your policy, go to the insurance company at once, explain it thoroughly and get them to give you a rider allowing you to continue what you are doing—provided they are willing you should continue. If they are unwilling, you had better know it now rather than after a fire.

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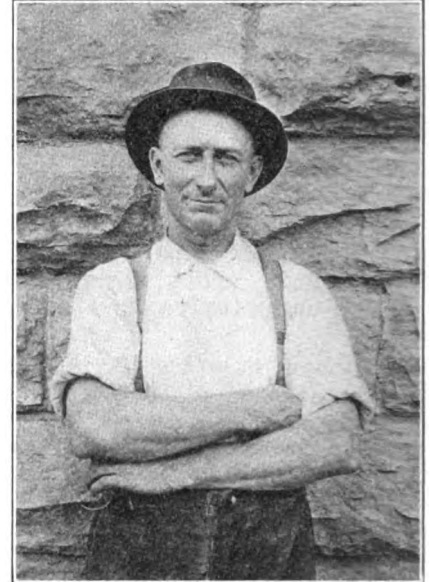
Hon. Joseph Carswell, Blacksmith and Mayor

JOE F. SULLIVAN

Longfellow immortalized the blacksmith in poetry, and Heber Springs, one of the fast growing little cities in the great state of Arkansas, has distinguished and honored him in politics, and if Hon. Joe Carswell succeeds in his reforms and his business administration as

Mayor of Heber Springs, immortality of the kind that comes to public benefactors will be his also.

A few years ago Texas woke up and elected as governor a blacksmith—and strange to say, Texas has been



HON. JOE CARSWELL, BLACKSMITH
AND MAYOR

on the climb ever since. Now Heber Springs, Arkansas, has wakened up and elected as Chief Executive a wellknown blacksmith—and consequently the people have already seen the coming of the dawn of municipal utopia; for Mayor Carswell is determined to give the citizens of the city those necessary public utilities that go to make up an ideal town and he has begun on his course, although he has been in office only a few weeks. He realizes that he must "make good" as Mayor or he will likely fall short of his desired goal as the next representative of Cleburne county in the general assembly, which position he will seek at the county election next March.

Heber Springs is not the only town in the nation that has seen fit to trust its affairs in the hands of a horseshoer, but the trust on her part was unanimous, as Mayor Carswell had no opponent. He went into office without opposition and under obligation to no particular clique. The "boot-leggers" and "blind tigers" have begun to realize this, as the new "City Boss" is putting them out on every side, regardless of persons or places. Active work toward securing water-works and sewers, which four other mayors failed to get for various causes, is now under way and his honor assures the public that the installation will come soon.

He tries his cases in the blacksmith



THE MONTANA GENERAL SHOP OF MR. T. B. TAYLOR



shop, nearby which stand the county jail to receive his prisoners, and signs legal documents while his iron is being heated to a "white heat" ready for the hammer and anvil. In short, no one can truthfully say anything else other than he is Mayor.

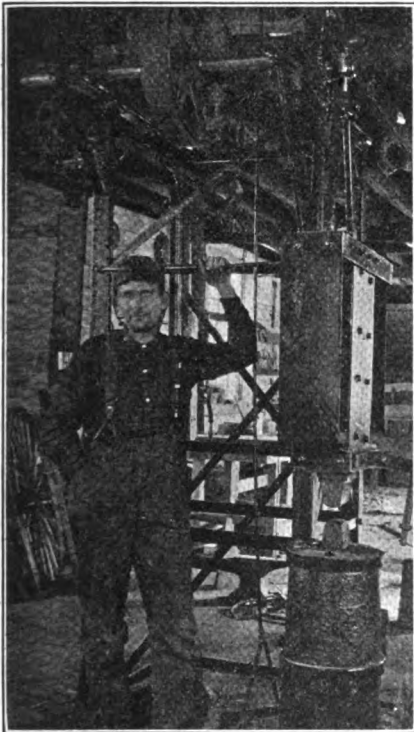
Joe Carswell is 45 years old and was born in Rome, Ga. He is a Democrat and is the father of three children.

Thoughts on Timely Topics

By THORNTON

Caustic Censure and Cheery Comment

SAUSAGE CASINGS FROM WOOD pulp are now all the rage, we understand. At least their announcement as an actuality has created a rage within our midst. Here the experts have now attacked a most noble and time-honored institution—the Sausage—that mysterious peak of the gastronomical heights made up of a conglomerate mass and collection of ingredients of secretive and mysterious origin, and which resultant product is backed by a guarantee to appease the most ravenous appetite and to assuage the gnawings of the most robust stomach—not to even mention the sweet deliciousness and tooth-



THE SHOP MADE POWER HAMMER OF A MISSOURI SMITH.—MR. B. F. TALLEY

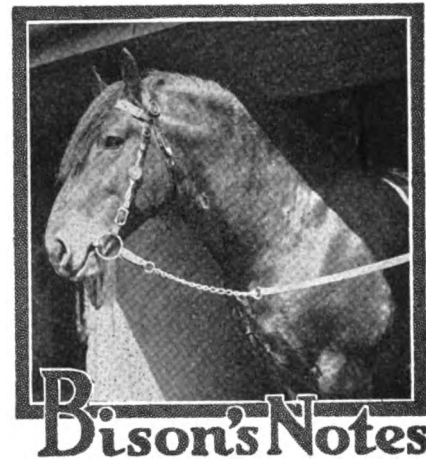
someness of the aristocratic breakfast pork mixture to gentlemen of more fastidious tastes. This flank movement of the wood-pulp interests will of course sound the doom, knell and destiny of the "hot dog" and

his caninely and porkly brothers. At least it will for us—for much as we hate to do it, we will be compelled to forego our uncontrollable liking for the country pork mixture. Yes, and sad as this fate may be, we'll naturally be compelled to "pass up" the breakfast porker's platter companion—the innocent buckwheat cake. For, as the mother is to the home, as cranberry sauce to the turkey, so is the luscious pork sausage necessary to the daily morning enjoyment of a sky-scraping stack of the rib-filling buckwheats.

But to resume—we've decided to let our appetite for sissage, wurst, dogs, frankfurters, etc., go by the board. This decision has not been hastily reached, by any means. We decided on this course only after a sad and earnest contemplation of the arduous task of ripping our way through several cords of scrub oak or second-growth hickory. And we have in consequence reluctantly surrendered to fate—we bow to progress. Ever and anon have we argued against a cruel and unjust industry that has caused our luscious morning breakfast of "bacon and —" to be transformed into a back-to-nature repast on saw-mill refuse afloat on a soup-plate of pale milk surrounded entirely by fruit and pictured by ambitious advertisers in seven colors. But to this pictured insult to the normally healthy stomach is now added injury in the shape of luscious country corn-fed pork encased in an Armour-plate of birds-eye maple or hard-shell walnut. It hits the robust man with a normal appetite in a vulnerable spot and it is only natural that a serious means of retaliation should entertain our mind.

SALESMEN, SOME SMITHS THINK, are a necessary evil—something like mumps and chicken pox in children. At least that was the old idea. Our grandmothers never thought a child was quite properly equipped for this life until it had gone through the rigors of mumps and chicken pox. And some smiths still think that the salesman, drummer, agent or whatever you want to call the road representatives of iron-store and manufacturer, are a necessary evil. Of course, there are salesmen and salesmen, but just because some are a bit off color, so to speak, is no reason for giving the whole fraternity the sign of the bouncer the minute one member comes into the shop. There are about as many varieties to the genus salesman as there are to pickles. Some of them are a real pleasure to meet and to do business with, while it surprises me at times

how some can continue to bluff their way along. Then again there is the chap who knows when you mean "no" and his brother who is just the opposite who is about as easily put off as a wet sock. But, remember, the salesman is the blacksmith's best friend if the smith will treat him right. He is the smithshop owner's wireless connection with the jobber and manufacturer. Without that connection the smith would be running a dead station—there would be no spark. The salesman can be a big help to you if you will let him. And you'll find the majority of him full of real human blood that flows from a heart that is placed right and working overtime.



There is one reason which the managers of trotting and pacing race meetings overlook for the seeming lack of interest which the general public shows in harness racing affairs as compared with the interest shown twenty or thirty years ago, and that is to be found in the failure to provide classes for the trotters and pacers that take sensationally fast records. In other words, just when a performer becomes famous enough to have his name well known throughout the country and to have his performances talked about in every town and hamlet, he is forced to retire because none of the associations make any provision for such horses when making up their speed programs. When Goldsmith Maid, Lady Thorn and American Girl were the sensations of the trotting turf, their names were household words and the many races between them which extended over a long period were talked about in every corner of the country and whenever they met, they drew the people from every direction within a hundred miles of their meeting. At a later period, the public took just as deep an interest in the rivalry for the trotting crown between Maud S., Jay Eye See and St. Julien, their names being as well known generally throughout the country as were those of the leading men in public life. It was at about that period that the pacers first began to attract unusual interest, and the older generation will remember how deeply interested the whole country became in the contests waged in the grand circuit by the "big four" as Sleepy Tom, 2:12¼; Mattie Hunter,



2:12½; Rowdy Boy, 2:13¼ and Lucy, 2:14 were called. Later on the sensational contests between Hal Pointer, 2:04½; Mascot, 2:04; Flying Jib, 2:04 and Direct, 2:05½ were read about and talked about from one end of the country to the other, as were those memorable races between John R. Pentry, 2:00½; Joe Patchen, 2:01¼ and Robert J., 2:01½ were at a still later period. Nowadays there are comparatively few persons who know the names of the sensational trotters and pacers, for after one, or at most, two brief seasons a trotter or pacer reaches the apex of his fame and then, for lack of classes to give him any money earning power, he is retired and forgotten. The public had a reminder of what interest races between racing stars created last season when Directum I., 1:58; Frank Bogash, Jr., 1:59¼ and William, 2:00 paced in different combinations. It has been a long time since so much interest in harness racing has been manifested by that portion of the public that is not included among the

ones on the phenomenal order, then will the names of our fastest performers again become household words and again will the race meeting at which they appear draw the attendance of persons within a reasonable distance of such meetings.

In spite of the war which Russia is engaged in fast trotting stallions continue to be purchased for export to that country from breeders of the United States. During the last few weeks the Russians have bought six stallions with records below 2:10, five trotters and a pacer. These horses are among the best bred ones produced in this country, being as follows: Redlac, 2:07½, by Allerton, 2:09¼, dam by Muscovite, 2:18; Ormonde, 2:08¼, by Oratorio, 2:13, dam Paronella, by Parkville; Lord Brussels, 2:09¼, by Axworthy, 2:15¼, dam Lady Brussels, by Welton, 2:19¼; Del Coronado, 2:09½, by McKinney, 2:11¼, dam Johanna Treat, 2:19, by Thomas Rysdyk; Harry Dillon, 2:10, by Sidney Dillon, dam Adioo, by

Proportions of Eclipse". The champion trotter was measured a few weeks ago by a prominent New York veterinarian and the measurements were as follows: Height of withers from ground, 62¼ inches; depth of chest at withers, 32 inches; height of elbow from ground, 34 inches; height of knee from ground, 17 inches; height of croup from ground, 62 inches; height of body from ground at lowest point of back, 58 inches; depth of body at lowest point of back, 28 inches; length of body from point of shoulder to extremity of buttock, 66 inches; height of hock from ground, 20 inches; distance from stifle to hock, 22 inches; distance from withers to hock, 63 inches; length of head, 26 inches.

While Uhlan, like Eclipse, is several inches longer than he is tall, those two noted runners of the present period of dash racing, Ormonde and St. Simon, are exactly the reverse. Ormonde was two inches taller than Uhlan and four and one-half inches shorter in body, while St. Simon, taller than Uhlan by an inch, was six and one-half inches shorter in body. In depth of chest, from withers to the brisket, Uhlan exceeds Ormonde by three inches and St. Simon by four and three-quarters inches. The greatest difference between Uhlan and the two great thoroughbreds, however, is found in the elevation of the brisket from the ground, largely represented by the length of leg. Here St. Simon measures 36 inches of the ground, Ormonde 35¼ and Uhlan only 30¼ inches. If harness racing is allowed to degenerate into dash racing, as has been the case on the running turf, it is evident that the physical proportions of the trotter will be marked by the same change that has made such a startling difference between the modern thoroughbred and that of the thoroughbred represented by Eclipse when runners were required to go four-mile heat races.

The first trotters to take a record as fast as 2:10 appeared in 1884 when Jay Eye See trotted in 2:10, and one day later, Maud S. trotted in 2:09¼, a record she later lowered to 2:08¼. Each of those two trotters was out of a daughter of Pilot Jr., son of the Canadian stallion, Pacing Pilot, breeding unknown. Pilot, Jr., died in 1865 and what a factor his blood has been in the production of trotting speed will be realized best when it is stated that considerably more than 60 per cent. of all the 2:10 trotters carry one or more crosses of his blood and its breeding-on capacity is amply attested by the fact that only 11 of the 71 trotters that entered the 2:10 list in 1914 failed to have a dash of the blood of this son of an unknown pacing sire, whose death occurred 50 years ago. Of the 60 new 2:10 trotters of 1914 that carried the blood of Pilot Jr., 23 had two crosses of his blood, 11 had three crosses, six had four crosses and two had five crosses of it. The ten members of that list that took records below 2:07, all have one or more crosses of Pilot Jr.'s blood with just one exception. The two carrying five crosses of Pilot Jr.'s blood are Allie Bingen, 2:09¼, a young mare that had but just beaten 2:30 previous to 1914 and Trumpright, 2:09¼, a three-year-old colt with no previous racing experience. In the light of what these statistics show, there must have been some wonderfully prepotent quality handed down to Pilot Jr. from his unknown pacing sire that possibly might be explained if it had been possible to discover his ancestral blood elements.



THIS PROSPEROUS LOOKING MASSACHUSETTS SHOP IS RUN BY MR. A. I. BARTLETT

regular followers of that branch of sport. It is safe to say that if each of the sensational pacers now in training was in the hands of a different trainer and a series of races between them could be arranged, that before they had met more than two or three times new attendance records would be set for this decade at pretty nearly every point at which they would race. It would pay the managers of the big meetings to bring about a series of meetings between the real racing cracks for the renewal of public interest which would follow such a course. No other branch of out of door sport possesses such potent possibilities in an advertising way as does harness racing and in no other branch of sport are the possibilities in that direction so utterly overlooked. Harness racing men complain that their branch of racing is not appreciated at its true worth by the public, but they make no move to secure for it the attention it deserves by methods which no other class of sport promoters would overlook. When they wake up to the fact that the surest and quickest way of re-establishing harness racing to its old-time popularity, is by taking advantage of the advertising value of the sensational trotters and pacers by keeping them before the public instead of forcing them into retirement just as soon as they show them-

Guy Wilkes, 2:15¼; and Donald McKay, 2:07¼, (pacer) by Gambetta Wilkes, 2:19¼, dam Leila, by C. F. Clay, 2:18. It is expected that these six stallions will sail from New York on June 8, for Russia, by way of England, Sweden and Norway. It was thought when the war broke out that the European demand for our trotters would cease until peace was declared. Russian and Austria had been the best customers for our trotters in Europe but, while the Austrian demand for them ceased at once, Russia, it seems, is still anxious to buy, for the same agent in this country who purchased the six above named, is reported as saying that he has orders for others which he has not yet been able to fill.

The famous runners of the present period, developed under the dash system of racing, are of far different proportions than were those of 150 years ago when the great runners were asked to go four-mile heat races, but, what is a notable coincidence in this respect, the champion trotter, Uhlan, 1:58, a product of a breed developed under the three-in-five heat racing system, is of geometrical proportions, corresponding very closely with those of the famous thoroughbred Eclipse, champion four-mile race horse of 150 years ago as given in Sanibel's elaborate "Essay on the



There's a Happy Medium

W. O. B.

Bill Billson is a first-class smith, his rep. for work is not a myth. At forging, welding and repair, his technique is beyond compare. His work at shoeing horses' feet has all the other shoers beat and with a job especially hard his meals he'll simply disregard. But while friend Bill wears ribbons blue for A-1 work at wheel and shoe, his training at his business book must some years since have got the hook. He never gives a thought to cost or what per cent of bills are lost. His records are on scraps and sheets that lay about the shop and streets, and so while Bill has work galore with lack of books he'll find the floor.

Jim Jimson is a system bug and on red tape grows fat and sung. He feeds on records night and day and figures on things in every way. He knows his costs per ounce of coal and what it costs to pare a sole, to fit a shoe and drive a nail, to rasp a foot or bob a tail. He keeps strict record of the work and what it costs for help to shirk until his home and office room look like a Hall of Record tomb. And so friend Jim just plugs along 'til now his business is all wrong. When patrons come with horse or rig they find friend Jim with a record big on how much coal and time and heat it took to fix the butcher's axe for meat, and while he figures forty ways he'll find his trade has numbered days. He'll wake and find he's no more biz. to record in those books of his.

Will Willson has a level head, can shoe a horse or cut a thread. He does his work with prompt despatch and while for Billson he's no match, his work is good and strong and neat and the wishes of his clients does meet. His business books are simple things to tell him what his business brings. He keeps strict tab on every job but does not let his books raise hob with business when a job comes in, for that Will says, would be a sin. So while poor, Billson, Jimson, Co., are making progress mighty slow, Will Willson gets the trade and coin and soon the millionaires will join.



Heats, Sparks, Welds

If time is money why do so many people waste it?

Pluck, Patience, Push and Persistence
Pretty near Procure Prosperity.

Of course you work hard, but if you don't get the profit you should get, what's the answer?

Keep the smile a-workin'—many a persistent light smile has outdistanced a heavy frown.

Competitor talking about you? Good—better put him on the pay role and tell him to keep up talking.

And now that she's within sight again we find that Miss Prosperity is the same good lookin' gal she always was.

"There's one thing that a business man can give liberally to his customers and still have plenty of it left 'says Thornton', and that is service".

What if the apprentice does occasionally prefer to swing a bat instead of the sledge. Remember all work and no play—but then too it's possible to overdo the play part.

A business expert says: "How can your business become a big business if it stands still? And how can you make your business grow if you do not study the trade papers for information?"

Every job you do at a loss consumes the profit on at least two profitable jobs. And jobs done at cost reduce the gain on profitable work fifty per cent. The doing of work at cost "simply to keep the men busy" simply keep the men busy at a loss.

What you think you know won't put a profit balance on your ledger nor put the money in the bank. You must know what you know and then be certain it is correct. If your books show a profit at the year's end that you cannot find in actual coin of the realm, something's wrong.

Have we received your replies to the questions asked in the May number? If not, turn right now to page 183 in the May issue and write, right now. We want to hear from you. Don't depend on the other fellow to do this. YOU are the reader we want to hear from if you haven't yet answered those questions.

Don't try to mould the boy as you do iron by pounding and beating. Remember the boy is a living, thinking, breathing animal. He needs careful handling, a kindly word and a steady guiding hand. Good smith work is a fine product of the shop, but good boys are a better product of both home and shop.

Are you selling any side lines? We want to hear how you do it. Tell us how you sell the things you handle on the side. Tell us just what arguments you use in selling a farmer customer a manure spreader or an incubator. What do you say to the autoist when you sell him a tire or a certain make of spark plug. We want to know—we want your story of side line sales.

Organization is a good thing. Its done wonders in all lines. But those wonders have not been brought about by dead or sleeping associations. Live, snappy, sizzling associations are the ones that are doing things. If your association simply meets regularly, talks things over and then goes back to sleep until the next meeting, wake it up. Get some life into it. Certainly there must be plenty to do.

Do you know steel better now? Haven't the recent articles on steel given you a better understanding of this particular metal? Haven't they raised your respect for the steel maker, the steel worker and the tool maker? We really believe, with many of "Our Folks", that the articles recently published are the most practical and most easily understood of any previously

TRUE TALES OF OUR SERVICE NUMBER SEVEN

A Pennsylvania smith with a good smithing education, an excellent character and a keen interest in boys and young men, was offered a position as instructor in a manual training school. He knew smithing and forging from the ground up but he had never tried teaching classes. He asked us for help. We suggested a few books, a correspondence with successful instructors in other schools and several other helps that he hadn't thought of and some he hadn't heard about. He's on the right road and going strong.

published on the subject of steel structure, composition and change.

No veteran smith grown old in the service of the forge and anvil knows as much as the new apprentice. If you don't believe that ask the apprentice who has worked anywhere for about a month or six weeks. If he isn't willing and anxious to "put you wise" to anything in the smithing line, from the annexing of axles to the zoology of zinc, you can make up your mind that he's an exception and is on the road to real and quick learning.

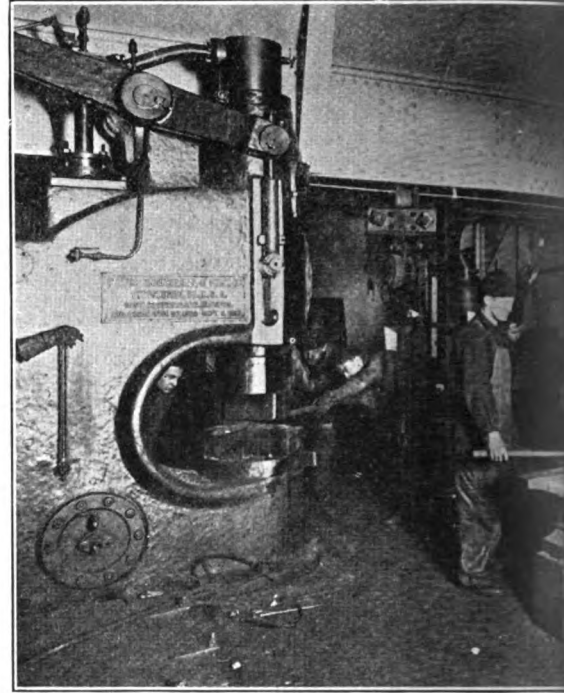
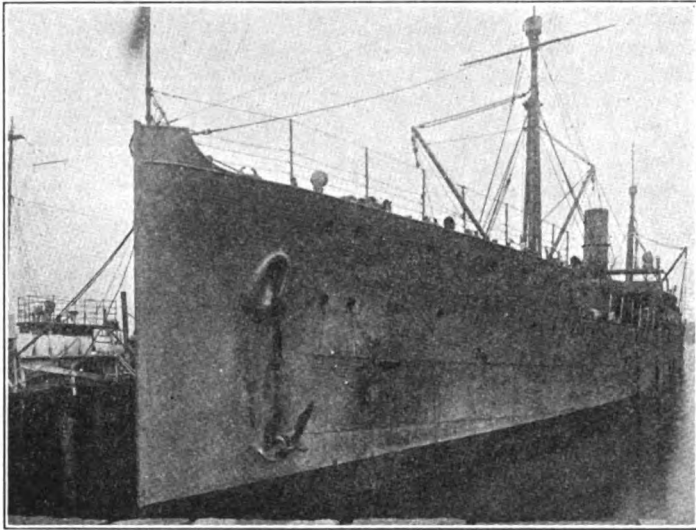
It isn't necessary always to do more business in order to make more profit. In fact in some cases it may be better to do less business. To make more profit, cut out the losing orders. Let someone else do the work upon which you cannot make money. Specialize, intensify and persist in going after, getting and doing work that assures you of a real profit. It may mean less business, but if it results in more profit that's what you want. How can you gain that ideal? A real cost system will tell you.

Friend Tardy is becoming quite a humorist. "How's the shoeing business?" we asked as we stopped in at Tom's shop the other afternoon. "Fine" called Tom from the depth of his arm chair. "Don't see any signs of it", we ventured. "Wal, I don't mean the same kind o' shoein' that you do. Here I been sittin' in this chair for an hour tryin' t' git a wink o' rest, but the pesky flies think this is a fly-shoein' shop an' keep me busy shoein' 'em all the time". When we suggested that a bit of get-up-and-hustle was a good thing to keep the flies off of a man, we had to dodge an old broom and a worn out hoof pad.

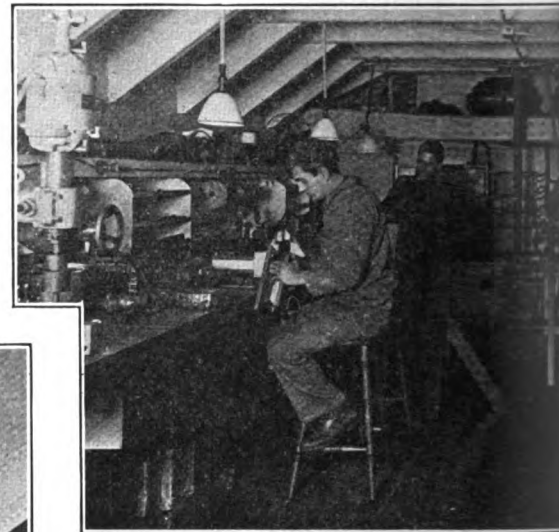
Pitching horseshoes, that good old-fashioned game which in recent years has given way to golf, and lawn bowls, has been placed on the approved list by the park department of St. Louis, Missouri. And we are glad to see the big city fathers providing a public place in the parks for the pitching of the noble animal's footwear. It gives the poor man a chance. There's no need for expensive equipment—the horseshoe pitching enthusiast needs no costly clubs, bag or caddy—he needs no special costume—he requires no expensive shoes. All he needs do is to call on his friend the smith and beg, borrow or purloin a couple of old shoes, and with two short lengths cut from an old broom handle, he is ready for the battle. We are glad to see this new move made by St. Louis and hope other cities will soon follow suit.

Uncle Sam's Floating Repair Shop

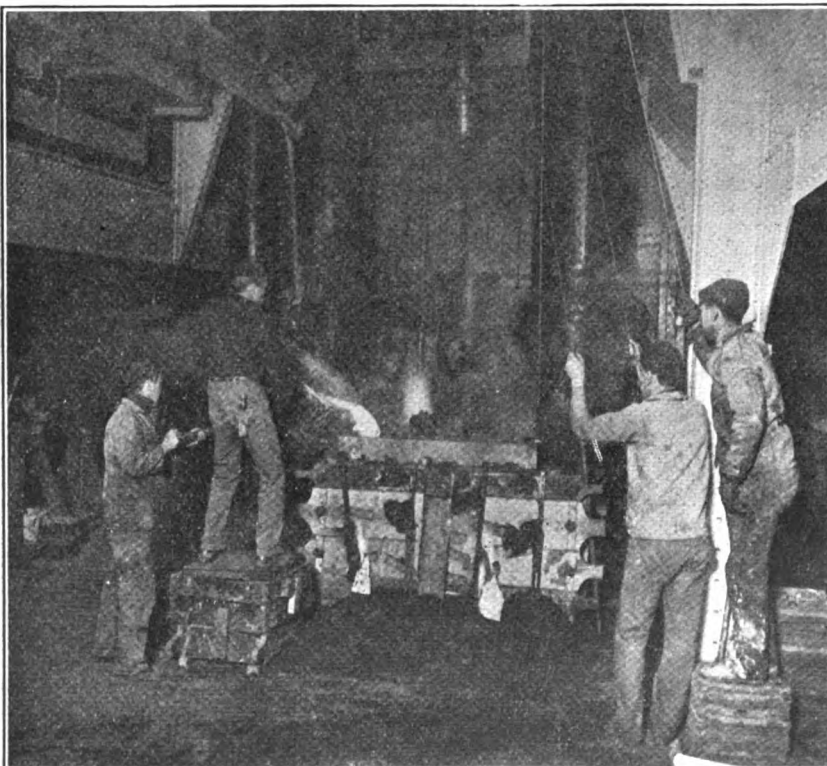
The U. S. S. Vestal is the repair ship for the United States Navy. It accompanies the sea fighters on their cruises and attends to the repairing of the war vessels when they are far from home waters. The Vestal is probably the most completely equipped repair ship in the world and its various department never carry less than \$50,000 worth of stock. It carries all the shops necessary to the repairing of warships and saves Uncle Sam's ships many a long slow cruise to home navy yards. The engraving immediately below shows the ship while the other pictures show views in the various shops on board. (Photos. by Int. News Service).



THE FORGE



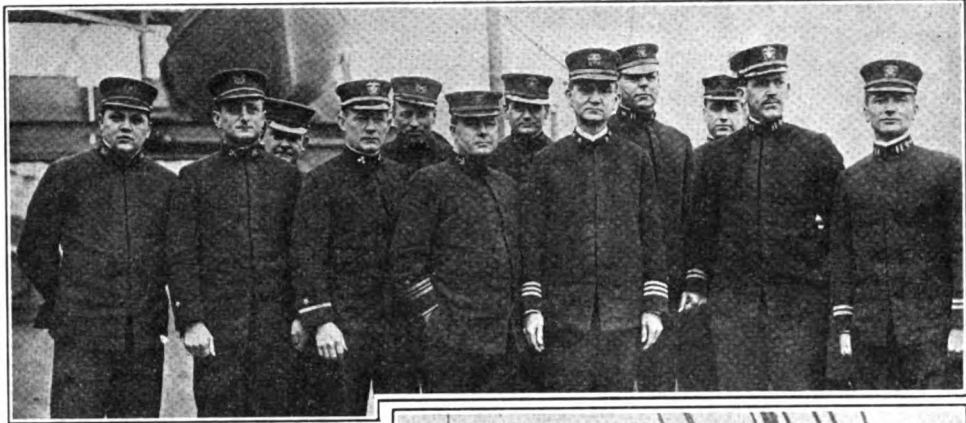
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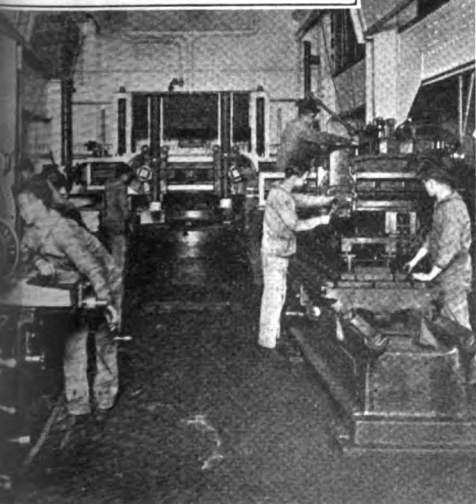


THE FORGING HAMMER

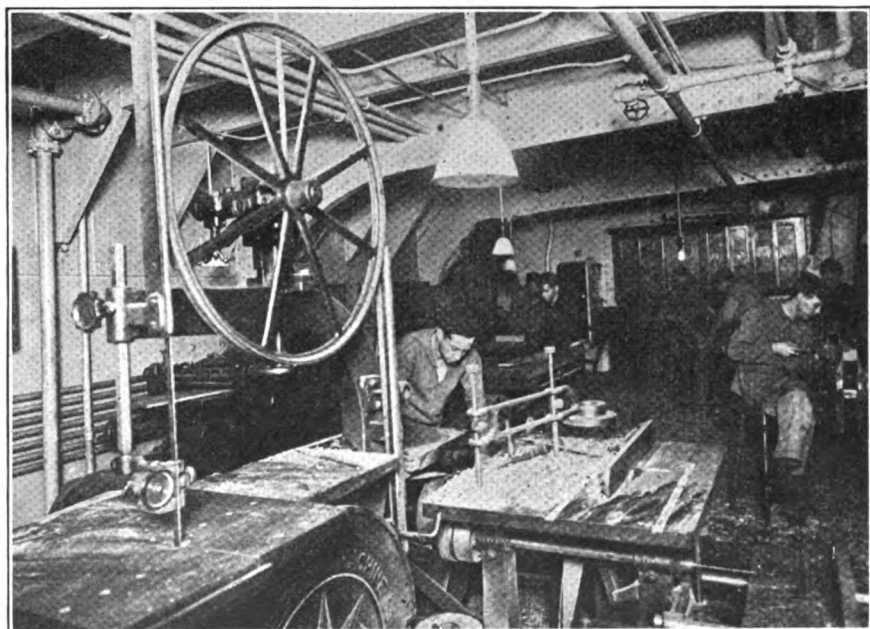


The Officers and Crew

The Vestal carries a crew of two hundred officers and sailor-mechanics. The officers shown in the upper picture are, from left to right Joseph A. Rebentisch, pay clerk; Murry Wolffe, boatswain; Maurice T. Scanlan, pay clerk; Frederick W. Teepe, chief machinist; John W. Armstrong, boatswain; Louis J. Connelly, lieutenant-commander; Ernest P. Schilling, chief carpenter; Urban T. Holmes, commander; Paul T. Dessez, P. A. Surgeon; Fred K. McMillan, P. A. Paymaster; Lieut. Fred M. Perkins; Lieut. Joseph S. Evans. The crew of mechanics who comprise the working force of this oddest of Uncle Sam's War equipment are shown in the lower picture.



THE MACHINE SHOP



THE PATTERN-MAKING SHOP

Our Honor Roll

THAT 1925—CLASS

The class of 1925 continues to grow. Better get into it now. You make a big saving in real money—you take care of your subscription account for a long time—and your name is put on the list right up among the leaders. Do it now. It's easy—if your subscription expires this month, send in a five-spot. (Canadian subscribers send \$7.00 and those in other countries 1£-14 sh.) And we'll put your name in the 1925 class and you'll not have another disturbing thought about your subscription account for some time to come.

Table with 3 columns: U. S. and Mexico, Canada, Other Countries. Lists subscription rates for 2, 3, 4, 5, and 10 years.

Send your order and remittance now—today. Don't wait until you forget all about it. You'll never regret it. Our subscription insurance saves you money. The sooner you begin saving the more you save. There is no better time than NOW.

Main subscription list table with columns: NAME, Subscription Paid to, NAME, Subscription Paid to. Lists numerous subscribers and their payment dates.

Continuation of the subscription list table from the previous block, listing names and payment dates.



The Horseshoer

Shoeing the Gaited Saddle Horse

LESTER W. SIMS

Treating on the subject of faulty action, we must bear in mind that if the action is faulty to start with, then, naturally, as the action is developed or increased, so is the fault effected accordingly, unless the necessary measures of prevention are carried out to obtain a balanced foot. This is done by means of dressing the feet, with the application of shoes of the proper weights, shapes, etc. A balanced foot means so much, yet is so seldom understood. Every animal has a big or little anatomical defect which leads to each individual his own distinct gait, or peculiar way of going which invariably spells imperfection. In the different horses this varies from well nigh perfect-

tion in some, to many degrees of deformity in others; often the pairs of feet and legs on the same horse may be very unlike. And as the gait and action are always in keeping with the anatomy, therefore the action varies from perfection in just so far as does the anatomy itself. This being true, the results of proper shoeing will prove beneficial and certainly remarkable. We must also remember the rules and principles employed to govern action in connection with this subject.

The most common fault as met with in the forefeet and limbs is generally known as paddling. In folding and extending, the feet swing out of what should be a straight line, and this may be done with only one or with both feet. The subjects of

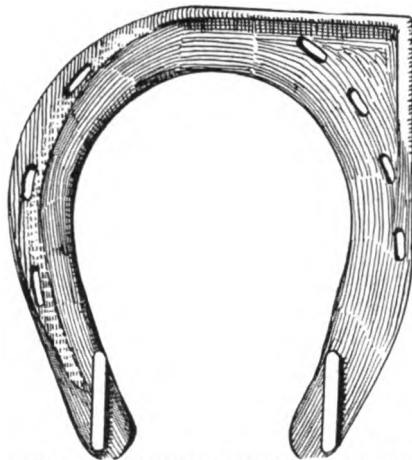


FIG. 2.—A SIDE EXTENSION AT THE TOE WITH SHARP SIDE CALKS

this text are those wherein the defect is found below the knee: in the ankle, pastern and foot. An experienced man can examine a horse of this kind, (while standing at rest and having never seen him in action) and after noting the standing position, then by raising the foot, observing the defects of the anatomy and the wear of the shoes, etc., can then tell what the fault is and also tell the extent of it. On the other hand an expert can observe an animal in action at a distance and describe the defects of anatomy, the wear of the shoes, etc., without going near the horse. In these cases the flight of the foot is indicated by the standing position always in the direction the toe of foot is pointing to. See engraving, Fig. 1, A. Note the conditions, the ankles drop out, the toes in and the feet naturally wear off the outside toe of the shoes. At B the conditions are just the reverse. Many of the shoes described work equally as well in either case by simply reversing the shoes. The true object in both these cases being

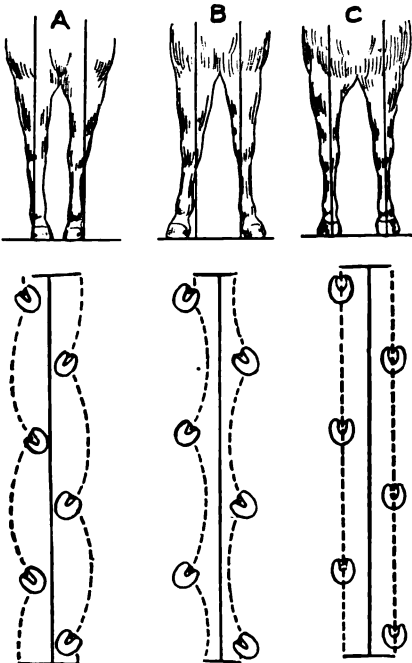


FIG. 1.—THE FLIGHT OF THE FOOT IS INDICATED BY THE STANDING POSITION

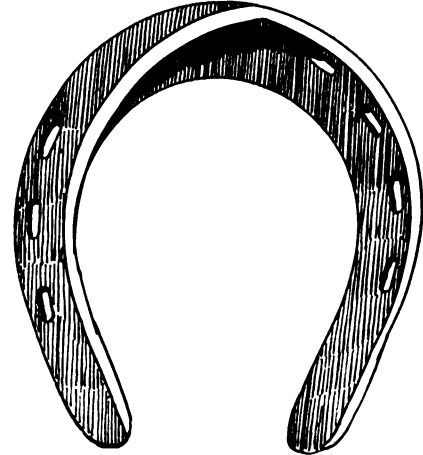


FIG. 3.—A SHOE TO PREVENT PADDLING

to bring about such conditions as at C; that of causing breaking-over at the center of the toe and carrying the foot in a straight line.

In order to accomplish this (referring to A), shoe base wide and toeing out, and the flight of the foot will be straight. Now I may be expected to start by saying to dress off inside toe. But no, in many instances they haven't any too much at this point, considering the fact of foot and action, so it may be necessary to save all the foot, and start by using an outside toe extension; see shoe, Fig. 2. To make this shoe most effective we use the sharp grabs which prevent swinging out of line. Fig. 3 is a rim shoe and very effective in either case by reversing. So is Fig. 4. This shoe is rolled on one side and convex on the other. This changes the ground bearing surface considerably and has a very material effect in the flight of the foot. It is very often the case that one side of the foot can not be pared down level with the opposite side, or the conditions are such that it is not policy to do so. A half rim shoe may then bring the desired results; see Fig. 5. If necessary, this shoe can

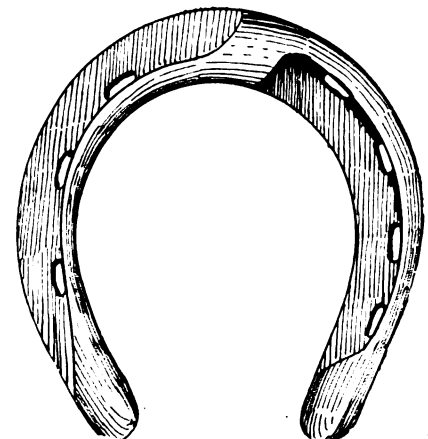


FIG.—THIS SHOE MAY BE USED ON EITHER A RIGHT OR LEFT FOOT

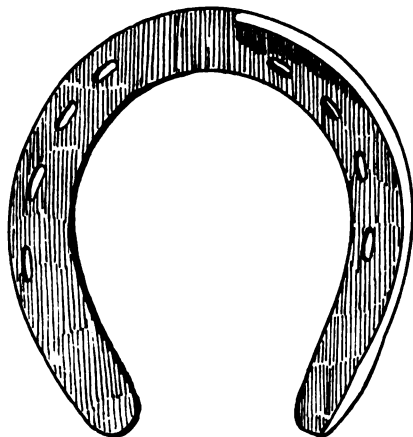


FIG. 5.—A HALF-RIM SHOE TO BUILD UP THE LOW SIDE OF A CROOKED FOOT

be punched deep and extended so as to balance up the low side of the foot. Fig. 6 is a heel weight combination rolled from quarter to center of toe. The toe is boxed with a side extension. This quickens the stride while the square toe causes a straight breakover, promoting folding action.

Aside from the many forms, shapes and weighted shoes to produce certain kinds of action, of which these few are only calculated to furnish an idea of the principles, calks may be used to an advantage in many ways. Fig. 7 shows a side toe extension, made by use of toe calk steel. Fig. 8 shows long-low calks used to build up the low side of a foot. Where the Memphis Bars are used they may be adjusted to aid in lining up the action.

Now I repeat, that in bringing about the changes necessary to these subjects it should be done gradually, which makes it absolutely necessary to shoe often for a given length of time, according to the conditions to be overcome. Each time we shoe, we improve and overcome the conditions at fault, but just as soon as we have

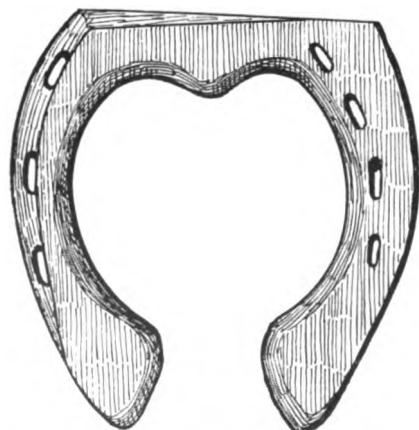


FIG. 6.—A BOX TOED HEEL WEIGHT SHOE WITH OUTSIDE TOE EXTENSION

finished our job of shoeing the foot begins to grow out of proper shape and the shoe wears out of shape. Naturally the foot is inclined to go from bad to worse, from the time we finish the job.

An old-time horseman remarked to me the other day that if shoers, in shoeing young horses, being shod for the first time, would observe the wear and natural inclinations and be assisted by following them up, he would consider them better shoers. Well, I have met a great many who hold this opinion, but it is wrong because, as set forth, big or little anatomical defects, if followed up and allowed to guide, assisted the shoeing in its natural inclinations to go wrong, the further will the fault go. So we must stick close to the text: Always a balanced foot.

The Shoer of Yesterday and Today

H. N. POPE

As there are no hard and fast rules to be followed in horseshoeing, I shall not try to lay down any laws governing it as each individual horse requires shoeing according to his own needs. I would like to give a few points of the shoer of today and of yesterday. The smith of fifty years ago was a man who not only shod horses but had to make the shoes, also nails, and all by hand. He was a man whom the whole town looked up to as he made all farming tools and many for the house as well. Shoes were made of most any iron one could get a hold of. I have heard my father tell of drawing down old axles for shoes. And the boy of today thinks he has to work hard! One of the first jobs a boy of former days got at the fire, was welding up and drawing out old shoes to make new. Many a winter's evening was spent at this work. The stock that nails were made from was a special grade of Norway iron which came in rods of suitable size for the different nails. After the machine-made nails came this iron could not be secured. First the machine nails were not pointed. This was another job for the boy; to sit at a bench with a small block of iron for an anvil and point nails.

With all our improvements I believe the smith of yesterday was the better workman of the two. The smith of today has everything he needs come right to his door—shoes, nails, calks and tools. And I know some men who enjoy good reputations as shoers who cannot make tools to do the work with. Unlike

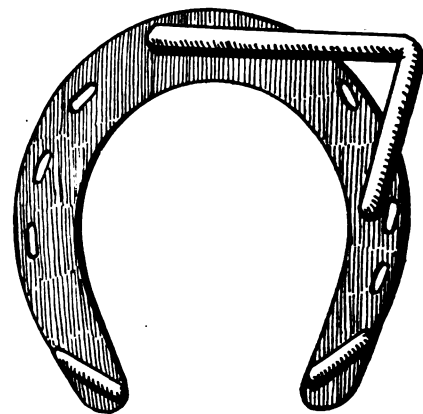


FIG. 7.—SIDE EXTENSION AT TOE MADE WITH TOE CALK STEEL

the shoer of yesterday who did all kinds of smithing, our man of today is a shoer, or a wagon smith or a machine smith,—a specialist in his own line.

There are a few tricks of the trade that the honest smith of any day will not practice. I heard a man say that his horse did not wear machine-made shoes. I asked him how he knew. He said, he saw them made—and so did I—but he didn't see the smith replace the hand-made one with a machine-made shoe and fit the machine-made one to the foot. And the set of shoes worn by that man's horse came out of a keg just the same as others. Another practice I do not believe in is graft. I have seen a horse's feet filed up, and the owner pay for a new set of shoes. I also know of a case where a man paid five dollars for some repair work and all that the smith actually did was to put in a bolt. Such practices are not right and the honest smith will not allow them. I believe a man should get paid for his work and paid at somewhere near what it is worth. If the price for shoeing is one-fifty it is not fair to the smith when he has a horse to shoe that takes all the men in the shop a half-

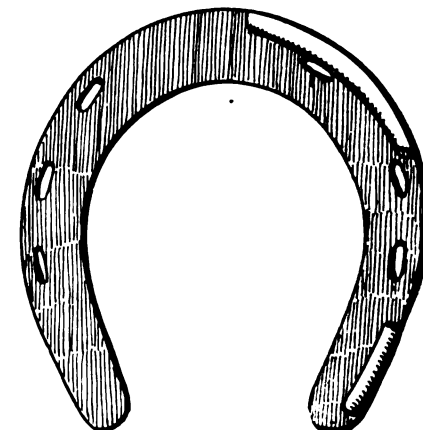


FIG. 8.—LONG LOW CALKS TO BUILD UP LOW SIDE OF FOOT

be cut under cleanly and then all brushed out thoroughly. If compressed air or a hand bellows is at hand, use this means to blow out all dust and loose particles from the cut portions. Then wet the cut-
out portions thoroughly and scrub with a stiff broom. Now fill the pores of the cut surfaces with a mixture of pure cement and water. This mixture should be about the consistency of thin cream. It should well brushed into all parts of the cut surfaces, the under cut edges and crevices, with a broom or brush. This should be followed by a stiffer mixture, about the consisting of soft putty, which should be well worked into all parts of the cut surfaces. Finally, a mortar of one part cement to one part crushed stone or gravel, should be put in before the previous mixtures have set. This last mixture should then be properly surfaced and then covered with wet bagging or wet sand and kept protected from use. The surface should be kept wet for at least a week before it is uncovered for use.

often. Now I am not opposed to a man taking a drink, I do myself, but it looks very foolish for a man to get drunk and unfit for business. A good shop is a good thing if it is handled right. I want to state that I like "Our Paper" fine and have taking it right along while I have been farming. It was about as good a treat to me as I can think of. I do wish all of our brothers would try and save something of their earnings. Now I have surprised a good many of my friends by going back to the shop, but that is the only place for me as I am only 44; too young to quit work and feel better at work; the harder the better.

H. H. ZIMMERLI, Illinois.

From A Missouri Smith.—I started blacksmithing when I was 15 years of age and have worked at it most of the time since. When I was 21 years old my father gave me \$100.00 and that was all of the money I had. I bought a shop where I am now and later, one acre of land for \$800.00. I didn't have any tools. I borrowed \$150.00 to buy tools with. I worked here four years and three months and had a fire. The stock and building were \$1,475.00 and I didn't have anything left but the lot that the shop stood on and \$125.00 in money. The lot was worth \$300.00. I borrowed \$800.00, built another for \$350.00 and stocked it up with the rest of the money. I am now doing lots of work and making lots of money. I have as up-to-date shop as there is in the county at this time. I have a gas engine, a grist mill and a sheller, all kinds of good tools and a better stock of goods than tools. I think best of all is a good stock of goods. I hardly ever fail to have what my customers want.

I have read "Our Journal" most of the time for about four years. I am well pleased with it as with any of my new tools that I have in my shop. I carry side lines of goods such as axle grease, oils of all kinds, automobile repairs, Corona Wool Fat, nails, ax handles, hammer handles, anti-rattlers, rivets, all kinds of files and all kinds of small articles that make my shop a handy place for the farmer to go to.

I don't know of anything in my experience that I haven't seen in "Our Journal" but this: I do not know any blacksmith that does this beside myself and I have better success with buggy tires than any one that I know of. Shrink your buggy tires just enough so they will not rattle or come off. Then boil them slowly for half an hour in linseed oil so that the water can not soak in and dish the wheel when it is out in the rain. I think this is the best thing for buggy tires that I have ever experienced. You have to charge more for that kind of work—one dollar more on a set will pay you and you will get more to do.

Don't credit "bad men" if you want to have good success in your business. I have been in business six years and have lost \$4.50. Don't cut prices on your brother blacksmith. If you cut price it causes hard feeling with both customers and competitors and results in no good to anyone.
GEORGE OFFUTT, JR., Missouri.

A General Shop of South Dakota.—I expect several smiths will think this a "fish story", but I sharpened and hardened 73 plow lays in one day and my helper polished them all, and 4 plow bottoms besides. I use two fires myself, one is electric, and the other is run by my line shaft. I am situated at the edge of an Indian Reservation, in a town of about 1,100 population. Prices are very good. I get \$2.00 for old shoes; \$4.00 for 8 new

shoes; \$5.00 for steel plug, and \$6.00 for Neverslips. Wagon pole, \$3.25; buggy, \$3.50; Cut down wagon, \$12.00; \$2.00 for cold tire setting and \$3.00 for hot; 50 cents for sharpening plow lay; \$1.00 for pointing; 75 cents for sharpening lister and \$1.25 and up for lister pointing. Other work accordingly. I am a young man of 30 years, but I have lived a long time. I am the fourth generation of a smithing family—my great grandfather, my grandfather and my father were smiths. I have been working at the trade steadily since I was 12 years old and don't know anything yet, but I make a living for just one wife, a boy and a girl. My shop is a power shop. I have a 5 H. P. Electric Motor; easy trip hammer; a circle saw; an emery stand; two disc sharpeners; one cold roller and one shaving sharpener; a drill press; one hot and one cold setter; a Little Giant shear and punch; a Barcus shoeing stocks, and most all kinds of small tools. We have three shops in town. I did a little over \$3,800 worth of work last year.

A. Pool, South Dakota.

A letter from Louisiana—I would like to say a few things in regard to The American Blacksmith. I find my copy very useful and I wouldn't run a shop without it. I receive my copy every month and I am always as glad to get it as I can be.

I have a very nice shop, well equipped for all kinds of repair work and motorcycle repairs, but I specialize in horseshoeing. My prices are pretty good—I get \$2.00 for shoeing from 1 to 4, and for 5, 6, 7 I get \$2.75. My other work is in proportion: \$1.50 for buggy singletrees; \$5.50 for 2½ wagon axles and \$1.50 for setting small buggy axles.

A few days ago a fellow called and wanted to work for me. He said he was a horseshoer. I asked him if he ever set up shoes, and he said he never set up a pair of shoes in his life. So he trimmed up a horse's front foot and I set the shoes. About that time a customer drove up and I had to step out to see what he wanted and the new man started to work on the horse. As I was where I could watch him I saw the horse jump a little and also saw he hit him four or five times with the rasp. So I walked right back in the shop



Queries— Answers— Notes

An Illinois Business Smith.—Five years ago I sold out my place and went on a 450-acre farm. In January, 1915, I bought my old shop back. The man had been there five years and is worth today \$300 less than nothing. He had a good trade, made a lot of money but spent more than he made, so to protect myself I bought it back, as he said he could not pay for it. Now, I am at a loss to understand why that man could not make the business go. There is no better location in the county. Now back to five years ago, I started to farm on a place of 450 acres. It took lots to start. Bought everything new. It cost me about \$5,000. I do not like the farm, only went on it for my boys; I have five. We are still on the farm, will remain for three or five years longer and I will conduct the shop. The property stands me at \$4,000. Now I am keeping down all expenses and all cash received to see just what I make out of the shop with what investments I have now. I could easily cash up for \$30,000. Does that look as though I need to work a shop? I do like the work though and feel much better working in the shop than working on the farm. I still have my half section in Jackson Co., Minn., and last spring bought 200 acres in this county, buying it at \$205 per acre; \$41,000, paying \$13,000 on same. It looks like a big debt, but I think I will do it up in time. It looks to me as though our brothers should see the worth of a dollar, and not spend them so foolishly. The man I sold to perfumed his breath too



A GENERAL SHOP OF SOUTH DAKOTA

and fired him on the first job. He left my shop right away. I don't fight stock when I shoe them and I am always successful with them and treat them right. I find it a whole lot nicer for the man and the horse. I remain a reader of THE AMERICAN BLACKSMITH and will as long as I am a blacksmith so here is best wishes to the editor.
J. S. WORLEY, Louisiana.

A Paint Query and Mr. Hillick's Reply—An Australian subscriber writes as follows:

"I would like to ask Mr. M. C. Hillick how to use or mix the yellows. I use the best white lead and tint it lemon with masuary chrome, put on two and three



coats but I can't get it to look solid or dense. I have used less oil and more color in mixing up, but there is no improvement that I can see. If I ask a painter he chases me. There is a knack in it somewhere but I cannot see it. With the reds sometimes I have the same bother, bar Indian, that will blot out anything".

To which query Mr. M. C. Hillick replies as follows:

In reply:—All yellows, from the most delicate to the most powerful shade should be laid over either a blank white or a very light gray ground. Apply a white or light gray priming coat, preferably the former, then a couple of white preparation coats, these containing a good raw linseed oil binder. If the yellow is to go over a rough stuff foundation, apply the white mixed to carry one part raw linseed oil and 6 parts turpentine. Use, if available, a white ground in japan and reduce it sufficiently to permit application with a camel's-hair brush. A second coat of the white containing one part of oil and 9 parts of turpentine will produce, with a good grade of material, a dense, solid base.

Now apply a coat of the selected yellow using it, if possible, japan ground. If so ground, thin to the proper working consistency with turpentine and to every 12 parts turpentine add one part raw linseed oil. Use no oil in any of the following coats. Oil injures the color effect of the yellow and causes it to darken and discolor.

Use one coat of the flat yellow. Next break some of the yellow up in turpentine to a cream-like consistency, and to every full pint of rubbing varnish add 4 ounces of yellow. This will suffice for a medium price job. For strictly high grade work another coat of the yellow varnish-color may be employed. To mix this coat add 2 ounces of color into a pint of rubbing varnish and apply with either a flat badger or a soft-point, half-elastic flat bristle brush. A dense, solid yellow will result from this method of employing any of the various tones and shades of yellow.

Any of the standard reds should give solid effects without much coaxing. Lay English vermilion over a peach-blow ground color. If desired it may be put over a blank white ground. Never employ oil in preparing the vermilion. Oil is fatal to the appearance of many of the reds. Use the first coat of vermilion as a flat color, employing a little rubbing varnish for a binder. Then for second coat make it in the form of a moderate color. Yellows and reds over proper grounds are easy colors with which to produce solid covering effects.

M. C. HILICK, Pennsylvania.

Pointers on Well Drilling.—In reply to Mr. Czajkowski of Oklahoma, I will say that he is not using tools of sufficient weight to cut an 8-inch hole.

Tools weighing 450 or 500 pounds might be all right for a 4½ or 5-inch hole. Drill cable of 1½ inch is a little heavy to use with such light tools on 100 or 150 foot water wells, but that should not be the cause of making flat or three cornered holes, if his machine is such as to give him control of the tools.

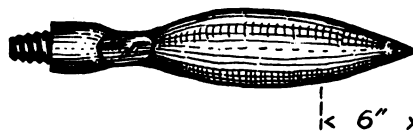
No machine will do that that cannot be run on a tight rope—that is, the rope must be stretched to take the spring out of it when the bit strikes the bottom of the hole—because a loose rope will not turn the tools with certainty, while a tight rope is as stiff as a hickory pole of

the same thickness. If the bit is of standard size and made for use on a rope machine and is dressed as shown in my recent article in *The American Blacksmith* it will drill a straight round hole under a machine that was really made to drill and not merely to be sold.

I would advise the use of 800 or 1,000 pounds of iron for driving an 8-inch hole and a 24 to 30-inch stroke should be about right for general purposes on the depths mentioned. In extremely hard rock it is well enough to reduce the stroke to 18 inches in order to save the box and pin joints of the tools.

The machine should be run at such speed that the tools come back as soon as they strike the rock and rebound—just like catching a ball "on the bound". If the hole is straight and clear the machine should handle the tools at 60 to 70 strokes per minute. The longer the drill is run after being let into a clean hole the more its fall will be hindered by mud and cuttings. Much water in a hole also checks the speed at which a drill may strike. The operator of a machine must be governed by the feel of the tools. This feel of the tools can only be acquired by practice and close attention to business. Of course a fellow may pound down a hole without such close attention and adjustment of the run of the tools, but then, he cannot tell what is causing trouble when things go wrong down the hole.

There are about as many makes and styles of drilling machines as of sewing machines. If Mr. Czajkowski had mentioned the kind and make of machine he



A BULL POINT FOR USE IN CLAY-DRILLING

rebuilt I might have been able to give him more definite information as to how to rig it so as to use it on a tight rope.

All walking beam machines can be run on tight rope. There are also several makes of machines that in reality are only "spudding in devices" that may be run more or less successfully on a tight rope. I have never yet seen a car and treadle machine that would do this without tearing its self to pieces or making such a din in the community as to make it a nuisance when the treadle thumped up against the stop at every stroke of the machine.

For the trimming out process mentioned, I would advise the use of a "round reamer" or a "four winged star bit". If the tools are kept in order and properly operated one need not resort to such performances. But if by chance such straightening need be done, 20 or 30 strokes per minute is fast enough to run the machine.

As to pulling tools at the end of a run my advise is to draw them at such speed as will permit you to stop them quickly in case they are caught by a stone or other obstruction as they are being brought to the surface. If you are sure that the hole is clear and straight you can let them come as fast as your power will permit until you see the rope socket, then slow down to keep them under control when the bit comes clear of the hole. I have known the throwing of a peck or so of sand into a 6-inch hole to be of some help in making

tough clay to mix with water in drilling. I have never had much clay of that kind to drill. Soapstone and soft yellow slate acts in the same way under the drill as the joint clay mentioned. Drilling in such material is a very tedious operation because these foundations are too heavy and sticky to mix into the proper slush—they will not float in the water. You understand that the sand has to be thrown into the hole after you have got out all the mud you can and before you return the drill to the bottom. Clay augers go about as slow as the drill and they will not work where there are stones or gravel in the clay. Right here I am wondering why anyone wants to be drilling 8-inch water wells 100 to 150 ft. deep. Standard oil well tools of 5½ inches are large enough for wells of such depths. You get no water above the joint clay, and clay of that nature will stand up and give satisfactory results without casing. I know of wells put down through stiff clay for 40 and 50 feet that are giving the best of satisfaction furnishing water for household and stock use and these wells were cased into the clay with sheet iron casing grouted in with quick-set cement mortar composed of 2½ parts clean sharp sand to one part cement, made just a little thicker than pan cake batter. A Finch spudding bit was used at the surface and 4½ or 5-inch tools below that. I believe a man could sink a 5½ or 6-inch hole through that clay by using a "bull point" of that size under the stem in place of a bit and keeping 5 or 6 feet of water in the hole. This tool may be operated on a short stroke or it may be driven by raising the tools 10 or 15 feet and let fall clear. See the accompanying engraving. Remember that this tool will only work in clay and is of no use in gravelly hard pan or soft yellow slate or soapstone.

I could not give further information of a practical nature without being on the job because I am not very well acquainted with the geological formation of your territory. Some operators claim to get good results by using a flat, thin, sharp bit and a mud socket in stiff clay. They drill until the bit is clogged, pull out the tools and send down the mud socket, which clears the hole to the bottom, and then they drill again. Jetting or revolving tools are of advantage in clay and soapstone but they require a great deal of water to operate, are expensive, and only suitable for certain formations.

In a general way water well work is done for too low a price to enable a driller to equip himself for work under special and difficult conditions. Too many men have gone into the water well business with little or no experience and they have cut the prices below the cost of doing difficult work simply to keep their machines going, hoping that if they lose on one well they may come out on the next. If you are not satisfied with your rig I can give you the addresses of several reliable concerns engaged in the manufacture of drilling machines and tools for all kinds of drilling and clay boring, but it would hardly be fair for me to enumerate a list here; beyond saying that *The Keystone Drilling Co. of Beaver Falls, Pa.*, who advertise in *THE AMERICAN BLACKSMITH* are among the oldest makers of portable well drilling machinery of merit. And I have never known one of their rigs to fail to make good when properly handled. I do not mean by this that there are not other good machines on the market. If you can



furnish me with the name and style of your machine, sizes of shafting and gears, power and speed of your engine per min., whether it is a steam or gas engine, together with the sizes of belt pulleys on engine and drilling gear, I may be able to advise you how to rig up or whether there is any use of trying to make it carry a proper string of tools for your work.

An old pin, or bit shank with proper size iron or double strong pipe welded on and the point shaped as shown in the engraving will punch a way through clay. The jars should be on when this point is used as in drilling. If dropped several feet no jars should be on, but if it sticks, throw a heavy strain on cable and surge back and forth upon cable when the strain is on. Mud sockets may be had from The Oil Well Supply Co. of Pittsburg, Pa., by stating size of hole and kind of tools and machine used. L. R. SWART, Pennsylvania.

refuse to work, although nothing can be found in their mechanism to prevent their faithful performance. In the lubricators where a gauze is used to filter the oil to the suction pipe of the little pump, close inspection will generally reveal that the gauze has become choked, and that little or no oil is reaching the pump.

Bolts are very often spoiled in driving them out from the parts in which they are located. If they do not start readily one is often tempted to use the hammer upon them, with the result that the ends of the threads are frequently burred over. A stick of hard wood, is still better, vulcanized fiber, used between the hammer and the bolt will prevent damage of this kind.

When fitting a new exhaust valve—especially if it has a long stem, and everything cold—care should be taken to see that there is sufficient clearance between the end of the stem and the tappet or push rod. If too little clearance is allowed when the parts are cold, the expansion due to the heat when the engine is working may be sufficient to lengthen the valve stem so much that it will rest on the end of the tappet, and so prevent the valve from seating properly.

Creaking springs may be remedied by lubricating with a mixture of oil and graphite, though on light colored under parts this mixture working out from between the leaves will soon spoil the appearance of the car. A good lubricating mixture that will not show on the paint of the car is made as follows: melt one pound of bees wax until it is liquid, then remove from the fire and add one-half pint of either turpentine or wood alcohol. Stir the mixture until cool and apply between the spring leaves with a brush.

Correcting Valve Troubles

C. P. SHATTUCK, M. E.

In the previous discussion of valves the writer outlined the work of retiming four-cycle motors and gave instructions for retiming motors the flywheels of which were not marked with the opening and closing points. Even with the valves timed correctly, insofar as the flywheel is concerned, there are a number of factors contributing to incorrect timing and some of these are the natural result of wear. While it is not always practical to correct faults of the designer, the operation of an old motor may be considerably improved by compensating for wear.

The design of the valve and its seating have much to do with the efficiency obtained from the motor, particularly the width of the seating, and much of the frequent grinding of valves is necessary because of too wide a seat. When the area of a valve seat is such that the pressure of the explosion is not sufficient to thoroughly squeeze the oil out from between the two surfaces of the seat, the heat of the exhaust burns the lubricant and deposits a thin layer of carbon which accumulates, causing pitting.

The remedy is to make the seat so

narrow that the oil will be squeezed out, and this is practical with cast iron cylinder and with valves of soft material. A seat of 1-16-inch is, as

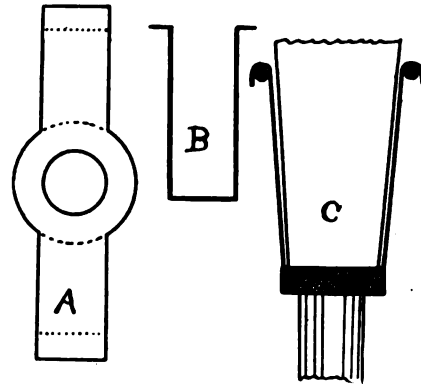


FIG. 1.—EASILY FITTED VALVE STEM PACKING

a rule, satisfactory, as it is well cooled and becomes hard in short period of use on account of the hammering action. The use of narrow seats is an advantage in that it provides a much greater effective area of gas passage with no larger outside diameter. An example of narrow valve seatings is that of a well known, popular-priced car fitted with a high speed motor.

Fig. 2, A and B, illustrate the points involved, A showing the narrow seat, while B depicts a valve that has been repeatedly ground. Generally valves of this type, particularly with an old motor, have a seat similar to that shown at Fig. 2, D, which is an exaggerated view to bring out the point discussed. Under such conditions the seat will require refacing as well as the valve. The work will generally require a reseating tool of the adjustable type which is now marketed at a reasonable price. It is a valuable addition to the equipment and can be employed to remove hard carbon deposits from the seats, which work usually takes considerable time with an abrasive.

The condition illustrated at Fig. 2, D, shows a valve-stem guide excessively worn. It is not an uncommon cause of failure of the cylinder to hold compression and is the cause of the motor failing to throttle down to a low speed. While more or less wear results to the guide and stem, due to the road dust being attracted by the lubricant, the chief offender is the valve spring.

The old and more common method of mounting the valve spring, particularly if the bearing portions of the spring are not true, exerts a side thrust upon the stem. No matter how correctly the valve be ground in, or how good the seat after the work, the valve will not seat properly when the



The Automobile Repairman

To waterproof a cork float soak it in a rubber solution made by cutting crude rubber into small pieces and dissolving in carbon disulphide or gasoline. To make them proof against oil as well, soak in a glue solution as follows: Gelatine or good glue, 2 parts; glycerine, 1/4 to 1 part; water, 6 parts; and enough oil of wintergreen to keep it from spoiling.

To prevent the tarnishing of lamp reflectors and polished metal parts give the surfaces a light coating of alcohol in which a little collodian has been dissolved. This makes a good protector and can be easily removed with a little warm water.

The rubber mats in the automobile may be freshened and made to appear much better by treating them with pipe clay or one of the several rubber coatings that are now on the market. After an overhauling and general repairing of a car, the mats and tires generally brightened up and with the various other parts of the car looked after, cleaned and polished, should make a good impression on the customer.

Ordinary rust, if not permitted to penetrate deeply, may be readily removed by brushing the parts with kerosene in which a little lime has been slaked. When the surface has been cleaned, the joints and knuckles should be well oiled. These instructions are especially applicable to such parts as brake rods, leaves of springs, and any other rod having as a means of adjustment a screw and nut.

Mechanical lubricators will occasionally



spring is in place. There will be a tendency for the valve to tip, and this side thrust will be increased if the guide is worn, which is generally the case.

The correct repair is to replace the old stems with new and to grind the top and bottom coils of the springs so that they will have an even bearing on the retaining collar and the cylinder. With the removable type of valve guide, such as shown at Fig. 2, C, it is a simple matter to withdraw the guide and replace it with a new member. The device for withdrawing a bushing consists of a bolt threaded at either end and provided with two nuts. A metal plate or washer is placed over the valve cap, and when the nut is turned the guide is drawn upward.

made and fitted. Fig. 1 illustrates the device and its application. Take a strip of any stiff metal, about 1.32-inch thick, and lay it out to the shape shown at A. Measure the diameter of the valve stem with the calipers for the opening in the strip and cut the hole to dimension. Caliper the bottom of the valve guide and allow for the thickness of the metal of the valve packing. Next measure form the bottom of the guide to its top where the upper coil of the spring rests against the guide, and allow for the bending of the strip as shown at B. The ends should be bent over and downward as indicated at C. The packing proper can be made of felt, and its outside diameter should be slightly larger than the guide, and the opening through

means the fitting of a new roller and a pin or the making of a new pin to replace the old member. Another factor affecting timing or the opening and closing of the valves, is a loose cam on the shaft. This is sometimes experienced with old cars. When the contour of the cam is worn there is no remedy other than new cams.

Worn keys and keyways in the valve stem are responsible for poor seating of valves, particularly with old motors. When the keyway and key are worn the tension of the spring is decreased, and when such a condition exists, fit a new pin. Weak valve springs may be improved by stretching.

Fig. 2, F, shows a method adopted by the writer for quieting the noisy

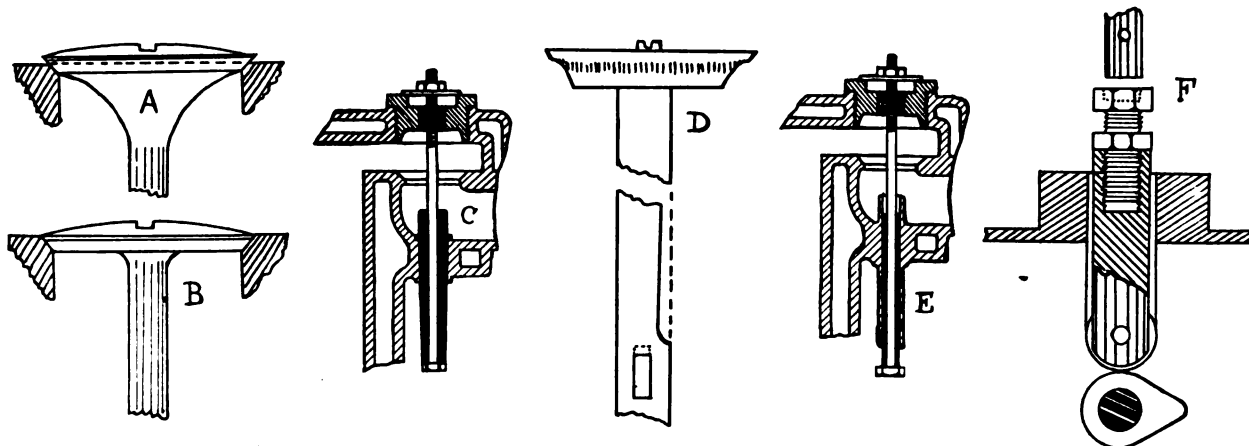


FIG. 2.—A, PROPER SEATING FOR VALVE; B, INCORRECT DESIGN; C, HOW TO REMOVE VALVE GUIDE; D, WORN VALVE STEM; E, FITTING BUSHING TO GUIDE; F, HOW TO QUIET TAPPET.

Fig. 2, E, shows a similar arrangement for drawing a bushing into place when the latter has been turned to fit a guide that has been re-bored, work that is necessary when the guide is cast integral with the cylinder. This is a job for the machinist, although it can be performed by the repairman.

It very frequently happens that the customer will not sanction the expense involved in placing the valves and guides in first class condition, and generally the owner cannot spare the machine. What will prove a very satisfactory repair can be accomplished by giving attention to the seats, valves and springs, and by making a packing to prevent the entrance of air between the worn guides and the stems. This extra air is drawn in on the suction stroke of the cylinder, and it is impossible to obtain a satisfactory carburetor adjustment. If the mixture be enriched at low speed to compensate for the extra air, it will be too rich at high speeds.

A valve stem packing can be easily

which the valve stem passes should be slightly smaller than the diameter of the stem so that the felt will grip the stem slightly.

To install the packing it is placed on the circular portion of the metal strip and slipped over the valve stem and the guide. The replacing of the valve spring retains the device in place, and the felt effectually seals the opening between the guide and the stem, preventing the entrance of air. Before fitting the felt, smear it with a mixture of oil and graphite. If there be considerable play between the stems and guides of the exhaust valves, which is productive of a hissing noise, as well as deposits carbon, fit the packing.

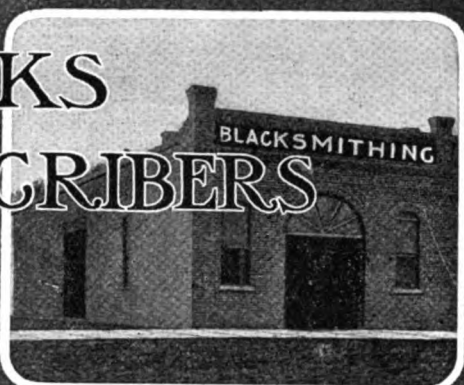
Reference has been made to the effect of worn components of the valve assembly upon the timing of the motor. Fig. 2, F, shows the tappet or push rod assembly, a conventional design. One of the troubles with this assembly is that the pin securing the roller is subject to wear, and generally it will be found that there is considerable play. This

action of tappets. The adjustable screw was removed and the temper drawn, after which it was drilled as shown by the dotted lines. A fibre plug was made and driven in. The plug should be slightly larger and thicker and well hammered. The surplus facing can be removed with a file. Non-adjustable valves can be made adjustable when there is sufficient room between the tappet and stem, and sometimes the stem may be shortened to permit of fitting the threaded bolt and lock nut. The temper of the tappet will have to be drawn with this method which can be employed at a slight expense to the owner.

After completing any work such as grinding in valves, fitting new ones or replacing worn components of the assembly, the timing of the valves should be checked by utilizing the marks on the flywheel. It is possible to improve the operation and efficiency of old motors by the methods above described, and as a rule the expense is warranted as considerable fuel economy will be obtained.



TIMELY TALKS WITH OUR SUBSCRIBERS



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To Our New Zealand Friends.

To our New Zealand friends we want to pass a reminder that new subscriptions and also renewals may be sent to our accredited representative, Mr. Richard Hill, Matlock House, Devonport, Auckland, New Zealand. Mr. Hill will accept and promptly care for any new orders or renewal subscriptions that are sent him and our New Zealand folks will no doubt find it most convenient to send orders to Mr. Hill.

The Oxy-Acetylene Number.

The September number, as announced before, will be devoted principally to the oxy-acetylene machine and oxy-acetylene torch practice, and to say it will be a great number is putting it very mildly. There will be several articles by authorities on the subject. There will be an article on safety in the operation of an oxy-acetylene plant; a real honest-to-goodness story of how one smith paid for an entire plant in a month and a half; several articles on practical work, and altogether, the September number will be an issue that you'll want very particularly if you now own or ever expect to own an oxy-acetylene plant.

Of course, there'll be articles on horse-shoeing and other subjects. For example, Dr. Seiter comes in with one of his usual good articles on his favorite subject, while a most interesting instalment of "Judging the Draft Horse" will also appear.

You'll want to read the September number and then you'll want your neighbor to read it, too.

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One Thing We Can't Do

The bundle of shingles in the cellar won't keep the roof from leaking, unless they are used on the roof. No matter how much oil is in the fuel tank, it will never make the engine go if the supply pipe is plugged up.

You can read this paper ten times over but if you don't make use of the information in it, if you don't use the helps, the formulas, the hints, stunts and short cuts, it will never do you a bit of good. You must use the paper to get full value out of it. This paper, nor any other paper, can help you unless you help yourself.

"Our Journal" is not simply a means of passing the time away. It is not a story paper or merely something to read between jobs. It has a purpose—a real live mission. And that purpose and mission is to help every member of the craft in every possible way within reason.

We want every reader and subscriber of THE AMERICAN BLACKSMITH to get the full worth and value out of THE AMERICAN BLACKSMITH. If you are not getting all you can out of "Our Journal" we want to know it. We want you to get not merely the worth of what you pay for the paper, but, as much more as you possibly can. We want you to get your money's worth and then some because we know it's in the paper. It's simply up to you to get it out. And we'll help you if you will tell us what you want.

From New Zealand

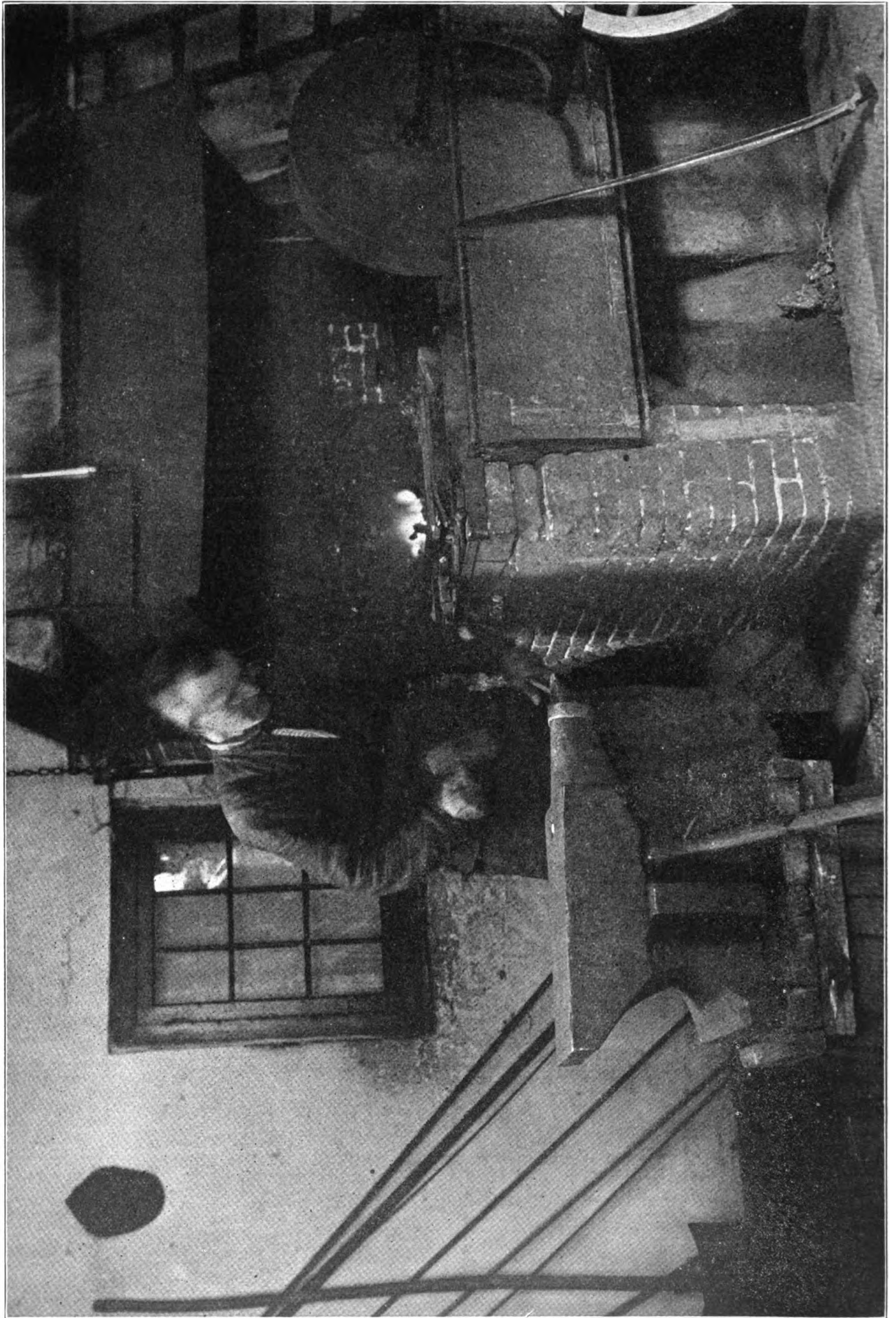
From across the seas comes a message that should make the heart of every reader of "Our Journal" glad. From New Zealand, that island of the sea, six and one-half thousand miles from our own western shore, comes a word of appreciation that has a sincere ring of truth and respect.

This reader of "Our Journal" writes: "I have carefully looked over the paper every month and I consider it the best in every way for the following reasons: It is handy in size, both paper and type; it does not soar above its readers; it is cheery in style; the matter is diversified; the advertisements are very helpful; it is very moderate in price, and last but by no means least, it is extremely anxious to help".

There is the platform of THE AMERICAN BLACKSMITH; that is its policy. And it is stated by an actual reader—Mr. H. Hurrell of Petone, New Zealand, just as he has found it, six thousand miles across the seas.

Subscription Agents

When a stranger solicits your subscription to THE AMERICAN BLACKSMITH or any other publication, insist upon his showing you absolute proof that he is an agent in good standing and is employed by the publication which he represents. Don't, under any circumstances, give the man your money if you are not sure that he really works for the paper he says he does. No matter what the man offers you—no matter what price he makes—no matter what premium he promises to send—DON'T GIVE HIM YOUR MONEY IF YOU ARE NOT SURE.



THE SMITH



Extracts From the Diary of a Horseshoer

Some Actual Shoeing Problems and How They Were Solved

J. W. CLARK

EVERY practical horseshoer who has been carving hoofs and tacking shoes for any length of time has stored in his mind the memory of certain jobs and shoeing problems and the solutions thereof, that stand out more prominently than others. And these jobs are usually the ones that required more than usual thought and study in the solving. Then too there is no doubt a failure or two (perhaps more) set down in every shoer's experiences that lend variety to one's thoughts of what he has done and that also tend to keep the thinker from getting a swelled head.

In the following I have attempted to extract such cases from my experiences as I think will be of most practical value to readers of *THE AMERICAN BLACKSMITH*. I make no attempt to say that the treatment followed in each case is the method anyone else should follow, but I do say that the particular course followed in each case, with the exceptions which I will note, was successful in bringing about the desired result in the horse's gait or in the animal's foot health.

The first case to consider was that of an animal prone to forge. When this horse came into the shop his fore feet appeared somewhat like the engraving at A. This is perhaps slightly exaggerated to bring out the idea of the abnormally long toe. Naturally with such a long toe, the front feet could not "get away" quick enough to suit the action of the hind feet. We therefore pared the front toes well, and fitted them with rolled toe shoes having swelled heels, somewhat as shown at B. These shoes were fitted just as closely as possible to the foot and the heel branches were leveled in line with the heels of the hoof. The hind shoes were flat with swelled toes instead of heels and with the foot set well forward as shown at C in the engraving. The hind shoes, as shown, were also fitted with side clips to

hold them more firmly on the foot. This method very soon stopped the forging and a gradual return to shoes is needed." After looking her over carefully I could find nothing at fault, in fact, I could not see what change could be made that would not be an incorrect one. So I told the owner to drive her for a day or two, as she was then, and to come in again within three days and I would look at her feet again. I did suspect, however, that the frog

normal shoes and shoeing over quite a considerable period showed that this particular animal was permanently cured by this system.

Just to show that each individual shoeing job is a case all its own it is fitting that another case of forging be cited right here. The animal was a small delivery horse that was as clever an animal for that particular work as I had ever seen, willing to do and to go at all times but as savage a fighter as ever was stabled when he thought he was being abused. He would not stand for tying, either in the shop, stable or street, he never ran away and no matter what happened near or about him, he always took good care of himself and kept out of harm's way. But he was prone to forge, and for this particular case a shoe similar to the one at D, Fig. 2, was used in front while a shoe like E was used behind. The calks, which were very low, were used to insure a good foothold for the animal on account of the speed with which he usually traveled on the hard pavements. Another shoe that could possibly have been used on the front of this little animal is a bar similar to F in Fig. 2. This would, however, need to be fitted closely and especially carefully at the heels because should the hind foot come within grabbing range of the front heel the bar, of course, presents a larger surface for contact. The bar, on the other hand, enables the smith to place lots of weight at the heels very easily, when such a shoe is desired to overcome the foot trouble.

The next case was that of an animal used as a driving horse, a gentle little mare, used Sundays and holidays principally, and owned by a family who were very fond of the beast. At first the owner remarked, merely casually, that the mare was striking occasionally behind. "Better see if her shoes are all right," he said and then suggested, "Perhaps a little change in her hind

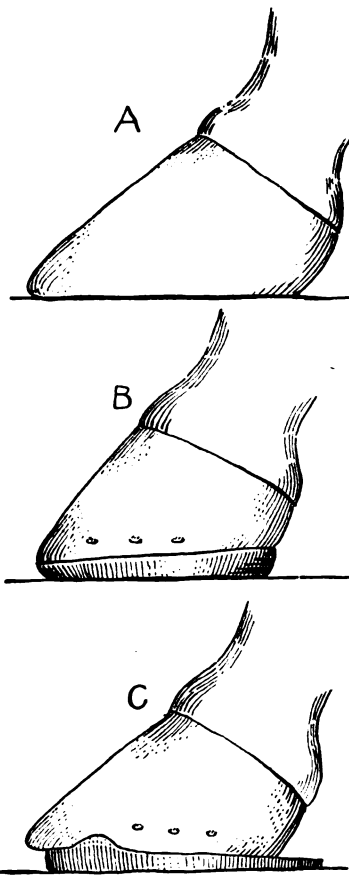


FIG. 1.—HOW THE FORGING ANIMAL
WAS SHOD



was not just as it should be, but said nothing at the time. The next day the owner brought the horse in bleeding from a cut on the foot where she had hit herself badly. So I removed the opposite shoe and carefully cleaned it out and discovered the frog quite badly effected with thrush. This then was the cause of the hitting and everything possible was done to effect a cure. A boot was put on the opposite foot, and instructions to wash out the affected foot carefully twice a day with a carbolic solution given. Shoes without calks were of course used. The owner was also told to see that the animal got more exercise.

The next case was that of an ani-

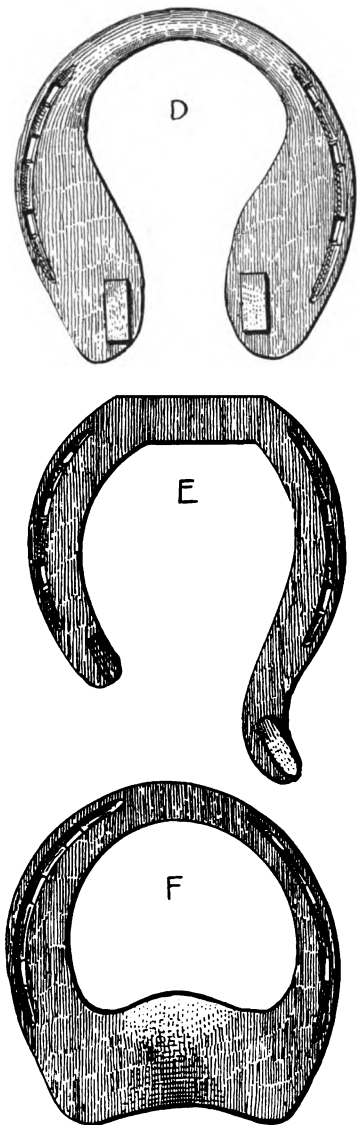


FIG. 2.—ANOTHER FORGER'S FOOT WEAR

mal with a bad crack in one of its hoofs. The crack was right at the toe and extended from ground surface, right up to the hair. The owner, when he brought the animal in, said the horse had had the cracked hoof for some two years or more and that he had tried about everything from brass plates to nails and had had the horse shod with every style shoe from bars to pads and special freaks. So I suggested he let me try and I offered to fix the foot or not charge him a cent. He said if I could take that crack out and grow a new uncracked hoof on the animal it would increase the animal's value at least fifty dollars, and he was willing to split with me. So I set to work. First, I made several little plates of brass, shaped as at G, Fig. 3. These were made up of good, tough sheet brass and finished smooth and perfect. The holes were very carefully drilled and the plates fitted in pairs. Having these plates ready with some brass screws, about 3/8 of an inch long, and some good, stout bolts fitted with nuts, I was ready for my patient. When the horse came in I cleaned up the foot carefully, cleaning out the crack as well as I could. I then fastened a pair of my plates on the front of the foot wall, as shown at H, Fig. 3, drawing the plates together until quite a strain was placed on the hoof. Of course, the bearing was cut away at X. The foot was shod with a leather after packing the hoof with hot pine tar and oakum. The crack was also treated with the pine tar and the surface of the hoof at the coronet was painted with a hoof liquid made of oil of thyme, linseed oil, turpentine and oil of tar in about the proportions by measure as follows: 7, 4, 2 and 3 parts in the order named. All of this treatment was, as will no doubt have been noted, to promote the growth of the horn. The clamping plate was for the purpose of holding the crack as immobile as possible. The owner was, of course, called upon to do his part and instructed to send the horse into the shop at least once a week. When any action seemed to occur in the walls of the crack a turn or two was given the nut and as the plate grew down another plate was attached to the new horn until the hoof grew in whole and healthy. This required almost a year from the time we began on the foot until the crack was entirely gone. Since then we have had several cases that were simple compared with this one and on each we applied, what we now call the "Clark

Clamp," successfully.

It is seldom a smith shop owner cannot learn something from the men that work for him. Some years ago we had an Englishman at work in our place and one day he sug-

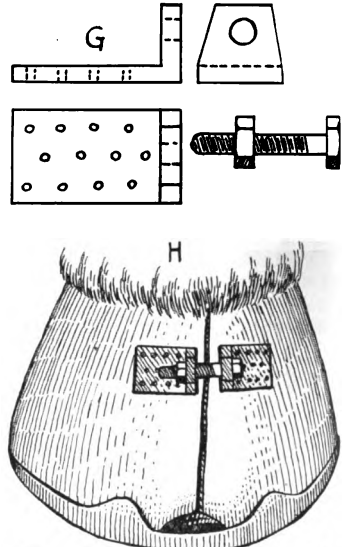


FIG. 3.—HOW THE TOE CRACK WAS REPAIRED

gested the following for a case of contraction: Instead of making a shoe with the usual flat hoof surface as usual, to take a shoe with a heavy heel and to forge out the heel in a bevel from the inside to the outside edge, somewhat as shown at J, Fig. 4. This shoe is nailed with the holes well up toward the toe so as to leave the heels free to spread from the action of the bevel on the shoe.

This same man also cured up the first case of dropped sole that I ever saw. He fitted the foot with an ordinary shoe with a wide bar welded across the branches as shown at K, Fig. 4. This was then shaped and bent to press upon the sole of the foot. A piece of heavy felt was then placed upon the sole and the shoe nailed on. This, I do not believe, would work successfully in every case, as I understand that dropped sole is generally considered incurable, but this case was not perhaps advanced to the chronic stage.

As said in the beginning of this little tale of experiences every case, practically speaking, is a law unto itself. Any rule, any method, any suggestion, must be made on the basis of fitting only cases that are exactly similar in all particulars. A careful study must be made of each and every case. If you cannot discover the cause of the thing that is



giving you the trouble you cannot. of course, apply the remedy correctly. Chance may solve the problem but study will come nearer a solution oftener.



The Horseshoer

Treatment for Thrush.

FRANZ WENKE

Very often the horseshoer is compelled to treat thrush. Thrush as every shoer knows is caused, very often, by dirty and wet stables, but also by faulty shoeing. Cutting and trimming of the frog, especially during hot and dry weather, will cause thrush, especially so if combined with high calks on the shoes, as the frog is removed to high from the ground and does not receive the necessary pressure. I have seen cases where the whole horny or insensitive frog was rotted away, exposing the sensitive frog and making the horse or mule very lame. In cases of this kind we have to resort to artificial pressure. The best plan I have found is first to wash the diseased foot with warm water and castile soap, a few drops of carbolic acid being added to the water. About 10% or 10 spoons of acid to 90 spoons of water. After washing the foot thoroughly, all the ragged edges are trimmed away carefully, care being taken not to draw any blood. I then pack the foot with dry salicylic acid, on top of which I put a heavy layer of oakum and secure the whole with a leather boot. This is left on for 24 hours, and if the discharge is not dried up and the smell gone, the treatment is repeated. After two applications the foot should be dry and not smelling anymore. Care should be taken to keep the animal in perfectly dry stables during the treatment.

The foot should now be ready for the shoe. The shoe itself should have a steel plate fixed to it in such

a manner that plate may be removed at will. After nailing the shoe to the foot, the whole foot should be packed with oakum, but without the salicylic acid and the plate put on. The packing must be heavy enough to produce a good, firm pressure on the diseased frog. The removable plate will enable the shoer or the caretaker to renew the packing from time to time, which should be done, and especially every time the animal's feet have been exposed to a wetting. In a short course of time a new and healthy frog will result.

The engraving will show the kind of shoe I prepare for cases of this kind. I always put the plate on the shoe with screw calks, as this will raise the foot off the ground and so tend to keep it out of the wet.

Judging Draft Horses

PART III.

A. S. ALEXANDER

Head and Neck. 10 Points

Head—Should be large, proportionate in size to the body and well formed, clean, free from coarseness and irregularities. Perfect, 2 points.

Strength may be shown in the head as well as the rest of the body. It should not be excessively fleshy or irregular. It should be carried well up and balanced properly upon the neck.

Forehead—Should be broad, full and not dished (concave) or too prominent. The profile of the face

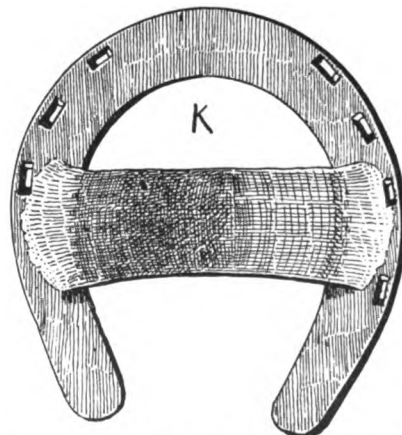
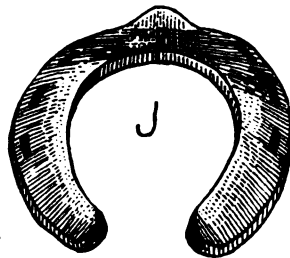
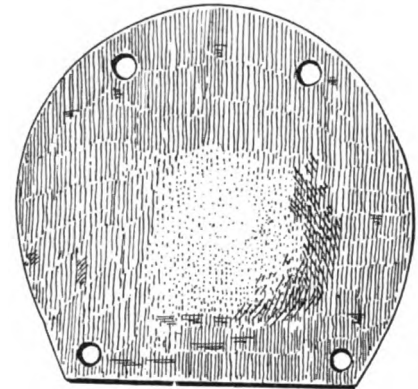
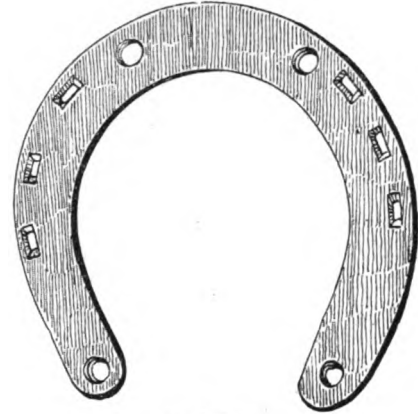


FIG. 4.—ONE FOR CONTRACTION THE OTHER FOR DROPPED SOLE



MR. WENKE'S SHOE AND PLATE FOR TREATING THRUSH

should not be too straight or convex (of "Roman nose" form). There should be good width and fullness between the eyes which indicate power and intelligence. A wide forehead and face indicate large sinuses, air passages, and breathing capacity. Grey hairs on the temples of a dark colored horse usually indicate old age. Perfect, 1 point.

Eyes—Should be bright, clear, mild, full, sound of the same color. The lids should be smooth, well arched, and free from angularities and wrinkles. Perfect, 2 points.

The eyes should be free from cloudiness, specks and white spots. They should not be staring or bulging. Test the eyes by gently threatening to strike with the hand. A horse with good sight will flinch under this test. The pupil should be elliptical in form, not circular, and should contract when the animal is suddenly brought into the light from a dark stable.

Ears—Should be of medium size, well placed, alert, normally active and free from coarseness. Perfect, 1 point.

The ears should be in proportion to the body in size, neither too large nor too small. They should be of good quality, soft, pliable, and free from an excessive amount of coarse hairs.



Muzzle—The nostrils should be large and flexible, the lips thin, even firm under control and all of the parts neat and clean cut. Perfect, 1 point.

The skin and hair of the muzzle should be of good quality. Small nostrils and a narrow face indicate poor breathing power. Note the lining membrane of the nostrils and the partition between them to see that it is pink in color, healthy, free from ulcers or purple spots and with no discharge or bad odor. The lips should be even, firmly held without drooping, and be free from sores or wounds.

Lower Jaws—These should be wide apart. The space between the lower jaw bones should be free from meatiness, abscesses, or tumors. Perfect, 1 point.

Jaw bones that are too close together indicate deficiency in ability to chew food and the animal is usually hard to keep in good flesh. The lower jaw bones should be smooth and even and the skin soft and free from much long hair.

Neck—A well-arched evenly muscled neck in proportion to size of body and large windpipe and smooth insertion into the shoulder is desirable. Perfect, 2 points.

The neck should be well arched, not curved downward (ewe neck) or "broken" in crest. It should fit neatly into the head and be free from thickness, coarseness, and enlargements at the throat latch. The neck should merge evenly and smoothly into the withers and shoulders and be free from sores at the seat of the collar. The mane should be thick, lie properly, and be of good quality. Largeness of the windpipe indicate good breathing powers. The jugular vein should show no scars of bleeding and the glands about the throat should be clean and of normal size.

Fore-Quarters, 20 Points

Shoulder—The shoulder of a draft horse should be moderately sloping, smooth, and well muscled. Perfect, 2 points.

A majority of the poorly formed draft horses have shoulders which are too steep. Occasionally the shoulders are too sloping. Either extreme in a draft horse is objectionable. Trouble with collars comes from these causes when the horse is doing heavy pulling. The correctly laid shoulder should form a smooth, comfortable bed for the collar. Straight or upright shoulders detract from easy, free action of the forelegs and generally are found associated with upright pasterns.

The shoulders should be smoothly and deeply covered with muscles and be free from coarseness, roughness, sores, and tumors. The withers should be well covered and moderately high.

Arm—The arm of the horse extends from the point of the shoulder to the elbow and should be

each fetlock joint, under the "foot lock" of hair. Chestnuts and ergots are considered vestiges of the hoofs or foot pads of the five-toed prehistoric horse. Chestnuts are not present on the hind legs of the jackass and sometimes are missing in the mule. The muscles of the forearm should be prominent in front

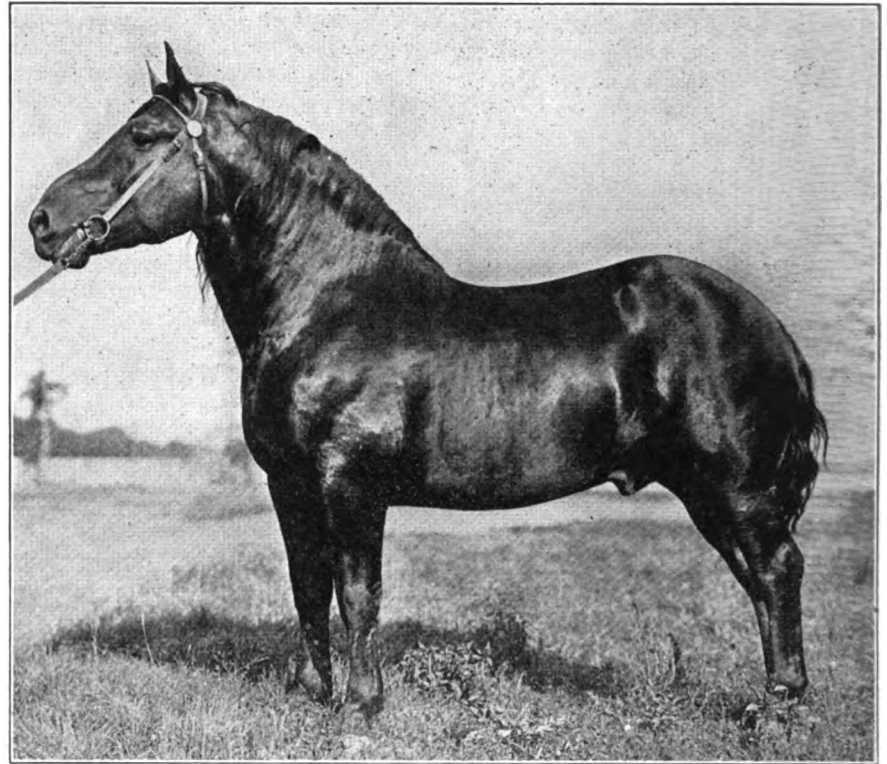


FIG. 6.—A GOOD MARKET TYPE—COMPACT BLOCKY FOUNDATION

short, heavily muscled, and properly placed. Perfect, 1 point.

This part is formed of the arm bone (humerus) and must be so laid or placed as to bring the leg in proper position to support the weight of the forequarter. The elbows should be prominent, clean, and not held too far out or too close in to the body. Score off for straight, poorly placed, or inadequately muscled arms.

Forearm—The forearm, extending from the elbow to the knee, should be long, flat, wide, heavily muscled, and free from coarseness. Perfect, 1 point.

This portion of the body of the draft horse, together with the lower thigh (gaskin) of the hind leg, cannot be fattened, but is composed chiefly of lean muscle and bone. A horny mass or callosity, known as the "chestnut", will be found on the skin of the inner face of the forearm, above the knee. Chestnuts are also found upon the inner, lower faces of the hock joints, and a callosity of similar character, known as the "ergot", will be found at the point of

and above and the entire part clean and free from puffiness or coarseness.

For weakness, lack of strength, or deficiency in muscles, cut sharply.

Knees—The knees should be large, wide, deep, strongly formed, and smooth. Perfect, 2 points.

So long as these and other joints are free from puffs, bony growths and meatiness, they cannot well be too large or too strongly developed. Knees should be so set as to perfectly carry the weight of the body. Sprung knees, or buck knees, bent in the forward direction, are as objectionable as those of the reverse type which are known as calf knee. Examine the knees for blemishes and the cannons for splints close up the knees. Splints will be likely to cause lameness. Blemishes may indicate tendency to falling. Score off for small, weak, crooked, or "tied in" knees or those that are rough, coarse, fleshy or scarred. The knee of the horse corresponds to the wrist of man.

Cannons—The cannons, extending from knees to fetlocks, are composed chiefly of bones and tendons. They



should be short, strong, clean, wide and tendons prominent and smooth. Perfect, 2 points.

The desirable flat appearance of these short, strong bones is largely due to prominence of back tendons and to lack of coarseness and meatiness. Feather, if present, should be fine and silky and spring from the rear of the tendons. Such hair indicates fine, strong bone of dense quality and is usually associated with strong tendons. Coarse, kinky, "gummy" hair, growing from the rear and sides of the cannons, indicates coarse skin overlying spongy bone and gives the legs a round appearance.

Fetlocks—These should be wide, straight, strong and free from puffs, callouses or interfering sores. Perfect, 1 point.

What has been said about feather in the foregoing paragraph applies equally to these joints. Sores or callouses caused by interfering, knocking, cocking forward, or breaking backward are highly objectionable.

At the cack part of each fetlock, under the "footlock" of hair, will be found a horny projection, known as the "ergot." This is large and prominent in some draft horses, but less developed in horses of the light breeds.

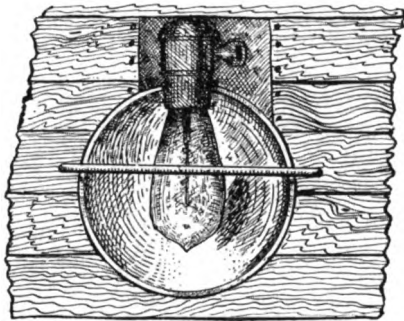
Pasterns—The pasterns, extending from fetlocks to hoofheads, should be moderately sloping strong and clean. Perfect, 3 points.

The tendency in the average draft horse is toward short, upright pasterns, and a stubby gait. This is highly objectionable as are also very long, weak pasterns, which bring the back of the fetlocks too close to the ground and cause strain upon the tendons when drawing heavy loads. The short upright pasterns are even more objectionable since they prevent springy, elastic action of the feet and allow concussion to jar the bony columns of the legs. This irritation and inflammation caused by continued jarring may help to induce side bones or ring bones and to cause corns and kindred diseases of the hoof. The bone of the pastern should have a slope of about 45 degrees and the front of the foot 50 degrees. Horses having upright pasterns and consequent stubby action wear out quickly when used upon paved streets. The long pastern (os suffraginis) often is termed the first phalanx, the short pastern (os coronæ), the "second phalanx" and the coffin bone (os pedis) the "third phalanx." The three are the "phalanges" of the foot.

Feet—The hoofs should be ample

in size, sound, smooth, symmetrical in shape. Perfect, 8 points.

The hoof is a continuation of the skin of the parts above. The color of the skin decides the color of the hoof. Dark-colored hoofs are preferred. Color counts for little, however, if the hoofs are of poor shape and texture. The horn should be smooth, waxy-looking, and free from cracks or ridges and the coronets (hoof



A SOLUTION OF THE SHOP LIGHTING PROBLEM

heads) should be open, prominent, and wide at the heels. The sole should be slightly cupped (concave), not flat or bulging (convex); the frog large, elastic, healthy and without a deep cleft; the bars prominent. Discount small, weak, brittle, flat, low-heeled or over-large, spongy, soft, shelly feet as well as those that are unsound. Poor forefeet are one of the commonest and most serious faults in draft horses.

Editor's Note—In the next installment, Prof. Alexander takes up the examination of the body and explains "Soundness and Unsoundness."

Lighting the Shoeing Floor

A simple but effective arrangement for lighting the shoeing floor is described by the *Electrical World* as used in the shop of J. W. McLean, of Massachusetts. Three round openings, $9\frac{1}{2}$ inches in diameter, were sawed in the inside boarding of the double wall partition, leaving a space the depth of the joists, about 4 in. In each of these openings there was then placed and secured a concave metal shade $3\frac{1}{2}$ in. deep, painted white inside, with a 25-watt tungsten lamp installed vertically in the center of the shade. A $\frac{3}{8}$ -in. steel rod was screwed to the woodwork, spanning the center of the shade and acting as a protection to the lamp against pressure of the horse's body.

The three lamps are in a row in the same side wall, spaced 7 ft. 6 in. between centers, and at a height of 32 in. above the floor. This location permits the light to shine directly on the work while the blacksmith is

hammering the shoe on the hoof held on his knee. It is a ready solution of the difficulty of securing proper lighting for this sort of work, and does away with pendent flexible cords, which have been found to be in the way of the workmen.

Locating the Smith Shop.

H. N. POPE

While the lay of the land must determine the locating and setting up of the shop and as no two locations are alike it is hard to know just how or where to place a building to obtain the best results. One thing is certain, unless one departs from what seems to be a fixed law as to smith shops the smith will find he has been placed in the darkest and most unhandly place in the whole plant. My first remembrance of a smith shop was a three-story building with basement with the paint shop in the upper story, wood working shop on the ground floor and the smith, of course, down cellar. As I look back tonight and call to mind the shop I have known they have been, with but few exceptions, like the one I have just mentioned. I was in one a few days since where the smith shop was as unhandy as could be made in the basement. There was light only on one side and at the end and poor at that. It was a shop some 50 ft. wide and 150 ft. long, with water, steam and electric power and machinery to match. Now with acres of land around and idle, why should the smith be stuck in the cellar? It is a question I have never been able to answer. But I believe the time when any old shack is good enough for the smith has passed. Smiths themselves are looking for and even demanding that the shop shall be clean and comfortable and well lighted and I believe it is due the smith that he should have the best.

After we have the shop built let us see to it that we get it laid out conveniently and handy. If it be a shoeing and jobbing shop, don't mix the two. Keep the shoeing by itself and have handy racks and shelves for the stock, for it eats up time to have to pull over a pile of stock to get some particular article. One wants a small stock room. It is very fine to have, as all stock can be kept by itself and used as wanted. Lumber should be nicely piled with slats between, for if this is not done there will be quite a leak and that is one of the most important points in business to look after. Another good point to look after and



one that is going to keep the shop clean, and that is to see that stock and tools are packed up where they belong. One may think a customer does not notice these things but I know they do. It is a very good plan to go over the walls at least once a year with whitewash. It cleans up and makes things much brighter. The Government has a wash that is used on lighthouses, that will stand much longer than ordinary lime will. In building the shop, don't forget the office. You

and instead of the ring of the anvil being heard along the highways, it echoes and re-echoes through the deep tunnels and copper workings.

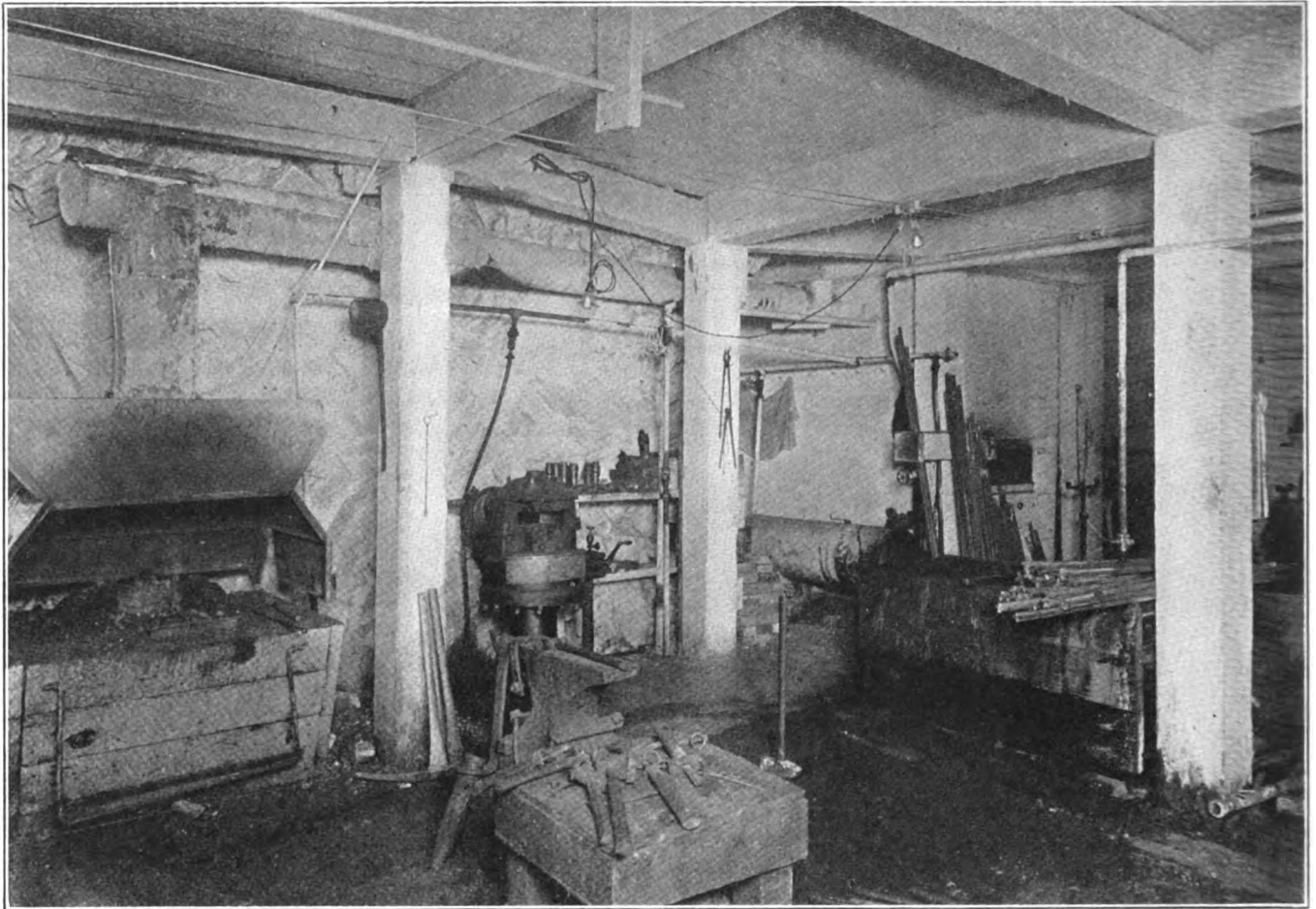
Here the miners bring their tools for repair and sharpening. And in the shop can be seen several picks, and, upon what appears to be a quenching or hardening tank, a pile of machine drills are lying. The forge is shown at the left in the engraving. The mine smith must needs also care for the shoeing of mules when these animals are used

what his brother on the surface may be compelled to endure.

The photograph from which the accompanying engraving was made was loaned through the courtesy of Grit, Williamsport, Penn.

Modern Business Methods in a Texas Smithy

Here is a description of a Texas shop and some of its methods that every readers of THE AMERICAN BLACKSMITH should read. Here is a shop run on modern business ideas. A. E. Hiester and Son, have



A MINE SMITH SHOP ONE THOUSAND FEET BELOW THE SURFACE OF THE EARTH

say you don't need it. Just think it over and I think you will conclude it will pay. One needs a place where it is quiet and clean and if one has a customer in, everyone does not know what your conversation is, whether business or pleasure.

An Underground Blacksmith Shop

The accompanying engraving shows the interior of a blacksmith shop that is said to be one thousand feet underground in Southwestern Arizona. This smith shop is located in one of the Arizona copper mines,

in the underground workings. For even when the "electric mule", as the mine locomotive run by electricity is called, is used, the mule is generally used though to a lesser extent than before electricity was called to the aid of the miner.

One big advantage that the underground smith has over his brother who works in a shop on the surface, is the fact that the underground workings are always uniform in temperature. The surface shop may be swathed in blankets of ice and snow, or may be parching in the blaze of a blistering sun, but the underground smith knows that his shop will be comfortable no matter

taken several lessons from the methods, systems and ideas followed in the large industrial plants and in larger business houses and have applied them with profit. Too long have smith shop owners been satisfied with the easy going methods of grandfathers' days. It is time that the lines of efficiency were tightened. When a smith shop owner is careful to see that his skilled labor is employed only on skilled work and that the low-priced help only is employed on the commoner jobs, he is on the right track and making a pretty good bid for greater efficiency and for the betterment of the craft generally.

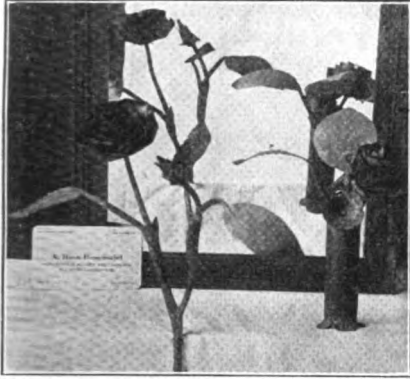
Read Mr. Hiester's article with an open mind. If you are doing similar constructive work along better efficiency in your shop tell us about it.

**The Shop and Business of A. E. Hiester
Son, of Texas**

Having been in business here 16



years and nearly the entire time have been a subscriber and reader of "Our Paper," it is needless to say that from the start I have gotten much valuable information and



FORGED FROM A BRIDGE SPIKE. THE MORNING GLORY AND ROSE ARE ALL STEEL AND MADE ENTIRELY FROM AN OLD BRIDGE SPIKE. THE VASE IS STEEL TUBING. FORGED BY MR. A. B. ROSENSTIEL OF WASHINGTON

expect still more in the future. In the last few years the paper has been exceptionally helpful to the man who is not only his own blacksmith and general mechanic but also manager of the business. It has wakened me to a thorough system of business. Up to a comparatively recent date craft books and papers considered the mechanical part only. That was a great help to the foreman and to us in small shops of our own so far as the mechanical training went, but it left the business end to be learned from other sources or too often by experience at a dear cost. We must learn to save time, material and fuel to succeed. We must go further and look for every possible leak from scrap pile to bad accounts. We must consider the expenses that are necessary, decide how much is profitable, must advertise and also know necessary power expenses. We must keep an accurate account of expenses and cost of material and labor and running expenses, such as phone, rent or interest on investment, advertising and help without forgetting full and occasional donations to worthy enterprises or helpless neighbors. All are expenses that must be met before profits can be declared.

By describing our equipment we may give some others an idea that will be of worth. We get many ideas by reading of others' equipment and methods of transacting business. We first and continually study the want of our customers and equip and stock to suit their necessities and

carefully select our stock in quantity and quality to suit the demand at the right season. Our shop is 30 by 66 feet, well aired and lighted; a warehouse annexed to it 26 by 32 feet to carry stock, and a sideline of plow shapes, binder and mower extras, plow shapes and plumbing goods, etc. In the shop engine room is a 4 horse power engine with a power blower connected to three forges with cut outs for hand blowers when we are not running the engine. A plow sharpener is located between first and second forges, and a trip hammer between the second and third forges. We also have a power drill, an emery stand, a hydraulic tire shrinker and a rip saw. Then there is a wood bench with its tools. All equipment is use good; high grade tools and machines for all classes of work. We try to arrange to have the \$3.00 men do the skilled part of a job and turn the grinding, drilling and similar work over to the helpers. Too many shop men use a high priced man where they could use the helper. One keeps books, watches the stock, and waits on customers so that the man with the tools can be kept busy all the time. We do business for profit and not pleasure and must place every man and tool where hand-made machines and tools, but

their own machinery, but many times it is a necessity to make some of it and then we get good ideas by reading of those constructed by brother smiths. I will not discuss our individual methods of keeping books and cost, but I place great emphasis on the necessity of accurate bookkeeping under any method you may adopt from a ticket day book and ledger to the loose leaf- ledger. The main thing is accuracy, with a method of such a kind so you can refer to anything without waste of time and with assurance and reliance. Be sure to have a place for tools and stock and insist on help placing them there no matter how much in a hurry. Hunting tools and stock is a waste of time no shop man should excuse.

Buggy, Dan Cupid's Assistant

Discussing the outlook in the vehicle trade, and with pleasure carriages particularly in mind, an Ohio carriage builder, said in a recent interview:

"There is neither an immediate or distant danger of the carriage business being an industry of the past. Although the automobile's popularity has for a time checked the normal development of the general vehicle



THE HORSELESS VEHICLE IN THE PHILLIPINE ISLANDS

factory-made ones are cheaper and better than we can make. The time spent on shop made machines is more valuable if spent in pushing our business. For some reason few there will be the greatest results.

There has been lots said about shop men prosper who make all

business, the latter is again coming into its own, notwithstanding the auto is recognized as a necessity by those who can afford it. In time the automobile will fill its proper niche in the economy of things just like other means of transportation have found their places.



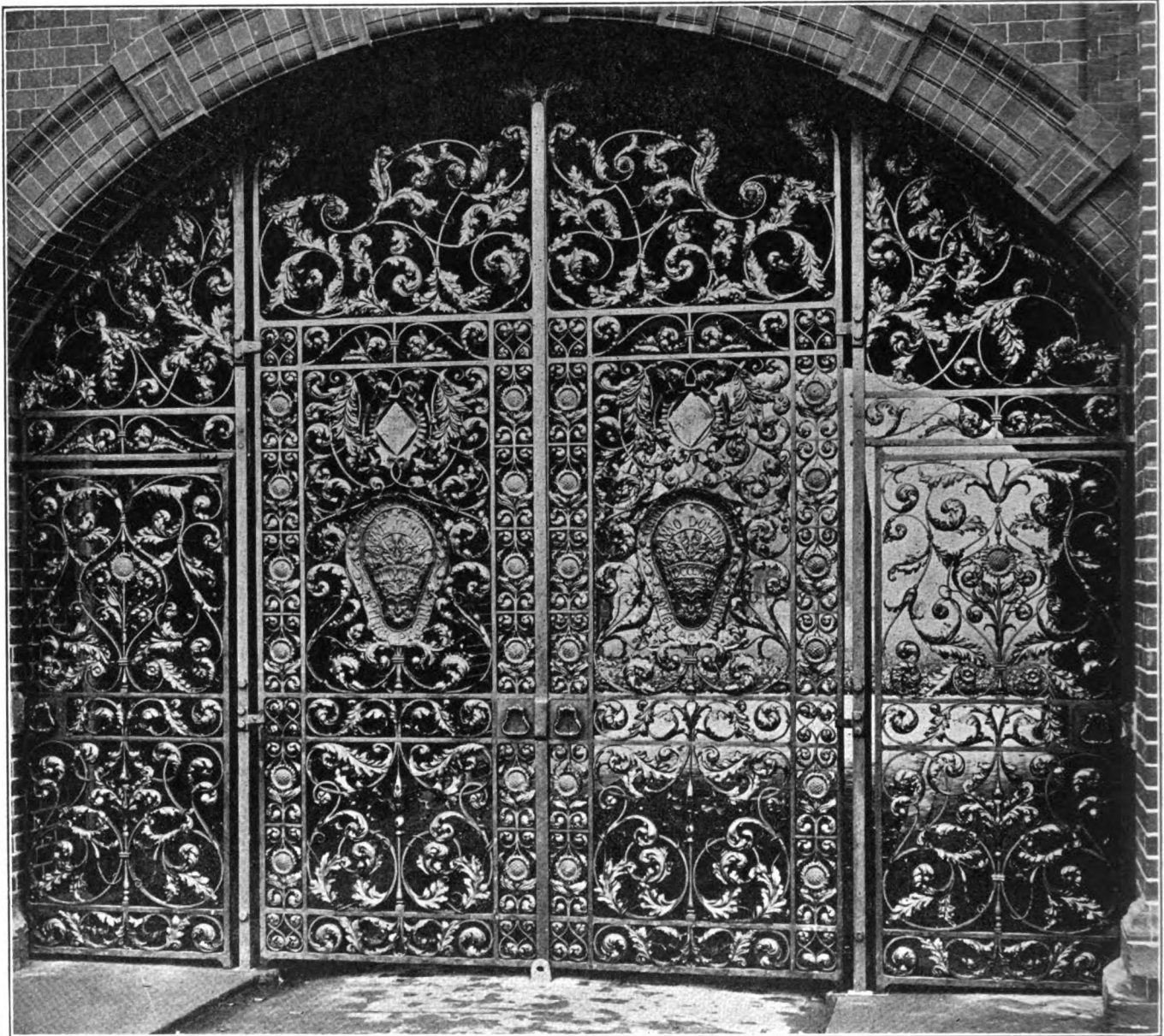
"With every innovation in transportation there come wholesale predictions that the old methods are to become totally extinct. But we have yet to see the total disappearance of any conveyance as cheap and as useful as carriages of all sorts.

"It is hard for some people to

"It's the same with the buggy business. Notwithstanding that a great many farmers have been using the automobile, they have held on to the buggy, too, and there are about as big demand for them as there ever was. The farmers' sons, especially, find they cannot get along

ways at Cambridge and are an example of modern workmanship that it would be difficult to surpass in either modern or ancient work.

The carriage gates are designed and forged to open a free passage way from pavement to arch, while the gates at each side open only a por-



THESE GATES HUNG IN ONE OF THE GATEWAYS AT CAMBRIDGE UNIVERSITY ARE PERHAPS THE MOST BEAUTIFUL IN ENGLAND

realize that almost as many buggies were made last year as in the years gone by. They actually believe the auto has driven the buggy out of business. These folks should be reminded that notwithstanding all the improvements in gas lighting and the perfection of the electric light, more kerosene oil is produced and sold than was the case when kerosene was the only recognized method of illumination.

without a buggy. One can't steer a Model T automobile with safety and at the same time keep his arm around the slender waist of the prettiest girl in the neighborhood.

A Beautiful English Gate

J. Y. DUNLOP

The gates in the accompanying engraving are perhaps the most beautiful to be found in England. They are hung in one of the college gate-

tion of the side panels, there being a stationary part above each gate.

The main posts for the hinging are $1\frac{7}{8}$ -inch square while the frames of the gates proper are $1\frac{7}{8}$ by 1 inch. The main gates have six horizontal members each, while the small gates have but five. In filling these frames the acanthus leaf is the motif in conjunction with spiral stems.

The side panels of the main or center gates, it will be noted, are

made up of a repetition of a rectangular form, composed of leaf and flower ornament which, at the top and bottom extremes, are finished with a square made up of the leaf figures.

The figures in the upper parts of the gates, both the stationary parts of the side panels and also the tops of the center gates, are especially graceful and pleasing. They fit into the whole exactly, and have that air of lightness which the gate top of this character should have.

Altogether the gates shown in the accompanying engraving are an example of beautiful design and good workmanship. The reader interested in ornamental work may well study the engraving.

Thoughts on Timely Topics

By THORNTON

"A VACATION!" growled a certain smith the other day when we asked him when he was going on his. "I ain't had a vacation since I was ten years old." And then having given the self-starter the signal he ran full speed onto a tirade of the foolishness of vacations and folks. After he finished and had caught his breath, we remarked as we departed: "Well, that's just the way we thought you felt about it." And that smith, still well on the tender side of sixty, looks like a composite picture of the Scriptural Wise Men of the East. A man, or, woman, either, for that matter, can't work all day and half the night for the 365 days of the year without growing gray, grizzled and grumpy. And these old men who brag about not having any vacation in, all the way from thirty to sixty years, are on the wrong track. Letting down the bars occasionally is just what the busy man and woman needs. The race for wealth with the intention to seek health and rest when the first goal is attained is usually found to be a delusion and a snare and never works out that way. Laying up good, solid simoleons for some one else to buy gasoline, champagne and other liquids with, is not our idea of life. A bit of enjoyment in life while it can be appreciated and as we go along has been our idea since we used to go down to Uncle John's farm during school vacation. But then there's another side of the vacation question which goes to excess the other way. But then that's another story.

"AIN'T NO STEEL knives like this nowadays," said the smith we were

visiting as he sharpened some old fashioned table knives for a customer. No, there aren't any knives like that now because we know more about steel. There is better steel today than was ever before used in the history of this little old world of ours. And nowadays there is, practically, a special steel for every purpose. Take knives for example—the steel in knives is made especially for knife blades. And not only that but there are special steels for particular blades. This talk about the old-time things being better than today's articles gives me a crimp in the side. Generally speaking, articles of manufacturer are today better than ever before, it being understood that the price be considered. Manufactured articles generally have, by quantity production and automatic machinery, become cheaper in price, and on the basis of cost, are better than ever. The great trouble today is that people generally do not want to pay the prices our fathers and grandfathers paid. If they did they'd get quality that would surprise them most surprisingly.

OL' CUFF BRASHER SAYS: "Ol' Belshazzler didn't hav' nothin' on them here dances that's been introduced into so-called polite society. An' Bels. was somewhat of an indoor sport himself in his day."

KANSAS—and now good, old Kansas comes forward with a proposition about which we have written, spoke and preached ever and anon for lo these many years. The good old state comes forward with twelve hundred dollars in her outstretched hand, so to speak, which is offered to the towns showing the best advantages for the raising of—no, not cattle nor hogs nor hell, but children. Yes-sir-ee, children. And Winfield, Independence and McPherson won first second and third place in the contest. Thus is old-fashioned Pop. U. Lation given a rap on the bean and a kick in the pants. For contests of this kind will make for quality, such as we have advocated, for it seems as tho' it were generations, but of course, it couldn't be. The world do move. From fighting for population as towns did most energetically a comparatively few years ago and being content to get an extra ten, hundred, thousand or two in quantity and letting the quality thereof take care of itself, towns are now seeking high quality, realizing that the more attention paid to the raising of blue ribbon and gold medal boys

and girls, the more blue ribbon men and gold medal women we will have, and the less crime, fewer criminals and smaller will become some of the big problems of the day. We're for more prize humans and fewer wishy-washy Willies and lazy ladies of leisure with cigarette appetites and a penchant for joy-rides and champagne. More power to Kansas and her campaign for quality population.

THEY SAY that bread is called the "Staff of Life" because a healthy appetite can lean on it three times a day every day in the week without becoming leaner.



The spring race meeting for trotters and pacers held at San Francisco in connection with the Panama-Pacific Exposition was not marked by fast time owing to the newness of the track, its peculiar shape and to the strong ocean breeze with which the racers were forced to contend all the way up the back stretch. The two feature events, the 2:10 class for trotters and the 2:08 class for pacers, each for a purse of \$20,000, went one to an Eastern bred horse and one to a Western bred one. The winners of the trotting event, Spriggan, by Baron McKinney, 2:10 $\frac{1}{4}$, was bred in New York. His share of the big purse was \$10,000 and he took a record of 2:08 $\frac{1}{4}$, his first record and he was the second new 2:10 trotter of the year. The pacing event went to White Sox, a California bred son of Del Coronado, 2:09 $\frac{1}{2}$, his share of the purse amounting to \$8,250, and he reduced his record from 2:06 $\frac{1}{4}$ to 2:05 $\frac{1}{4}$. It is peculiar that the sires of these two big winners, Baron McKinney, 2:10 $\frac{1}{4}$, and Del Coronado, 2:09 $\frac{1}{2}$, are both sons of McKinney, 2:11 $\frac{1}{4}$. The horses that won \$1,000 or over during the meeting are as follows:

TROTTERS.

Spriggan, 2:08 $\frac{1}{4}$, by Baron McKinney, 2:10 $\frac{1}{4}$	\$11,175
Virginia Barnette, 2:08 $\frac{1}{4}$, by Moko	4,000
Peter McCormick, 2:08 $\frac{1}{4}$, by Peter the Great, 2:07 $\frac{1}{4}$	3,250
Allie Lon, 2:18 $\frac{1}{4}$, by Kinney Lon, 2:07 $\frac{1}{4}$	2,832
McCloskey, 2:08 $\frac{1}{4}$, by Theodosius	2,500
Bonnie Ansel, 2:16, by Prince Ansel, 2:21 $\frac{1}{4}$	1,700



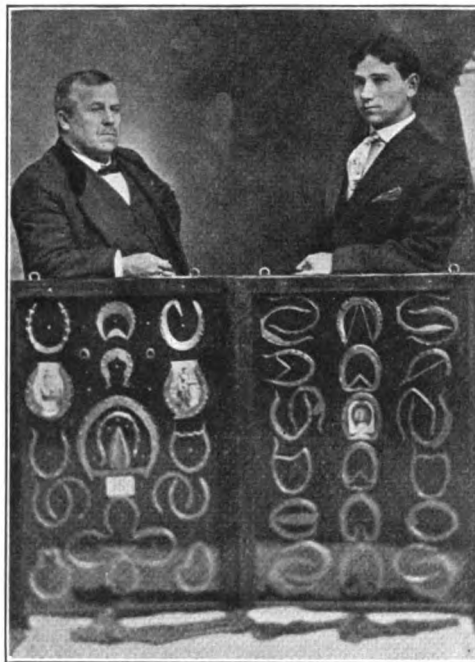
Brutus, 2:20 1/4, by Aleryon, 2:15..	1,375
Nicola B, 2:18 1/4, by Carlok	
2:07 1/2	1,312
Laramie Lad, 2:10 1/4, by Mrster Bo	1,500
Albaloma, 2:09 1/4, by Almaden D.,	
2:16 1/4	1,250
Adbell M., 2:09 1/2, by Moko.....	1,000
Anvillite, 2:22 1/4, by Anvil, 2:02 1/4	1,000
Bon Coes, 2:10 1/4, by Bon Voyage,	
2:08	1,000
Carl, 2:19 1/4, by Carlokin, 2:07 1/2.	1,000
PACERS.	
White Sox, 2:05 1/4, by Del Coron-	
adq, 2:09 1/2	\$ 9,750
Hal Boy, 2:07 1/4, by Hal B, 2:04 1/4	7,376
O. U. C., 2:07 1/2, by C. The Limit,	
2:03 1/4	5,650
The Beaver, 2:05 1/4, by Searchlight,	
2:03 1/4	4,500
Leata J., 2:03, by Royal McKinney,	
2:00 1/2	2,500
Potzro Boy, 2:08 1/2, by Damond,	
2:11 1/4	2,375
Agnes Patch, 2:20 1/4, by Dan	
Patch, 1:55 1/4	1,500
A. D. C., 2:10 1/4, by Young	
Monterey	1,000
Fluta Dillon, 2:08 1/4, by Sidney	
Dillon	1,000

There has been a lot of discussion as to whether a horse of the trotting type, at his natural way of going, or one of the thoroughbred type at his natural gaits, would be able to go twenty miles the easier carrying a man in the saddle. Each type of horse has his advocates, those backing the trotter believing that, in a long race carrying weight the trotting gait will be less wearying to the horse than to go at that gait than will the gallop be to a thoroughbred, but there are plenty of men who hold the contrary opinion. To test out which of these beliefs is right, the managers of the Grand Circuit meeting to be held at Empire City track at Yonkers early in September announce that a feature of the meeting will be a contest between horses of the two types, the distance of the race to be twenty miles. Each horse will be required to carry a rider weighing 150 pounds. The trotters will be permitted to trot and walk and the thoroughbreds will be permitted to gallop or walk, each type of horse to confine themselves to the prescribed gait. Just now when so much attention is being paid to the production of horses suitable for the cavalry branch of the army both in this and foreign countries, this contest will attract widespread interest, for its outcome will indicate in a marked degree which type of horse will carry riders long distances with the greatest ease.

The death, in Montclair, N. J., a few days ago, of Jonathan Hawkins, reminds trotting horse lovers how closely the present is linked with the past in trotting horse breeding. On Mr. Hawkins' father's farm in Orange County some sixty years ago one of the horses in use was a black mare sired by American Star, called Clara. The younger Hawkins drove the mare to and from school and a little later—fifty-eight years ago, to be exact—Jonathan Hawkins made his first venture in the breeding field by sending Clara to be bred to Rysdyk's Humbletonian, then a horse of no reputation, standing at a fee of \$25. The foal resulting from this mating was a colt afterwards known as Dexter. When the foal was four years old young Hawkins sold him to George B. Alley of New York for \$400, an almost unheard of price

for a colt in those days. Four years later Dexter reduced the world's record for trotters to 2:17 1/4 over the old Buffalo track and was purchased directly afterwards by Robert Bonner of New York for \$35,000. Three years later Mr. Hawkins sent Clara to Hambletonian again and the foal from that mating was Dictator, whose son, Jay Eye See, 2:10, became the first trotter to enter the 2:10 list when he took his record in 1884. How rapid has been the reduction of the speed rate at the trotting gait may be realized when it is said that Mr. Hawkins lived to see Dexter's record of 2:17 1/4 reduced to 1:58 by Uhlan, and the 2:10-list started by Jay Eye See, 2:10, increased to 691, forty-three of which have records of 2:05 or better.

The veteran trainer, Ed. Geers, affection-



CHRIST AND SON OF MISSOURI, ARE HORSESHOEING SPECIALISTS

ately called "Pop" by his friends and thousands of lovers of harness racing who know the great driver only by reputation and from seeing him in the sulky, has recently arrived at the North Randall track near Cleveland from Memphis, Tenn., with the stable of horses he will campaign down the line of the Grand Circuit this year. Mr. Geers, although now sixty-four years old, will race as large a stable as ever this year and this despite the fact that he has just recovered from a serious surgical operation. It was in 1881, thirty-four years ago, that Mr. Geers drove his first Grand Circuit race and every year since he has been seen racing a stable of horses through this great series of race meetings. The winnings of his stable during the past twenty-five years total \$1,178,450, and while he has never paid special attention to prepare horses for record breaking, yet several of the holders of world's records at different periods were trained and driven by him, these performers including The Harvester, 2:01, the champion trotting stallion at the present time; Etawah, 2:03 1/4, the present four-year-old champion trotter; The Abbot, 2:03 1/4, a former trotting champion; Fantasy, the one-time holder of the world's three-year-old trot-

ting championship with a record of 2:08 3/4; Brown Hal, 2:12 1/2, champion pacing stallion of an earlier period, and Hal Pointer, 2:04 1/4, for quite a while holder for the world's pacing record.

Mr. Geers' stable that he brought north with him this year is made up of the following horses: Trotters, The Guide, 2:07 1/4, by Peter The Great; Dorsh Medium, 2:06 1/4, by Red Medium; Guy Nella, 2:07 1/4, by Guy Axworthy; J. Malcolm Forbes, 2:08, by Bingen; Barney Gibbs, 2:10 1/4, by Prodigal; Zomidotte, 2:11 1/4, by Zombro; Judge Jones, 2:12 1/4, by Prodigal; High Jeanson, 2:15 1/4, by High Admiral; Star Kay, 2:15 1/4, by Buoning Star; Deroche, 2:22 1/4, by John A. McKerron; Russian Dame, 2:24 1/4, by George Muscorite; St. Frisco, 2:26 1/4, by San Francisco. Pacers—Napoleon Direct, 2:02 1/2, by Walter Direct; Bud Elliott, 2:08, by Prodigal; Halplex E., 2:09 1/2, by Empire Hal; Presolite, 2:11 1/2, by Don Varrick; Hal Connor, 2:14 1/4, by Argot Hal. Most of these horses had beaten 2:10 in their work before they were shipped from Memphis and there is no reason to doubt but that, with them, the veteran trainer will occupy his usual prominent place in the truf battles of the season. Two more horses will join his stable at an early date, Etawah, 2:03 1/4, the champion four-year-old that has made a stud season in Kentucky, and Sir Harvester, 2:24 1/2, a son of the champion stallion The Harvester, 2:01, that is the property of Mr. Geers and that he confidently believes will prove to be as fast a trotter as his famous sire was.

The New York trotting nursery, Hillanddale Farm, located in the eastern part of the state is now credited with being the breeding place of fourteen 2:10 trotters, Spriggan, 2:08 1/4, winner of the \$20,000 purse for trotters at San Francisco, last month, being the fourteenth such performer bred there. Only two other farms now stand ahead of Hillanddale Farm in the production of 2:10 trotters, Patchen Wilkes Farm and Walnut Hall Farm, both located in Kentucky. The roll of honor for Hillanddale Farm shows the following 2:10 trotters were bred at that speed nursery:

Marta Bellini, by Bellini	2:05 1/2
Gazeta, by Admiral Dewey.....	2:06
Bonington (4), by Bellini.....	2:06 1/2
Carlotta Bellini, by Bellini.....	2:07 1/4
Atlantic Epress (3), by Bellini....	2:08 1/4
Leonardo, by Bellini.....	2:08 1/4
Spriggan, by Baron McKinney.....	2:08 1/4
Oro Bellini, by Bellini.....	2:08 1/2
Beatrice Bellini, by Bellini.....	2:08 1/2
Carlo, by Bellini.....	2:08 3/4
Tokio, by Bellini.....	2:09
Farfalla, by Bellini.....	2:09 1/4
Parisette, by Bellini.....	2:10

Only three other breeding farms located outside Kentucky and California have produced as many as eight 2:10 trotters and all three are now out of existence: Ponkapog Farm that was owned by the late J. Malcolm Forbes of Boston, Mass., and located near that city was the breeding place of nine, including those two sensational performers of several years ago, Admiral Dewey, 2:04 1/4, and Sadie Mac, 2:06 1/4. Village Farm at East Aurora, N. Y., before its disposal on account of the death of its famous founder, C. J. Hamlin, produced nine, including the former holder of the world's record holder, The Abbot, 2:03 1/4. The third of these farms was Shuttshurst Farm.



Our Journal

G. N. SIDDEERS.

I used to work with all my might
From early morn till late at night
With primitive methods and tools the same
As were handed down by Tubal-Cain.

Tired I grew of the good old trade,
Would rather have ditched with shovel
and spade,
But soon to my rescue a journal came;
A sample copy—you know its name.

Lo! and behold! it seemed but a myth,
The things I saw in The American Black-
smith,
Rules and recipes for forge and lathe,
And numerous devices your labor to save.

I ordered that journal the very next day.
Since then times have changed, 'tis need-
less to say,
The hammer or shovel, you now ask
which?
I no longer would trade with the man in
the ditch.

I've now read "Our Journal" for many a
year,—
It's chockful of help and full of good
cheer,
I can't do without it, I very well know,
Not even one issue, when the price is so
low.

So now I am sending a dollar to you,
For another good year I am pleased to
renew,
And I'm sure should I reach the ten and
four-score
I will still say, "Dear Editor, send it some
more."



Heats, Sparks, Welds

How long since you've worn out a broom
in the shop?

The keener the smith the slower he is
to cut prices.

How's your insurance? Don't wait for
the fire before you find out.

Where are the New Year resolutions
now? Lost—strayed—or stolen?

A debt every man owes to his business
is to keep constantly after collections.

How do you point plows? Read of the
methods mentioned in this issue and then
tell us your way of doing it.

Quick now! What is Pearlite? Ah!
You did read that article on the structure
of steel carefully, didn't you?

Of course, you can't do all the business,
but are you sure, certain and positive,
that you are getting all you can get?

Isn't it the busy man who is always
ready to do more? The fussy chap is the
one is, is too busy to even do business.

We want to know what you really think
of "Our Journal." We want you to kick,
if you have a kick to register—so let 'er
come.

It's pretty hard to lose any account af-
ter keeping after the delinquent persist-
ently and regularly—in fact, it's almost
impossible.

A smith without a paper is like a shop
without a forge. Keep posted on things
in the trade by reading a trade paper on
your trade.

The only standard of size that is the
same over the entire world, is said to be
the width of moving picture films, which
is 1 3/4 inches.

Use isn't always responsible for the
wearing out of tools. Sometimes neglect
and lack of care will wear them out long
before their time.

Wood of every variety known to man is
said to be on exhibition in both finished
and unfinished condition at the Univer-
sity of Wisconsin.

Friends are necessary to the successful
business man. "Make friends and then
make them customers," should be a good
business building slogan—try it.

Some things come to he who waits, but
did you ever hear of anything coming to
the smith who didn't go after it? Espe-
cially trade and slow pay accounts?

Taken that vacation yet? Better do so
before you grow to the side of the shop.
And take the missus and kiddies along.
Don't forget they need a vacation, too.

No leaks? you say? How about bad
debts, lost charges, stolen goods and the
like? A mighty small leak will sink a
mighty big boat if it's not stopped up.

Are you? There must be a good chance
to sell something on the side—something
that will aid and not retard your busi-
ness. Again we ask, are you handling
a side line?

Bread is the staff of life and advertis-
ing is the bread of business. Keep feeding
your business liberally with it—a liberal
slice regularly and often will keep the
business going strong.

It seems almost necessary in these
days of high cost to sandwich a little
real business in with the war bunk and
dope. For the w. b. & d. doesn't do very
well as a provider and meal ticket.

The emery wheel may be tested for
soundness when installed by tapping it
lightly with a light bar, and when placing
on the mandrel see that the washer on
each side of the wheel are exactly the
same size.

Of course you want to save money.
Then why not grab one of those long-
time-rate offers? You save money on
every rate and the investment can be
made to pay just as big dividends as you
care to declare.

Some men are like power pulleys, they
keep at their work, silently and efficient-
ly doing all that is expect of them,
while others, like loose pulleys, keep
whirling around continually without ac-
complishing anything.

The submarine boat which was consid-
ered extremely limited in its cruising radius
has been brought up to a stage of develop-
ment in the present world conflict where
from four to five thousand miles have been
traveled with apparent ease.

Nine years ago 'twas estimated that

TRUE TALES OF OUR SERVICE

Number Eight

An Indiana smith was planning a
new shop. He was undecided on sev-
eral points and asked our help. He
told us the size of the proposed shop
and gave us an idea of his ideals.
We submitted plans, suggested a lay-
out and made suggestions and recom-
mendations concerning his new shop
that increased the efficiency of the
new smithing plant and made for eas-
ier and better working conditions.

the automobiles registered in the United
States numbered 80,000. The output of
one factory alone now amounts to over
three times that figure. But then some
folks don't call 'em automobiles.

Experience may mean much or little.
If your experience has been long but not
broad, it will not mean much. Sixty
years at anvil and forge may mean much
or little. The broad experience of a man
with a broad, open mind means much and
then some.

With oxy-acetylene plants in the smith
shops, bigger opportunities daily in the
auto-field and small tractors an assured
fact, isn't the outlook for the smith
brighter than ever? Necessary, it is, how-
ever to grab the opportunity and the big
money is going to the first grabbers. Are
you one of the first?

And now the toothbrush is condemned.
What the scientists and bacteriologists
tell about the poor bristles and their dan-
gerous character as germ carriers would
make the simple weapons of warfare
blush with envy. Dental floss and the
forefinger are recommended for use for
the daily mouth renovation.

"Yes," said the Craft Booster, after lis-
tening to the Calamity Howler's discourse
on the automobile and the doom of the
smithing craft. "And when everybody's
using automobiles, trucks and tractors
and all the shoeing and smith shops are
turned into garages, who is going to re-
point the poor farmer's plows and repair
his mowers and things?"

A new course starts September first.
Why not get six weeks of scientific, prac-
tical horseshoeing knowledge under the
guidance of an expert? You'll be better
fitted for the business after a course at
Cornell. Write to Prof. Henry Asmus,
New York State Veterinary College,
Ithaca, N. Y., for particulars. The cost
is very little and the benefits limitless.

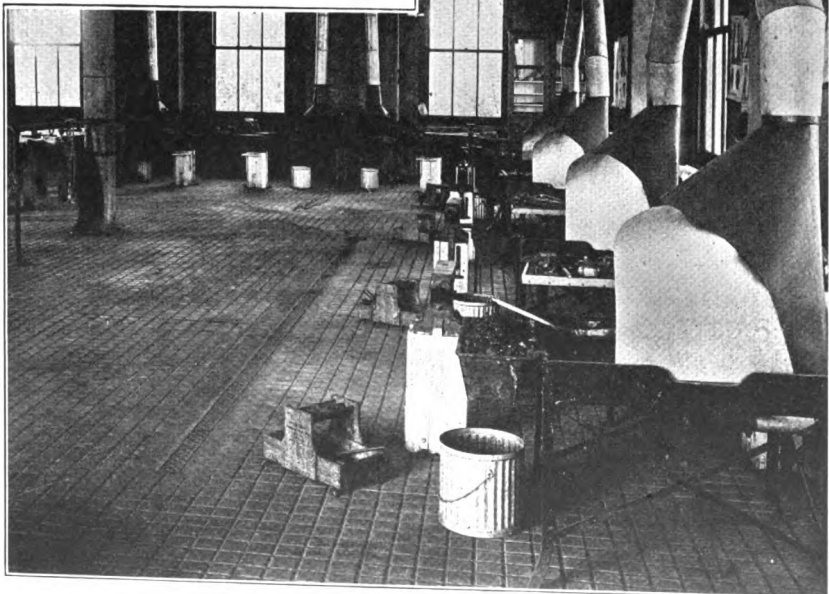
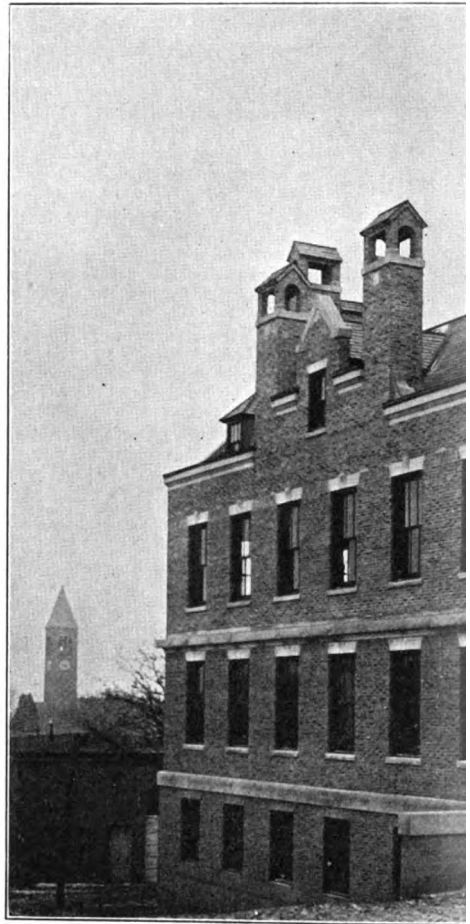
"What's come o' the B. L.?" asked one
of "Our Folks" the other day. Why, it's
still growing. Don't hear as much knock-
ing as you did two years ago, do you?
Well, that's the B. L. at work. Are you
a member of the Boosters' League? that
live-wire band of boosters that silently
but solemnly pledge themselves to boost
for the craft and to answer the knocker
and object. Better join.

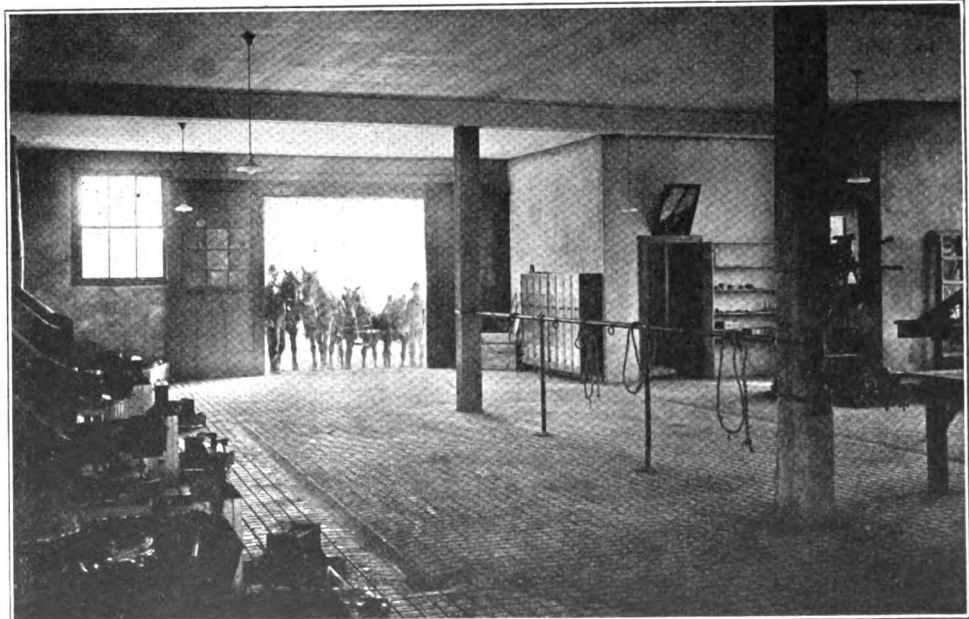
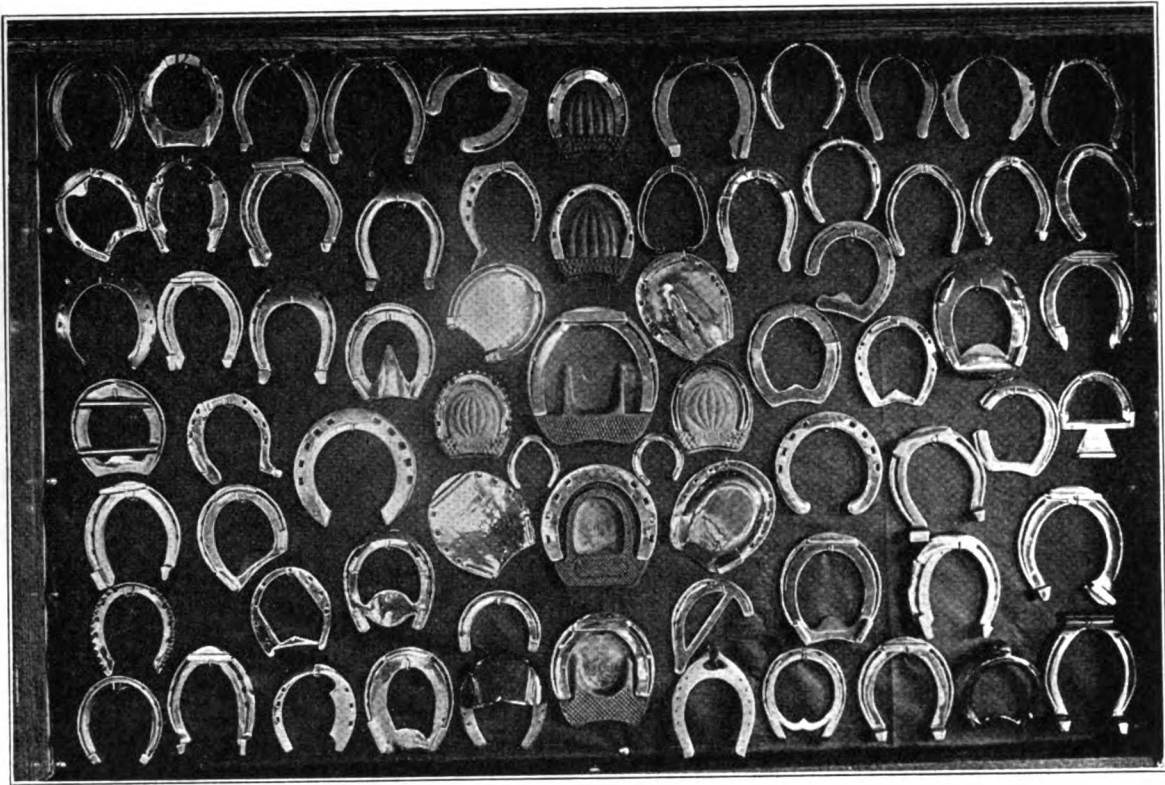
"I don't never get none o' that work,"
returned friend Tardy when we told of
the big, well-paid job that a neighbor
smith had just finished. "Seems as tho'
I get nothin' but cheap jobs." "Perhaps
that is the kind you go after?" we ven-
tured in response. And then we launch-
ed into a lecture on the relationship of
prices and quality. But it was lost on
Tom, for he only reiterated that old saw
about making low prices to introduce his
work.



Cornell Shoeing School

The course in horse shoeing, established by the New York State Veterinary College at Cornell University, is under the supervision of Prof. Henry Asmus, whose picture is shown above. The building at the right is occupied by the school. The upper picture at the extreme right shows Prof. Asmus and the first class to graduate in the shoeing course. Below is shown a case of shoes; the work of Prof. Asmus. The views at the bottom of these pages show the lecture and demonstrating floor. The course at Cornell offers the horse shoer an opportunity to acquire a thorough knowledge of the principles of shoeing and to become familiar with the anatomy and physiology of the horse's foot. The next course begins September first and Prof. Asmus says he is preparing for a more interesting course than ever.







Our Honor Roll

THAT 1925—CLASS

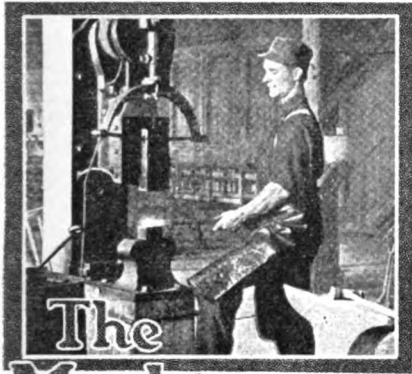
The class of 1925 continues to grow. Better get into it now. You make a big saving in real money—you take care of your subscription account for a long time—and your name is put on the list right up among the leaders. Do it now. It's easy—if your subscription expires this month, send in a five-spot. (Canadian subscribers send \$7.00 and those in other countries £14 sh.) And we'll put your name in the 1925 class and you'll not have another disturbing thought about your subscription account for some time to come.

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2 yrs.	\$1.60 save \$.40	\$2.00 save \$.50	10 sh. save 2 sh.	4 yrs.	3.00 save 1.00
3 yrs.	2.00 save 1.00	2.70 save 1.05	14 sh. save 4 sh.	5 yrs.	2.50 save 1.50
4 yrs.	2.50 save 1.50	3.20 save 1.80	18 sh. save 6 sh.	6 yrs.	3.00 save 2.00
5 yrs.	3.00 save 2.00	3.75 save 2.50	1 £ save 10 sh	10 yrs.	5.00 save 5.00
10 yrs.	5.00 save 5.00	7.00 save 5.50	1£ 14 sh. save 1£ 6 sh.		

Send your order and remittance now—today. Don't wait until you forget all about it. You'll never regret it. Our subscription insurance saves you money. The sooner you begin saving the more you save. There is no better time than NOW.

NAME	Subscription Paid to	NAME	Subscription Paid to
The Fix-It Shop, Utah	July, 1935	J. B. Kunmire, Iowa	Mar., 1923
W. C. Watt, Kansas	Dec., 1930	Lowndale Bros., Mo.	Mar., 1923
I. J. Stites, N. J.	Jan., 1929	J. Carswell, Ark.	Mar., 1923
Waddington Farm, W. Va.	Mar., 1928	G. E. Glazier, Ohio	Mar., 1923
J. Taylor, Calif.	Oct., 1926	G. Fath & Co., S. Africa	Mar., 1923
D. M. Kile, Okla.	Apr., 1925	T. Bradley, N. S. Wales	Mar., 1923
G. Gullgren, Iowa	Apr., 1925	G. Fath & Co., S. Africa	Mar., 1923
V. Prissnitz, Wisc.	Mar., 1925	L. T. Nedham, Ill.	Feb., 1923
E. Price, Ill.	Feb., 1925	G. C. Disinger, Miss.	Feb., 1923
D. C. Garber, Ohio	Feb., 1925	J. Hughes, Ohio	Feb., 1923
J. H. Kurz, Ill.	Feb., 1925	J. Wieber, Minn.	Jan., 1923
E. R. Hlteshue, Ohio	Feb., 1925	Z. A. Enos, Kansas	Jan., 1923
H. F. Schreiber, Penn.	Feb., 1925	W. G. Wise, Cal.	Jan., 1923
J. S. Damm, Iowa	Jan., 1925	F. S. Bishop, S. Africa	Jan., 1923
C. M. Adams, Conn.	Jan., 1925	J. Curran, Ariz.	Jan., 1923
J. M. Withers, Hawaii	Jan., 1925	S. P. Harney, Mont.	Dec., 1922
F. H. Jarvis, Ind.	Dec., 1924	W. Breckner, Okla.	Dec., 1922
F. H. Jarvis, Ind.	Dec., 1924	J. Pabian, Neb.	Dec., 1922
Geo. Tatum, Jr., Fla.	Dec., 1924	P. Fredericksen, Iowa	Nov., 1922
I. Clark, Va.	Dec., 1924	L. O. Leturs, Ill.	Nov., 1922
A. N. Estes, Va.	Dec., 1924	W. Lawson, N. Zealand	Nov., 1922
J. Balley, Man.	Dec., 1924	W. O. Grant, Cal.	Oct., 1922
E. G. Naylor, Md.	Dec., 1924	W. H. Miller, Iowa	Oct., 1922
H. E. Snyder, Ore.	Nov., 1924	A. O. Martin, Idaho	Sept., 1922
J. A. Stewart, Ky.	Oct., 1924	O. A. Mortimore, Idaho	Sept., 1922
C. Richenecker, N. Y.	Oct., 1924	H. J. Wyatt, Wash.	Sept., 1922
W. L. Bertholf, N. J.	Oct., 1924	J. N. Skow, Iowa	Sept., 1922
J. W. Hewson, S. Africa	Sept., 1924	A. D. Standiford, Wash.	Sept., 1922
Ed. Larson, N. D.	Sept., 1924	T. Temkiewicz, Que.	Sept., 1922
R. T. Monk, Ill.	Sept., 1924	A. Pfeiffer, Ohio	Aug., 1922
W. T. De Young, Ill.	Sept., 1924	W. D. Valentine, Iowa	Aug., 1922
Chas. Wells, Colo.	Aug., 1924	G. Hoffman, N. Y.	July, 1922
H. G. Weaver, Pa.	Aug., 1924	J. Erman, Ark.	July, 1922
Working Men's College, Vict.	June, 1924	W. K. W. Hansen, Penn.	June, 1922
F. M. Kenoyer, Neb.	June, 1924	Robert Tochter, Cal.	June, 1922
R. C. Frederick, N. D.	May, 1924	J. Van Marter, N. Y.	June, 1922
H. L. Fenton, N. Mexico	May, 1924	F. Norrie, Yukon, Ty.	Jan., 1922
J. Carl, Iowa	May, 1924	E. Anders & Son, S. Australia	May, 1922
J. E. Little, Penn.	May, 1924	Louisa Carriage Wks., Va.	May, 1922
H. I. Brenzel, N. Y.	Apr., 1924	S. Smith, Tex.	Apr., 1922
W. E. Parr, Iowa	Apr., 1924	J. W. Haar, La.	Mar., 1922
F. Sramek, Neb.	Apr., 1924	D. W. Smith, R. I.	Mar., 1922
L. A. Hulén, Cal.	Apr., 1924	E. A. Dillon, Nev.	Mar., 1922
A. Hulstrand, N. D.	Mar., 1924	D. F. Kuster, Wash.	Mar., 1922
W. F. Riske, Wis.	Mar., 1924	G. F. Johnson, Mich.	Feb., 1922
B. F. Selbert, Cal.	Mar., 1924	R. H. Keith, Iowa	Jan., 1922
H. Roeschwetter, Mo.	Mar., 1924	J. H. Ickes, Penn.	Dec., 1921
W. B. Briant, N. J.	Mar., 1924	E. Willis, Colo.	Dec., 1921
A. Bosch, N. Y.	Mar., 1924	O. M. Johnson, Minn.	Oct., 1921
A. R. Johnson, R. I.	Feb., 1924	H. Feldus, Neb.	Sept., 1921
F. Jacobs, Ohio	Feb., 1924	W. F. Kline, Kansas	May, 1921
A. J. Ferry, Ill.	Jan., 1924	E. Slee, N. Y.	Feb., 1921
H. D. Erskine, Vt.	Jan., 1924	J. L. Jester, Mo.	Jan., 1921
E. G. Walker, Cal.	Jan., 1924	G. A. Moffatt, Yukon, Ty.	Jan., 1921
E. Fowler, Pa.	Jan., 1924	T. P. Considine, Mass.	Dec., 1920
Breen & Son, Ireland	Dec., 1923	A. E. Reere, Mass.	Sept., 1920
M. Lamoreaux, Ohio	Dec., 1923	H. M. Wittman, Neb.	July, 1920
C. R. Davis, N. Y.	Dec., 1923	A. J. Hamburg, Ohio	June, 1920
F. W. Copeland, Me.	Dec., 1923	C. M. Holton, Okla.	June, 1920
J. L. Tomlin, Kansas	Dec., 1923	C. L. Graf, Ohio	June, 1920
H. A. Davis, N. Y.	Dec., 1923	A. Mellum, N. D.	June, 1920
E. H. Troyke, Ill.	Dec., 1923	F. Greer, Queens.	Apr., 1920
D. B. Johnson, Iowa	Dec., 1923	Alex. Zimmer, Ont.	Apr., 1920
S. Horton, Cal.	Nov., 1923	Clark Bros., Cal.	Mar., 1920
J. Spratt, Mass.	Nov., 1923	W. H. Leonard, Penn.	Mar., 1920
F. Watkins, N. H.	Nov., 1923	Ed. Grimm, Tex.	Mar., 1920
J. Koppins, Ala.	Nov., 1923	H. L. Place, S. Australia	Mar., 1920
W. C. Lienert, S. Aus.	Oct., 1923	J. Hiemenz, Minn.	Mar., 1920
W. B. Ahell, N. Y.	Oct., 1923	G. S. Aukers, Va.	Mar., 1920
W. R. Turner, Man.	Oct., 1923	J. F. Leiss, N. J.	Feb., 1920
C. Nelson, Neb.	Sept., 1923	C. M. Jacobsen, Utah	Feb., 1920
H. M. Anderfuren, Cal.	Aug., 1923	P. Bianchi, Texas	Jan., 1920
Cramp Bros., Tas.	Aug., 1923	R. S. Crisler, Ky.	Jan., 1920
L. C. Larsen, Iowa	July, 1923	A. Mahar, Me.	Jan., 1920
S. Effenaar, S. Africa	July, 1923	T. Horne, Ariz.	Jan., 1920
G. L. DeWitt, Mont.	July, 1923	H. B. Draper, Ind.	Jan., 1920
W. W. Gregg, Tex.	July, 1923	H. H. Schwoob, Wyo.	Jan., 1920
W. R. Stroupe, N. C.	July, 1923	L. A. Coats, Mont.	Jan., 1920
O. C. Young, Mich.	June, 1923	I. Blough, Penn.	Feb., 1920
Otto Spittel, Penn.	June, 1923	Dayable & Sons, Vict.	Dec., 1919
A. Chapman, N. Y.	June, 1923	E. M. Crouch, Conn.	Dec., 1919
C. Birely, Md.	June, 1923	R. Werk, Neb.	Dec., 1919
F. H. Shupe, Penn.	June, 1923	J. R. Wilson, Md.	Dec., 1919
J. C. Stover, Penn.	Apr., 1923	N. Buchanan, Ont.	Dec., 1919
W. Schoonover, Penn.	Apr., 1923	P. Reif, Ohio	Dec., 1919

NAME	Subscription Paid to	NAME	Subscription Paid to
A. Larsen, Ida.	Dec., 1919	E. T. Marshall, Wis.	Dec., 1918
H. Andresen, Iowa.	Dec., 1919	F. Hoopengardner, Md.	Dec., 1918
I. P. Powers, N. J.	Dec., 1919	Hebrew Tech. Inst., N. Y.	Dec., 1918
J. G. Grantlund, Conn.	Dec., 1919	G. E. Winchester, Cal.	Dec., 1918
F. B. Horn, N. Mexico	Dec., 1919	F. T. Grisham, Ark.	Dec., 1918
A. J. Haun, Calif.	Dec., 1919	J. Gray, Scotland	Dec., 1918
A. Clark, Viet.	Dec., 1919	W. Tait, N. Zealand	Nov., 1918
O. J. Willson, N. H.	Dec., 1919	A. Larsen, N. Zealand	Nov., 1918
Booth, MacDonald & Co., N. J.	Dec., 1919	R. E. Russell & Son, Penn.	Nov., 1918
A. Luke, Neb.	Dec., 1919	H. Schaffer, S. Dakota	Nov., 1918
L. F. Keilholz, Penn.	Dec., 1919	D. MacDonald, N. S. Wales	Nov., 1918
J. W. Rupp, Wisc.	Dec., 1919	C. A. Ritchie, Scotland	Nov., 1918
F. G. King, N. Y.	Dec., 1919	T. E. Sanders, England	Nov., 1918
W. Vallance, New York	Nov., 1919	G. E. Hardcastle, N. Y.	Nov., 1918
W. Schaid, Wisc.	Nov., 1919	C. Ziehe, Iowa	Nov., 1918
J. Delane, Neb.	Nov., 1919	J. L. Peffer, Penn.	Nov., 1918
P. Gudmunson, S. Dakota	Nov., 1919	W. H. Houghton, Penn.	Nov., 1918
R. Ramach, N. W. Ter.	Nov., 1919	F. R. Tomlinson, Kans.	Nov., 1918
J. Nalsmith, N. Zealand	Nov., 1919	F. A. Rhea, Ill.	Nov., 1918
W. H. Lick, Ohio	Nov., 1919	C. A. Brouloulor, Ill.	Nov., 1918
W. H. Spicer, Ky.	Oct., 1919	H. V. Rueli, Ala.	Nov., 1918
O. Bourgon, Que.	Oct., 1919	Cyclone Gate & Fence Co., S. Afr.	Oct., 1918
T. Russell, N. S. Wales	Oct., 1919	W. Alson, Minn.	Oct., 1918
J. Alston, Viet.	Oct., 1919	H. P. B-erman, N. D.	Oct., 1918
M. Pople, N. S. W.	Sept., 1919	P. Deverney, Viet.	Oct., 1918
J. P. Jones, Col.	Sept., 1919	H. C. Henderson, Queens	Oct., 1918
A. F. Stickle, N. Y.	Sept., 1919	J. Eley & Son, S. Australia	Oct., 1918
A. E. Reere, Mass.	Sept., 1919	J. E. Matthews, England	Oct., 1918
T. B. Smart, Mo.	Sept., 1919	Munro & Co., N. Zealand	Oct., 1918
Schmitt Bros., Ill.	Sept., 1919	D. R. Winton, N. S. Wales	Oct., 1918
W. Clark, S. Africa	Sept., 1919	E. Schrapel, S. Australia	Oct., 1918
W. R. Randall, N. J.	Sept., 1919	Platt & Braman, Minn.	Sept., 1918
W. H. Sheaffer, Penn.	Sept., 1919	C. Madison, Ill.	Sept., 1918
R. Crosswell, N. Zealand	Aug., 1919	A. Quay, S. Africa	Sept., 1918
W. E. Sheets, Penn.	Aug., 1919	J. Wilkinson, Queens	Sept., 1918
Cooper & Curd, N. Zealand	Aug., 1919	Grimeley, Ltd., N. S. Wales	Sept., 1918
A. Discher, N. Queens	Aug., 1919	J. E. Birely, Md.	Sept., 1918
E. Underwood, S. Africa	Aug., 1919	C. F. Baggett, Queens	Sept., 1918
E. P. Wambold, Penn.	Aug., 1919	J. Thomeycroft, N. W. Ter.	Sept., 1918
W. F. Turner, S. Australia	Aug., 1919	W. A. Thuge, Queens	Sept., 1918
C. H. Smith, S. Australia	July, 1919	A. L. Varrie, S. Africa	Sept., 1918
W. Letbether, Ark.	July, 1919	Geo. A. Petty, Utah	Sept., 1918
J. P. Dambach, N. J.	July, 1919	G. W. Hazzlett, Penn.	Sept., 1918
J. T. Wilson, S. C.	July, 1919	C. Walter, Ore.	Sept., 1918
J. A. Moffett, Penn.	July, 1919	T. B. Holt, Okla.	Sept., 1918
I. B. Harey, Cal.	June, 1919	Robert Cook, Ky.	Sept., 1918
Wright, Boag & Co., S. Africa	June, 1919	A. B. Wendlandt, Wash.	Sept., 1918
F. Rass, Sask.	June, 1919	A. J. Brookman & Co., Vict.	Sept., 1918
W. H. Hopper, Cal.	June, 1919	Peter Cocks, W. Australia	Sept., 1918
G. Jackson, England	June, 1919	R. J. Koppkins, Texas	Sept., 1918
E. G. Mulholland, Me.	June, 1919	E. H. R. Scholz, S. Aus.	Aug., 1918
Vinsten & Duncan, S. Africa	June, 1919	J. Vascetti, Colo.	Aug., 1918
W. F. Helmke, Tex.	May, 1919	E. C. Puxton, S. Australia	Aug., 1918
J. V. Delmore, Nev.	May, 1919	V. D. Sibley, B. C.	Aug., 1918
C. H. McCormack, Kansas	May, 1919	L. Smith, Cal.	Aug., 1918
M. Duboise, Miss.	May, 1919	W. Cribb, Queensland	Aug., 1918
R. Manske, Tex.	May, 1919	Geo. Reed, S. Africa	Aug., 1918
Clyde Engineering Co., N. S. W.	Apr., 1919	H. Kelenbons, N. J.	Aug., 1918
A. Thompson, Fiji Islands	Apr., 1919	W. D. Bradford, Cal.	Aug., 1918
Theo. Paschke, Cal.	Apr., 1919	J. Meyn, Ill.	Aug., 1918
I. M. Townsend, Neb.	Apr., 1919	E. A. Winkler, Penn.	July, 1918
G. Bish, Fiji Islands	Apr., 1919	J. A. West, Kansas	July, 1918
G. D. Gamble, Mass.	Apr., 1919	T. H. Graham, Vic.	July, 1918
G. Ingram, Va.	Apr., 1919	Gilbert Bros., S. Australia	July, 1918
J. H. Martin Mfg. Co., Ind.	Apr., 1919	Geo. Dash, N. Zealand	July, 1918
R. H. Kuhrtz, Iowa	Apr., 1919	C. R. Oliver, S. Africa	July, 1918
J. Moyer, S. D.	Apr., 1919	L. G. Reid, S. Africa	July, 1918
Emil Hatum, Minn.	Mar., 1919	J. M. Kunzier, N. J.	July, 1918
G. H. Pollmar, Neb.	Mar., 1919	Polzer Bros., Wisc.	July, 1918
C. J. Vonblad, Penn.	Mar., 1919	P. A. Stohl, Neb.	July, 1918
F. Weber, Tasmania	Mar., 1919	Geo. Chappelaine, Que.	July, 1918
Wyper Bros., Queens.	Mar., 1919	J. W. Heneries, Ore.	June, 1918
A. Rogers, N. Y.	Mar., 1919	I. Boynton, Utah	June, 1918
P. W. Fossett, Me.	Mar., 1919	W. Baum, Ill.	June, 1918
C. Habman, Colo.	Mar., 1919	G. A. Erlinson, Mo.	June, 1918
Onondaga Forge Co., N. Y.	Mar., 1919	C. E. Wilson, Ohio	June, 1918
A. F. Bowman, Ohio	Mar., 1919	F. Feltz, Ohio	June, 1918
C. Williams, W. Australia	Mar., 1919	J. L. Rehn, S. Australia	June, 1918
J. P. Mackin, N. D.	Mar., 1919	W. M. Puryear, Ala.	June, 1918
E. Raetz, Kansas	Mar., 1919	Thom & Verste, S. Africa	June, 1918
A. Burke, N. J.	Mar., 1919	L. Lacaste, Que.	June, 1918
D. Frazer, N. Zealand	Feb., 1919	Wright & Son, Texas	June, 1918
C. T. Haskins, N. Y.	Feb., 1919	J. Lindsay, S. Africa	June, 1918
N. E. Koch, Cal.	Feb., 1919	J. H. Gibbs, S. Africa	June, 1918
C. W. M. Burroughs, N. J.	Feb., 1919	W. W. Bridges, Ark.	June, 1918
L. Artzner, Ohio	Feb., 1919	F. J. Wurtz, Neb.	May, 1918
R. Taylor, N. Zealand	Feb., 1919	I. A. Miller, S. D.	May, 1918
R. Strode, Ore.	Feb., 1919	C. M. Simmons, Mo.	May, 1918
Lehman Bros., Ill.	Feb., 1919	J. C. Klein, Miss.	May, 1918
W. J. Andrews, Ark.	Feb., 1919	Matheson Bros., Iowa	May, 1918
O. N. Benninger, Penn.	Feb., 1919	Ed. Holland, Queens	May, 1918
W. Harsenape, S. Africa	Jan., 1919	H. L. Haswell, N. C.	May, 1918
J. J. Begerholm, Cal.	Jan., 1919	Christensen Bros., Cal.	May, 1918
L. A. Telking, Kansas	Jan., 1919	I. Butterworth, N. Y.	Apr., 1918
W. S. Wagner, Tex.	Jan., 1919	A. Waite, R. I.	Apr., 1918
A. Mackenzie, W. Australia	Jan., 1919	F. Koatmann, Mo.	Apr., 1918
M. Beck, New York	Dec., 1918	W. H. Decker, Me.	Apr., 1918
B. R. Merritt, Queens	Dec., 1918	A. J. Klinger, Ohio	Apr., 1918
Brown & Scully, N. S. Wales	Dec., 1918	C. Isaacs, Cal.	Apr., 1918
A. Horstad, Minn.	Dec., 1918	T. Pollock, Penn.	Apr., 1918
E. P. Howes, Mass.	Dec., 1918	W. H. Collett, S. Africa	Apr., 1918
C. N. Robinson, Vt.	Dec., 1918	G. F. Brackett, Wash.	Apr., 1918
F. Trelegan, N. J.	Dec., 1918	E. Koepke, Wis.	Apr., 1918
G. F. Vincent, N. Y.	Dec., 1918	H. S. Wayne, S. Australia	Apr., 1918
J. R. Conrad, Kansas	Dec., 1918	H. S. Yongue, Wash.	Apr., 1918
A. O. Giroux, Mass.	Dec., 1918	W. Wellhans, N. D.	Apr., 1918
A. A. Murray, Tex.	Dec., 1918	W. H. Chipman, Mo.	Apr., 1918
C. W. Brake, Mich.	Dec., 1918	A. P. Strobel, N. Y.	Apr., 1918
J. Dubendorf, Penn.	Dec., 1918	E. H. Alberty, Penn.	Apr., 1918
G. F. Laughlin, Ill.	Dec., 1918	J. R. Jeffries, Penn.	Apr., 1918
L. M. Platt, Penn.	Dec., 1918	R. Colvin, Ind.	Apr., 1918
F. Boeckman, Ill.	Dec., 1918	J. Lippert, Ill.	Apr., 1918
W. H. Habermehl, Iowa	Dec., 1918	Otto Tietz, S. Africa	Apr., 1918



Machine and Tool Smith

The Structure of Tool Steel*

J. V. EMMONS

Chief of Metallurgical Staff

The Cleveland Twist Drill Company

Tool Steel may seem at first to be a very special subject, of interest to but few. Actually every man is brought into intimate relationship with some form of tool steel many times every day. As he rises in the morning he shaves with a razor of 1.50% carbon steel made in New York. He files his nails with a file of 1.30% carbon steel made in Philadelphia. He carves his steak with a knife made in Sheffield, of 1.10% carbon steel. His pocket knife is made in Germany of 1.20% carbon steel. The delicate springs and pinions of his watch, all of highly tempered tool steel, guide him to his office on time. So all through the day tool steel is the servant of man in countless intimate and personal ways.

But in the work of the engineer, tool steel is even more indispensable. From the time the designer first picks up his drawing instruments until the last rivet is driven in the structure or the last screw in the machine, hardened and tempered tools play their part. With all this universal use of tool steel, what an elu-

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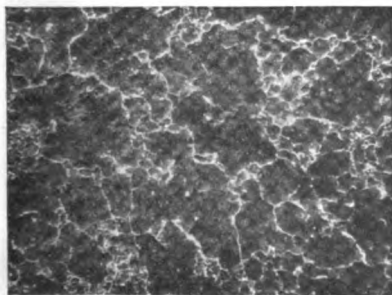


FIG. 1.—THE BRITTLE KNIFE BLADE LOOKED LIKE THIS, UNDER THE MICROSCOPE

sive and indefinable thing is quality! How many of you have borrowed a mechanic's pet screw driver? Do you remember how unwilling he was to lend it? He knew that a first class screw driver was hard to find and harder to keep. And there is no way to tell before you buy it whether a screw driver is good or bad. Some time ago I bought a pocket knife from a large hardware firm in the city. I paid enough for it to insure, as I thought, getting a good knife. After trial I soon discovered that one of the blades of the knife was so brittle that you could break large pieces out of it with the thumb nail. Upon returning it, the knife was at once replaced with another similar in appearance, of the same make. One of the blades of this knife was so soft that it could be bent over at right angles without breaking. The knife being replaced a second time, I found a knife that has been the best I have ever carried.

An examination of the two defective knives revealed that the first had a structure similar to Figure 1, the long coarse lines of which greatly weaken the steel. The second

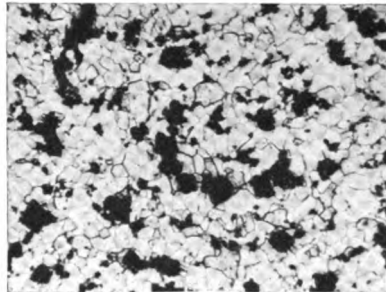


FIG. 2.—THE STRUCTURE OF THE SOFT BLADE SHOWN UP LIKE THIS

knife with the soft blade had a structure similar to Figure 2, in which the carbon is all in the form of graphite, serving no useful purpose. This structure is almost exactly like that of malleable cast iron, the white grains representing pure iron, the black graphite. The good blade has not been examined but it undoubtedly has a structure like Fig. 3, in which the fine uniform structure shows clearly the quality of the material. Yet these three knives under ordinary examination appeared exactly the same. Furthermore, the chemical analysis is undoubtedly similar, the difference in quality being purely a matter of the different arrangement of the various chemical constituents or, in other words, the structure.

With this introduction we will proceed to study in detail the micro-

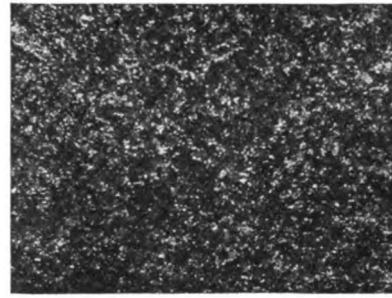


FIG. 3.—SHOWING A STEEL STRUCTURE OF UNIFORMITY AND QUALITY

structure of tool steel. Tool steel ordinarily contains from 0.60% to 1.75% carbon. The principal structural constituents of annealed tool steel are Ferrite, Pearlite and Cementite. Ferrite is pure iron and usually appears under the microscope in the form of small hexagonal grains.

Cementite is carbide of iron containing three parts of iron to one of carbon. It is remarkable for its great hardness and brittleness, and its resistance to attack by acids. It usually appears white under the microscope.

Pearlite is an alloy of iron with 0.84% carbon and always appears to consist of alternate plates of Ferrite and Cementite.

Ferrite, being pure iron, is very soft and weak. Cementite is harder than glass and very brittle. Pearlite, consisting of a mixture of the two, is harder than Ferrite and tougher than Cementite.

The principal constituents of hardened tool steel are Martensite and Cementite. The Cementite is the same as described above. The Martensite is a solution of carbon in iron which possesses great hardness. Its structure is remarkable, consisting of very fine interlacing needles which probably give it its great strength. Hardened and tempered tool steel contain two other constituents. Troostite and Sorbite, which are softer and tougher than the Martensite from which they are derived by tempering, but still much harder than Pearlite.

By far the larger part of the tool steel now on the market is made by the crucible process. This, the oldest of all processes of steel making, consists of melting the iron, together with carbon in the form of charcoal, in a crucible and pouring into an ingot. From this process crucible steel has often been called "cast steel". Tool steel, as it is cast, is very brittle and unfit for any purpose. Its structure is coarse, consisting of Pearlite with an excess of either Ferrite or

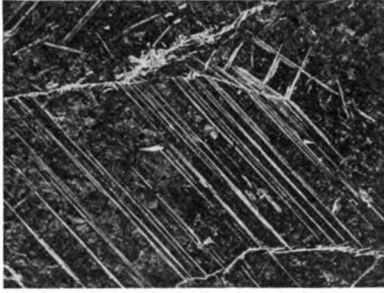


FIG. 4.—SHOWING THE STRUCTURE OF THE TOOL STEEL INGOT

Cementite, depending on whether the carbon is below or above 0.84%. The structure of a tool steel ingot containing 1.30% carbon is shown in Fig. 4.

From this starting point the process of manufacture of a tool steel product is one of refinement of structure. In the steel mill the ingots are first inspected, graded and the pipe in the top broken off and discarded, then reheated and hammered or rolled to a billet. This hot working breaks up the coarse crystals and refines the structure very appreciably. The structure of a high carbon billet is shown in Figure 5, the grain size of which, while still large, is much superior to that of the ingot as shown in Figure 4. After the billets have had the surface imperfections chipped or ground out they are again reheated and forged or rolled to a block, plate or bar, according to the purpose for which the steel is intended. This working which is usually at a lower temperature than the previous one, results in a still greater refining of the grain size. See Figure 6.

The steel is now in the form as received by the tool maker, but before it can be machined the structure must be still further refined in order to give it softness and put it in proper condition for hardening. This is accomplished by carefully regulating annealing. This annealing consists of heating the steel to a temperature above its critical point, usually about

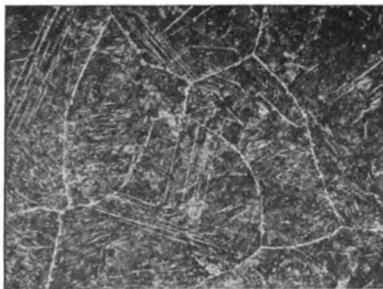


FIG. 5.—THE HIGH CARBON BILLET SHOWS A FINER STRUCTURE

1450° F., and cooling very slowly. This treatment breaks up the coarse network which has been such a prominent feature of the several stages shown before and substitutes a very fine granular structure in its place.

Steel in this condition is now ready for machining and hardening. The machining has, of course, no effect on the structure of the steel. The last stage in the series of refining process is hardening. The principal structural changes which take place on hardening are the change of Pearlite to Martensite, the absorption of all Ferrite present, the absorption of part of the remainder into smaller sized particles. In the case of a low carbon tool steel these changes produce an amorphous mass of Martensite in which even the highest powers of the microscope find it difficult to distinguish a structure. In a high carbon steel the Martensite mass is thickly dotted with small particles of Cementite.

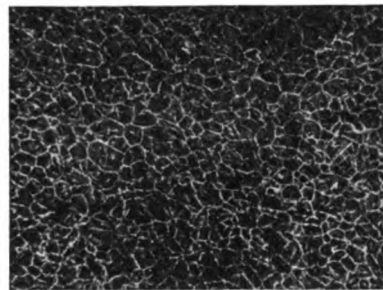


FIG. 6.—ROLLING REFINES THE STRUCTURE STILL FURTHER

The final heat treatment, drawing the temper, results in a change of a portion of the Martensite to Troostite and Sorbite, toughening the tool and reducing its hardness but not affecting the degree of refinement. This structure is the one which will be present in all high grade tools which have been properly hardened. In the preceding series of operations for the refining of the structure of tool steel from the ingot to the finished tool each operation may be assumed to have been perfectly done. Each illustration has been of a perfect piece of steel for the stage to which it had progressed.

In the manufacture of tool steel products on a large scale, there is opportunity at every turn for defects to creep into the steel and all unseen by the ordinary eye remain to undo the work of the most skilled mechanics. The microscope has been shown to be by far the most useful means of tracing these hidden flaws to their true source. It also, in many cases, points out the cure or the

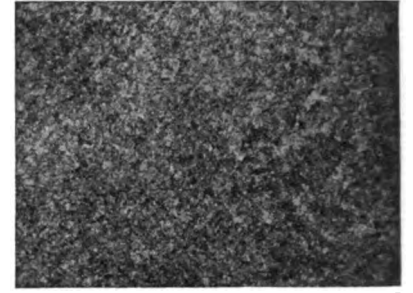


FIG. 7.—HEAT TREATMENT STILL FURTHER REFINES THE STRUCTURE

means of eliminating the harmful condition. Defects in tool steel may be divided into three classes:

(1) Defects which originate in the casting and hot working operations of the steel mill.

(2) Defects resulting from annealing.

(3) Defects resulting from hardening.

In the mill the first structural defect which may occur in tool steel is the formation of a pipe or shrinkage cavity in the center of the ingot. This pipe may be closed over at the top of the ingot and so not being discovered rolled down to the finished bar. In the absence of proper inspection it may even progress as far as the hardening operation unsuspected. There it makes its presence known by splitting the tool open along its entire length as soon as it is cooled in the quenching bath.

Laps, seams and bursts are other defects caused in the mill and are usually visible to the naked eye. Fig. 9 shows a slight seam which has become a still more serious defect through decarbonization.

Segregation of the carbon is a defect which occurs in the mill, either by prolonged soaking in the reheating furnaces or insufficient hot work. The carbon, in the form of Cementite, instead of being uniformly distributed through the steel, becomes collected in large groups or masses. These masses, as the steel is rolled out in the form of bars, are drawn into long streaks or strings, which are a seri-

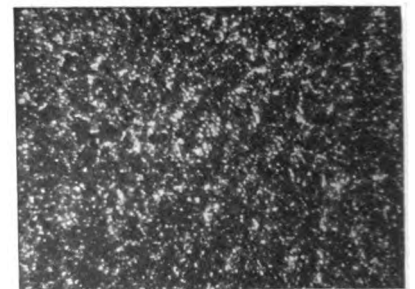


FIG. 8.—THE MARTENSITE IS THICKLY DOTTED WITH CEMENTITE

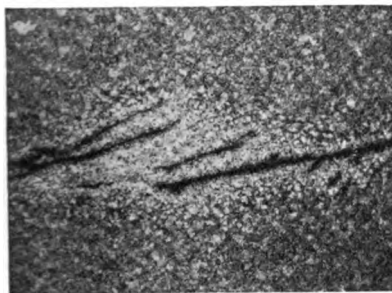


FIG. 9.—DEFECTS ARE SOMETIMES CAUSED IN THE MILL. THIS SHOWS A SEAM

ous form of weakness in the steel. Fig. 10 is a cross section of a bar showing this segregation. Fig. 11 is a longitudinal section.

Too high temperature of finishing under the rolls or hammers may leave the steel in too coarse a condition to be refined by any ordinary annealing or hardening methods. This is one of the commonest of defects in steel as it comes from the mill. Steel in this condition (Fig. 12) will harden with a coarse crystalline fracture and be liable to fire-crack.

The annealing of tool steel is sometimes done by the mill and sometimes by the tool manufacturer, so the defects due to it will be considered separately. Tool steel, as it comes to the annealer, is usually in the condition shown in Fig. 6. It is necessary that this network be broken up and the steel reduced to a fine uniform structure, as is shown in Fig. 7.

If the heat is not sufficiently high or if the time is not long enough the coarse structure will be incompletely broken up with a result like Fig. 13. This would make a tool very likely to chip and of poor wearing quality. A very serious defect which is sometimes caused by annealing is the formation of graphitic carbon. (Fig. 14). In this condition, which is produced by prolonged annealing at low temperature, the carbon is thrown entirely out of combination with the iron and assumes the form of graphite.

When this change has taken place the tool steel is no longer steel but a

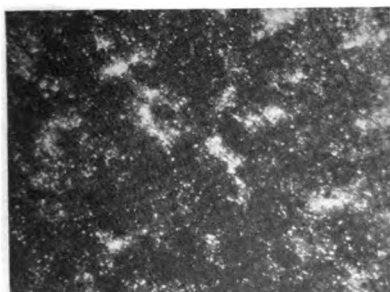


FIG. 10.—A CROSS SECTION OF THE SAME BAR SHOWN IN FIG. 11

very excellent grade of cast iron. Fig. 15 shows for comparison the structure of ordinary cylinder iron. In many cases the precipitation of graphite is not as complete as this, only a portion of the carbon being thrown out of combination, as in the example of Fig. 16.

In considering the defects which may be due to hardening, we should not forget that too often the hardener gets the blame for all the mistakes which may have been made on the steel before he gets it. The most common defect due to hardening is over-heat. When a piece of perfectly annealed steel is overheated, the coarse crystalline structure which the steel mill has gone to such great trouble to break up, is again given a chance to grow. The larger this structure is allowed to become the greater damage is done to the steel. A few minutes' carelessness by a hardener may thus undo many days' work of a careful steel maker. Under-heat in

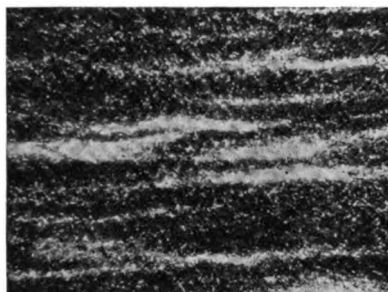


FIG. 11.—THIS IS A LONGITUDINAL SECTION OF THE SAME BAR SHOWN IN FIG. 10

hardening, of course, results in a soft tool with little change of structure. Uneven heating and heating for too short time, result in uneven hardening, with great danger of firecracking. Heating for too short or too long time also causes distortion of the tool.

One of the commonest defects in tool steel has not been classified above because it may occur at any time the steel is heated above its critical point. This is the decarbonization of the exposed surface which is commonly known as the bark of skin on tool steel. (Fig. 17). This defect is present to a greater or less extent on all tool steel and must be removed by machining. It is caused by the exposure of the steel to the air or other oxidizing conditions while heated to a high temperature. The result is the removal of the carbon from the surface and often penetrating to a considerable depth. For example, in a 1.25% carbon steel, the cross section of which is shown in Fig. 17, the outside of the steel has been reduced to pure iron. Below this

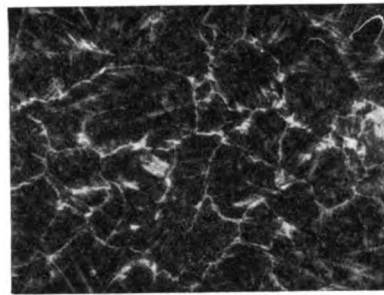


FIG. 12.—THIS STEEL IS TOO COARSE TO READILY REFINE PROPERLY

is a band of steel of about .80% carbon, then the 1.25% carbon of the interior. This bark or decarbonized surface, if not completely removed, will result in soft spots and poor cutting qualities of the hardened tool.

These structural defects are with a few exceptions not visible to the naked eye, yet upon their successful prevention depends the quality of the tool. A finished tool containing such a defect might be likened to a bridge which, perfect in every other detail, is built upon an unsafe pier. The entire structure may be instantly destroyed through the failure of a single member.

In the production of finished tools on a large scale, the most constant vigilance is necessary in both inspection of raw material and regulation of heat treatment to insure that none but tools with a perfect structure may reach the customer.

Even those who make and temper a few tools for their own use, find that inspection of the raw material and regulation of their heat treatments repays many times their cost in the production of tools of increased efficiency.

The increased use of the pyrometer in regulating the temperatures of heating has been of immense value in promoting great accuracy and uniformity.

The introduction of the microscope for the inspection of steel and for research will result in still greater improvement. A finished drill or reamer bears no indication in its sur-

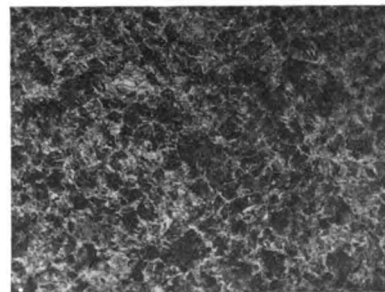


FIG. 13.—HERE THE COARSE STRUCTURE IS INCOMPLETELY BROKEN UP

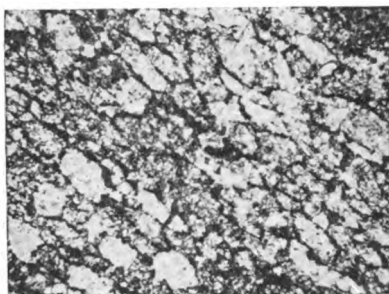


FIG. 14.—PROLONGED ANNEALING AT LOW TEMPERATURE PRODUCES THIS STRUCTURE

face of its cutting quality. But by the stern test of chemical analysis and under the searching eye of the microscope its secrets stand revealed.

Notes on the Theory and Practice of Hardening Steel*

J. C. WEST.

Now, "what happens inside of the steel" is this. The hardening carbon being held in combination with the iron, having but weak ties to that form, is partly released by the heat, although this heat is so very much less than the degree of heat of calescence, by which the hardening carbon was formed. This released hardening carbon combines with a much less proportion of the iron and forms carbide in the tempered steel; the greater the degree of temperature the more rapidly the process proceeds; but it proceeds all the time the steel is exposed to the lowest tempering heat although very slowly, perhaps. Wonder of wonders?—the laws of being of steel ordain that the rate of oxidation keeps pace almost exactly with the rate at which the hardening carbon resolves itself into carbide, and thus we possess an infallible guide in what we are doing.

If the steels under the different tempers, as shown by their colours, are analysed, the light yellow will be found to contain more hardening carbon and less carbide than the dark yellow, and so on down through the gamut of the tempering colours.

[The factor of time is again shown in the transition of hardening carbon into carbide in the process of what is called "broken hardening" (ominous nomenclature). In this process the steel is first dipped in melted lead (!), which quenches it sufficiently to fix the hardening carbon for the moment; but the heat in the steel, if given a very little time, would allow

*The first installment of this article appeared in the May issue.

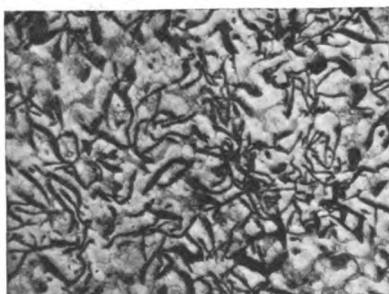


FIG. 15.—THE STRUCTURE OF GOOD CAST IRON

the hardening carbon to transform into carbide. So, to prevent this taking place, the steel is removed from the molten lead directly the red colour has gone, and dipped into oil or water, the further cooling of which keeps the combined carbon in the hardening form. This shows how much faster the transition of hardening carbon into carbide is the higher the temperature. The cooling effect of lead has brought the steel to a temperature that would show a blue oxide, yet the hardness is greater than that of a "blue", because there has not been sufficient time for the combined carbon to change, the subsequent dipping into a much colder medium not allowing the necessary time, which if kept in the lead, there would have been. Broken hardening is resorted to with articles the shape of which gives a great liability to warp or crack in hardening. Another illustration of the factor of time is that a piece of steel kept at a temperature of 230 deg. C. for 15 minutes acquired a yellow oxide. Thirty minutes later it turned red purple, in forty-five minutes it began to turn blue, and in an hour a light blue appeared, although the temperature was maintained all through at 230 deg. C. If hardened steel is kept at a temperature of boiling water for a long period, there is a perceptible tempering action. Oils' fats, rosins, all sorts of mixtures and messes are used to produce the required degree of

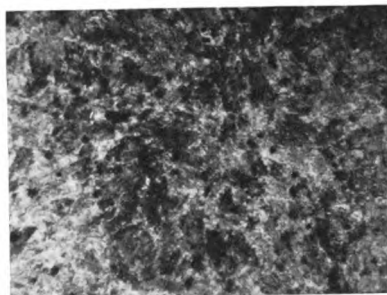


FIG. 16.—ANOTHER CONDITION IN THE STRUCTURE OF STEEL

hardness (approximately) at one operation, and because the result is often a tougher article at the degree of hardness, there is a superstition amongst rule-of-thumb workers that the quenching medium exerts some occult thurmaturgic influence on the steel, but the probable explanation is that as the steel is cooled rather slower than would be the case if quenched in water, there is more time for the molecules to rearrange in contracting, and so they come into closer relation, analogously to what happens inside the steel when a piece of overheated (not "burnt") steel is allowed to get quite cold, when, on reheating properly, and quenching, it will be found to have recovered itself. It is very amusing to watch a rule-of-thumb worker using some "secret" composition of his own for hardening a piece of steel. Nobody ever was as wise as he looks. Diana never guarded herself with the zeal with which he guards the secret of this composition. And yet it would only be effective in a certain range of bulks of steel; anything above or below this range would be too hard or too soft, because the speed with which the heat was extracted would be affected. Probably the traditional excellence of certain ancient swords was due to their being of one bulk. A lighter sword would have broke, a heavier one have bent. In steel-working, as in most things, practice hits upon the facts, science afterwards explains them, and such ex-

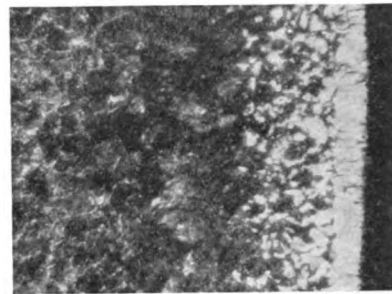


FIG. 17.—SHOWING DECARBONIZATION ON THE SURFACE OF THE STEEL

planations lead to better results still. Each does its part, and is the counterpoint of the other. So let neither feel too "cocksey" about it. I have been made to actually "ache" sometimes, by the air of infallible profundity with which some "practical" man has expressed his contempt for "books", and the erudite way he would impart some trite fact that his narrow purview prevented him knowing the banality of. Compare this attitude with the freedom with which the contributors to the "E. M." give valuable information every week. Why? Because here, books and bench have gone hand in hand, each doing its allotted part in producing competency, and leaving no room for self-sufficiency to occupy.]

Old-Time Pump Makers' Tools and Operations

L. R. SWARTZ

My ancestors brought from Germany in 1738, a set of pumpmaker's tools and from that time down it seems to have been the heirloom of the eldest son to be a pumpmaker. In the year 1742 it seems that a new auger-shaft was needed, for a new shaft was imported bearing the maker's mark and that date upon the eye where the handle was inserted. In my father's time about 3 feet of that shaft had become worn thin in working over the rest and it became necessary to replace it with 1 1/4 inch rolled iron. My grandfather kept the main part of the shaft but my father had the eye and part of the old shaft, when I was a boy and many a foot of timber I bored with it. The first tools of which I have any recollection are the pumpmaker's tools used by my father and grandfather. When I was a little tot I played with the auger chips and was proud when I was allowed to lubricate the bowl and point of the leader with a chunk of fat bacon. Later on I acquired the ability to bore a 28-foot log from each end so accurately that the hole was straight through the piece.

For several years my father and I finished 125 pumps a year from the stump. At that time the drilling

business was only a small "side show", with pump making as the main business. It took years to convince our patrons that there was any merit in the 5 or 6 inch drilled well as compared with the well dug by hand.

Timber was plenty and of good quality then and we had plenty to do then making wood pumps for wells from 10 to 200 feet deep. My father was of an ingenious inventive turn of mind, and for the purpose of gaining speed and accuracy he re-pointed the leaders to about the shape shown in the engraving at A. The old leaders had a slimmer point and longer screw than that shown and were more apt to follow the heart of the timber instead of the true direction of the hole to be bored. They were also harder to operate.

He also invented the followers with cast body and inserted bit. With the old style followers the chip had to be drawn out about every four inches. They were hard to operate and a knot or fault in the timber would pull them out of true. The new style followers were easier to turn and always bored a true hole and it was possible to bore a foot or two without pulling out the chip.

I have a six-inch follower of his make marked "G. W. Swartz 1860" with two bits. Later on other patterns were made with brass body and single bits. These latter proved to be the best land boring tools made.

Augers of English and German make were either formed like the chamber bit shown or the old style followers with clips to permit an auger to bore various sized holes. Sometimes the screws were let out and a wedge of wood driven between the clip and auger to still give a wider range of size.

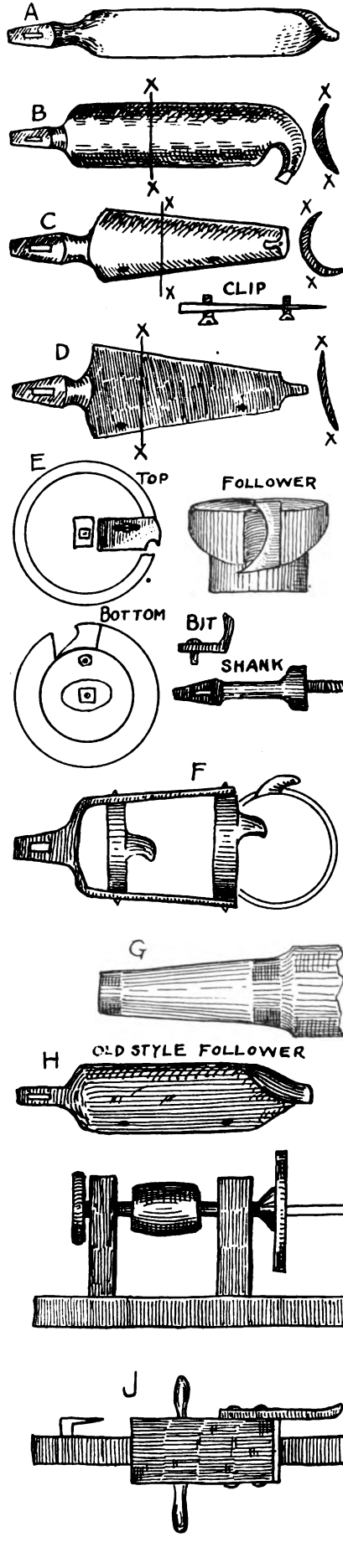
The old style followers imported from England were of the form here shown as the chamber bit (C and D), and it took considerable end pressure or pushing on the shaft to make them lead, while the German style with a spiral edge led without pushing and were set to various cuts from 5/8 to 1 or 1 1/4 inch to the turn. A knot or fault in the timber would cause any of the old style followers to pull over so that the hold was not true. This could not happen with the followers invented by my father because the two guides held the bit true and it would not pull over.

Whether my father or George Leuherr invented the double fitting joint I cannot say. They worked

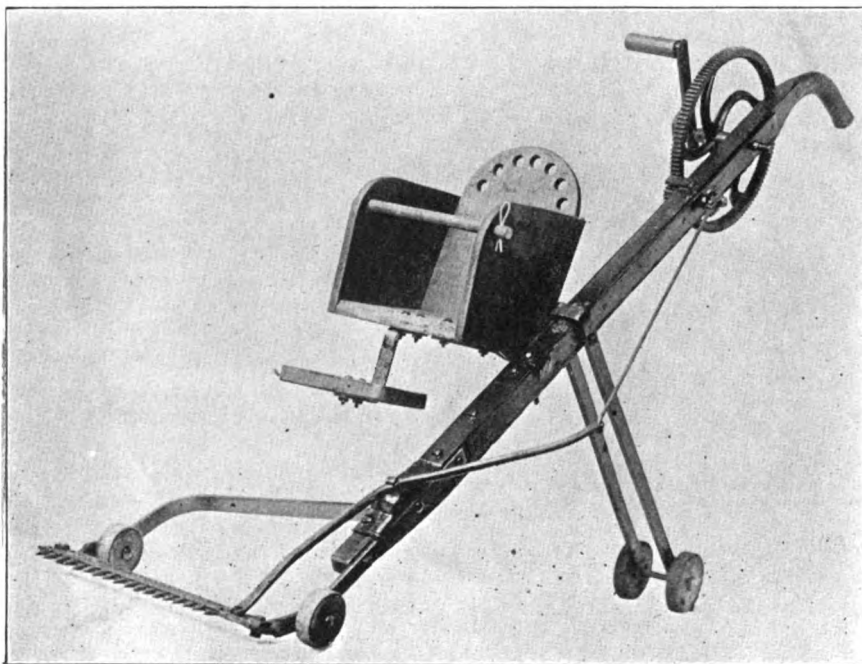
awhile in partnership before the Civil War and their joints were of the same size and pattern so that pump stocks were interchangeable without having to refit the joints. The jointer for boring the tenon on lower stocks and the chamber bit with hook on nose, were invented by my father. That hook was for the purpose of keeping the chip in the auger shell when drawing out the bit to empty the chip. All the other augers were drawn out face down, but the chamber bit was drawn out on its side with edge up so as not to score the bore of the chamber where the plunger of the pump was to work. A chamber bit with the edge of proper shape at the end next the shaft would bore a hole in good, sound wood, as true and smooth as one could have finished a surface with a plane. And nearly all pumps for wells under 40 feet depth were not fitted with copper lining in the chamber or working barrel, but the chamber was bored smooth for 3 1/2 or 4 feet above the valve seat, so that in case the chamber became worn about 13 inches could be taken off the sucker rod and the plunger made to work in a new place as when new.

To make the bit bore a smooth hole even in curly or cross-grained wood the edge carried an even taper from the point within 1 1/2 inches of the heel, then the edge ran straight with the bore 7/8 inch and 5/8 inch and was gradually turned in toward the centre of the bore. This style of bit was retained because it was stiff in the edge to bore smooth and because it had the proper taper to form the valve seat for the "lower sucker", which was a drop valve turned to a taper and fitted with a "bow" or bail so it might be withdrawn for repair.

No other style of auger will



SOME OLD-TIME PUMP MAKERS' TOOLS AND IMPLEMENTS



A HOME-MADE LAWN MOWER AND BABY CART COMBINED

answer both these purposes. Of all the augers the leader or first auger is hardest to make or to repoint when broken. Viewed from the point the cutting edge describes a spiral starting from a 5-16 inch circle which is the point proper the edge makes the first turn in about 7-16 inch. That is, looking from the open face it forms a tapered screw of one turn in 7-16 of an inch. This turn is called the lead. However, the lead of the auger may be changed by setting the edge in or out just above the first turn. As these augers like all pump augers are filed on the inside, the pitch of the edge forces them ahead against the bearing and as the edge is set ahead the auger will cut farther in a turn and if the edge is set back the bit will not cut so far at a turn. On this account leaders are hardly ever tempered, or if they are the temper is drawn low enough to permit easy filing and setting of the edge, something like a low saw temper.

The small stub of stock left at the tip of the hawk's bill of the stock in the flat was about an inch long and left square until the point are cutting edge was brought into shape by twisting and forging with a ball pene hammer; the square gave a good hold for a wrench or tongs to twist by. It was then rounded up and the edge and point finished by filing. After the auger was made to bore straight and true to size it was taken to the lathe and the inside of the shell ground smooth by an egg shaped emery stone fitted on a

mandrel (see I). This mandrel had a deep center print in the end carrying the emery and the regular tail block of lathe removed. The tail block was replaced by one carrying a point turned from the top toward the face plate of the lathe. This point entered the deep center print and carried the emery end of the mandrel so one could grind close to the point or heel of an auger.

For pipe logs a jointer (see J in engraving) was made of wood fitted with adjustable cutters for reaming the hole to receive the tenon and also to cut the tenon to fit the hole. We also had a steel jointer to match the 4 inch follower for jointing $2\frac{1}{4}$ and $2\frac{3}{8}$ inch pipe and one matching the 5 inch follower for 3 or $3\frac{1}{2}$ inch pipe. They were steel rings (see K) of $1\frac{1}{2}$ by $\frac{3}{8}$ inch stock, one end was upset and drawn out wide enough to furnish stock to form the cutter and then welded up. Two holes were tapped with $\frac{5}{8}$ inch bolt thread to receive the handles. The bolt running through the handles were threaded and shouldered to screw into the rings, one set of handles fitting the three sizes of ring jointers we had. The cutter was turned out at the point to make a shoulder on the joint or tenon.

A Lawn Mowing Baby Cart

The photograph from which the accompanying engraving was made was sent in by Mr. William V. Gist, of Tennessee, with the following comment:

"This is a picture of a lawn mow-

er and baby cart combined, which I made for my wife. The cog gears came off an old blacksmith blower. I made the other parts except the plow handles upon which the whole thing is built. The cutting is done on the same plan as is done on a large mower, the crank pulling and pushing the bent rod which in turn operates the cutting knife. This machine is not patented but it is a good one."

This is a good suggestion for those who may need a machine of this kind, and those of our readers situated in the belligerent countries will no doubt be able to fill a vital need where we understand many of the labors "at home" have devolved upon the women folks.



Benton's Recipe Book

To keep tables and charts in good condition a Cleveland smith makes use of a novel stunt. He makes constant use of several tables and small charts and the constant handling of them was causing them to be torn and badly worn. He therefore soaked the tables and charts from the cards upon which he had pasted them, and after dipping them in lacquer he spread them out on new cards. After brushing, them out smoothly with a brush and allowing them to dry, he dipped all the cards again and now has his tables and charts protected against wear and tear and an occasional wipe with a moist cloth keeps them clean and readable.

Welding steel springs may be easily accomplished by using a piece of what is generally known as Russian sheet iron on the joint. If L. H. O. of Ohio will use this he will have little or no trouble in making his welds. Just before you bring the steel up to welding heat lay a piece of the Russian sheet iron on the joint. This will welt, run into the joint and enable you to get a perfect weld.

To glue labels to iron or steel is a little job that every smith tries at some time only to be met with failure, as a general rule. I had occasion to renew the labels on several objects in my specimen case recently and in preparing to glue the labels on, rubbed the metal surface first with a piece of cut onion. The labels were then glued on in the regular way. The other specimens which were treated in this way several months ago still retained their labels.

Turning in screw eyes is usually a hard job for the average craftsman, and it was therefore decidedly pleasing to see one



smith using an ordinary brace to turn them in quickly and accurately. Try this stunt the next time you have a number of screw eyes to put in.



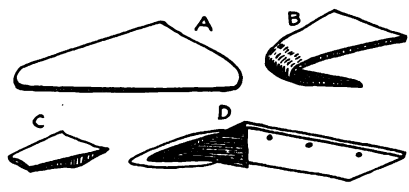
Queries—Answers—Notes

An Old Horse. As I was looking over April issue I came across something that is very nice of a Mr. J. W. Tucker of North Fulton, Mo., pertaining to aged horses and mules. I think that I can do him one better as I have a horse that has turned his 36 years and I am his third owner, and when I have a load for him to haul he is there. When not in use he has two lots to exercise in. The horse shoers of local 102, Hackensack, of which I am one of the charter members, claim he is the oldest horse in Bergen County, and a great many friends have begged me to show him at the fairs as a sample of old age. THOMAS GOODRICH, New York.

Two Hints for Beginners. We often have to weld up pieces with holes or projections that must line up, one with the other. When but a little out after welding they can be brought into line by proper use of the swage, turn the piece one way in swaging and it will twist the rod. If this is not wanted one must turn both ways. Also in drawing out stock, it is best to turn both ways and get equal pressure on both sides, for in turning one way only the grain of the iron will be spiral. H. N. POPE, Connecticut.

A Talk on Plow Pointing. After seeing several articles on plow pointing in "Our Paper" will give my method: I use 3/4-inch plow steel for point. You can buy or make them as shown at A. I forge to shape to fit the share and then bend, depending on the length, as at B. I then use another piece of 3/4-inch steel but shorter (see at C) to lay between point. Then I heat and clamp the share on with tongs. When it is ready for the heat it will look like D. Use two heats to finish, leaving point three inches or more longer than it was and that being three inches of solid steel. I also use Mr. M. W. Abts' method on certain shares, such as a share which is thin at the cutting edge of point. Not having any power and doing my work by hand I think the forging part is easier using 3/4-inch steel than by using 3/8-inch. JOE WILHELM, Missouri.

A Machine Repair and a Tire Hint. I have no brick bats to fling at you. I see many articles which are of interest to me, and one in particular which helped us out just fine. That was how to braze a band saw blade. I will tell how I repaired a



ON PLOW POINTING

band saw frame which may be of some interest to some one who may have the same misfortune that I experienced. The band saw frame was broken just below the table which I considered a weak part on my machine. I stripped the machine of all its equipment, bolted the broken parts together as closely as possible, put in the forge and used borax and brass wire spelter and the job was a success. I am using the machine every day.

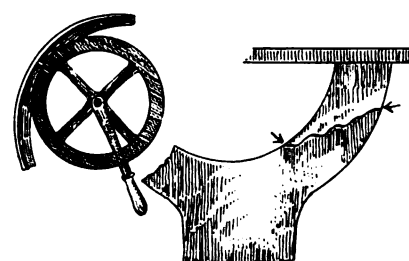
A handy kink for a dark day when using your tire wheel is to make a heavy chalk mark on the tire and then mark on each side of where this mark comes on the traveler. J. W. GIBSON, Missouri.

Making Twist Drills. In reply to reader who asks for information on the making of twist drills from high speed steel 5-16 by 1 3/4 inches, I would say that the way I have made twist drills from flat stock by twisting them is to cut off enough from the bar for a drill, heat the whole of the part to be twisted, having a little more heat at each end than there is in the center, as the center will always be inclined to twist faster than the rest of the drill, hold one end in the vise and use a lever with an oblong hole in the center to do the twisting. Should one part be inclined to twist faster than the rest of the drill let it cool down a little and then give a little more heat to the parts that show the least twist. When the whole piece has been twisted fairly uniformly, take a nice even heat all over and straighten on a metal surface plate, using a wooden mallet to take out the kinks.

High speed drills are heated until they begin to show a greasy looking sweat at a bright lemon color. For hardening, they are quenched in linseed, fish or oil specially prepared for the hardening of high speed steel. Should they warp a little in hardening, this is taken out with a screw press after they have been warmed.

I presume your reader is only making a few drills and I think if he follows the plan I have given he will not have much trouble. But if he is going into drill manufacturing it would pay him to get a special device for twisting and leave the drills large enough to be straightened in grinding. JAMES CRAN, New Jersey.

A Missouri Plow Smith. The engraving shows yours truly at the anvil and a part of the shop. I do all kinds of repair work, plow work being my main line of business. The anvil in foreground has seen 35 years



A MACHINE REPAIR AND A TIRE HINT

of hard service, while the hammer lying on the block in front of anvil is a 4 1/2-pounder and has been used more than any other one in the shop and every working day for 40 years. It was second-hand when it came into shop. Steel like this hammer contains cannot be bought today. The corners never ship off it like on the new ones. JOE WILHELM, Missouri.

Mississippi Notes—A Spoke Kink. I have been a subscriber to "Our Journal" but a short time. It took a hard pull to get me into line, but I would not be without it now for twice its price. Don't see how any smith could do without it, as it is the greatest "help" I ever had in my



MR. JOE WILHELM A MISSOURI PLOW SMITH

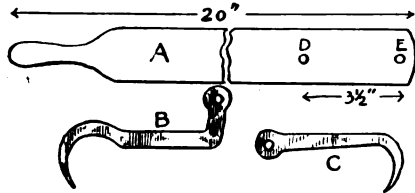
shop. I enjoy the lessons in shoeing each month. Although I do but little shoeing, it enables me to do it in a workmanlike manner.

Bison's notes are very interesting and Thornton's Talks are up to "now". One thing I have tried is the bolt header described in the May issue by S. W. Wallace. It is O. K. Give us another kink, Brother Wallace. In June issue Mr. H. N. Pope gives a pointer on welding. This method is very good but I have discovered that you can get a good weld on both sides by keeping a supply of good, clean, dry sand handy to your anvil. Just before taking stock from fire wipe face of anvil clean, and sprinkle thickly with sand. After striking top of stock a few licks with hammer reverse quickly, and hammer. You will find that by using the sand that the trouble of chilled stock is overcome. In pointing shares I use plow steel or lay steel. I make my lay to fit snugly under bottom of point and come out on wing, so as to cover throat well. Then fold enough stock to take care of worn part on top, and hammer down snugly. I usually use three heats and seldom fail to make a first class job, but I seldom turn out one in thirty minutes.

I have a little kink that will probably be of help to some one. In putting rims on heavy wheels it is sometime difficult to make the tenons come close enough together to start in the rim holes. I use a



device similar to that shown in the engraving. I make a handle from $\frac{3}{4}$ by $1\frac{1}{4}$ -inch stock. The hooks are made of $\frac{3}{8}$ by $\frac{1}{4}$ -inch stock and are shaped as shown at B and C. Two holes D and E are drilled in the handle and the hook B is then riveted in hole D and hook C is riveted in hole E. In use place the hooks over the spokes with the handle leaning toward hook B.



A SUGGESTION FOR THE WHEEL-WRIGHT

Then slide the hooks toward the rim until tight. Now, with a slight pull on the handle you may pull spokes to desired position. I have a few more kinks but will give them latter.

L. C. COOPER, Mississippi.

A Rule for Hanging Sleighs. In the May number some brother says he knows of no rule for hanging sleighs. I will admit that it does look as though there were no rule, for it one will measure the different sleighs that one sees and has to repair he will find that there is about four inches difference in various makes. Then too, there is considerable difference in the run of sleighs and in the wear of the shoes. Some wear out first at the front and others at the heel.

Here is a rule that I have used for thirty-five years and I have always had easily running sleighs upon which the shoes wear evenly: Take the runner and set it on the bench and mark the point at which it starts to turn up or raise.

their nose into the road.

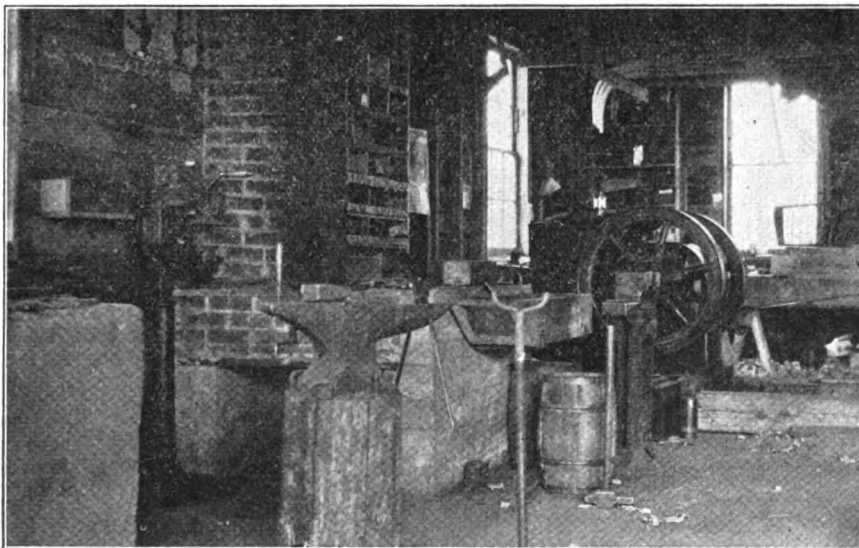
On all of our sleighs in this country we use the cross chains and pull from the front bench as we have only one bench in the sleigh. The roll should be about even with the bottom of the bench.

I also note the article, "A New Idea On Sleighs", and would say that the thimble skein idea was tried out here some years ago but they did not prove a success. If the writer, Mr. D. W. Murphee, would see some of the sleighs that we have here he would think that his 2 by 4 runners were rather light. Our sleigh runners here are $2\frac{1}{2}$ by 7 and 8 feet long and for heavy work we have 4 by 8 and 10 feet long and up to 7 feet wide. If Mr. Murphee will write to Sherwood, Hall and Co., Grand Rapids, Michigan, for Rempis sleigh pulls he will get something that will give better satisfaction than his thimble skein and cheaper. R. R. TICKENOR, Minnesota.

A Brief Wisconsin History. I came here the middle of 1912 and had just about enough property to flag a mosquito with but I went to work. There was no shop here then, but one man (a blacksmith), who was looking for a location, told me this place wouldn't provide work enough to pay shop rent. Well in November, 1914, I moved into this shop. It isn't all paid for yet, but it will be. The shop is 29 by 36 with cement floor, two convenient forges and a six room flat upstairs where we live. We have plenty of work all the time.

I have a gasoline engine and while I haven't much machinery yet, I will have some time in the future. The engine is a 4-horse power and I find it a very great help even now. This picture and the fact that I came here three years ago "busted" and have made enough to pay for all my tools and over half of the shop in that time, may be of any interest and encouragement to some of your readers.

STEVE DUDLEY, Wisconsin.

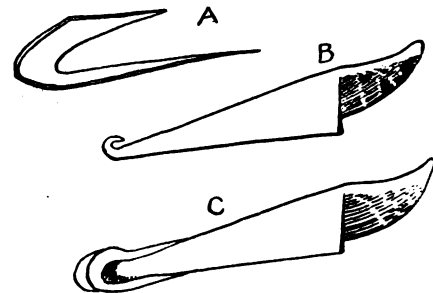


THE POWER CORNER OF MR. STEVE DUDLEY'S WISCONSIN SHOP

Measure from that point to the back end and find the center or mid-distance point. Now set the front sleighs one inch ahead of this center and set the back sleighs one inch back of this center. This rule is used because on all sleighs the hind runners pull from the front ones and the load tends to arise the front ones when the sleigh is pulled. The hind ones are also just back far enough so as not to dig

On Shoeing and Plow Work. In the June number I notice some interesting articles on plow share pointing, and shoeing, especially Thos. Northwood's on the evils of shoeing with calks. I am a corporal shoeing smith in my company so have to do with the fitting of shoes. In the first place I must indorse all Bro. Northwood says about calks with the exception of a small wedge heel calk on some hind shoes.

As you perhaps know the regulation shoe in the army is flat, and seems to give satisfaction in every way. As far as I possibly can I always recommend it, and have been wonderfully successful in curing difficult cases of lameness. One very particular point I lay great stress on is to always have my shoes wide enough at the quarters



MORE POINTERS ON PLOW POINTING

to get a good bearing there and to give the horse as wide a foot as possible to stand on. So many seem to try to take a short cut to the heels and thus spoil a horse's foot. One of my chief protests against the calk is, that you narrow a horse's standing room, so to speak, and cause his foot to rock easily from side to side. I might say that in saddle horses one has to fit the foot very close at the heels to prevent the shoes being pulled off.

I was shoeing for over seven years in some of the best shops in the City of London, England, and all the horses there that I shod or saw shod, were shod flat in front with the exception of about three. On the hind feet or shoes, a heel calk was used, but no toe calks, and the shoes as a rule were very heavy at the toe on account of the hard wear on the wood block street pavement. Very little stone is used on the roads over there; chiefly wood and asphalt and the shoes just grind out.

Now about plow shares. I must say to Mr. M. W. Abts of Nebraska, that his article is all right, but he might easily save a little more time by using our method, which is somewhat like his, but still different. Where I worked before joining the Canadian Army Service Corps we made our points exactly like he does except that we doubled our point over before welding as at A. Next thing we would take the share to be pointed, thin the point down and double it back. Looking from the landside it would appear as at B. Then take the point, get it hot and put it on, squeeze it together in the vise as at C, fit it a little and then weld the carfs, X and Y, at one heat and the point also. Then draw point down under hammer in this heat. Now take a second heat, weld throat and finish drawing down. With a little practice one can work quickly this way. I have seen six points welded on in an hour all ready for sharpening. I have done five myself, but for pointing and finishing from three to four an hour is a fair average with a trip hammer and power blower. If Bro. Abts will try this method I believe he would find my remarks helpful after a little practice. EDW. ODLING, Manitoba.

A Word from Ohio.—We blacksmiths have wakened to the times. We are charging \$1.40 up to No. 4, and \$1.60 and \$2.00 for 5, 6, 7, 8; \$1.00 for resetting old shoes. The old price was 4 new shoes for \$1.00 and 60 cents for resetting old shoes. That has been the price in this town for 68 years. Two months ago a horse

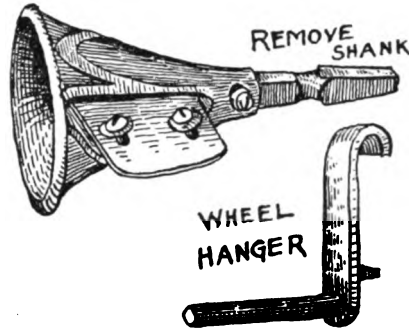


shoe agent got the shoers together through the Association and got us organized and we are doing fine. We went to our first convention like business men. So, Mr. Editor, you can see what one man can do to help lift the down-fallen mechanic, nad if we depend on ourself like we have for 68 years we would still be down. Mr. Editor says it depends on the blacksmiths which is true.

I love THE AMERICAN BLACKSMITH paper and I love to read where some poor blacksmiths, which is true.

work. While at the convention I talked to several blacksmith on the paper and they had about the same view as I had. Here is a story and it will apply to myself as well. When a young smithy starts at the business young and full of vim and the farmers pat him on the shoulder he feels like shoeing all the horses in the country at 50 cents a head, but in time his bones will commence to ache and then he will want something for his work. That is the trouble with us all. We go at it too late. CHARLES CHISM, Ohio.

Tenoning Spokes on the Drill Press. A perfect and speedy spoke tenoning machine can be made by any wheel worker and repairer by removing the square shank from an ordinary hollow spoke auger and making and inserting a round shank to fit the drill press. The spoke pointer can also be fitted up in this way: In use the rebuilt tool is placed in the drill chuck of the drilling machine, the wheel hung on the wheel hanger, which is reguarly supplied with many drill presses, and the wheel work can be done easily, and quickly and accurately. In case the drill machine hasn't a wheel hanger, one can be very easily and quickly made by any smith. H. HAVEMORE, Washington.



TENONING SPOKES ON THE DRILL PRESS

repairman must make a study of the motor and determine how best to proceed with the work of installation.

In installing magnetos there are several points to be considered aside from location and suitable form of drive. The magneto should be so located that the circuit breaker and distributor are accessible to the owner as these parts require periodic attention and adjustment. It is not advisable to locate the magneto near the exhaust manifold, as the heat is likely to injure the magnets and the insulation of the windings, and neither should the instrument be placed too close to the carburetor.

If the owner is guided by the repairman, that is, consults the latter as to the magneto best suited to the engine, it is possible to obtain the dimensions of the various instruments marketed and select one that can be more readily installed than others. Many times, however, the owner invests in a second-hand instrument and does not take into consideration its adaptability to the motor. Some owners will prefer a dual type of magneto, one permitting of starting on the battery, while others will purchase a low-tension magneto that requires a coil for intensifying the current generated. When the last named type is selected, and the coil is of the cartridge or tubular type, it must be installed away from heat and protected to a certain extent from water.

For the benefit of the repairman not familiar with installing magnetos the following suggestions will be of value, particularly the speed at which the instrument must be driven:

The single-cylinder magneto for four-cycle motors is driven at one-half crankshaft speed, and at crankshaft speed if of the two-cycle type. Two-cylinder horizontal, four-cycle motors require that the magneto be driven at crankshaft speed. If the

two-cylinder motor be of the vertical type, the magneto is driven at crankshaft speed but a special distributor is required. The three-cylinder magneto, when fitted to the four-cylinder type of engine, is driven at three-quarter crankshaft speed, while the most common form of engine, the four-cylinder, four-

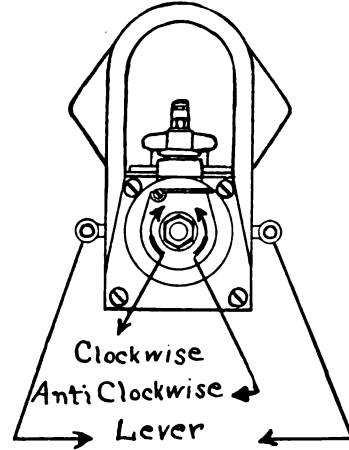


FIG. 1.—DRIVING END OF MAGNETO

cycle, utilizes a magneto driven at crankshaft speed. Thes ix-cylinder engine requires that the magneto be driven at 1½ times crankshaft speed, while the eight-cylinder magneto is driven at twice crankshaft speed. When the magneto is applied to two-cycle motors it must be driven at twice the crankshaft speed because there are twice as many explosions a revolution. Drive of the magneto is referred to as armature shaft speed of the instrument.

After deciding upon the type of magneto to be installed the next step is to ascertain how it is to be driven. There is but one practical drive for the old motor and that is a positive drive as by gear. Silent chain is utilized on modern motors but it is not practecal with old engines as the cost of enclosing the chain is generally too expensive. A careful study of the power plant and a little figuring will determine how to proceed with the work. Generally, the drive can be taken from the timing gears by mounting an extra gear and enclosing it. This usually means making a pattern for a cover, and sometimes the crankcase must be cut into to mesh the driven gear with the driving member. If the owner desires a cheap job and is willing to take the chance of foreign material lodging between the gears, and will not object to the noise, open gears may be fitted. Generally a gear can be attached to the extension of the crank-



The Automobile Repairman

How to Install a Magneto.

C. P. SHATTUCK, M. E.

Because the magneto provides an inexhaustible source of current, synchronizes the spark and makes for high engine efficiency, the repairman is frequently called upon to install it on the used automobile. When the motor is designed to take a magneto, a drive being arranged by the manufacturer, the work is simple provided one is familiar with timing the instrument. But when no provision is made for driving the



shaft and the magneto so mounted that its gear will mesh with the crankshaft gear. This method is not recommended, however.

In studying the situation allowance must be made for the linkage between the timing lever of the breaker box and the control on the steering wheel. This will save considerable time and expense in the work. Lengthy and complicated linkage should be avoided when possible.

After deciding upon the location of the instrument, the direction of drive or rotation of the armature shaft must be known before ordering the magneto. Fig. 1 shows

The illustration at C shows the magneto driven from a camshaft with a four-cycle motor. The camshaft is rotating anticlockwise, which will require a magneto driven clockwise. It will be noted that the camshaft gear has 42 teeth and that on the magneto has 21. This arrangement is necessary as the camshaft gear rotates at half engine speed, and, as previously pointed out, the armature shaft must be driven at crankshaft speed.

It may be possible that the best location of the magneto requires the use of an idler gear, such as illustrated at D and E. This arrangement is adopted when the distance

the magneto be perfectly aligned with the driving member, particularly if the drive is taken from a shaft. The most common form of coupling is the Oldham, which permits of slight misalignment, but the disadvantage of metal couplings is that the magneto has to be timed carefully, the coupling tightened on the taper shaft of the magneto, and a hole drilled for a taper pin to secure the construction. This does not permit of any alteration in the timing of the magneto without considerable work. This applies to where the magneto is driven by a shaft, not to a gear drive. When a gear drive is employed, the magneto

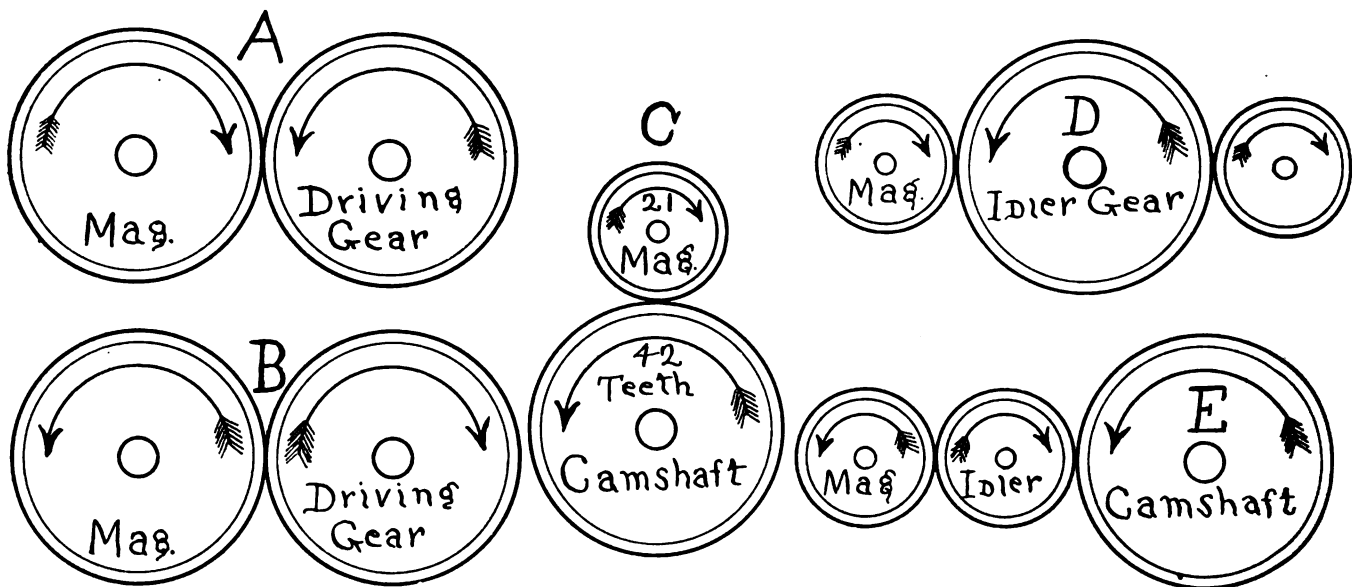


FIG. 2.—SHOWING VARIOUS FORMS OF GEARING USED FOR DRIVING MAGNETOS AND ALSO HOW CLOCKWISE AND REVERSE ROTATION MAY BE SECURED

clearly how the direction is ascertained, the arrows, which are located on the driving end of the magneto, show the clockwise and anticlockwise direction. With some types of magnetos it is important to know on which side the timing lever should be on the breaker box.

Fig. 2 illustrates a number of different drives of clockwise and anticlockwise direction. That at A illustrates the armature shaft of the magneto being driven clockwise as the driving gear is rotating to the left or anti-clockwise. The drawing at B shows a magneto being driven anti-clockwise, and this condition would exist if the crankshaft of the motor were employed to drive the armature shaft of the instrument; that is, if a gear were to be fitted to the crankshaft and meshed with a gear on the armature shaft. In both instances, A and B, the gear on the armature shaft must carry the same number of teeth as that on the crankshaft.

between the centre of the driving gear and the magneto is such that it would require gears of too large a diameter. The engraving at D shows drive taken from crankshaft and the gear has the same number of teeth as that on the magneto. When this method is utilized and as shown, the magneto is driven clockwise. The arrangement at E shows the use of an idler and with the drive taken from a camshaft gear. Both the magneto and idler gear have one-half as many teeth as the camshaft gear. The idler gear is generally employed.

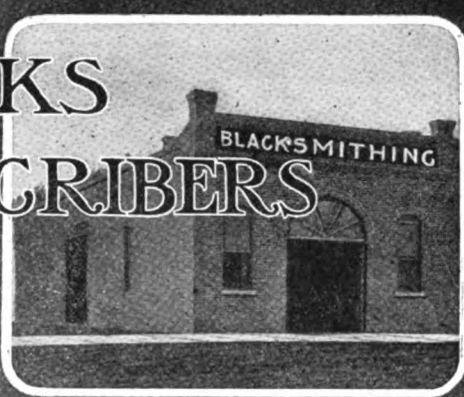
In attaching the magneto to the motor it should be firmly anchored to a base or shelf of non-magnetic material so that there will be no passage of magnetic lines of force except through the core of the armature. Hinged straps are easily made and attached to the base, and if provided with a turnbuckle, the instrument may be easily removed.

It is important that the shaft of

may be retimed by setting the gear ahead or behind a tooth.

The size and pitch teeth of gear will depend upon the installation. Gears having 12 pitch teeth are strong enough, and this size is recommended as it will permit of more accurate timing than when larger teeth are utilized. Relative to gears, one can obtain a catalogue from any gear house and select stock gears. As complete directions and descriptions are given, the selection of suitable gears should be a simple matter.

If it be possible to utilize a shaft drive, a flexible form of coupling will save considerable time and expense, and a large number of flexible couplings are marketed. They are not only noiseless, but many provide for adjustment. This is particularly desirable when installing a magneto on an old motor, for generally the timing must be slightly altered before the best results can be obtained.



TIMELY TALKS WITH OUR SUBSCRIBERS

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Volume 14 Ends

This issue marks the end of Volume Fourteen of THE AMERICAN BLACKSMITH. For fourteen years now has THE AMERICAN BLACKSMITH stood up for the craft. For fourteen years it has taught and preached—spoken and cautioned—advised and counseled—and represented the smithing craft and smithing interests. And in those fourteen years it has done many big things for the craft. It has helped bring about many changes for the better in the craft and in craft shops. It is therefore fitting that some of these matters be mentioned in this issue—the last number of Volume 14.

"Our Journal"—THE AMERICAN BLACKSMITH was the first craft paper to take up the subject of better business methods with thoroughness and real constructive ideas. It has since preached price calculation on the basis of actual costs and not on organized ideas as to what to charge.

"Our Journal" gives its readers and subscribers real service. Service that is individual. Service that has gained for "Our Journal" the name of "The Service Journal," because it helps the reader just when and where he needs help.

"Our Journal" through its pages and its service department has very materially helped to raise the standard of smith shop construction and equipment. It has helped to arrange and to equip shops and has suggested methods of construction.

"Our Journal" introduced the oxy-acetylene torch, plant and process to the smithing craft—the most important happening in the smith craft since the blower was introduced. And THE AMERICAN BLACKSMITH is today teaching thousands of smiths the world over how to use this newest of smith shop aids.

These are just a few of the big things "Our Journal" has done—space does not allow for enumerating all. And then too, you who have read "Our Journal" for any time know what we have done and are doing for the craft and for the individual craftsman. You know the policy of THE AMERICAN BLACKSMITH. You know the stand it takes for fair and square dealing—for clean methods—for clean living—and for a bigger, better craft. You know this, Mr. Reader—won't you tell your neighbor?

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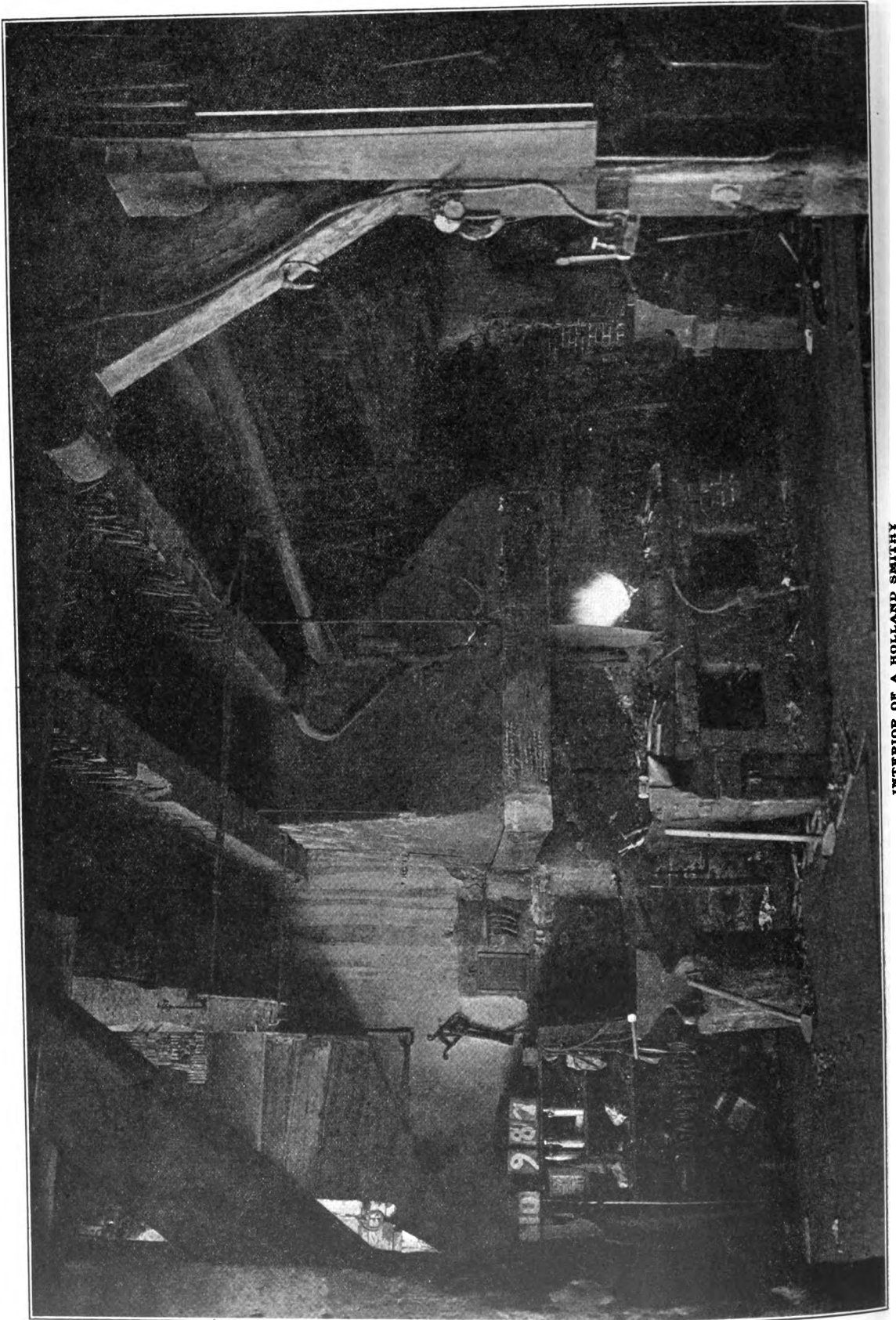
Several years ago the Editor attended a demonstration of the oxy-acetylene process of welding at one of the large railroad shops. The process was then just being introduced into big shops. Among other things done, the firebox of a big locomotive was repaired without removing the big driving wheels or any of the other parts usually removed when similar jobs are done the old way. The foreman said the cost of that repair by the oxy-acetylene process was less than the mere dismantling of the locomotive as formerly required to make the broken part accessible. And the thought then occurred to the Editor: "What can this new oxy-acetylene flame do for the smith shop owner?"

Some months later we heard of a man who made a small oxy-acetylene outfit for his own shop. We got into communication with him, and finally got him to describe how he made his machine. He told "Our Folks" all about it in these columns some months ago. Since then several machines of that pattern have been placed on the market. And since then "Our Journal" has had much to say on the subject of oxy-acetylene.

This number—an oxy-acetylene issue—really had its beginning several years ago. For in this issue is answered the Editor's question: "What can the oxy-acetylene flame do for the smith shop owner?"

The Volume Index

In this number, the last of the volume, you will find an index of the past year's issues from October, 1914, to October, 1915. This index is carefully prepared so that you may still get the full value and usefulness of "Our Journal." When you have a problem to solve, ask the index. The chances are you'll find just what you are looking for in some of the back numbers. In fact the records of "Our Subscribers' Service Bureau" show that the greater part of the questions asked and the queries to be solved have been answered and solved in previous issues. Unless you keep your numbers on file and refer to them from time to time you are not getting full value from your paper. The Volume Index will help you get more than your money's worth out of "Our Journal." Keep your copies, bind them and use the Volume Index regularly.



INTERIOR OF A HOLLAND SMITHY



WELDING WITHOUT HAMMERING

BY M. KEITH DUNHAM

MANY blacksmiths throughout the country have already installed autogenous welding equipments; others hold back purchasing because of lack of knowledge. Some of the users have difficulties in handling certain metals or certain shaped pieces. The purpose of this article is simply to acquaint the reader with some elementary principles.

Equal volumes of acetylene and oxygen gas, burned in a proper torch, give a flame of over 6,000 degrees Fahrenheit. Because this temperature is double that necessary to melt steel and for the reason that such a flame can be controlled in a small point, it is possible to fuse metals together merely by flowing the edges together and without hammering. All welds are butt welds,—therefore, the added stock necessary in all butt welds is in the form of a "feeding in" rod or wire, as in Figure 1.

Mild steel or wrought iron are butt welded with no flux and without pounding and with the loss of but little carbon, because a proper regulated oxy-acetylene torch has a neutral welding cone,—neither oxidizing (burning) or carbonizing. Aluminum, bronze cast iron, etc., are mastered with a little practice but proper flux and welding rods are essential for these metals.

The Apparatus

The simplest form of equipment is that using the tank system. Acetylene gas is stored in safety storage tanks, which are filled with a porous material and an absorbent

liquid. Figure 2). While this gas costs more in this form than it can be generated for, it offers several advantages—it is absolutely safe, there is no waste and the initial investment, a fact usually of primary importance to the blacksmith, is quite small. If a generator apparatus is desirable, too much emphasis cannot be laid upon the importance of knowing that it is constructed in accordance with approved methods and that it meets the requirements of the fire insurance companies. The manufacturers of safety storage, or as it is more often called, dissolved acetylene, have special cylinders for welding uses, and automobile lighting cylinders should not be used unless the needs are very small, as the gas in this form is more costly than in welding tanks and the absorbent liquid is easily exhausted from an automobile lighting cylinder to the detriment of the weld. These special welding cylinders may be purchased or rented.

Oxygen, cheaper and purer than it can be manufactured from chemicals, may be purchased in cylinders loaned by the manufacturers. These cylinders are usually charged to 120 atmospheres (about 1,800 pounds) and the commonly used size contains 100 cubic feet.

Regulators

The gases are used under varying pressures, depending upon the size of the tip used (governed by the thickness of the weld being made) and it is essential that the flow of both gases be stable; otherwise the flame cannot be held constant and it

will vary from a carbonizing to an oxidizing cone and the resulting weld will be deficient in strength. Many of the troubles of the inexperienced gas welder may be traced to fluctuating or pulsating regulators.

The regulating valves for oxygen and safety storage acetylene may be constructed upon the same principle, with a few changes to meet the requirements of each gas. Mechanically, they are practically the same.

A brief description of the ordinary type is as follows: these regulators have a metal diaphragm, the edge of which is soldered, all the way around, to the body of the casting. Into the centre of this diaphragm is a yoke, which straddles the inlet nozzle from the cylinder gas, and into the yoke is fitted the seat. In the front of the diaphragm is a spring, which, when pushed against the diaphragm by means of the thumb screw, forces the seat away from the inlet nozzle and allows the gas from the cylinder to come into the regulator (and to the welding torch) to the extent of the spring tension. When the gas in the body of the valve reaches a pressure in excess of that of the spring force, it overcomes that tension by pushing

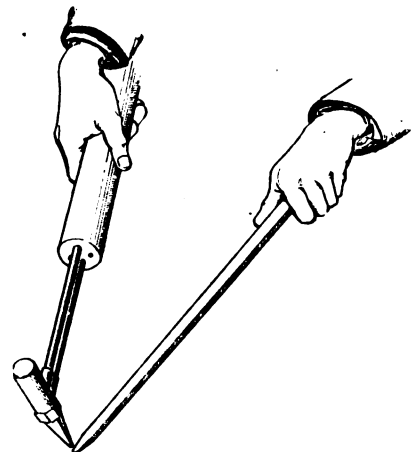


FIG. 1.—"A FEEDING IN" ROD IS USED



the seat back on the inlet nozzle, thus closing the valve.

Oxygen Regulator

It is important to note the following brief fundamentals in the use of the oxygen regulator.

Always have the thumbscrew unscrewed (spring tension relieved) when turning on the oxygen at the cylinder.

Never use oil on the regulator or any part of the oxygen connections.

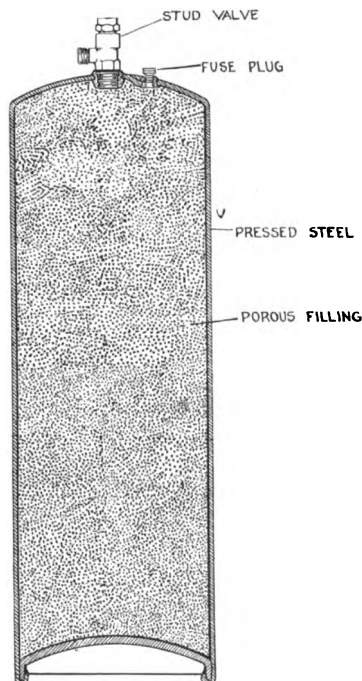


FIG. 2.—ACETYLENE GAS IS STORED IN SAFETY TANKS

Stand behind the oxygen tank, as in Figure 3, when turning on the gas and turn it on slowly.

Make sure that the seat used is non-combustible (ask the manufacturer what it is) as there have been many accidents caused by the use of hard rubber seats burning up by the heat created by the inrush of oxygen into the regulator and the consequent destruction of the valve.

Watch the line-pressure-indicating gauge as this is a positive index of valve trouble. If the hand on the dial keeps moving when the gas is shut off at the torch and does not stop within a few pounds, the seat or the inlet nozzle should be examined, or better, the regulator sent back to the manufacturer for repairs.

Practically all the regulators made in this country have no safety devices and most mechanical con-

trivances for this purpose are not to be relied upon, if used. If the regulator has a shut-off valve or pet cock, (like Figure 4) to which the hose is attached, take it off and connect the hose to the regulator without the interposition of any shut off. Then, in the event of the valve not seating for any reason, you can more safely depend upon the hose bursting or blowing off the connections, before the destruction of the regulator. While most regulators in use are equipped with shut off valves, they serve no real purpose, as a good regulator will shut off the gas merely by the unscrewing of the thumb screw and the valves on the welding torch are always used in lighting and operating. Shut off valves on oxygen-welding regulators are not only useless but may be dangerous.

Acetylene Regulator

Because the acetylene gas is under a comparatively low pressure (about 225 pounds) all the safeguards for the oxygen are not necessary for this gas.

It is customary to use copper or bronze diaphragms on oxygen regulators and it is a matter of regret that some manufacturers do not recognize the need of changing this diaphragm when it is to be used for acetylene. There is a chemical action on copper by acetylene gas and in the case of a moving part, like a diaphragm, there is likely at any time to be an explosion. Where a metal diaphragm is used, German silver will be found desirable in place of copper.

The Torch

With pure gases and good regulators, the welding torch demands your careful investigation, as it is the most important part of your welding equipment.

It should be well balanced. Avoid

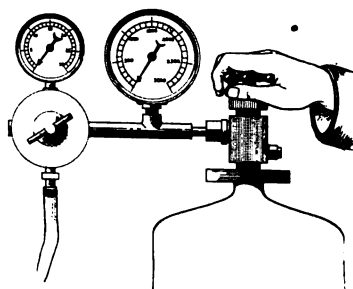


FIG. 3.—STAND BEHIND THE OXYGEN TANK

too light weight, as it is fragile. Excess weight is unnecessary and tiring. Strike a happy medium.

The tubes should be threaded into

the heda (if this design is used), not silver soldered, as the latter course anneals the tubing and the torch is likely to become bent or broken the

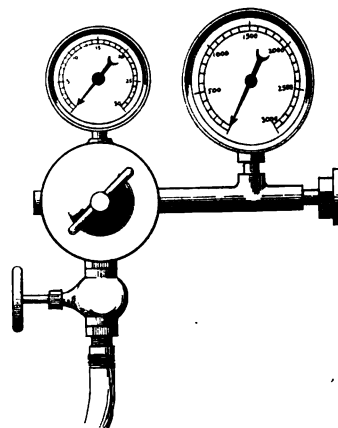


FIG. 4.—TAKE OFF THE VALVE ON THE REGULATOR

first time a tip makes up hard. The length is a matter of personal fancy; on the ordinary run of repair work in the shop, somewhere between eighteen and twenty-eight inches would be about right. There should be about ten interchangeable tips, in order to secure the right range of flame sizes. More than one torch for this purpose is unnecessary, if the tank system of gases is used. Extra tips is the essential thing. The handle covering the tubes (if there is one) should be provided with ample size vent holes (Fig. 5) in order that the gases escape in the event of a leaky tube inside the handle. The torch must have substantial, though not necessarily, clumsy shut off valves.

The theoretical consumption of gases to secure a neutral welding flame is one volume of oxygen to one volume of acetylene, but with generator equipments it is impossible not to use an excess of oxygen, varying with the type of generator and torch employed. This excess of oxygen is not only wasteful but deleterious to the weld.

The tank acetylene, being under sufficient pressure to bring it to the welding torch without the use of the oxygen as an injector, it is possible to practically reach, with the rightly designed torch, the theoretical gas consumption. The result of this is good welding with no wasted gases.

If you use a comparatively high oxygen pressure, say 15 to 25 pounds, and a low acetylene pressure, say 1 to 5 pounds, you are

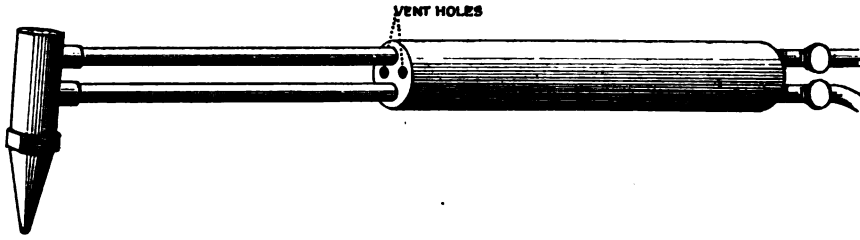


FIG. 5.—THE VENT HOLES IN THE HANDLE MUST BE OF AMPLE SIZE

wasting oxygen and not securing the results you should.

The torch should be used with pressures about equal, this rule applying, however, only when using tank (dissolved) acetylene.

The torch should not flashback (gases burn inside) except in the rarest of instances, i. e., when the head is excessively hot or when the weld is being made in a depression, inside a cylinder, etc., where there is a limited escape for the products of combustion. Recent developments show that it is quite possible to construct a torch, using tank acetylene, so that a flashback, even under the above conditions, is impossible, but if in ordinary work, the torch causes no trouble and uses about equal pressures, it can be classed as good. If, however, it keeps flashing back on ordinary work, return it to the manufacturer for repairs, or if this for any reason is not feasible, buy a new one; it is wholly impossible to do good work with a poor torch. Most manufacturers will sell their apparatus on a guarantee basis.

Care of Welding Torch

Any well-made torch will wear indefinitely. Of course, heavy hammers cannot be dropped upon it without damage; neither can it be left lying on the floor to walk upon, but with reasonable care it is good forever. The welding tips will at times be burned but these may be purchased, as a rule, at a very low price.

Do not allow any dirt to get into the head or tips to destroy the seat or the threads. Keep the shut-off valves clean and easy working and re-pack when necessary.

Hose

It has been found that hose with a canvas or linen wrapper is better than that with rubber on the outside. It is less likely to spring a leak and is more or less unaffected by the small sparks. It should be clamped to the connection by the usual device or by a small wire.

General Care

Shut off gases at the tanks when through using.

The oxygen tank, being of small

diameter, should be clamped to the bench or wall, (Fig. 7), if used always in the same position, or if mounted on a truck, means should be provided to securely hold it.

If there are indications of a leak, use soapsuds to learn where—not a match.

If, on opening the oxygen cylinder, the valve in the tank allows the gas to escape to the air, quickly open this valve to its full capacity. If this does not stop the leak, close the valve and return it to the maker. Do not attempt to repair this valve.

Glasses

Wear darkened glasses, preferably of a greenish-gray color—never a blue lens—as the latter color may

allow the eye to become seriously affected.

An apparatus meeting these specifications, including the first supplies of welding rods and fluxes, may be purchased at from \$60 to \$100. At least twelve manufacturers offer apparatus within these figures and meeting the requirements set forth. As previously noted, it is unnecessary to purchase the gas cylinders.

Since good welding can only be accomplished with apparatus constructed to meet the peculiar requirements of the gases used, it has been deemed necessary to briefly describe the equipment. With such an equipment, the blacksmith has practically nothing else to buy, since his shop is already equipped with the necessary aids to welding.

Cast Iron Welding

While steel is really the most difficult metal to weld successfully by the oxy-acetylene flame, the blacksmith, due to his previous knowledge, would probably disagree and name cast iron, so that we will take up the welding of this metal first.



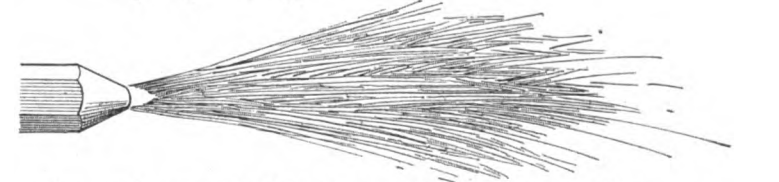
Acetylene turned on with sufficient pressure so that it burns away from the tip slightly—same appearance as "steam" coming from a tea-kettle.



Oxygen turned on, uniting with the acetylene. A cone begins to appear in the centre, shaped somewhat like a rosebud, blue-white in color. This is what is called a carbonizing flame—that is an excess of acetylene or not enough oxygen.



Properly adjusted or neutral welding flame. Cone in centre is sharp and distinct, somewhat blunt. Ragged edges of the rosebud cone of the figure above just disappeared. To test, increase acetylene slightly until rosebud shape begins to appear.



Too much oxygen in this flame, so it is termed an oxidizing one. Cone is shorter than in the above figure, more pointed and a different color, changing from the blue white to a darker blue. This flame is most easy to get and will ruin the weld.

FIG. 6.—HOW TO ADJUST THE OXY-ACETYLENE FLAME

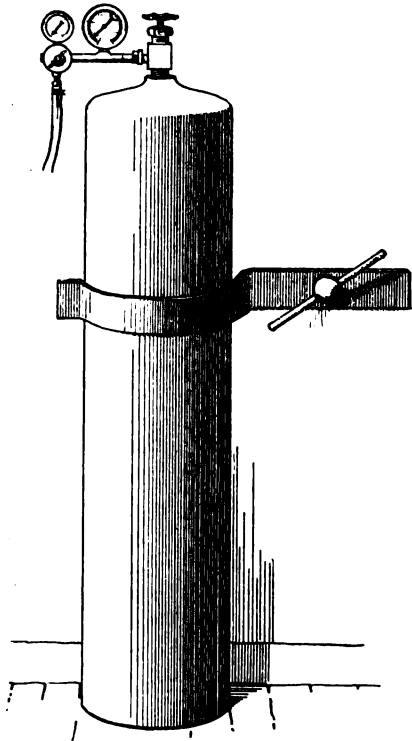


FIG. 7.—THE OXYGEN TANK SHOULD BE CLAMPED TO THE WALL

There are three big points to remember in the welding of any metal by the autogenous process:

- 1st. A neutral welding flame.
- 2nd. Metal (or break) in fusion while the feed-in rod is being added.
- 3rd. Expansion and contraction.

Figure 6 shows how to obtain a neutral welding flame. It is not sufficient that it be neutral only at the start of the welding but it should be examined and tested during the welding.

The second point is the one most beginners stumble on. Remember that the welding rod in your left hand is the same material and melts at the same temperature as the piece you are welding. Therefore, the article and the welding rod should both be melting at the same time.

The third point every blacksmith should easily understand, but few realize its importance—expansion and contraction. A tire is heated in several places to expand it so that when it contracts it firmly fits the wheel. Then remember that when you weld with the oxy-acetylene flame, there is an expansion everywhere the metal is heated and that there must be a contraction in the same area.

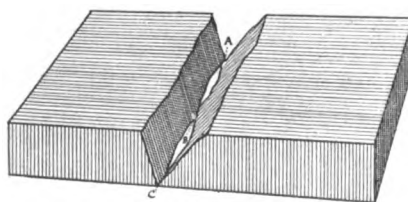
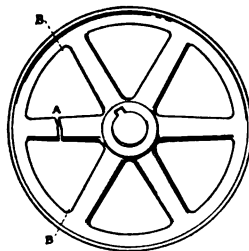
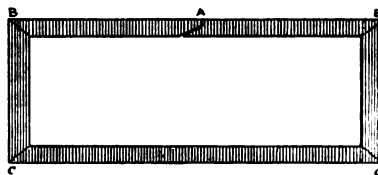
Figure 8 shows a straight piece of cast iron with the weld at A. Nothing prevents the ends, B, from moving when the metal is heated or from coming back when the metal

cools.

Figure 9 illustrates the same weld, but here the straight piece forms one side of an oblong. If we make this weld in the same manner, either the weld will break when cooling (because the ends, B, are firmly held) or if the casting is particularly soft, the oblong piece will twist or bend and the distance from B to B be less than from C to C, as contraction must always take place. Though this appears to be so simple as to hardly need explaining, it is this principle which must be grasped before the welding of any casting is attempted.

Since the major portion of the work which the blacksmith would be called upon to repair in this new kind of welding may be iron castings, he must thoroughly understand how to guard against contraction cracks.

Refer again to Figure 9. By heating a point or portion of the side, C to C, in the forge, we find that the break at A on the line, B to B, opens. Now, with this break open, we quickly make the weld. Both sides are then hot and both contract equally. We find then that by pre-



FIGS. 8, 9, 10, 11.—SHOWING WHY THE EXPANSION OF THE METAL MUST BE CONSIDERED AND HOW WORK IS PREPARED

heating we are able to offset the expansion set up by welding. On some castings, like automobile cylinders, it is necessary to heat the entire casting, and as a general rule, it is

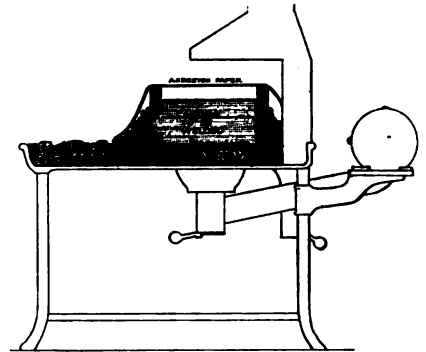


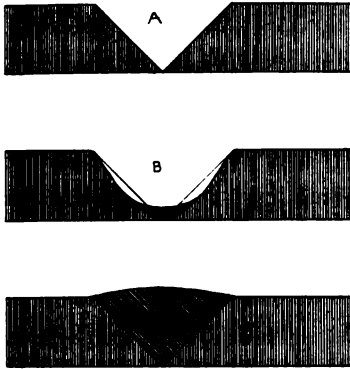
FIG. 12.—IT IS CHEAPER TO PREHEAT IN A FORGE

safer and the quality of the weld is better, if this is done. But in many instances this is not possible and then the shape of the article must be studied to see where the contraction will take place in order that the proper part may be preheated.

Take Figure 10, a frequent repair in a job shop and one which the beginner will invariably fail to understand. The fly wheel has one spoke cracked at A. By slowly heating to a dull and the rim B to B, the break at A opens, the weld is made and the rim and spoke gradually contracts into place. If more than one spoke be broken, the method of overcoming the contraction is the same. Other methods of offsetting this difficulty will be spoken of later. On cast iron welding, however, preheating is not only desirable to prevent contraction cracks, but it improves the quality of the welding, since cast iron must always be cooled slowly to avoid brittle welds and castings which are heated allow the weld to cool more slowly than those which are cold.

The forge will be found one of the best pre-heating furnaces possible. Charcoal, however, is more desirable as a heating agent than coal or coke, though the latter may be used. There should be some fire brick handy for building a temporary furnace for work too large for the forge. Asbestos paper, which may be bought cheaply by the roll and which serves a number of purposes, should also be on hand for covering the work, protecting yourself from the heat while welding a heavy section, and for shielding the work from drafts.

Preparation of Article
The casting should first be entirely



FIGS. 13 AND 14.—THE BREAK READY FOR WELDING, THE START AND FINALLY THE FINISHED WELD

stripped, i. e., any springs, valves, brass parts, bolts, etc., should be removed as these may be affected by the heat. The casting should then be entirely cleaned along the break and for one or two inches on each side. Then with a diamond point chisel V out the break, practically to the bottom. If the casting is entirely broken, prepare as in Figure 11, leaving at least three points to fit your pieces together. Now a forge fire is considerably cheaper to operate than the welding torch, so wherever it is possible, heat the article to a dull red heat, *slowly*. (Fig. 12). It may be necessary to *partially* weld the two pieces before heating in the forge in order to hold them together. This we call "tacking" and this metal should always be melted out when the weld is made.

With the article properly heated, we are ready to make the weld. Protect all but a small portion of the weld with asbestos paper. Light the torch and regulate the flame as previously described, then with the welding rod in the left hand and the can of welding flux easily reached with this rod, hold the flame on the break (starting on one end). The end of the blue cone must not come into contact with the metal but be held a little distance away. Holding it too close is one of the reasons for hard spots in the weld. The proper distance will vary according to the thickness of the metal—on an auto cylinder water jacket about 1/8 of an inch for instance.

The absorption of a certain amount of heat by the metal is necessary before fusion can actually start. If the article is already heated in the forge, practically all this absorption heat has been obtained from the fire, so that with the

flame playing on the break, it should instantly be ready to melt.

Drop a little of the welding flux on the break by dipping the end of the welding rod in the flux can. Do not throw the powder on with the hands. Depend upon the welding rod picking up enough each time it is dipped, as too much flux is still another reason for hard welds.

The bottom of the weld should flow together, before any metal is added from the filling rod and the sides of the break partially melted down as in Figure 13-B. Then add metal from the feeding-in rod, keeping the sides in fusion with the rod and making certain that the material from the rod is melting with the material of the break. This method is continuous and it is customary and good policy to make the weld a little thicker than the original piece as in Figure 14.

Too much time should not be spent on any particular portion and the work should not be gone over the second time. Weld correctly each section as you come to it as the continued melting of cast iron changes its chemical qualities.

When the weld is completed, great care should be used to cool slowly, since quick cooling means chilled iron and chilled iron is very hard. The article may be removed from the forge and completely covered with any good non-conductor—ashes for instance—or if the fire is not needed, it may stay in the forge, covered with asbestos paper and cool there with the dying fire.

Figure 15 shows a bothersome construction to the beginner. Here the weld will join a heavy section

to a light one. Bear in mind that the heavy piece will absorb a great deal more heat than the light and that this heavy piece will need a great deal more heat to fuse it than the light one. Arrange for the welding of it, then, so that it will be kept at the red heat by other means than the welding torch—charcoal, the forge fire, or a kerosene burner—and in the welding remember that because it needs more heat than the light section, you can tip your welding torch to direct the greater part of the heat to the heavier section as in Figure 16.

(To be Continued.)

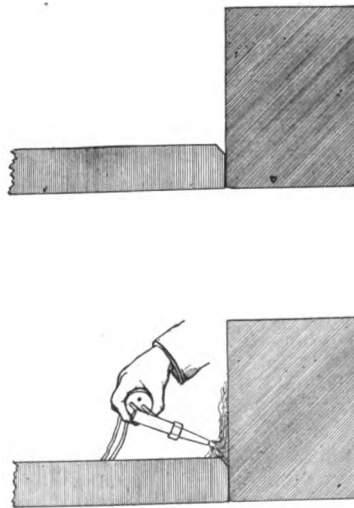
Editor's Note.—The second part of Mr. Dunham's article will appear in the October issue and will take up the important subject of aluminum welding.

How I Paid for my \$225 Welding Machine in Forty-three Days

IRA GOSSETT.

It may seem a little out of the ordinary to make a statement like this but nevertheless it is easily done if one goes about it as I did. For some time I had wanted a welding machine and came to the conclusion it would be a paying proposition from what I could glean from others' experiences. So one day I got the nerve to purchase a machine with the necessary equipment which cost me complete \$200.00. I then built an oven to take care of the crank cases and such castings as would be likely to crack when cooled in open air. This oven cost installed \$23.00. It was made of brick with a charcoal burner below, which afterward was changed to a kerosene burner.

When I purchased the machine the factory agreed to furnish free of charge a competent operator to stay with me a week free of charge, and I made good use of his services, both for profit and learning. A couple of weeks before he and the machine arrived I got into my car and drove over the country and gathered together all the broken castings that I could get to repair (and I found many), and carried them to the shop. The farmers began to take an interest and wanted to know when the welding would be done as they would like to see some cast iron welded. I advised them that I would let them know, that they might see it. This put me to thinking and I decided to advertise a demonstration in front of my place and set aside a day to demonstrate the machine while the expert was there. We welded during the



FIGS. 15 AND 16.—A DIFFICULT JOB AND HOW IT IS DONE



week the operator was there \$97.00 worth of castings taken from farm machinery such as plows, discs, harvester and threshing machines, etc. The day we gave our demonstration there were a great many people there to see the work done and it created quite an interest as there was not a machine in the country and many of them had not even heard of the machine doing such work. The county commissioners brought us some bridge steel to cut after seeing a demonstration in cutting steel. The cutting of this steel netted us \$12.30 above expenses.

day he received a number of traps and among the lot four of the large ones were broken. He was fair with me and told me what they cost before starting to weld and said he would be willing to pay half price to have them welded. This I did and on the job I made \$36.00 and did the entire lot in less than a day. He was well pleased with the job and for other work while he was here he paid me \$27.00 more.

Then a breeder of fancy poultry wanted some coops made to take his fancy stock to the fair. The way he wanted them made would have re-

came to me who lived some little distance and wanted to know something about the welding machine and said he had heard quite a little about them. He wanted to know if I could really weld cast iron and I told him that I could. He then wanted to know if I could weld cogs in a wheel. He said he had two broken from one of the large wheels on his tractor and it was a job to get the wheel off. I told him he need not take them off, I would take the machine to the work. He was somewhat surprised, but said to come out and gave me the direction and the



THERE SHOULD BE MORE OF THIS IN THE SMITH SHOP SO——

Afterward we received quite a little work from them.

After the expert went home I took my car and made a canvass in the neighboring towns. I had no trouble in getting the business as I arranged the prices so that the men securing the business could get 20% for their trouble, and they secured the business for me for some time. From the neighboring towns I secured quite a little repairing such as broken crank cases, broken and cracked cylinders, etc. It was not long until they found I could do the work and they gave me most of it instead of sending it to the city as they had done before.

Then there came a contractor to the city to place a water works and sewerage system and he had some work for the welding machine. One

quired quite a little time to drill and bolt them up, so I suggested welding the coops up with the weld nig machine and the idea struck him as good. I made him sixteen of the coops and painted them. Not a joint showed anywhere and he gave me \$3.00 each for making the coops; \$48.00 in all. The material for the coops in raw iron cost me \$13.78 and the canvass, paint, etc., \$8.50, so the job netted me \$26.00 clear. If I had tried to make them by hand as I had made them with the machine, it would have been next to impossible to say nothing of the time it would take and the expense, and some parts would have been made of wood. The coops he now has will last for years, as there are no joints to break down and no nails or screws to rust out.

On another occasion a thresher

distance. I went out in the morning, put in the two teeth in the wheel and came back in the middle of the afternoon with \$10.0 for my day's work I asked him but eight, but he was so well please, he gave me the ten dollar bill and said to keep the change. From that time on I did all of his work and that of his neighbors. I then found it necessary to get another man in the shop, for the cast welding was getting advertised until it took the most of my time to keep up with the work. The first job in the new territory only added to my business.

When fall came I placed an advertisement in the paper stating that I could weld stove legs as I knew folks would be setting up the stoves and getting in shape for the winter. The first week I not only



welded many stove legs, but many other parts of a stove such as doors, grates, etc.

There was a small creek close to where I lived and I made a small boat from iron and welded up the seams leaving a solid iron shell and put it into service. This attracted quite a little attention and as a result I made six of the boats for farmer boys along the creek.

Of course I made a few failures, as every one does, but when I failed I profited by it as I never failed twice in the same way, so in the long run every failure was a boost. I

it with lime or place in the oven to prevent cracking from cooling unevenly in the open air.

The welding of aluminum I found at first a trifle difficult, but after a time it was just as easy as the rest of the metals that I had to weld. I found also that aluminum expanded and contracted a great deal more than other metals and therefore it was necessary to keep it quite hot while welding and immediately place it in air-slacked lime to cool. The reason for using lime is, it prevents air from reaching the work. A piece of any sibe will hold heat

good aluminum flux and I have tried many, and there is it seems to me a chance for some one to make a hit among welders.

The welding of brass is quite easy and is strong after welding unless the metal is heated too hot. It is not best to get it hot enough that a blue flame comes from it as in doing so the zinc is burned from it and its strength weakened considerably. The flame should be played on the filler rod keeping it just a trifle hotter than the work so it can be placed where wanted without overheating the work.



—THERE WILL BE MORE OF THIS AT THE PROPER TIME

found that the flame should be adjusted differently for the different metals. I also found that in getting cast iron too hot and using an excess of oxygen it would become hard to such an extent that it could not be machined. The cast iron should be just hot enough to go together and no hotter. I always grind a V notch in the metal parts to be united so the metal does not have to be overheated to get through it. In case it is very thick I grind the notch from both sides and turn it over after welding the one side. I always have clay at hand and when I have a hole that I want to save I fill it with clay and after welding break the clay out and leave the hole as before. In welding the rims of wheels I find it a good plan to heat the wheel pretty well all over and cover

many hours when placed in lime.

My first job of welding in aluminum reminded me of trying to drive a hog to some place he didn't care to go. I tried to get the metal hot enough to run but it would not run, so I found it necessary to heat it up until a large bubble would come up with sort a scum over and break it with the filler rod and continue this one after another until the required amount was filled into the crack. It is the best plan to weld aluminum from both sides when possible as a good job cannot be done from one side. A cement called retort cement is fine to use in backing up castings to keep from falling from the heat. This cement is made up from a sort of an asbestoes fiber and does not cost very much, say five to six cents to the pound. I have yet to find a

Repairing a Crank Shaft and Case

NEWT BAGLEY.

Recently the writer repaired an Overland motor that was considered a total wreck and beyond repair. In Fig. 1, is shown the upper half of the case, the broken and repaired parts being marked A. The three parts known as "main-bearing supports" were broken from the case as was also a portion of the magneto support. To repair this was no little job and to still keep all parts in correct alignment. In the first place the grease was removed from the case by washing it in gasoline, after which the shaft of solid steel was used to take the place of the crank shaft and the caps bolted over it to hold them in place. The

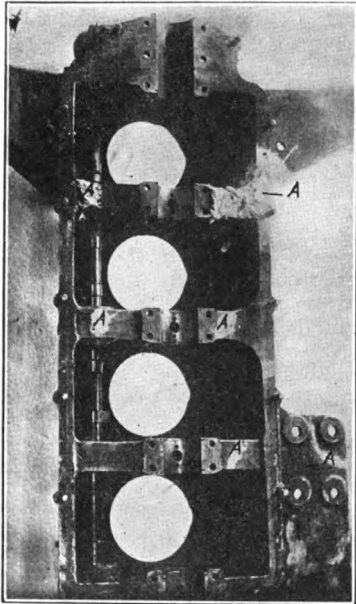


FIG. 1.—A BADLY BROKEN CASE RE-PAIRED AS SHOWN

case was placed in the oven and slowly heated to expand the metal evenly. It was then welded, after which it was placed again in the oven and the fire turned out and all drafts closed. In this manner it was allowed to cool gradually, which took about four hours before it could be handled with the hands. It was then removed and the surfaces dressed smooth where necessary. Of course, it was necessary to make only such parts smooth and free from roughness where the lower pan bolted to the upper, as the bearing supports would be stronger with the extra metal on them.

In Fig. 2 is shown the crank shaft from the same car. This was broken at A; a very easy place to weld as it was not necessary to do any machine work, as the emery wheel would complete the job after welding. Many operators claim that a welded shaft is just as strong as before, but, while I have not had one broken after welding, I would not be in position to say. Judging from experience the weld with the same amount of metal would no doubt be a little weaker. I never tell a customer the casting will never break again and make such statements as will effect my business in case the casting does break. Many castings are welded and many times break within an inch or so of the weld and again they will break in the weld, therefore conditions alter cases. When a customer asks the question: "Do you think it will

break?" just tell him that it broke once and could do no worse than the first time. Most castings can be reinforced with an excess of metal, which in all ordinary cases will make it as strong as new if not a little stronger, and it is a good plan to "puddle" in extra metal where it will not interfere with the working of the casting. One should be very careful not to heat the metal hotter than is necessary to make the weld as metal heated too hot will be quite a little harder which, of course, would weaken it to a certain extent. Metal just hot enough to flow has quite a little more strength than that that has been heated too hot and it machines a great deal better.

In Fig. 3 the broken shaft is shown placed in the repaired crank case for welding. It was clamped down into position by the bearing caps to keep it in perfect alignment. At the break A the two parts were ground out leaving a V-shaped notch, which makes welding quite a little easier. A weld of this sort should be made with the very best filler rod, such as chrome nickel or vanadium rod. The vanadium rod has answered well for all such welds as I have made of this kind; after welding it should be left in the cases until entirely cool before removing and it will come out perfectly straight. The lower half of this same case was also broken in a few places.

Fig. 4 shows the shaft removed from the case after welding and before grinding. After it was ground it was hard to tell where the shaft had been repaired. This repair job has been in constant use for some time now, and has not yet shown signs of giving way. The customer told me after he had used the car for a couple of months that for the first week or so he would expect every minute to have it go to pieces, but that feeling has long since left him and he feels confident it will give him no trouble unless something similar to the accident he had before happens again.

In Fig. 5 is shown a cast job which is a very simple one, yet it has an idea which can be worked well in a number of places and that is the alignment of the broken parts. A steel shaft, B, was passed through the openings, which should be in line, and clamped. Thus it was an easy matter to hold the broken part in correct position while welding. The broken arm at A should be ground to a V shape from both sides and then all that is necessary to do is to fill the broken place with the

filler rod and grind to shape. And many times it is not necessary to grind, for a little extra metal is a very good thing as it will add to the strength and in no way effect the working of the casting.

One should be very careful in sending out finished work to do the very best job that it is possible to do and have each and every time a satisfied customer and the business will continue to grow. When a casting has a number of holes or bearing places that should be kept in alignment always bear in mind these little

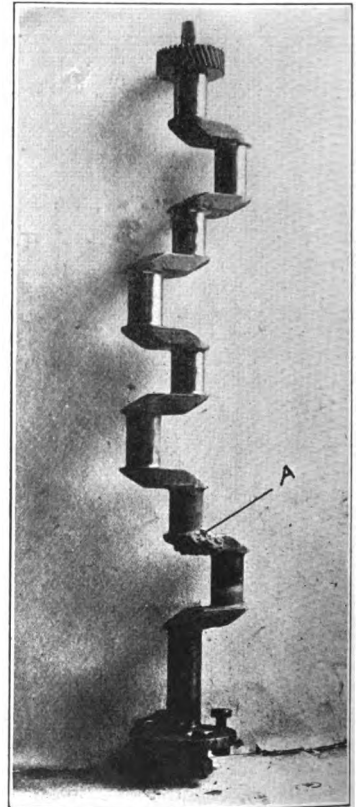


FIG. 2.—THE BROKEN CRANK SHAFT

things and take great pains that when the casting is finished it will fit as before without a great deal of trouble on the part of the customer, or he will get anew casting next time. All small holes that are likely to be filled with the metal or to be destroyed by the heat can be filled with clay, which can be knocked out after the weld is made and it saves drilling and fitting. A small flask of moulding sand is a very good thing to have on hand from which to fill holes or to hold a casting in shape while welding, and many times a lost part can be made

in the sand and the metal run new and the seam welded after.

Safety in Oxy-Acetylene Welding and Cutting

Editor's Note.—A considerable amount of space has been devoted to the subject of the dangers of handling oxy-acetylene apparatus, and cautions and warnings are continually being voiced on the care necessary to insure the safety of operators and others in the use and care of the "double-flame" machines, tanks and equipment. The article, from which the following is an extract, appeared in "The Travellers Standard", a monthly publication promoting the "Safety First" idea and published by The Travellers Insurance Company. The following paragraphs should be read carefully by every blacksmith who has installed or intends to install an oxy-acetylene machine.

There are two methods for generating the supply of acetylene for welding and cutting operations, one generally called the carbide-to-water plan, and the other the water-to-carbide plan. The first makes use of a cylinder partly filled with water into which calcium carbide is dropped by a mechanism controlled by the pressure of the gas in the cylinder. This has the double advantage of producing the largest amount of gas per unit of carbide, while the gas is also separated from certain of its impurities by bubbling up through the lime water.

On the other hand, the water-to-carbide method is very apt to reduce the calorific value and the amount of

acetylene produced per unit of calcium carbide, and at the same time form a tar product which will clog up the pipes, valves, and torches. For these reasons, among others, the superiority of generators of the carbide-to-water type is generally acknowledged.

It is not safe to store gaseous acetylene in tanks under a pressure approaching two atmospheres; and to overcome this difficulty storage tanks are provided, containing a porous substance such as brick or asbestos, and filled with acetone. Acetylene gas is then pumped into the tanks and this combines with the acetone, which has the property of absorbing approximately twenty-five times its volume of pressure, at 60° Fahrenheit temperature. By this process acetylene may be safely stored under a pressure of 150 pounds per square inch.

A great deal of the success of oxy-acetylene welding depends on the torch. The low-pressure, or injector-action torch, is used in connection with acetylene under a pressure of a few ounces. A chamber in the torch permits the accumulation of a small quantity of acetylene, and the oxygen passing through this chamber, under pressure, carries along a certain amount of acetylene, usually in quantities of one part of acetylene to 1.6 to 1.8 parts of oxygen. This excess of oxygen, besides being wasteful of the oxygen itself and increasing the length of time required for making the weld, tends to oxidize the metal, thus forming a brittle, unsatisfactory joint.

To overcome this defect the high-pressure or positive-mixture torch was designed. In this torch both the acetylene and the oxygen are admitted under pressure, the ratio being one part of acetylene to 1.13 to 1.15 of oxygen. Since both the acetylene and oxygen are under a pressure of several atmospheres, reducing valves and pressure gages are employed to regulate the flow of the gases in the correct proportion to produce rapid and satisfactory welding and cutting.

The quality of the oxygen has an important bearing on the efficiency of the welds, and for this reason it is essential to see that the impurities, incident to the generation of oxygen, are eliminated. This is practically impossible in a portable pressure generator, since some of the deleterious impurities, such as chlorine, must pass through nearly 100 feet of washing fluid before they are removed. In a stationary oxygen-generating outfit, however, it is quite easy to

provide the necessary amount of washing fluid, and store the oxygen in tanks. This increases the cost of the oxygen, but since better results are obtained, the ultimate cost of the weld is no doubt less than with a portable generator.

If portability is essential, we recommend that both the oxygen and acetylene be obtained from storage

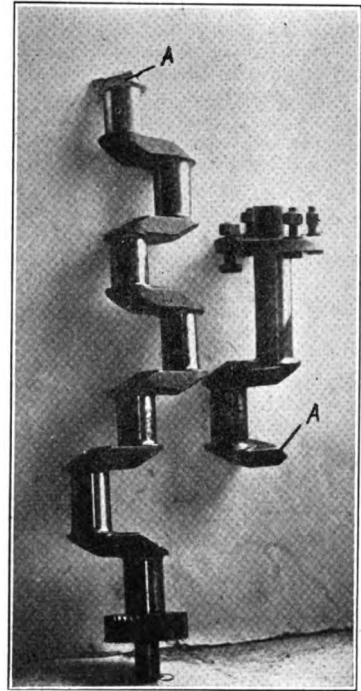


FIG. 4.—THE CRANK SHAFT AFTER WELDING

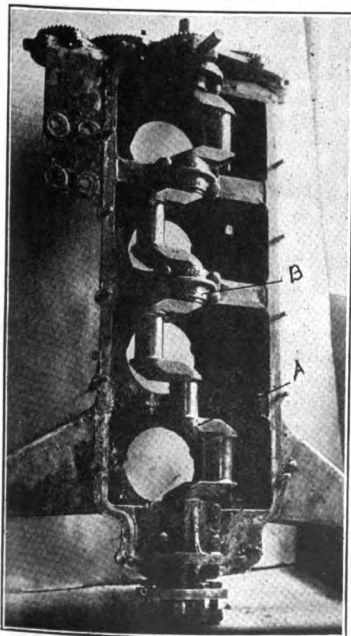


FIG. 3.—THE CRANK IN THE CASE READY FOR WELDING

cylinders. A portable acetylene generator has the disadvantage of requiring the removal either of the water or the calcium carbide before the generator can be taken safely from one place to another. If neither the water or the calcium carbide is removed, and the generator tips over, the mixture of all the water and carbide will generate large quantities of gas, causing an explosion; or in case of a small leak the escaping gas may become ignited, thus causing severe burns.

A number of accidents have occurred, due to the practice of using an open-flame light when cleaning out an acetylene generator. It is customary to wait until the pressure gage indicates no gas in the generator before cleaning operations are started. Sometimes a small pocket of the gas remains, however, and burns the workman when ignition takes place from the open flame. Calcium carbide will occasionally cake on the



sides of the generator tank, and unless the water is removed at once the caked carbide will generate gas as it is knocked from the tank, and will ignite and burn the workman. A portable incandescent electric lamp should be used instead of an open light, and the lamp bulb should be protected against breakage by a fibre or wire guard.

The tubes or hose connecting the torch with the acetylene and oxygen supply are constantly subjected to twists, turns, and abrasive action, and are apt to be so weakened that minor leaks occur, or the fastenings may become loosened and permit gas to escape. The torch itself provides a flame that will ignite the escaping gas, or the sparks from the welding or cutting operation may also light it. Occasionally gas escapes from loosened fastenings and gathers about the clothing of the man wielding the torch. Sparks from the burning metal then cause the gas to ignite, severely burning the workman. This indicates that the hose fastenings and the hose itself should be frequently inspected to see that no leaks exist or are likely to occur during an operation.

It is essential that colored glasses be worn by every one connected with oxy-acetylene welding or cutting work. Not only should the eyes be protected from the intense light of the oxy-acetylene flame, but also from the very fine, slag-life substance that occurs during the welding operations, and that is decidedly harmful to such sensitive organs as the eyes.

Very little, if any attention has been given to the subject of the effect of oxy-acetylene welding upon the health of the workers. The amount and intensity of the heat from the flame is sufficient to cause vaporization of the metals, and since the workman's head must be within a foot or two of the flame, he cannot avoid breathing the products of combustion unless some protection is provided. It would seem that a helmet, with a colored-glass front, would afford the necessary protection in this way, as well as protect the eyes from the intense light.

The economy and efficiency of this method of making welds and cutting metals has led to its adoption in many of our manufacturing plants, and this in turn has created an oxygen-generating industry. The cost of transportation is such, however, that the oxygen is usually sold in cylinders in which it is stored under pressures up to 1,800 pounds per square inch. Should one of the cylinders be defective a destructive explo-

sion is apt to result. To guard against accidents to the workmen from this cause, the cylinders should never be stored in the working room, but kept in a special storage room with substantial walls. Care should also be taken to avoid leaving full

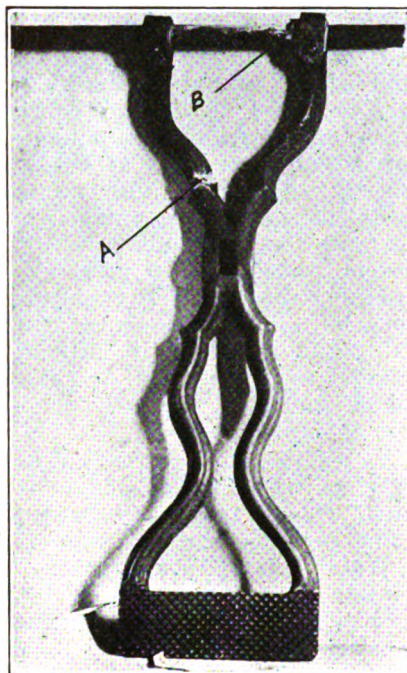


FIG. 5.—HOW THE PARTS WERE HELD IN ALIGNMENT WHILE WELDING

tanks in place where the direct rays of the sun may strike them, or in close proximity to heating apparatus or any other sources of heat.

Thoughts on Timely Topics

By THORNTON.

Caustic Censure and Cheery Comment

SOME SMITHS don't seem to realize how closely profits and capital are related. Talk to any smith and ask him what his aim in life is and the chances are he'll tell you that he is trying to halter and hitch enough business to keep him going so that he needn't work quite so hard. And if you ask him about his prices and profits you most likely find that he has the cart hitched before the horse and is trying to build up a business on small prices and no capital. To build up a business, a man needs capital, whether that business is a peanut and banana stand or a munition factory. After the initial start profits should build up a capital for future development and growth. If there is no profit there can be no building up of capital and naturally no business growth. Now then, on this basis, isn't the "small profit big business"

idea a snare and a delusion? The smith who expects to build a bigger business on the small profits idea has about as much of a chance of succeeding as Bryan's chances in 1916. The very foundation of business is profit. It is the alpha, omega and the whole bloomin' works. If it wasn't for little ol' P. Rofit the word business wouldn't even be in Mr. Webster's big book. And why on earth,—under the sun, and in Top-het, any man will continue to think that he can get anywhere in business, (except in the Pit of Failure) by cutting prices and shaving profits I cannot understand. The smith who does not arrange for better equipment by accumulating capital from the profits of his business will never see any bigger success than he is making right now.

"BUILDING NOTES" is the request of one reader who has mistaken this column for the building department. And while this is somewhat out of our line we may be able to pare off a few of our experiences in this line without any excess cuss words so as to make the few resulting notes intelligible to the novice. In the first place, the most important requisite to any building operations whether it be a bird house, hog pen or country villa, is a building contract. This is a legal instrument of torture filled with legal phraseology that will not stand for any sass or back talk and which is supposed to protect the builder. But it has since been proven that the protection afforded is only momentary and passing and only of import before building. Nevertheless the building contract is a good thing to have. It contains almost as many words as the unabridged dictionary and for a quiet evening's reading is as understandable as Ibsen. This latter quality shows the infinite care with which the lawyers work. For upon the merest provocation the lawyer's services are in demand, for one of the wonders of the present century is a layman who can correctly and intelligently interpret the average building contract. Attached to the building contract is a clause of the protected cruiser class known as the forfeiture clause. This makes the builder feel secure and safe concerning the entire contract no matter what the other 99 parts of the contract might and do say. And when the builder reads the contract to his wife under the evening lamp with a final flourish he shows how he has the builder haltered and roped in the stocks where he cannot move, all because of the forfeiture clause.



The builder, however, shatters the buidlee's protected cruiser with several submarines consisting of extras that develop a bill of expense which makes the original contract price look like a ditch digger's salary beside the Germanic war appropriation.



Dison's Notes

The 2:10 list, the exclusive circle for trotters and pacers, a list in which all lovers of harness racing take the deepest interest, is growing rapidly nowadays, nearly a dozen performers having been added to it since the opening of the Grand Circuit at Cleveland, July 19, making in all, nearly thirty that have taken records of 2:10 or better since the harness racing season opened. The list, at this writing has received the following new additions:

Trotters

- Lette Lee, 2:06¾, by Moko, dam Amy Lee, 2:14¾, by Axtell, 2:12.
- Linden Hall, 2:08, by Arion, 2:07¾, dam Shamrock Girl, by Moquette, 2:10.
- Caddo Belle, 2:08, by Prodigal, 2:16, dam Baroness Hanley, 2:25½, by Baron Wilkes, 2:18.
- Spriggan, 2:08¾, by Baron McKinney, 2:10¾, dam Helen Simmons, 2:11½, by Simmons, 2:28.
- Nowaday Girl, 2:08¾, by McDougal, 2:10¾, dam Nowaday, 2:14¾, by Look-away, 2:22¾.
- Strafford, 2:08¾, by Moko, dam Ruby, 2:11¾, by Independence, 2:23¾.
- Tom Patch, 2:08¾, by Joe Patchen, p., 2:01¾, dam Jane, by Poteen, 2:12½.
- Al. Mack, 2:09¾, by McLintock, 2:16¾, dam Mignon by Director, 2:17.
- Loe Blossom, 2:09¾, by Lepide, dam Lillian W., by Harvey Hontas, p., 2:24¾.
- Henry Todd, (3), 2:10, by Henry Setzer, 2:10¾, dam Nowaday, 2:14¾, by Look-away, 2:22¾.
- Moko Hall, 2:10, by Walnut Hall, 2:08¾, dam Dansy Wilkes, by Moko.

Pacers

- Hal S., 2:04¾, by Hal Chaffin, p., 2:05¾, dam Bessie Hal, p., 2:16½, by Red Hal, p., 2:13¾.
- Hal Boy, 2:05¾, by Hal B., p., 2:04¾, dam Altatuna, by Altamont, 2:26¾.
- The Beaver, 2:05¾, by Searchlight, p., 2:03¾, dam Ripple, 2:28¾, by Glenbrook.
- Bingen Pointer, 2:06¾, by Bingen, 2:06¾, dam by Star Pointer, p., 1:59¾.
- Queen Abbess, 2:06¾, by The Abbe, p., 2:04, dam Queen Regent Ideal, by Mambrino King.
- Lock Logan, 2:07¾, by Zolock, p., 2:05¾, dam Effie Logan, by Durpee.

- O. U. C., 2:07¾, by C. The Limit, p., 2:03¾, dam Rosie Wodoburn by Easter Wilkes.
- Acointe, 2:07¾, by Aquilin, 2:19½, dam Mattie S. Wilkes, 2:26½, by Simmons, 2:28.
- Direct Line, 2:08, by Baron Direct, dam Woodland Echo, by Woodline, 2:19.
- Potrero Boy, 2:08¾, by Demonio, p., 2:11¾, dam Potrero Girl, by Prince Airlie.
- Pat Caronody, 2:08¾, by Al Stanley, 2:06¾, dam Eve Love, by Walter Direct, p., 2:05¾.
- All Wilkes, 2:09¾, by Baron H., 2:09, dam Rose F., by Ettran K., 2:22¾.
- Billy Brino, 2:09¾, by Wildbrino, 2:19½, dam by Prohibition.
- Billy Dale, 2:09¾, by Dale Patchen, p., 2:20¾, dam by Almont Brunswick.
- Gyksey Margrave, 2:09¾, by Margrave, 2:15½, dam Gyksey Girl, p., 2:12½, by Pilot Almont.
- Lizzie Dillon, 2:09¾, by Sidney Dillon, dam Angela S., by Silent Chimes.

More and more does it appear that the stallion Peter The Great, 2:07¼, once rejected from a prominent New England breeding stud, is one of the rare horses entitled to the appellation "the sire of his generation". Not only does the son of Pilot Medium outrank all other sires of 2:10 trotting speed by a great margin, but no other sire is so numerously represented by great race horses this year as he is. His daughter, Margaret Druin, 2:04¾, is not only the fastest trotter of the year, but she looks to be one that no other trotter eligible to the 2:05 class has an even chance to heat, and it is freely predicted that she will trot to a record of 2:03 or better before the end of the year. Then there is a trio of wonderful stallions out this year by Peter The Great, indeed it is doubtful if any other sire ever has been represented by three such stallions in one year. These three are Peter McCormick, 2:05½, Peter Scott, 2:06¾, and The Guide, 2:07¾. Still another stallion by him that may a little later be in the same class, is Great Isle, that has already been close up to the winner of a heat in 2:07. And when these four are joined by Peter Volo, 2:03½, the world's champion three-year-old (now four), later in the season the unprecedented sight will be witnessed of five trotting stallions by one sire racing miles around, and in some instances below 2:05. Volga, 2:13¾, the sensational two-year-old trotter of the year, is also a daughter of Peter The Great and still another daughter, Empress of Russia, a four-year-old, is racing right around 2:10. There is every indication now that Peter The Great's record breaking list of 2:10 trotters, which numbered twenty-seven at the close of last season, will be nearly if not quite, forty next fall, which will be one of the most remarkable accomplishments which have featured trotting horse breeding history, especially when it is remembered that his great grandsire, Hambletonian (Rysdyk's) was the wonder of the breeding world forty years ago, because forty of his sons and daughters had taken records of 2:30 or better, and the fastest held a record of 2:17¾.

In years gone by a number of enterprising men have made use of a fast trotter or pacer as an advertisement for various lines of business, but, with the single exception of the champion pacer Dan. Patch, 1:55¾ whose many exhibition campaigns were largely an advertisement for a stock food, none of the horses so

used were as notable, as an advertisement, as the trotting mare Lon Jennings, 2:06¾, promises to be for the United States Horse Shoe Co., of Erie, Penn., which company is campaigning a stable in two divisions to advertise the merits of the shoes of their manufacture. About the first of the horses raced for advertising purposes was the trotter Yellow Dock, 2:20¾, that was campaigned in 1882. A little later came Elastic Starch, 2:24 and the pacers, Dyspepsia Pills, 2:15¾ and Dyspepsia Cure, 2:19¾. The trotter Roetta Soap, 2:14¾, came next and then the "Gelatine" quartette of pacers, Gelatine Boy, 2:09¾, Gelatine Queen, 2:10, Gelatine Lad, 2:12¾ and Gelatine Baby, 2:14¾. Lon Jennings, the trotter that is calling attention to the United States Horse Shoe Company's products is a daughter of the noted sire Todd, 2:14¾, and the expert horsemen who are following the Grand Circuit have tabbed her as one of the three or four highest class trotters out this year. During the Cleveland Grand Circuit meeting she started in two races, only two days apart, and in each one she headed a classy lot of horses to the wire, putting in a heat in 2:06¾ in each race. At Detroit she disposed of her field with equal ease and it is difficult just now to point out the trotter that was eligible to the 2:13 class when the season opened, that has an even chance to beat her. Last year the United States Horse Shoe Company raced their horses over the half-mile tracks exclusively and one division is racing over the two-lap courses this season, three of their horses having scored victories on the minor tracks, Lon Jennings, The Climax, 2:07¾ and Colonel Riser, 2:20¾, the first two mentioned having been raced on the half mile tracks before the opening of the season on the mile tracks. An adjunct to the campaigning stable is a commodious tent in which samples of the numerous styles of shoes made by the company are displayed.

Five fast record stallions, all bred in the choicest lines fell victims to the European war when the steamship Guido of the Nelson line, bound from Hull, England to Archangel, Russia was torpedoed and sunk by a German submarine, June 9, off the coast of Scotland. On board the ill-fated steamer were the five stallions which were shipped from New York a couple of weeks before consigned to Russians who purchased them in this country early in the spring. The five stallions destroyed were: Redlac, 2:07¾, by Allerton, 2:09¾, dam by Muscovite, 2:18; Ormonde, 2:08¾, by Wilkes Boy, 2:24¾, dam Paronlela, by Parkville; Lord Brussells, 2:09¾, by Axworthy, 2:15¾, dam Lady Brussells, by Milton, 2:19¾; Harry Dillon, 2:10, by Sidney Dillon, dam Adio, by Guy Wilkes, 2:15¾; and Donald McKay, (pacer), 2:07¾, by Gambetta Wilkes, 2:19¾, dam Lula, by C. F. Clay, 2:18. Redlac and Ormonde were sires of a number of fast performers. The others were too young yet to have made a reputation in the stud, but they doubtless would have been successful in Russia where all of them were to have been used for breeding purposes.

When the two trotters, Nowaday Girl, 2:08¾, and Henry Todd, (3), 2:10, took their records a few days ago, they made their dam Nowaday, 2:14¾, by Look-away, the fifth mare to become the dam of as many, as three 2:10 trotters, as she had previously produced Totara, 2:09¾.



The Oxy-A Flame

W. O. B.

Jim Fair, the smith up at Sueetz'es Creek put in one o' these here oxy-acetylene machines a while back, and this is what he's got t' say about it in his characteristic way:

The oxy-a flame will weld an axe,
Or cut through steel or melt up tacks.
It'll fix an engine good as new,
Or put a calk upon a shoe.
It cuts through steel with perfect ease,
Just like a razor cuttin' cheese.
And when it comes t' meltin' brass,
Why that there flame has gimpan' class.

Aluminum welds are hard to make,
So some one said, but goodness sake
You'd ought t' see that oxy-a flame
Do 'luminum work, it's 'most a shame
To take the money, it's made so quick,
And then the work's done neat and slick.

And brass work's done so bloomin' quick,
You'd almost think't a magic trick.
While copper welding's just a cinch,
To do a foot or yard or inch
Is just a little bag-a-telle
And also it is done so well.

Its' just an awful powerful thing
That oxy-a flame it is, by jing.
There aint no job it can't complete
For welds and cuts are done so neat.
No matter what the mental is,
That flame is "there" and does the bis.
And copper, iron, steel or brass
It welds 'em up with ease and class.

And thus this wonderful oxy-a flame
Makes easy the work that made you lame.
And when the winter of life appears
You'll feel like Spring in spite of years.
For doing your work the oxy-a way
Makes the winter of Life seem just like
May.



Heats, Sparks, Welds

How can a man tell what his profit is unless he knows his costs

Read this issue from cover to cover. Is there anything you don't understand about oxy-acetylene work now?

Are you stuck on your job or stuck on a job? There's a difference. In either case you'll want THE AMERICAN BLACKSMITH.

Remember when figuring what your shop and stock is worth that the acid test of

value is what a stock will bring—not what it cost.

From Missouri comes this comment: "I enjoy reading The American Blacksmith and consider it a booster and the most encouraging journal I ever read."

One man we know would sooner get a job at a price below cost than let his neighbor get it at any figure. His initials are T. T., and his first name is neither Dick nor Harry.

Have you a real idea of the work "Our Journal" is doing for the craft? Let us know what you think personally. We know what others think, now we want to hear from YOU.

If you don't believe that advertising pays ask Kellogg, Heintz, Uneceda Biscuit, Ivory Soap, Campbell's Soup, and a few of the other little fellows who have paid out millions for advertising.

Don't let the cost of finding the cost of a job cost more than the job costs. When that stage is reached call time. A little cost accounting and lots of common sense is a hard to be combination.

Smiles in the smithy mean business. Don't be afraid to crack a good business smile when in the shop. And then don't be afraid to carry the smile home with you. You'll find it worth more than money.

Some smiths think that their real purpose in business is to get the price their competitor is going to get, or a little less irrespective of cost. Don't guess at profits. Know and then you'll know just where you stand in a business way.

How long are you going to allow those patent medicine and tobacco signs to disfigure your shop? Wouldn't a sign of your own pay bigger dividends? Try it and see. Certainly a neat sign with your own name on it will look better and more prosperous.

How many people in your vicinity are there that you want, as customers? Do you know? Wouldn't it be a good idea to make a list of those for whom you would like to do work, and then to tell them so? Try it and see what results you get.

How's your herd? We're still sending out Pink Buffalo Stamps. "Our Folks" are still using them. Better look up your supply. If your herd has stamped or if there are only a few of 'em left ask for more. Just say: "Send Some Pink Buffalos." You'll get 'em quick. And then too—they're free.

"Why wouldn't it be a good idea for every one of your readers to send in one other new reader. Then you'd have twice as many as now and could do still more good work?" questions a York State smith. How about it, Mr. Reader? If you'll do your part, we'll do ours and give you something for your trouble beside.

This issue is a veritable text-book and full-term course combined on the subject of oxy-acetylene torch practice. Contributors in this number are: An oxy-acetylene expert and former maker of the dual flame machines; an engineer—author of a text-book on oxy-acetylene practice, and two practical workers with the oxy-acetylene torch. How's that for a combination?

TRUE TALES OF OUR SERVICE

Number Nine

A Connecticut smith sold his shop and retired from active service beside the forge. But as the weeks grew into months his hand ached for the feel of the hammer handle and his ear longed for the music of the anvil ring. He asked us if we knew of a location. Within five days we placed him in touch with four live chances to get back into harness. In a short time he was again handling a hammer in a shop of his own.

A very good hardening compound is given by D. E. Fish, of Oregon: 2 ozs. of cyanide of potassium, 2 ozs. sal ammoniac and 1 oz. bicarbonate of soda (Arm and Hammer soda.) Pulverize the first two, then add the third and mix thoroughly. Heat share to a dark red and sprinkle in the compound. If it is not hot enough to make the mixture flow well, heat to proper temperature and dip.

The Automobile—has it effected your trade? We'd be glad to know if it has and to what extent. If it has and to what extent. If it has not, tell us so. We want some real facts on the situation as you have found it. We're not opening our columns to any professional figure manipulators who are trying to demonstrate that the horse is "on the go" or that he isn't. What we want are facts. Facts on how the automobile is affecting your business and how it is likely to continue to affect it. And don't let us arrive at any conclusions hastily. We must consider carefully conditions as they are and weight the evidence we have on hand. Write a letter, as long or as short as you like, on the automobile situation as you see it. It is a problem which the banker, the grocer, the butcher, the clothing merchant, the harness maker and the livery man have faced and discussed. Why not the smith who is so directly affected? Write now.

There are blacksmiths and blacksmiths. It was the Editor's privilege recently to visit another city to address a body of blacksmiths. Before meeting the smiths of the city as a body the writer had the pleasure of getting well acquainted with one of the smiths. To say that this man is an honor to his craft is putting the matter very mildly. In the first place he runs a big business and devotes his time to it personally. He is the superintendent of a Sunday School, is the father of a family and is a real blacksmith. He doesn't drink, seldom smokes and discourages profanity. He is clean in mind and body, dresses like any other business man and is not ashamed of his business, his religion nor his principles. Another member of that city's smithing craft was about to take up evangelistic work. Another, the owner of a big shop, has raised a good family and is known for his prominent stand for fair and square dealing. And so similar examples could be pointed out among the craft of that city. And those men dominated and made their clean, straight, upright principles felt throughout the shops in that town. We can use more such men in the trade. Let us all encourage men of this kind in their good work for a better craft.



The Horseshoer

Judging Draft Horses—4.

A. S. ALEXANDER
Body, 10 Points.

Chest.—As this part encloses the heart and lungs it should be roomy in every respect. Perfect, 2 points.

The withers form the "roof" of the chest (thoracic cavity) and the sternum its "floor", while the rear part is separated from the abdominal cavity by the diaphragm which runs from the sternum, well inside of the ends of the ribs, to the first lumbar vertebrae (segments of back bone) at the loins.

The chest is judged from the front and sides. It should be fairly wide in transverse diameter through the breast from in front and through the body, at the median line, behind the elbows, markedly deep, with the breast bone (sternum) low and level and the heart girth large. A narrow, shallow chest denotes poor constitution, lack of endurance, and deficient breathing organs. If too wide the action tends to waddling or rolling. A narrow chest and high knee action often go together. An ample, wide, deep chest denotes vigor, power, strong constitution and easy keeping qualities.

Ribs.—These form the "barrel" and should be deep, well sprung and carried low at the flank and close to the hip. Perfect, 2 points.

Flat ribs mean lack of room for the digestive organs; the rounded barrel indicates good keeping qualities and ability to do hard work. A "cut up" flank, with short, flat ribs and a long lose coupling, indicates weakness, poor digestive powers, poor keeping qualities, constitutional debility, and tendency to scour. This conformation is termed "washy."

Back.—The general appearance of the back should denote great strength and compactness. Perfect,

2 points.

The back extends from the rear of the withers to the last rib and should be broad, straight, and muscular. If the ribs are poorly sprung the back will be narrow and sharp. A rounded barrel tends to give a horse a slightly leggy appearance. This must be considered in judging.

Loins.—The loin is the part of the back not supported by ribs. It couples the body to the hips and should be short, wide, deep and strong. Perfect, 2 points.

Long, low loins are objectionable. Action of the hind legs is defective (slouching and scuffling, where there is such conformation. A "roach" (convex) back is the opposite of a "sway" (concave) back, and is preferable to the latter. The loin of the mare is longer than that of the male, but should be strong, not sagging.

Underline.—From the floor (sternum) of the chest the underline of the body should run back full and low. Perfect, 2 points.

If the underline slopes sharply upward to the stifle the abdomen

legs the power to start and draw heavy loads. The region should be capacious for the accommodation of the maximum amount of muscle. Steepness toward the root of the tail (croup) detracts from the symmetry of form and lessens the space available for attachment of muscles.

Croup.—This part of the hind quarter extends from rear of the loin to the insertion of the tail. It should show comparative levelness, ample muscle and great strength. Perfect, 2 points.

The most notable deficiency of this part in draft horses is excessive droop, or steepness and shortness, with weakness of muscle. Such conformation tends to slouchiness in gait and often is associated with "sickle" hocks. The draft croup should be smooth, of fair length, and neither too steep nor perfectly level. The steep croup often is characterized by a deep depression or "valley" constituting a "double" croup. Both forms are objectionable.

Thighs. From the hips, down to the stifles; should be strongly mus-



FIG. 7—A PAIR OF HIGH GRADE WORK HORSES

has a cut-up appearance. This indicates lack of roominess and denotes poor keeping qualities.

Hind Quarters, 30 Points.

Hips.—The upper part of the hind quarter should show great development of wide, thick, smooth muscle and freedom from angularities and coarseness. Perfect, 2 points.

The muscles of the hips and hind quarters in general, give the hind

cular, wide and long. Perfect, 2 points.

Slim, light, narrow, poorly muscled thighs denote lack of draft power. It is important that the thighs and all other parts of the hind quarters should be richly supplied with muscles.

Quarters.—Looking from the rear the plump muscles of the inner sides of the thighs form the quarters and should be full, thick, and car-



ried well down to the second thighs (gaskins). Perfect, 2 points.

Stifles.—These joints should be strong, thick with muscle, clean cut in front, and free from dense dropsical swellings. There should be a marked depression above and below the patella (knee cap). Like the elbows they should be so set as to allow of straight, free action, and

stitute serious unsoundnesses. The joint should look and feel firm and hard with each bone well defined, free from meatiness and of great size. The point of the hock should be prominent, clean and sharp and the tendons under it straight, clean, distinct, and free from bulging.

Cannons, Fetlocks, Pasterns, Feet.—What has been said about the members of the fore leg applies with equal truth to the corresponding parts of the hind extremity. The cannons should have the same side, flat appearance desirable in those of the fore leg. As the hind feet strike the ground a slanting blow, while concussion on the fore feet is direct, absolute correctness in form and perfect soundness is somewhat more important in the fore feet than in the hind feet. The hind pasterns may be slightly more upright than those of the fore leg. The hoofs of the hind legs are steeper and narrower than these of the fore legs. The hind fetlocks are most likely to be blemished by puffs and interfering sores.

score of transmissibility, but depreciates sale value. In work horses the degree to which a disease or unsoundness is temporary or permanent and likely to detract from serviceability for work, must be carefully considered. A horse may be afflicted with strangles ("colt distemper") and recover perfectly; or the attack may pass off, but leave the animal a "roarer." The attack of strangles would constitute a temporary unsoundness; the "roaring" a permanent and serious unsoundness in a work animal. In a breeding animal it is commonly accounted an unsoundness unfitting the horse for breeding purposes. A large barb wire cut scar would ordinarily be considered a blemish or eyesore; but should it have caused permanent lameness it would be a serious unsoundness in a work animal. In a breeding animal, not used for work, the blemish and even the lameness, would be of slight gravity, not being transmissible to progeny.

Editor's Note.—The next part of Prof. Alexander's excellent paper on "Judging the Draft Horse", takes up the subject of "Unsoundnesses" and brings to a close a series of articles that have proven most interesting and valuable to our readers.

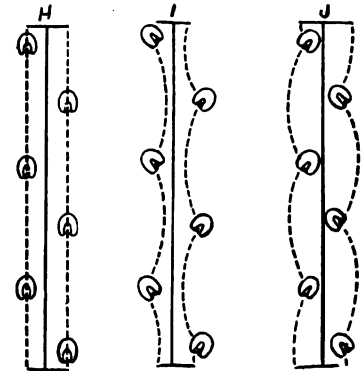


FIG. 8.—THE FLIGHT OF THE ANIMALS FEET MUST BE OBSERVED

therefore neither appreciably turned toward nor away from the body. They should lie close to the abdomen, with a slight deviation outward. Such a deviation is preferable to turning inward or even a direction parallel to median plane. The position and direction of the stifle is not dependent upon the form of the flank. The stifle joint corresponds to the knee of man. Perfect, 1 point.

Gaskins.—These are the lower thighs and correspond to the forearms and what is true of the latter applies equally to the gaskins. The muscles should be large, prominent in front of the bone, and carried well downward. Perfect, 2 points.

Hocks.—These are most important joints as the great strain of load starting and hauling falls upon them and they must be immensely strong and perfectly sound or soon will break down. The joints should be large, clean, sharply defined, wide, deep, and well set. The point of the hock corresponds to the heel bone of man. Perfect 8 points.

Weakness of the hock is one of the most common and serious defects in the draft horse. It is important to improve this deficiency. To that end breeding animals should have ideal hocks and for work horses this also is imperative. The hock (not "hind knee") is commonly the seat of some one of such diseases as bone and bog (not "blood") spavin, thoroughpin and curb. These con-

Soundness and Unsoundness
The professional veterinarian, when examining a horse for soundness, proceeds, on the basis of a "negative" test. He looks in turn for one of a number of possible unsoundnesses each at its particular location. Not finding an unsoundness present he accounts the part sound. If all parts are found to be sound, the animal is certified as sound. There is no such condition as "serviceably sound." A horse is either sound or unsound. He may

Common Sense in Shoeing Horses

DR. JACK SEITER.

In looking over the columns of any of the periodicals that maintain a horseshoeing department, one cannot help but notice that most of the writers, in explaining their difficult cases, invariably insist that their success was due to some fantastically-shaped shoe—a shoe with

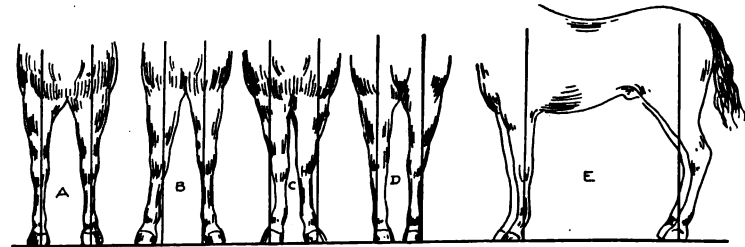


FIG. 9.—THE ANIMAL IS VIEWED FROM THE FRONT AND ALSO FROM THE SIDE AND THE CONFORMATION OF THE LIMBS NOTED

be too unsound to work, or able to work despite unsoundness. The seriousness of the particular unsoundness present is to be estimated by the judge and for that intimate knowledge and experience are necessary.

For breeding purposes any disease is serious. A disease considered hereditary is most serious. A distortion, deformity, or blemish, due to accident, is not serious on the

numerous calks and projections sticking all over its surface. They will proceed to explain how this calk will prevent the animal from breaking over here, and how this projection will make him break over there, until to the uninitiated it appears as though one could readily make an animal do this or that by simply making one of those fantastic shoes,—shoes that it would probably take some of us the greater part of a day



to make,—shoes that are difficult to fit to the foot,—shoes that cannot help but break an animal down,—shoes that verge so on the unnatural that they are simply not in the category of the practical horseshoer, or the experienced horse-man.

I believe I have had my share of experience during the past twenty-five years, and I dare say that I have been fortunate to have had the chance to shoe some of the best horses that were out every year, and to shoe for most of the world's greatest drivers, from the time of Charles Marvin and Budd Doble to that of Tommy Murphy and the younger generation of reinsmen. But never in all my experience have I seen a good horse, handled by a good trainer, shod with any of those fantastic-shaped shoes that we see advocated for the numerous faults of gait and conformation that horse flesh is heir too. And I really do believe that the only place one does really see these shoes is in the cases of nickel-plated-freak shoes that some of our brother shoers decorate their shops with. Not one in a hundred could give an intelligent answer as to their use or virtue. They



FIG. 10.—THE REAR LIMBS MUST ALSO BE CAREFULLY OBSERVED

will simply tell you that this shoe will stop an animal from hitting his knee; this one from hitting his ankle; this one from cross-firing, and this one will prevent an animal from this or that. The fact of the matter is this, the majority of them will do just one thing to an animal, and that is, generally speaking, break him down. It is utterly out of the question to even attempt to make an animal break over any given part of the foot, or shoe, where nature has not intended for him to do so; and the moment that we attempt to carry out any of those insane ideas in regards to shoeing, we are bound to get into trouble of the

most serious sort.

We may, by the intelligent use of the rasp and knife, work wonders in the line of correcting faults of gait or conformation of our colts; and even then we have got to work on them while the animal is young, preferably when they are weanlings up to the time they are two or three year olds. But after that the bones are set and matured and if no attention has been paid to their feet previous to this, we had better let them alone and assist them to break over at any given point that seems most natural for them to do so.

With some horseshoers (so-called scientific horseshoers), the general practice is to put a lot of extra iron at the point of the shoe where it shows the most wear, or else have a large projection on the shoe at this point, or perchance they will put a large calk there. Naturally this will prevent the shoe from being worn out as fast, at this point, but still at that he animal will wear it out at the same place in spite of all their efforts to prevent him from doing so, and one does not have to be an experienced horseman, or a veterinarian, to realize that we are slowly but surely wearing out the animal's limb. The strain is all on the bones, the ligaments and tendons. We can not pit flesh and bone against steel and iron. But still this is the average horseshoer—the shoer who follows this old-time system—is slowly, surely, but perhaps unconsciously doing. Nowhere is this better illustrated than in our large city shops. The large drafters working upon the hard stone pavements are apt to grind out a set of shoes in a few weeks, the large majority of them wearing out the outside of the shoe first. Naturally, the shoer, in his efforts to make the shoe wear more evenly, will put a large calk at the point that shows most wear. This is absolutely wrong. There is no science at all to this procedure. It is an undisputed fact that the high side of a foot will land upon the ground first. If on soft earth the foot will sink in the deepest at the high point. If he is traveling over hard pavements this is impossible, consequently we get the excessive wear at this part of the foot, or shoe, and the more we extend the shoe to this part of the foot, the higher we build it up, the more are we working against that which we wish to overcome. We have all seen a newly shod horse leaving the shop. His calks may all be of an even height, and he appears to be standing with equal pressure upon all of

them, but watch him as he walks out. He will land upon the outside toe, then gradually the outer heel is placed upon the floor. Then watch the inside heel calk,—it does not touch the floor until the opposite limb is taken up and the weight placed upon the limb, then it is gradually forced down, generally with a twist of the entire ankle and limb. This procedure is repeated at every step that the animal takes until the outside calks are worn almost off. The inside of the shoe, however, remains intact, for at this stage of the game the animal has gradually attained—by wearing out the high part of the shoe—a level or natural bearing, a bearing that conforms to the conformation of the limb and foot.

All the measurements in the world cannot convince me that an animal's foot is level, or properly dressed, as long as that animal continues to wear out one side of the shoe faster than the other side. And it stands to reason that if we dress the foot the lowest at the point of excessive wear, make our calks a little higher at the low side, and a little lower at the high side of the foot, we will gradually attain the desired result,—the level wear of the shoe and the minimum amount of unnecessary strain to the foot and limb.

Among our light harness racers we have got this part of the business down to a fine art, and rarely, if ever, do we see a shoe worn any way but level. In order to attain the flight of speed that is required by the modern day trotter all the attention possible is centered upon the foot and the shoeing of the same. A perfectly level foot is one that lands upon the ground with both heels at the same time, then rolls over the toe square and true with the least possible amount of friction. When an animal wears the shoe level he is balanced and boots are unnecessary to protect him against interfering.

The artists who construct the cure-all shoe, as a rule, pay but little attention to the foot, as far as getting a balanced foot goes. They simply cut the sole and frog out, then rasp off the wall until they can rasp no more. The wear of the old shoe signifies nothing to them. But to the mechanic who has made a study of this proposition, the old shoe resembles the page of a book. On the little plain band of steel he immediately reads where the foot is too high, if the toe was too long, or if the heels were too low or too high. Did the animal forge, or interfere



or speedy-cut? The experienced eye will note all of this by simply observing certain signs that are bound to show upon the front shoe. There is too much reckless carving of the feet at best. We are trying to save the foot, the primary object for any and all shoes is to simply protect the foot from undue wear, and all the cutting that is necessary is to simply reduce the wall to where it naturally belongs. All that carving of the frog, bars, and sole are unnecessary, this part of the foot will take care of itself provided the wall is kept soft and pliable.

I had over two hundred of the best trotters and pacers in the country in my charge during the spring and summer. But not one of them ever left the shop without my keeping my eyes on their feet. There was no thinning out of the soles, or paring away of the bars and the frogs. The shoes were fitted to the feet, consequently there was no rasping off of the wall after the shoe was nailed onto the foot. And I absolutely forbid my helpers from attempting to give the outside of the wall the so-called "finish" which consists of dressing off the entire wall after the nails are clinched. This allows the natural moisture to escape and the wall becomes dry and brittle.

Among all these horses I had only one that had bad feet. This was The Assessor, 2:04 $\frac{1}{4}$. He came here with the worst set of brittle and broken up feet that I ever saw, and as he only wore a five-ounce swaged bar-shoe in front and a four-ounce half swedged-shoe behind, it was a mighty difficult proposition to keep the shoes on him and hardly a day passed but what we had to put a nail or two into his shoes. About a month before he was to be shipped away to the races I thought I would give the anti-clip and the anti-hot-fitting advocates a sample of what one can really do to a bad shelly foot. So I dressed his feet and rasped off any and all loose edges from the outside of the foot, also dressed it down all it would stand, both heel and toe. I then made him four bar-shoes, drew up three clips on each one of them, heated the shoe a dark red and burned it to a good snug bearing on the foot. I do not believe in this if it is carried to extremes, and I would not advocate the use of this method every time an animal is shod, but in cases like the above it was absolutely necessary to do something radical and the hot shoe coming in contact with the horn

simply formed a sort of glue that seemed to unite the shattered wall. After burning the shoe in well I had my helper cool the shoe and then I nailed it onto the foot while the horn was still warm and sticky. I drew the nails up well, clinched them and set the clips in good. I repeated this procedure three weeks later and a decided improvement was noticeable in all of the feet.

We can not lay down any hard and fast rules in this business. It may not be proper to apply a hot shoe to the foot, nor is it customary to apply three clips to the shoe of a race horse, but common sense would teach one that something had to be done, and when one does things a little out of the ordinary in order to attain their object in view, we must call it good judgment and common sense combined.

The Horse—Man's Greatest Helpmate

The importance of the horse in the progress of the world and civilization is fittingly pictured in words by a writer in an exchange. It will do every horse lover and even the auto lovers good to read this appreciation of man's best friend:

"Down from the days before history was first carved on Egyptian stone, from the days when legends and traditions were handed from father to son, from bard to harper, come tales of the love of a man and his horse.

"From the days when the Arab steeds first spurned the desert, carrying their masters from harm, from the doughty days of chivalry, intermingled with the stories of the cavalier, the colonist, the pioneer and plainsman, are those wondrously touching stories of man and beast.

"Man wrought civilization, but not by himself alone. Ever at his side, working steadily, suffering with him and willing to give life itself in his service, was man's best friend—the horse.

"No one could calculate what the world would have been without him. He alone made possible the conquest of the prairie. He brought the first men, hauled their food and supplies, rounded up their cattle and turned their sod. Even in this day of marvelous mechanical devices for performing farm work he is still as indispensable as in the early days of the pioneer.

"Civilization makes life more prosaic. We get used to thrills of all sorts; inventions which a century

ago would have startled the world are today passed by with little more than passing comment. Our lives, sometimes even our thoughts, are artificial.

"It is a far cry for some of us, from the heart of the dusty city to the vastness of a wind-swept plain; from the cushioned seat of a limousine to the swaying creak of a saddle, yet it comes to us all at times. At times it comes to the city bred man who has never bestrode a horse just as strongly as it comes to you and me, who were raised on horseback; it is that instinctive love, bred through the years of many centuries; the love of a man for his horse. The passing years take their toll from all of us, they destroy many of the illusions that are with us when first we start out in life; yet the love and trust of man and horse go hand in hand until the end".



Queries—Answers—Notes

Polishing wheel hint I have for a long time had trouble in getting a polishing wheel that would hold the emery. I tried everything I could think of and found nothing that would help until one day I moistened or wet the emery before putting it on the polishing wheel, and found by so doing it would hold home than twice as long.
F. A. HUNT, North Dakota.

A query on plow shares. I would like to see an article from a good plowman, to let me know if the shares with a star on back and crucible shares can be tempered as well as the soft center shares. I am a blacksmith in the country and most farmers have them, and they pretend that they are just as good as the soft center. I should be very glad to hear from brother smiths and to have them let me know something about my request, also the method if any for tempering them.
ZEPH DUMUR, Canada.

A handy tire tool. Here is a practical tool we use for putting on tires. By the aid of a couple of these and a hammer two men can put on a tire that is quite tight and, that is the way we like them for cold setting, as they are not so apt to buckle up.



I am glad to see you are keeping up the fight for fair prices. I think a great deal of our price trouble is caused by folks mixing things, that is to say, when they want to do someone a favor they knock off a little instead of giving outright as they should, or to have charged a fair price. There should be a time for everything, a

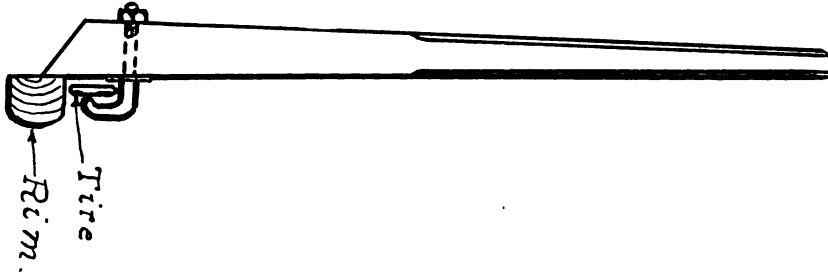
ground or roads, this piece may be left as illustrated at A. If the animal is to be used in the mud, or soft footing, the shoe in illustration B. would answer the purpose better.

To make the shoe as at B, simply weld on the piece of tire as in illustration, A, but have it about four inches long. Then

convenient form for publication".
THE T. S. Co.

The mule with strained tendons.—In answer to your reader's query concerning the mule, beg to say that it is pretty hard to suggest any treatment for the mule in question at this distance. However, here goes: If the mule has his suspensory ligaments strained as I suspect, the following treatment should be of some avail: First, pare the feet as ordinarily (that is level) and give a very good roll on the toe of the foot itself. Prepare a shoe thin at the toe and also rolled to correspond with the roll of the foot, that means fit the shoe to fit the foot closely on the bearing surface. Have good high heels on the shoe and do not fit shoe too closely at the heels. This would be my idea of shoeing such a case. The next thing should be exercise the mule moderately on hard ground. If exercised on soft ground the mule will have too much of a chance to dig his feet into the soft earth, and will not bring his heels down. On the other hand if exercised on a hard wood or other ground, the weight of the animal will compel him to bring his heels down at every step, which should eventually adjust his leaders, especially as the mule is young.

The legs of the animal in question should be further treated with hot fomentations at least three times a day. This is best done in the following way: Take a bucket of hot water; hot enough so a man may just be able to hold his hand in without scalding. Add to the water a big handful of common table salt. If time will permit two buckets of water are better than one. After using the water, the legs should be gently massaged from the knee down until all



A TIRE TOOL TO EASE THE WORK OF APPLYING TIRES

time to laugh and a time to weep, a time to give and a time to charge; don't mix the two.
H. J. WYATT, Washington.

Calculating stock. In our March number I read with interest Mr. Simcock's letter on measuring of stock for making a ring collar on tire; also for calculating the desired amount of iron required for a forging of varied sizes. I have no doubt but he is correct when he says very few smith could figure out a job. But I have no doubt but many like myself had very little opportunity for learning as I myself had to leave school at a very early age. In country places where many of our good men have learned, very few facilities were afforded for any such thing. Many smiths however find out ways of calculating stock and the amount of iron required for a forging, and I have one of my own which might help any one who has not just thought of such. My plan is to use Fodden's Mechanical Tables, which I have used for many years. These can be had at the price of THE AMERICAN BLACKSMITH. They give the correct amount of iron required for a circle. And by it I also often get help on irregular forging. In fact I have not once been wrong, and I turn to the tables where I find the greatest size I have to work from, and find the weight per lineal foot. I then find the weight for lineal foot of the size. I have to work down to, and by that I arrive at a correct length of iron required for a forging. I also use it on some fairly big jobs too. I have done work for another firm who have not a steam hammer and have always been asked the amount of iron or steel for the job, and I always resort to Fodden's Tables. I have come out with practically not an ounce of waste. I would advise others of the craft to try it and let us hear the result. I am not saying Mr. Simcock is wrong, it is very good and commendable to be able to do it in his way, but as he says very few can. I would be like a gear wheel without a tooth without Fodden's Tables.
WM. WATT, South Africa.

That toe-walking mule. In reply to your reader who describes a six-year old mule that walks on his toes, I would suggest the following: Have the feet dressed down to where they naturally belong, then apply shoe as per illustration, this is to be a plain shoe, with neither heel or toe calks. Onto the toe jump a piece of wagon tire an inch and one-half wide, let it project out over the toe for two inches.

If this mule is kept, or worked on firm

draw out the end to a feather edge, and turn it up the same as a toe clip, only do not have it follow the wall.

After applying this shoe it is advisable to turn the animal out for a few weeks in order to get it used to this shoe. It will not do to attempt hard work at once.

DR. JACK SETTER.

The set of auto springs.—In reply to reader who wants to know how to correctly calculate the set between spring plates the following information from two of the best spring makers in the country will be interesting:

"The matter of set between plates is a very complicated matter and one little understood by engineers in general.

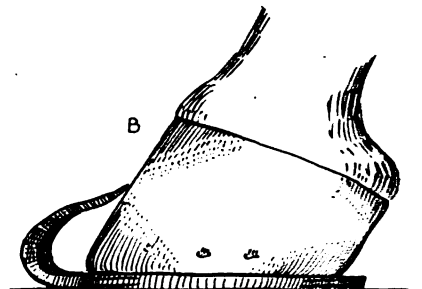
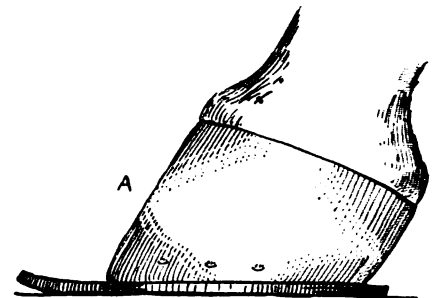
"Briefly; the set between adjacent plates in a multi-leaf spring is determined by the amount of negative or positive initial loading required by the spring plates so that the maximum fibre stress in all plates will be equal when the whole spring is under extreme deflection. It will be seen from this statement that even in two springs where the capacity and rate of deflection are the same and where the riding clearance is different, the set between plates will be different. It also fellows as a geometrical fact that the set between the longer plates will be greater than that between the shorter plates.

"There are very few spring makers who understand this item and who are able to compute it properly, but it is a very necessary function of what we call a 'Uniform stress spring'. We have arrived at our knowledge on this subject after many years of patient study and experiment and that our reasoning and calculations are correct, is proven by the fact that today we are the largest producers of automobile springs in the world".

THE P. S. Co.

"Not only does the set of the individual leaves of automobile springs vary with the different manufacturers but it must necessarily be governed by the various dimensions of the spring itself, and the grading of the steel which is often considerably reduced in thickness for the short plates.

"It might be of considerable advantage to the spring-maker if a series of curves or tables were developed to determine the best possible decrease in the radius of curvature, as the plates decrease in length, but at the present time we know of no theoretical or empirical formulas for determining this variation. With us it is a matter of experience and we are careful to maintain as nearly as possible constant fibre stress in the different plates, but have not yet developed this material in



FOR THAT TOE-WALKER

the water is squeezed down and out. Immediately after the legs should be thoroughly drenched with white lotion. This lotion is prepared as follows: Acetate of lead (sugar of lead) one ounce; sulphate of zinc, one ounce, and one quart of rainwater. Shake well before using. After a reasonable soaking with this lotion the legs should be bandaged. The best time to use this treatment is before



the mule is taken out to work, and immediately after work. Of course, much depends how thoroughly the work is done. The animal should be shod at least every twenty days, and should be moderately exercised in a light wagon (not too hard), but he should not be allowed to exercise loose by itself in a lot, as he will not exercise as properly as when worked on a hard road. Nor should the mule be turned loose after working but should be tied so he may lay down. Nor should the animal be exercised on a trot, but on a steady walk, trotting will only make the mule more sore and his legs inflamed and chances are he will stumble, fall and injure himself otherwise. In steady walking on a hard road (country road is the best), the animal is compelled to use his whole foot. The heels should gradually be lowered, say from about the third shoeing or about 40 to 50 days after treatment begins. I have had several cases while being farrier in the United States Cavalry and Light Artillery and have had good success in most cases where the animal was young, about eight years. But never was I successful where the animal was much older. At the same time, I must say, in all such cases, a cure is problematical. Shoeing alone will accomplish nothing in this case.

FRANZ WENKE, Colorado.

of water. It may then be tempered to a dark straw.

A hand saw that works hard can be made to work more easily by rubbing it well with kerosene oil.

Motion study has been receiving the attention of the efficiency experts for the past several years, and by means of studying the motions through which a mechanic goes in the doing of his various tasks, the experts have been able to cut down a man's labor per job or task surprisingly. And while reading of the work of some of these experts the thought has often occurred to the writer as to the possibilities of motion study in the smith shop and the elimination of unnecessary motions. I wonder if any readers of "Our Journal" have given this subject any thoughts. It is certainly possible to eliminate a whole lot of lost motion in the performance of smith shop work. For example the continuous rapping upon the anvil with the hammer when forging or turning a piece. If the cross falls thickly couldn't it be cleaned off the anvil more quickly with a brush? And then think of our relieved ears! The noise of the smithy would be reduced just about one-half. And then there are other unnecessary motions for which the smith and shop are well-known that could be very well abandoned and eliminated with increased efficiency. Has any reader of this column given this subject any thought? I'd be glad to hear from any one on the matter.

A soldering acid that is said to be far superior to any of those usually given and which is somewhat out of the ordinary in its composition is made up of glycerine, chloride zinc solution and alcohol, the proportions being one ounce each of the glycerine and zinc solution and seven ounces of alcohol.

Drilling cast iron seems to puzzle so many smiths that I am going to attempt to settle the problem for some time to come. When a hole is to be drilled in a piece of cast iron heat the iron red hot at the point to be drilled and place a piece of brimstone where the hole is to be drilled until it melts. When the piece is cold the spot will be found soft enough to drill easily. That is the method in a nut-shell, Now the application of it: Secure a single tree ferrule, or several of them if several holes are to be drilled, and after heating the iron to be drilled, place a ferrule right over the spot to be drilled; then place brimstone in ferrule and allow to melt; or light the brimstone and allow to burn itself out. The drilling can then be done in the regular way with an ordinary bit.

Cracked water jackets have already been heard from and therefore the following suggestion: Mix dry two parts of sal-ammoniac; one part sulphur flour and 17 parts of cast-iron filings. Mix well and then add twenty times the weight of new iron filings. Now put in a mortar and add water enough to make a paste. Apply this to the crack. In a short time it will harden like the metal itself.

Soap and glue are two substances commonly on hand and as neither is dissolved by gasoline they make excellent emergency repairs in the gasoline system. A punctured tank can be easily made tight with good glue and paper or cloth. And a wrapping of a glued paper strip around a gasoline pipe that has been strained or bent to permit a slight opening, is easily applied and serves emergency purposes admirably.



The Automobile Repairman

Overheating of the Engine may sometimes be remedied by pitching the fan blades so that an increased amount of air will be thrown against the radiator. Of course, this will not overcome heating due to a clogged cooling system, but after the cooling system has been examined and pronounced O. K., a slight twist of the fan blades will be found to help considerably.

Gasoline Vapor is about as dangerous a thing as dynamite, if you don't understand it. The smith who has begun to care for the auto and who has become used to seeing the self-propelled vehicles in his shop cannot be too careful and cautious in his handling of gasoline and also gasoline laden cans and pans. For instance: A mechanic at work on an automobile motor which he had just cleaned with gasoline, dropped his wrench. It struck the cement floor causing a spark which immediately caused an explosion that resulted in serious injury to the man, not to mention the fire which damaged the shop. In another case, a spark caused by the nails in the heel of a man's shoe coming into contact with the cement floor, ignited the gasoline vapor. And so cases could be cited almost without limit. From a study of them it seems impossible to prevent the generation of the igniting spark, though it should be easily possible to prevent the accumulation of gasoline vapor in dangerous quantity. A clean floor, the absence of gasoline drippings and the cleaning of all parts out in the open air when gasoline is used as a cleaning agent, will go a long way toward the observance of safety first in the auto shop.

Timing the Magneto Correctly

C. P. SHATTUCK, M. E.

The final step in the work of installing a magneto on the used motor vehicle requires a knowledge of the instrument and of the motor to which it is to be attached. While it is not a difficult matter to time the magneto so that its sparks will ignite the mixture in the cylinder, to obtain satisfactory results the work will involve a careful study of the motor.

There is a difference in the suc-



Benton's Recipe Book

The new flux for hard soldering mentioned in the July issue seems to have puzzled some of "Our Folks" because of the particular reference to Boric Oxide and the caution to use the Oxide and not the Acid. Quite a number of readers have had difficulty in explaining matters to their druggist or chemist, therefore this word of explanation: In the event of your not being able to secure the Boric Oxide ask for Boric Acid Crystals. The evident intention of Mr. Searle, the author of the recipe, was to use an anhydrous material, and if the Crystals are specified you will secure as near the ingredients called for as it required for all practical purposes.

To imitate ground glass which L. G. H. wants to do in a skylight through which the sun shines too brightly, use a mixture of whiting and water. When the water evaporates after the mixture has been applied to the glass the whiting will remain. If a permanent coat is desired use paint of a consistency depending upon the condition you want the glass to remain. A thin paint will naturally allow more light to pass than a thick paint.

A scratch awl is easily hardened by heating the point in an alcohol flame, leaving the extreme end out of the flame to prevent it being over-heated. When cherry-red push the point through a piece of ordinary yellow soap and into a cup



cessful timing of the battery and the magneto. With the former the current is supplied as long as chemical action takes place, or in other words, until the battery discharges. With the magneto the time of the break of the contact points and likewise the position of the armature in relation to the pole pieces are factors that cannot be very well overlooked.

dead centre, the spark would have to occur at Y on the compression stroke to obtain the maximum pressure or complete combustion at the dead centre X. If the speed be increased to 1,000 revolutions a minute, and the spark be timed to take place at Y, the piston would go to X and return to Y on the power stroke before the process of combus-

varies, a contention that is borne out in practice. The initial step is to place the piston of the first cylinder (if the motor by multi-cylinder) at top dead centre of the compression stroke. This location may be attained by passing a wire through the opening in the compression cock or inserting a wire through the spark plug opening and noting when the wire comes to a dead centre. Rocking the flywheel back and forth will enable one to easily ascertain the dead centre point with the wire. If a slight advance of the break of the contact points is desired, for example $\frac{1}{4}$ to $\frac{1}{2}$ -inch which corresponds to from 22 to 34 degrees crankshaft travel, the flywheel is moved backward from dead centre or until the piston lacks the distance to complete the stroke. A late break is obtained by having the piston descend on the power stroke to the distance of say $\frac{1}{4}$ or $\frac{1}{2}$ -inch.

With the Bosch magnetos the relation of the piston travel to the rotation of the crankshaft depends on the stroke and length of the connecting rod, and the piston travel and the determining of the rotation of the crankshaft in degrees, corresponding to any desired piston travel, may be ascertained by the diagram shown at Fig 2. In this diagram the

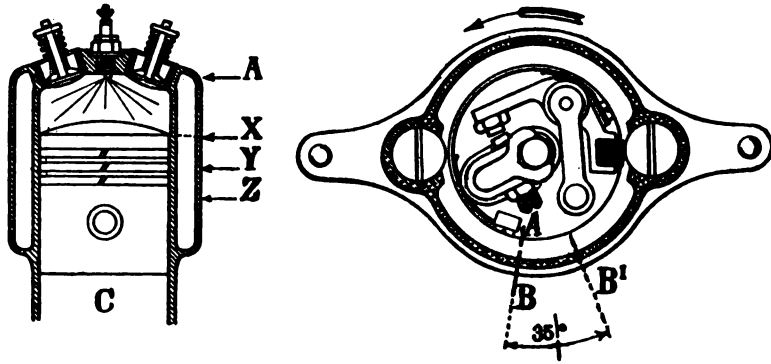


FIG. 1.—ILLUSTRATING IGNITION POINTS OF A CYLINDER AND PISTON TRAVEL AT A AND HOW VARYING POSITION OF TIMING LEVER AFFECTS TIME OF SPARK

There is a point in the revolution of the armature when the greatest number of lines of force are cut; that is, where the strength of the current and resultant spark is at its best. Consequently the spark must occur when the piston is in the right position in the compression stroke; that is, when the greatest pressure may be obtained upon the piston by the expansion of the gases caused by the burning of the mixture. Another fact to be considered is that a highly compressed mixture burns more rapidly than one that is not so dense and in a high compression motor the combustion is completed more quickly. The capacity of the combustion chamber and density of its contents are therefore two important factors in the timing of the magneto. There is another and more important factor, that of the speed of the motor.

Taking, for example, the cylinder C shown at the left in the engraving at Fig. 1, and assuming that according to the cylinder dimensions and compression, it would require a certain length of time to fully ignite the mixture in the combustion chamber represented by A—X, and it is desired that the combustion take place at X, the dead centre, it would be necessary to set the spark in advance of the X position by the amount equivalent to the travel of the piston (at a given speed) during the time required for the complete burning of the mixture. If at 500 revolutions a minute, and assuming X to be the

tion were completed. This would result in the loss of considerable power during the travel of the piston between X and Y during the power stroke, and the full force of the explosion would not be exerted on the piston until the point Y was reached. To overcome this the piston speed is calculated at 1,000 revolutions a minute and the spark is set at Z, which permits of complete combustion by the time the piston reaches X on the compression stroke.

To permit of varying the time of spark as compared with the position of the piston, the circuit breaker housing is made to rotate in either direction by moving the timing lever forward or back as indicated in the engraving at he right at Fig. 1. If the lever be moved in a direction contrary to the rotation of the armature (advance position) a full advance is obtained as indicated by A on the make and break mechanism and B on the timing lever. If the timing lever be rotated from this point with the direction of rotation point, B will be moved around until it attains the position indicated by B 1, which is full retard and 35 degrees from B. As the armature is rotating in the direction of the arrow, the change of the break from B to B 1 makes it later as regards the position A of the armature which rotates at the same speed as the crankshaft of the motor with four-cylinder, four-cycle motors.

The correct setting of a magneto

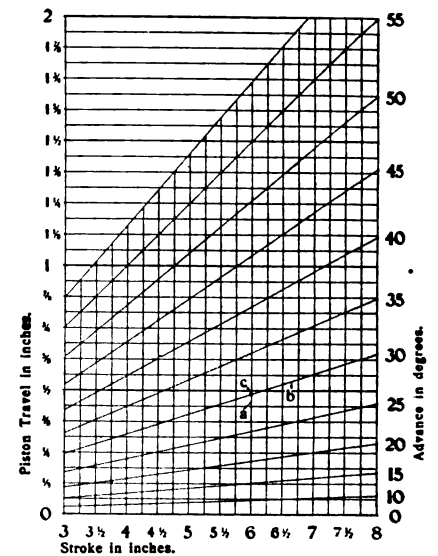


FIG. 2.—DIAGRAM FOR DETERMINING PROPER ADVANCE

relation between the crank and the connecting rod length is as 1:4.5. In the diagram the vertical lines numbered at the bottom give the stroke of the engine in inches, the rotation of the crankshaft in degrees being indicated by the slanting lines and the figures at the right. For example: If it be desired to ascertain the piston travel for an advance of



30 degrees on a motor of six-inch stroke, the vertical line for the desired stroke may be identified by the figures at the bottom of the diagram, and this vertical line may be followed upward until it cuts the diagonal line indicating the desired number of degrees, which is 30 in the present case. The horizontal line nearest this point should be followed to the left, and in the present instance it will be seen to indicate about 1/2-inch. The figure 1/2 indicates the advance in inches corresponding to a rotation of 30 degrees of the crankshaft.

It is because of the variation in

will be necessary to displace the distributor cover or plate and to rotate the armature shaft until the brush or other contacting member of the distributor arm makes contact with either the right or left hand lower segment, the position depending upon which way the instrument is driven and the direction of rotation of the distributor. If the workman will bear in mind that the distributor rotates in a direction opposite to that of the armature shaft, the work of setting and wiring will be greatly simplified. Another point to be considered is which end of the

replacement of an old one.

In wiring the magneto the firing order of the cylinders must be considered and the direction of rotation of the distributor brush. This is made clear in the drawing at Fig. 3 A, which shows a magneto running clockwise and the firing sequence of the motor is 1-3-4-2. As may be noted the terminal 1 of the distributor is connected to the first cylinder, but the No. 2 contact is connected with the third cylinder as that cylinder fires second. The drawing at B illustrates the wiring of a magneto operating clockwise and

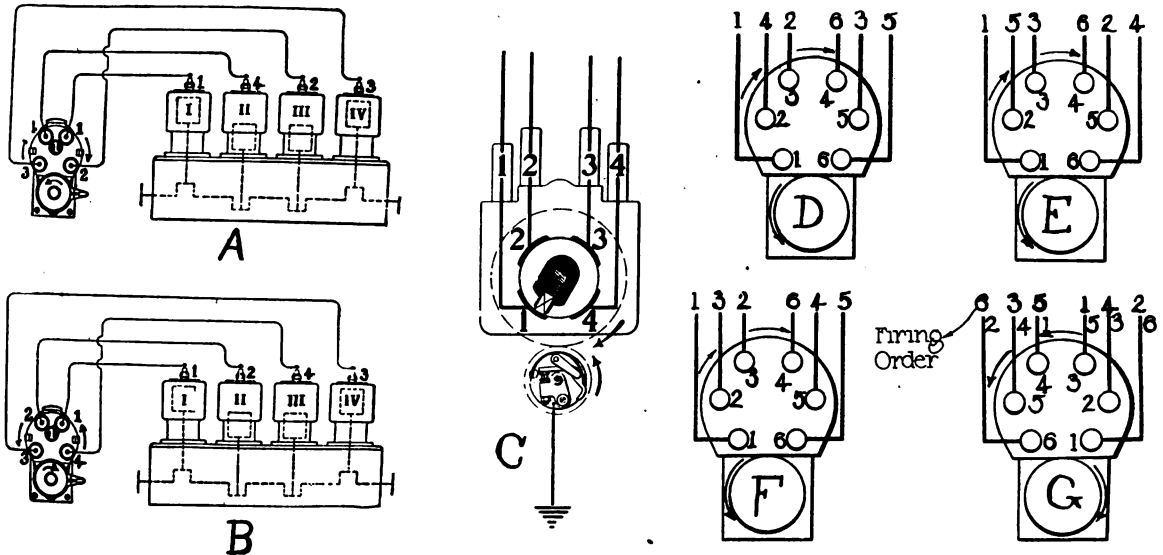


FIG.—3.—WIRING MAGNETOS: A, magneto running clockwise and motor firing 1-3-4-2; B, magneto operating anti-clockwise and motor firing 1-2-4-3; C, showing position of distributor brush when armature is coupled to driving shaft; D, magneto running clockwise and firing sequence 1-4-2-6-3-5; E, same direction with motor firing 1-5-3-6-2-4; F, same with firing order 1-3-2-6-4-5; magneto operating anti-clockwise and firing order 6-3-5-1-4-2.

motors that the writer recommended the use of a flexible, adjustable coupling to connect the armature shaft of the magneto with the driving shaft of the motor. When such a coupling is employed, any necessary alterations in the timing may be easily made and which are not always possible or convenient when the armature shaft has been pinned to part of the usual or Oldham form of coupling.

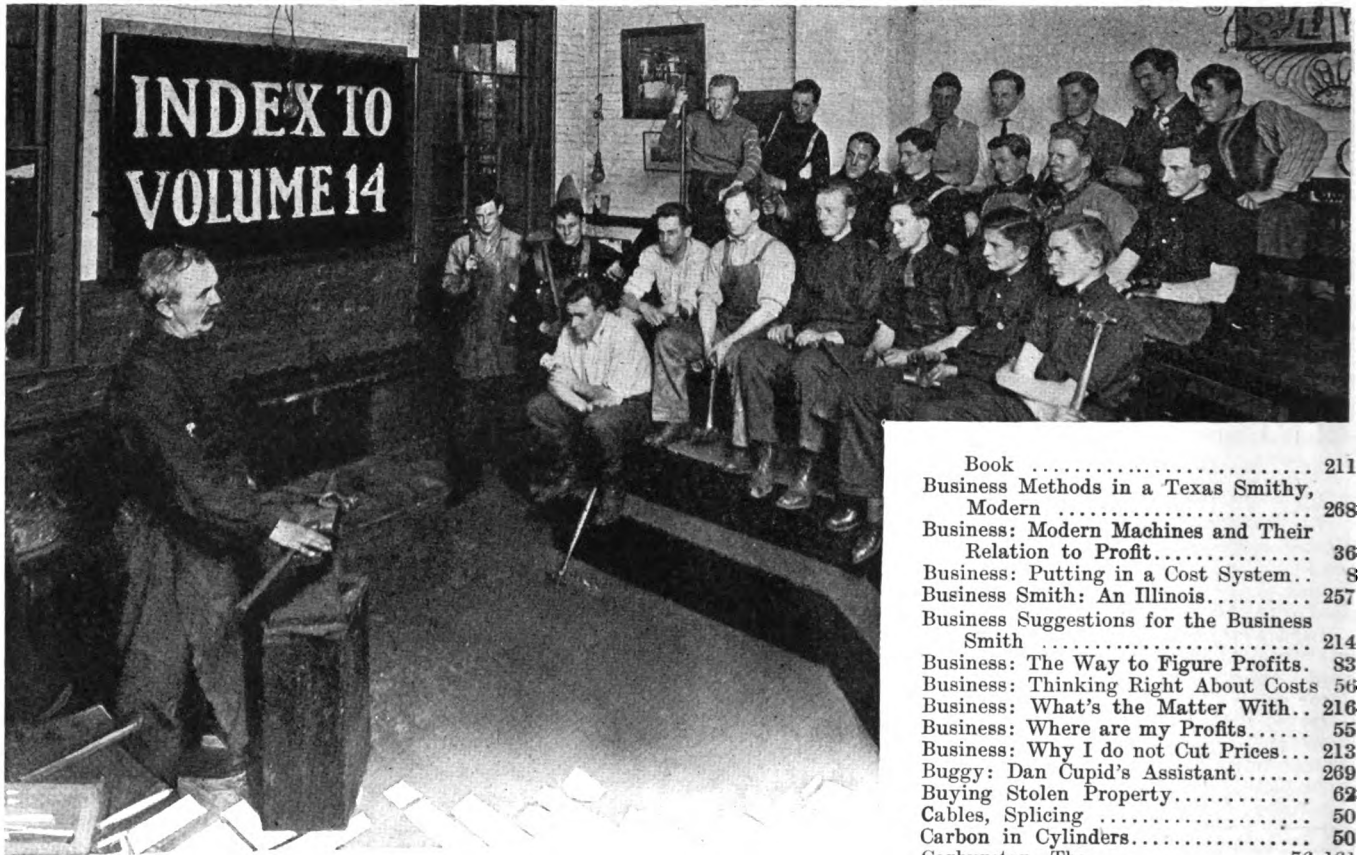
In setting the magneto having an indicating window as shown at Fig. 3 A, the armature shaft is rotated until the figure one appears, then lift the oil well cover, which will lift the distributor gear, next turn the armature until the marked tooth of the gear registers with the marks on the side of the sight hole, then secure the coupling. With magnetos not equipped with the indicating window to facilitate installation it

instrument is viewed; the driving end or the distributor and circuit breaker end. When looking at the distributor end a magneto driven clockwise will have a distributor brush revolving anti-clockwise and vice versa with an anti-clockwise instrument. The drawing at Fig. 3 C brings out these points. As may be noted, the distributor is rotating clockwise looking at the distributor end while the armature is revolving in the opposite direction. With such a drive the left hand lower terminal of the distributor is employed for the wire connecting it with the spark plug of the No. 1 cylinder. The sketch also shows that the contacts made by the brush are in order; that is, 1, 2, 3, 4. This brings up the subject of proper wiring which is simple but frequently confusing to those attempting the first installation of a magneto or the

with the firing sequence of the motor 1-2-4-3. Here the No. 3 terminal or segment of the magneto brush is wired to the fourth cylinder, which is the third to fire according to the sequence.

The illustrations D, E, F and G show the firing order and wiring plans of six-cylinder magnetos. The rows of figures with D, E and F indicate the cylinders or firing order of same, while the figures on the distributor show the sequence of the contacts made by the distributor brush. The arrows give the direction of the armature shaft as well as that taken by the brush.

The sketch at G shows a magneto running anti-clockwise and with the motor firing 6-3-5-1-4-2. The lower row of figures or those directly under the firing order indicate how the segments are connected by wire to the cylinders.



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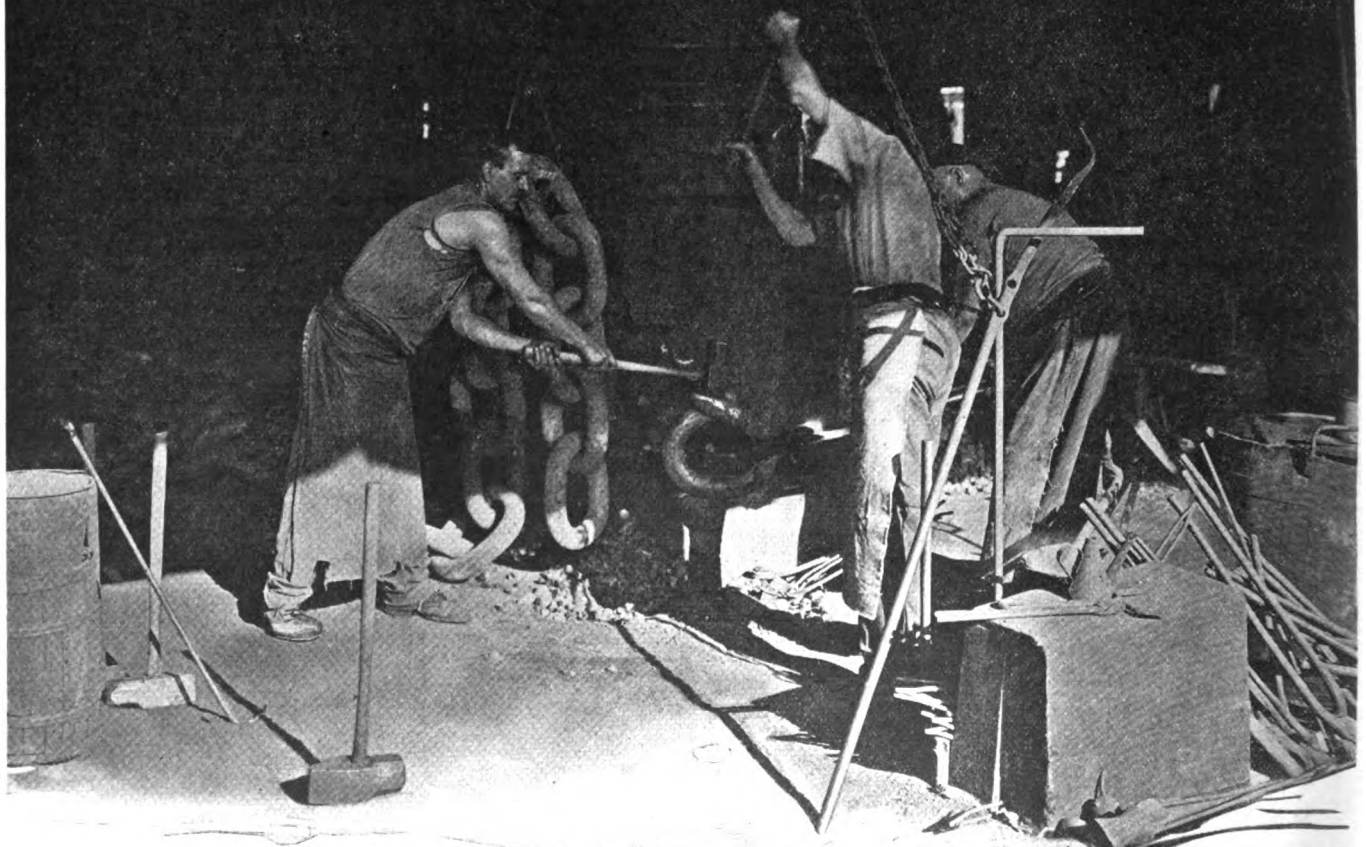


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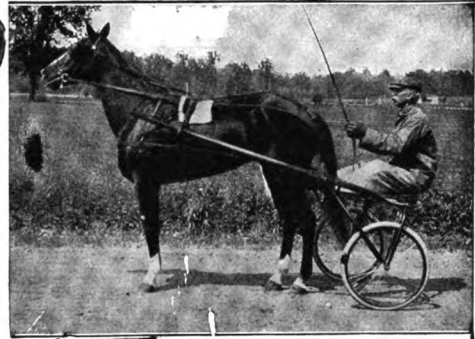


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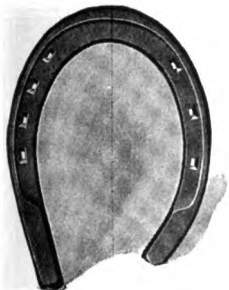
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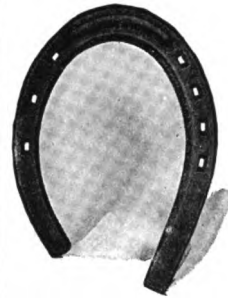
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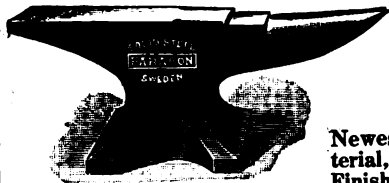
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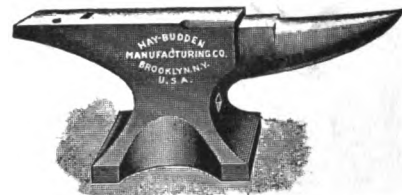
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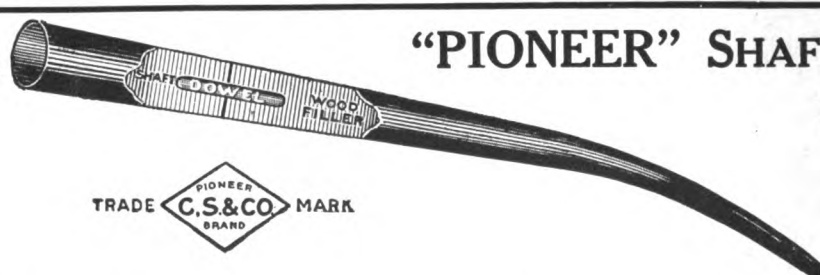
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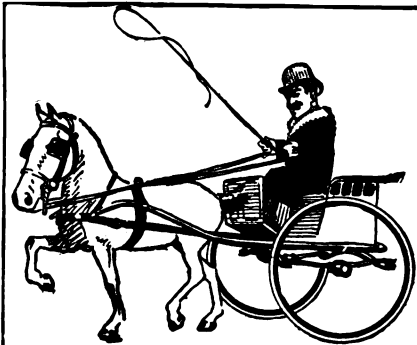
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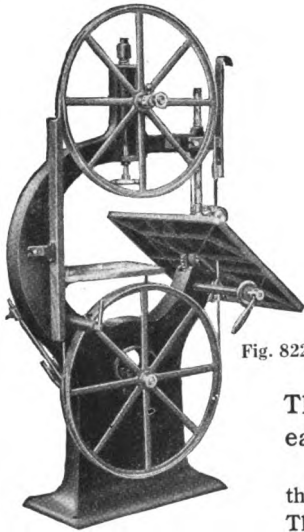


Fig. 822

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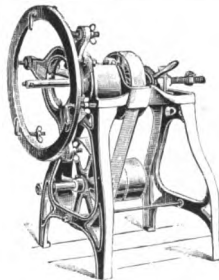
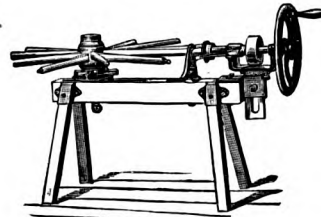


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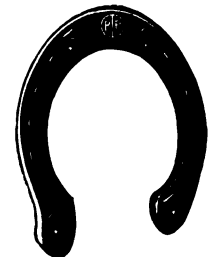
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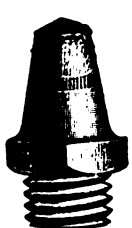


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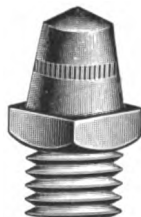
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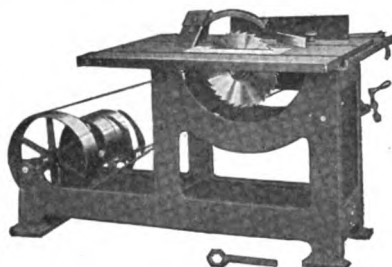
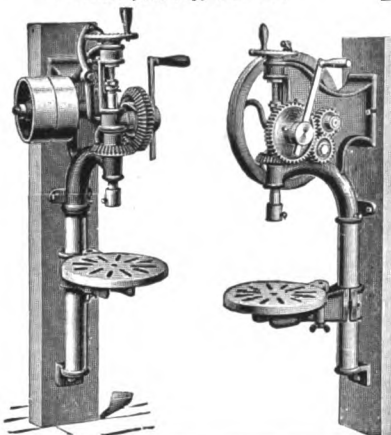
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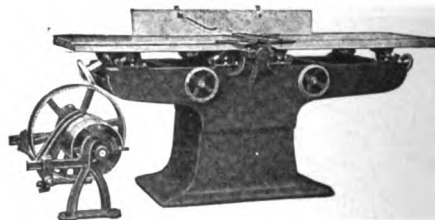
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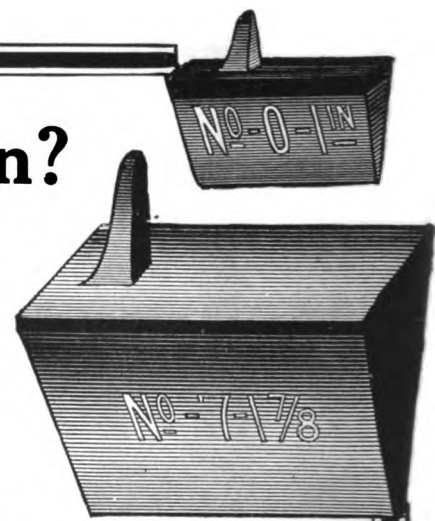
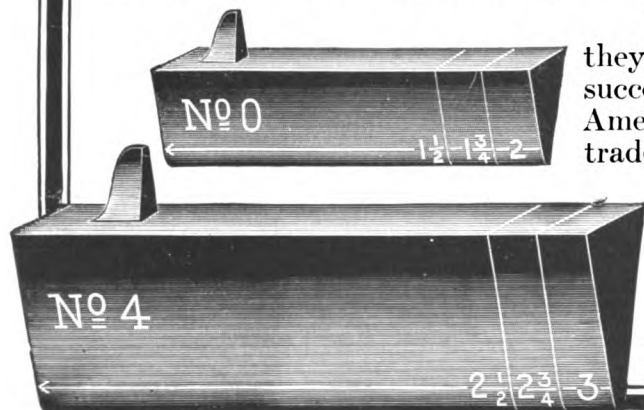
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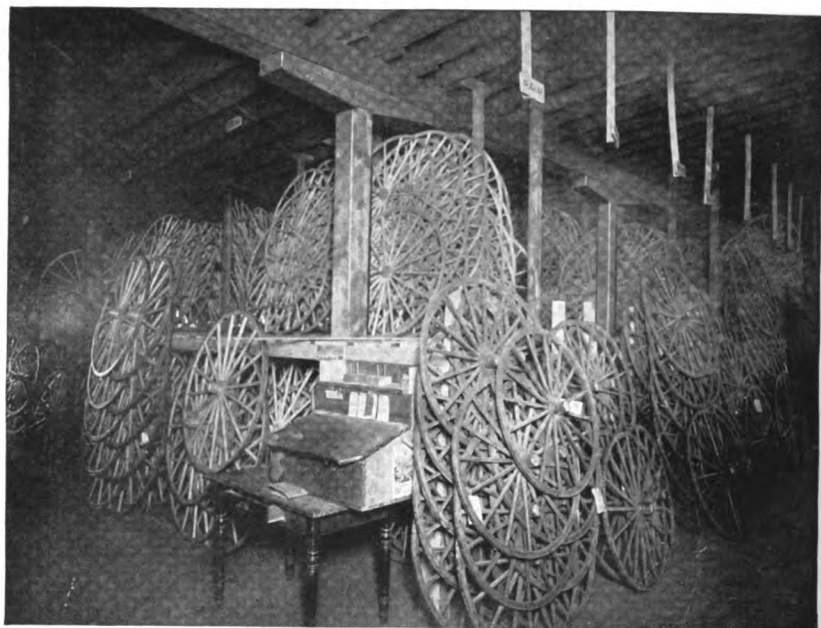
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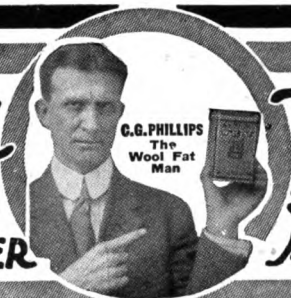
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1.—It will never become rancid or decompose.

2.—It is the greatest thing on earth to heal a sore of any kind on man or beast. *If applied to sore necks, shoulders, wounds, etc., on horses or other animals, flies will never molest them; for cows' teats it has no equal.* Remember, there is no grease about Corona Wool Fat.

3.—It will promote the growth of hair better than any other fatty substance, because it contains no oil which excludes the air, and air is absolutely necessary to the growth of hair. No scars where you use Corona Wool Fat.

Rushville, Ind., Dec. 2, '14
Corona Mfg. Co., Kenton, O.

Gentlemen:—I have used your Corona Wool Fat for the past two years with great success in the curing of Quarter Cracks and sore heels, and I find nothing better to use on hard feet. I have sold a lot during that time and never had a can returned. Among the prominent persons who have used it are Harrie Jones, the well known trainer, and Davis Bros., Livery and Transfer, and they always keep it in their stables. I believe I cannot say too much in favor of it, and think that every Horse-shoer and Horseman ought to use it.

(Signed) J. J. GERAGHTY

CORONA M'F'G. CO.

Lock Box "A" KENTON, OHIO

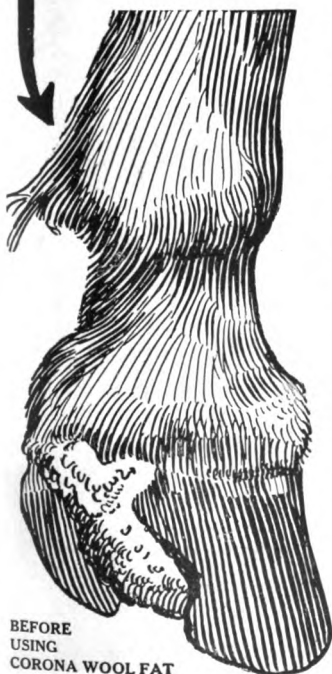
COUPON

Gentlemen:— Please mail to my address below one of your regular 50c cans Corona Wool Fat for trial. If satisfactory shall be interested in the agency.

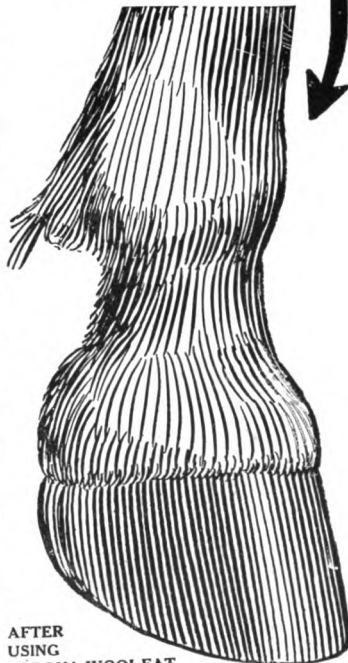
Name _____

Address _____

THE NAME OF MY IRON STORE JOBBER IS _____



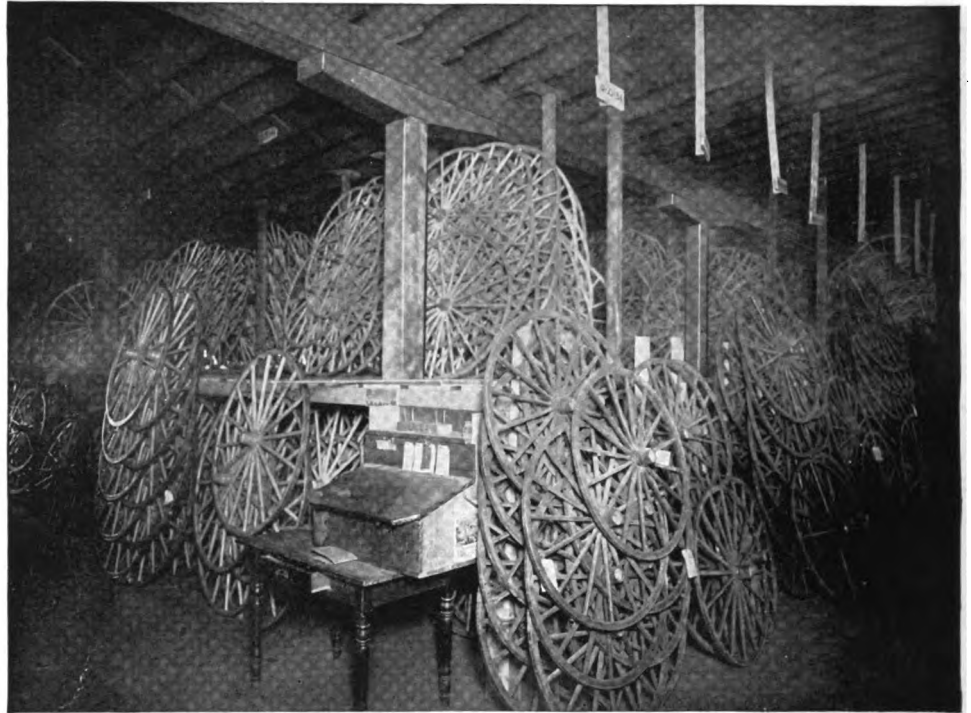
BEFORE
USING
CORONA WOOL FAT



AFTER
USING
CORONA WOOL FAT



Portion of Wheel Stock of Muncie Wheels



Mr. Blacksmith

If you need a set of wheels promptly, order it from this stock.

It is the largest in the United States.

It contains over forty thousand wheels of assorted sizes. We ship wheels from it the day we get the order.

We give you the best value you can get for your money.

Buy your wheels from us.

Send for complete Price List No. 51, and if you haven't our booklet, "Knowledge Is Power," be sure to ask for it. It will help you with your customer.

Muncie Wheel Company
Muncie, Indiana

1915

VOLUME 14

THE AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

BUFFALO
N.Y., U.S.A.

MARCH, 1915

Atha "Horseshoe" Brand

Blacksmiths' tools carrying this famous brand have a quality that may well be called the STANDARD for tools of their class.

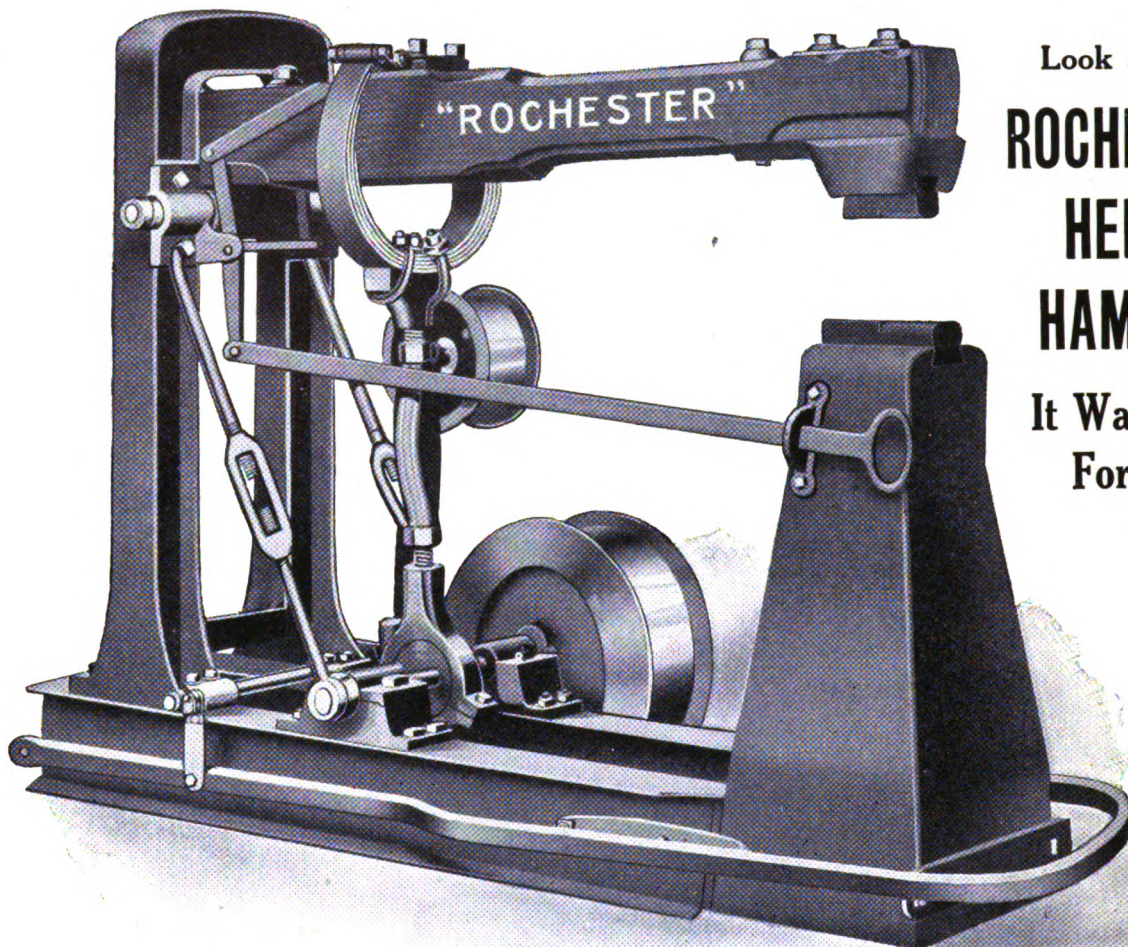
We have just issued a new catalogue containing illustrations and descriptions of all the tools we manufacture. Among those of especial interest to the Blacksmith and kindred trades, will be found a very complete line of ANVIL TOOLS—TONGS—HOT and COLD CHISELS—BALL PEIN, FARRIERS and HEAVY HAMMERS and SLEDGES. Ask for a copy of Catalogue No. 14-A. It will be sent to you by return mail.

All dealers should carry ATHA "HORSESHOE" Brand Tools and it will be to your interest to insist that your orders be filled with tools so marked. If, however, your dealer does not carry them, write us and we will advise you where they may be obtained.

Atha Tool Company,
Newark, N. J., U. S. A.



BLACKSMITHS



Look at this
**ROCHESTER
 HELVE
 HAMMER**

**It Was Made
 For You**

Note the steel I-beam base which cannot be broken; the trussed upright frame which has not failed in a single instance; the heavy anvil which gives proper resistance to the blow and makes it possible to get maximum results with little power. You know how important it is to have a good anvil when working with a sledge—well, it is just as important in a power hammer.

The above cut illustrates our 25-lb. size "A" Hammer, which weighs approximately 1200 lbs. and will do more and heavier work than some so-called 50-lb. hammers. Will weld 2-inch axles or occasionally a larger one. Will weld tires up to 4 in. x 1 in. and do a good job—has done much wider. Note how conveniently a tire can be handled in this hammer, also the large open space around anvil for working odd shaped pieces, carriage irons, etc.

The price for the next sixty days will be net \$130.00 delivered f. o. b. car Rochester, but the cost of materials is advancing and we cannot guarantee that the price will not be advanced on this hammer later.

If you paid double the money you could not get a better general purpose hammer, but if you pay less you will not get so good a one.

Cut shows hammer with dies lengthwise of helve, but for some kinds of work it is better to have dies crosswise.

Write us just what you want to do with the hammer and we will advise you regarding dies.

Send a letter today to the address below.

MR. E. A. GRENELLE, Secretary

WEST TIRE SETTER CO.

ROCHESTER, N. Y.

16 '918

AMERICAN BLACKSMITH

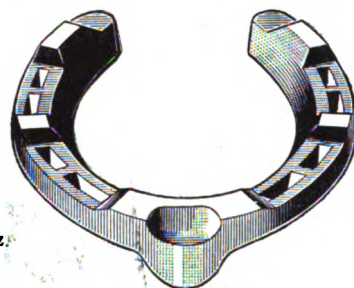
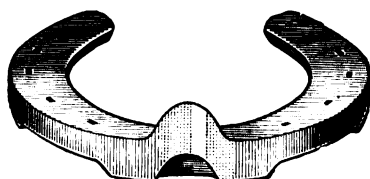
A Practical Journal of Blacksmithing and Wagonmaking

BUFFALO
N.Y., U.S.A.

APRIL, 1915

\$1.00 A YEAR
10c. A CCOPY

Improved Heavy Pattern Goodenough With Drawn Clips



Size	Front	Hind	Size	Front	Hind
No. 2	16 oz.	15 oz.	No. 5	28½ oz.	27 oz.
No. 3	21 oz.	20 oz.	No. 6	32½ oz.	31½ oz.
No. 4	25 oz.	24 oz.	No. 7	37 oz.	36 oz.

ACTING upon the suggestion of Horseshoers throughout the country, our well known and service-proven Goodenough Shoes are now sold with drawn clips.

The plain Goodenough Shoe, itself always a winner, will give way to the greater popularity of the new style with drawn clip.

BOSS TOE WEIGHT



OUR FREE TRIAL OFFER

Just send us your name on a post card and we will send you complete samples without charge so that you may give them a thorough test in your own shop.

BOSS COUNTERSUNK STEEL SIDE WEIGHT

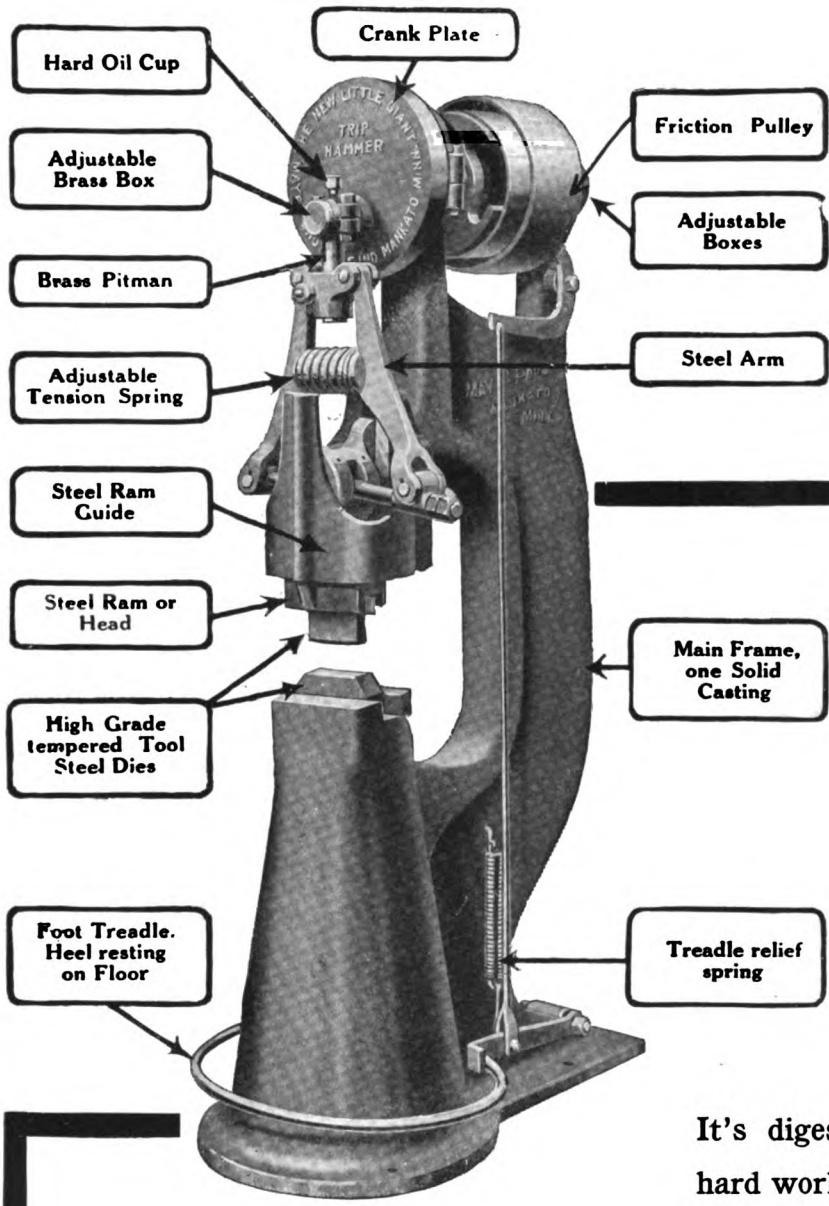


Size	Light	Medium
No. 1	11 oz.	13 oz.
No. 2	14 oz.	16 oz.
No. 3	16½ oz.	19 oz.
No. 4	19 oz.	22 oz.

In order to make it more convenient for the Horseshoers to use our Toe Weights and Side Weights we are now furnishing both styles in boxes instead of kegs. Each box contains ten pairs of a size.

Size	Light	Medium
No. 1	9 oz.	10¾ oz.
No. 2	10¼ oz.	12 oz.
No. 3	11¾ oz.	13¾ oz.
No. 4	14 oz.	16 oz.

BRYDEN HORSE SHOE CO. CATASAUQUA, PA.



Here is a Healthy Hammer

It's digestion is fine. It's appetite for hard work is a joy to watch. It's sinewy striking arms and staunch frame show it is going to live a long, useful, uncomplaining life.

Who will be the lucky Smith? Who will get this well trained partner? Who will hire this helper that never tires, gets sick, kicks or quits.?

YOU—if you really plan on progress.

The Little Giant never disappoints. It's reliability makes its guarantee unnecessary. It's the one hammer good enough for your shop.

Your jobber will tell you we're right. Ask him or write us if more convenient.

MAYER BROS. CO., Mankato, Minn.

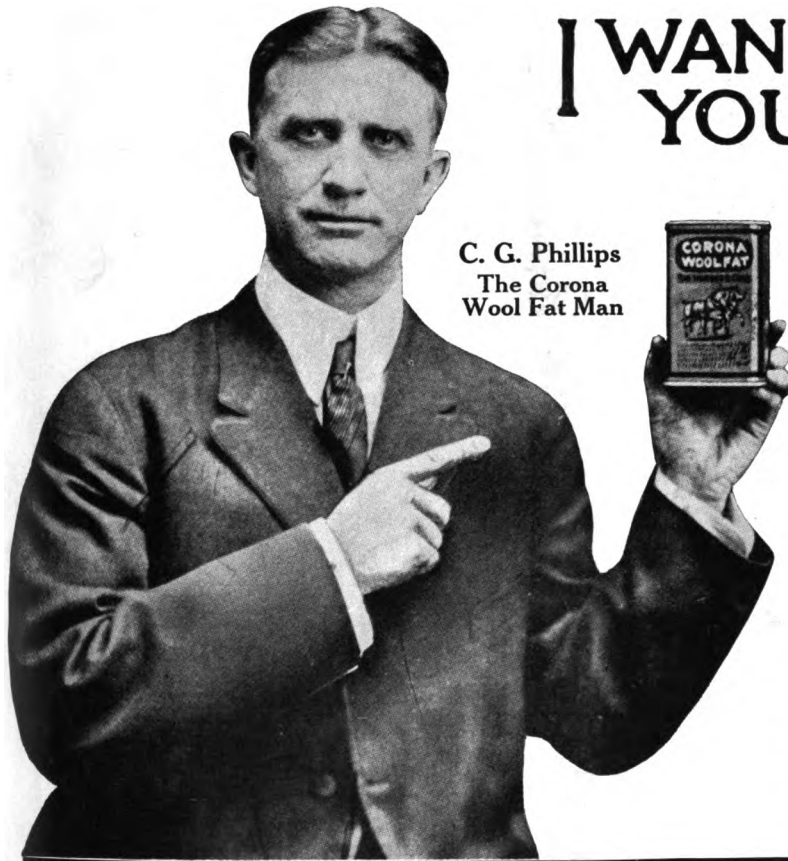
AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

BUFFALO
N.Y., U.S.A.

MAY, 1915

\$1.00 A YEAR
10c. A COPY



C. G. Phillips
The Corona
Wool Fat Man

I WANT TO SEND YOU THIS

50¢ CAN OF CORONA FREE

I KNOW CORONA--I KNOW WHAT IT WILL DO FOR CATTLE AND HORSES AND I KNOW WHAT IT WILL DO FOR YOU AND YOUR BUSINESS. THIS 50 CENT CAN IS WAITING FOR YOU--I WANT YOU TO HAVE IT. GIVE ME YOUR ADDRESS ON THE COUPON TODAY AND WHEN I SEND THE CAN I WILL TELL YOU HOW CORONA WILL MAKE MONEY FOR YOU.

I want blacksmiths and horseshoers all over the country to act as my agents. CORONA is a money maker for the horseshoer. I know what I'm talking about. If I didn't, would I back up CORONA with such a strong guarantee? Would I offer you a 50c can for free trial, if I didn't know that CORONA is positively the best article of its kind on the market today? I stand back of every can, just as I stand here holding out this free can for you.

Be the first in your town to look into this money making proposition. Try out the 50c can I offer to send you and then judge accordingly. Will you give me a chance to prove CORONA to you?

CORONA MFG. CO.

Lock Box "A" KENTON, OHIO

CORONA WOOL FAT will heal the worst cases of Cracked Hoof, Grease Heel, Corns, Mud Fever, Scratches, Gall Shoulder, Barbed Wire Cuts, Sore Teats of Cows, and all other hoof and skin diseases known to the animal kingdom.

Tear on this line and mail to Corona Mfg. Co., Kenton, Ohio.
Mr. Phillips:
I have never acted as your agent and will be pleased to give
CORONA a good test. Send me a 50c can free of cost
and tell me how I can make money selling CORONA.
Name
Address
The name of my Iron Store
Jobber is



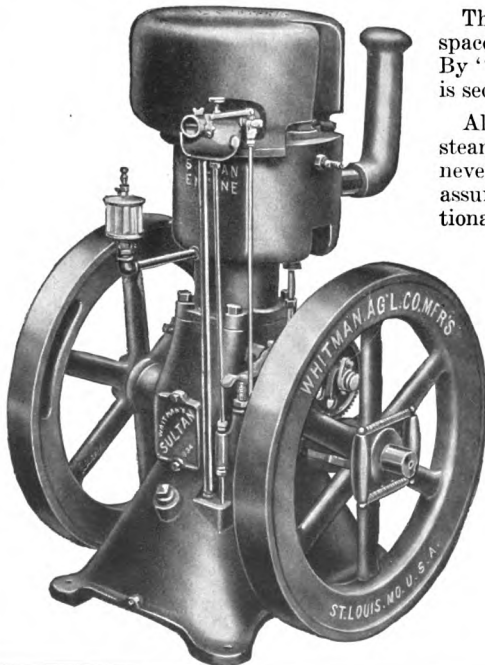
Put This Light, Portable SULTAN WOODWORKER in Your Shop

When you have a Sultan saw rig and one man in your wood shop you will have more work done than if you had six men working with hand saws.

The Sultan is the *handy* wood worker. Compact enough to fit in with any shop arrangement, it is also light enough to move about as desired and lets you handle the work in the most convenient way.



Note the "Built In" SULTAN Engine



This novel idea not only makes an important saving in space but also makes the outfit truly complete and *portable*. By "Building in" the engine a smoother running power plant is secured that is remarkably simple to control.

Although the Sultan runs like a motor it throttles like a steam engine. While every part is readily accessible it is nevertheless closed against dust and dirt. Plenty of power is assured *whenever you want it* and yet this engine is exceptionally low in operating cost.

The saw rig itself, although light and portable, is sturdily constructed to give hard work and accurate service. There is a gravity blower to carry the saw-dust away. The rigid all steel frame is hot riveted under great pressure. The table top is one solid casting of fine gray iron carefully machined. In fact, the construction is so thorough that every part is guaranteed for one year.

If you want to save money on your wood work—and do more work—put your name on a postal and mail it to us today.

Whitman Agricultural Company

7008 South Broadway

ST. LOUIS,

MISSOURI.

1915

AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

BUFFALO
N.Y., U.S.A.

JUNE, 1915

\$1.00 A YEAR
10c. A COPY



COUPONS

PACKED WITH
ALL

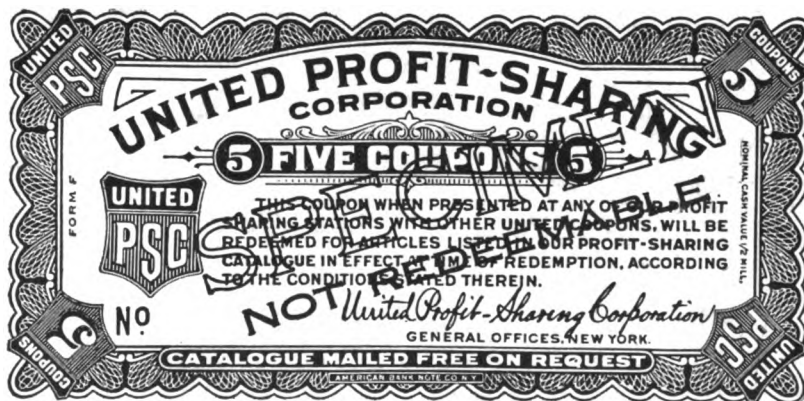
ROWE CALKS



Since April 1st, 1915, we are packing into every CARTON OF 50 ROWE CALKS the following UNITED PROFIT SHARING CERTIFICATES:

GOLDEN RUSTLESS RING POINTS and PAD CALKS	5-16 and 3-8	Certificates representing	25	U. P. Coupons
	7-16 and 1-2	" "	27	" "
	9-16 and 5-8	" "	29	" "
ROWE JUNIOR CALKS	5-16 and 3-8	" "	23	" "
	7-16 and 1-2	" "	25	" "
	9-16 and 5-8	" "	27	" "
ROWE DRIVE CALKS	7-16, 1-2, 9-16 and 5-8	" "	22½	" "

SAVE
THESE
COUPONS
THEY ARE
VALUABLE



YOU GET THEM
NOT ONLY WITH
ROWE CALKS
But with many
other High Grade
Trademarked
Goods

United Profit Sharing Coupons are packed only with the highest class of merchandise. They have the purchasing power of money when used in exchange for any of the handsome premiums illustrated in the list of The United Profit Sharing Corporation, 44 West 18th Street, New York, N. Y.

WRITE THEM TODAY FOR THEIR PREMIUM LIST.

THE ROWE CALK CO., HARTFORD, CONN.



HERE YOU ARE!

PEERLESS WELDING OUTFIT PRICE \$50

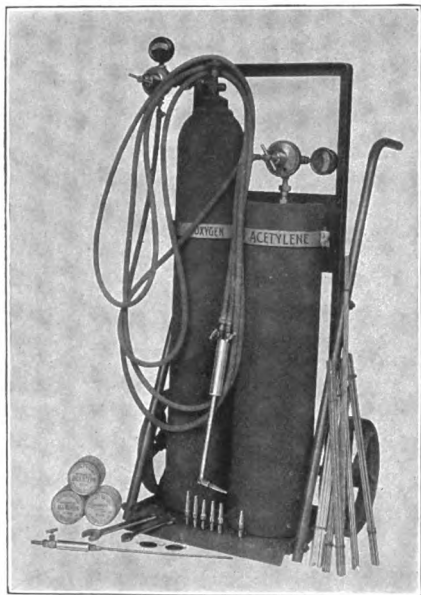
TERMS

\$20.00 Cash with order, balance 30 and 60 days.
5% Discount, if CASH with order. \$47.50 Net.
2% Discount, if \$10.00 with order, balance C. O. D.

ORDER NOW

and get in the PROFITABLE Welding Business.

You can make more money with a PEERLESS than any other piece of machinery in your shop.

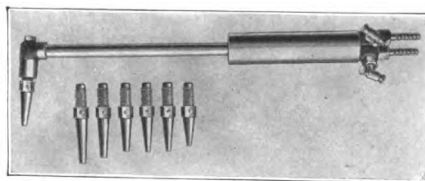


Showing Outfit Mounted on handy truck.

The PEERLESS OUTFIT is made for SERVICE. It is a light, portable and dependable outfit for doing all classes of WELDING and CARBON REMOVING.

WHAT YOU GET

- 1—Peerless Welding Torch, with 7 Welding Tips, Nos. 1, 3, 4, 5, 6, 7 & 8.
- 1—Carbon Remover Torch.
- 2—10-foot lengths of hose, with clamps.
- 1—Acetylene Pressure Regulating Valve, with gauge graduated 0 to 50 lbs.
- 1—Oxygen Pressure Regulating Valve, with gauge graduated 0 to 250 lbs.
- 1—Pair Welders' Spectacles.
- 1—Torch Wrench.
- 1—Can "Dicksteph" Cast Iron Flux.



The Peerless Welding Torch.



The Carbon Remover Torch.

- 1—Can Aluminum Flux.
- 1—Can Brass, Copper and Bronze Flux.
- 1—lb. 3-16 in. Cast Iron Welding Rods.
- 1—lb. 1/4-in. Cast Iron Welding Rods.
- 1—lb. 5-16-in. Cast Iron Welding Rods.
- 1—lb. No. 9 Swedish Iron Wire.
- 1—lb. 1/4-in. Tobin Bronze Welding Rods.
- 1—lb. 1/4-in. Aluminum Welding Rods.
- 1—Set Instructions.

TRUCK AND CYLINDERS EXTRA.

The PEERLESS OUTFIT is designed made and guaranteed by

Economy Welding Machine Company

213 Southwest Blvd., Kansas City, Mo.

AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

BUFFALO
N.Y., U.S.A.

AUGUST, 1915

\$1.00 A YEAR
10c. A COPY

ROWE DRIVE CALKS

THE ONLY DRIVE CALKS PACKED WITH COUPONS

Each Carton of 50 Calks contains a Certificate representing 22½ United Profit Sharing Coupons

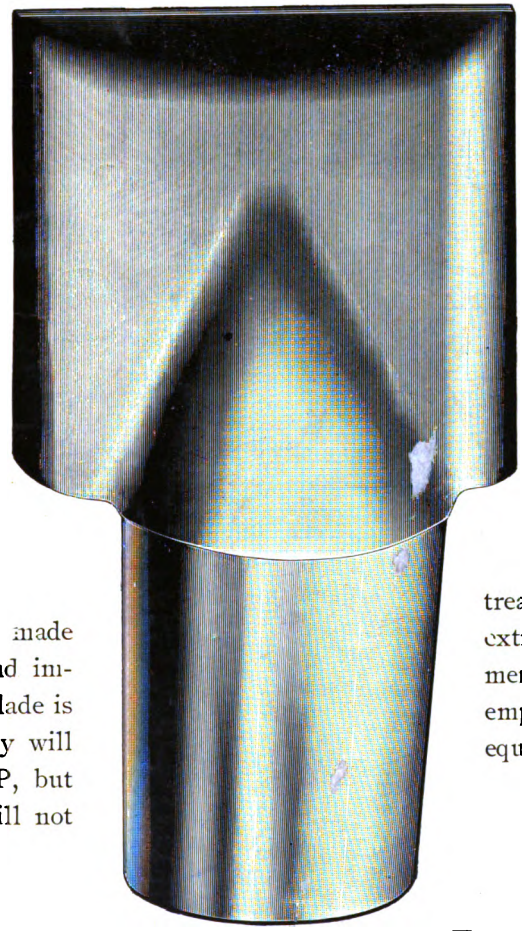
Rowe Drive Calks

have uniform shanks of correct taper and size.

They will fit any shoe of Standard Make. They will stay in the shoe and won't fall out.

Rowe Drive Calks

are well designed and made by the most modern and improved process. The blade is thin enough so that they will always WEAR SHARP, but not too thin so they will not break.



Rowe Drive Calks

are hardened by the same scientific methods which are used in hardening our famous **Golden Rustless Ring Point Calks**. They will therefore wear longer than any other Drive Calks. We are experts in the heat treating of metals and use extreme care in that department of our factory. We employ the best and latest equipment for that purpose.

Rowe Drive Calks are cheaper than any other First-Class Drive Calks
Write Us Today For Sample

THE ROWE CALK COMPANY
PLANTSVILLE, CONNECTICUT



How do you judge your coal?

Do you buy your coal according to **price** or **performance**?

Do you inspect your coal carefully when it is delivered to make sure that it isn't full of sulphur or other impurities?

Do you lay down a set of rules for the coal to follow and kick good and hard when it fails to live up to requirements?

Then **you** are the smith that will appreciate

SONMAN SMITHING COAL

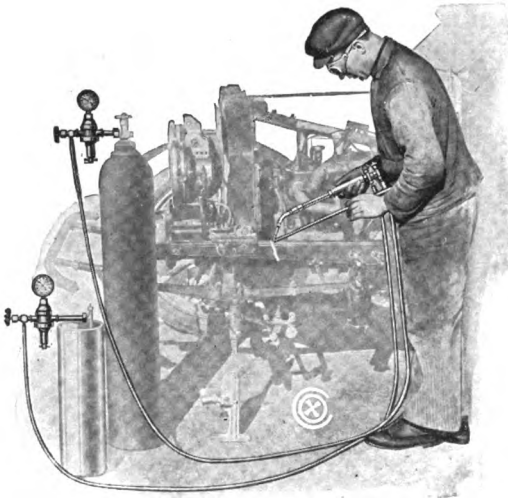
The **performance** of this coal will be a new smitling experience for you.

With **SONMAN SMITHING COAL** your fire will hold a longer heat. It will help you make **firmer** welds in **less** time. No sign of sulphur traces—no clinker or dirt to choke the life out of the fire.

Why make smithing unnecessarily harder by trying to get along with a dull, balky fire? Make your work easier and pleasanter—make your shop pay bigger profits—by letting **SONMAN SMITHING COAL** bring new life to your forge fire.

Find out about **SONMAN SMITHING COAL** without delay. Talk it over with your dealer or write us direct.

Thorne, Neale & Company, Inc.
Old Colony Bldg., Chicago, Ill.



Our Customers—the men who are actually making money every day with the COX welding equipment—wrote this advertisement for us. That's why it should come pretty near convincing YOU that the

COX equipment is the one you should operate.

The Winton Motor Car Co., says:

"It might be of interest to you to learn that the Welding Outfit * * * has been giving very good results and we are well pleased with its purchase * * * in fact, we feel that the outfit has about paid for itself."

John Dubendorf, Elizabethville, Pa., says:

"I received the Welding Outfit and have it in use every day. I cannot see how I ever got along without it. This is the first outfit I ever tried to weld with and every job I turn out is all right for they come back with the second job."

Edwards Auto Co., Watertown, N. Y. says:

"I have done welding enough for others to pay for it besides a great deal for ourselves * * * are very much pleased with it."

Smiths Auto Shop, Chicago, says:

"Your torch is very good and giving very satisfactory results both as to economy in gases and in time * * *. I am well satisfied with your torch its price, weight and usefulness."

Plenty of other similar letters from everywhere.

Get a little more information about this money-making welder selling for only \$75.00. Send for free circular, "The Facts." It's well worth reading.

Cox Brass Mfg. Co.,

Established 1872

ALBANY, N. Y.

1777 Broadway, New York City 2129 Michigan Ave., Chicago, Ill.

15 1915

VOLUME 14

Rowe

THE

NUMBER 12

AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

BUFFALO
N.Y., U.S.A.

SEPTEMBER, 1915

\$1.00 A YEAR
10c. A COPY

COUPONS

IN ALL

ROWE CALK CARTONS



ALL CALKS packed by us since April 1, 1915 will come with United Profit Sharing Coupons.

Should you receive stock which was packed before that time, send us the CARTON LABELS showing the SERIAL NUMBER stamped thereon and we shall send you at once Coupons for every carton of 50 calks according to the following schedule:

GOLDEN RUSTLESS RING-POINTS AND PAD CALKS	5-16 & 3-8	CERTIFICATES REPRESENTING	25	COUPONS
	7-16 & 1-2	"	27	"
	9-16 & 5-8	"	29	"
ROWE JUNIOR CALKS	5-16 & 3-8	"	23	"
	7-16 & 1-2	"	25	"
	9-16 & 5-8	"	27	"
ROWE DRIVE CALKS	7-16, 1-2, 9-16 & 5-8	"	22½	"

THE ROWE CALK COMPANY
PLANTSVILLE, CONNECTICUT



How do you judge your coal?

Do you buy your coal according to **price** or **performance**?
 Do you inspect your coal carefully when it is delivered to make sure that it isn't full of sulphur or other impurities?
 Do you lay down a set of rules for the coal to follow and kick good and hard when it fails to live up to requirements?
 Then **you** are the smith that will appreciate

SONMAN SMITHING COAL

The **performance** of this coal will be a new smithing experience for you.
 With **SONMAN SMITHING COAL** your fire will hold a longer heat. It will help you make **firmer** welds in **less** time. No sign of sulphur traces—no clinker or dirt to choke the life out of the fire.
 Why make smithing unnecessarily harder by trying to get along with a dull, balky fire? Make your work easier and pleasanter—make your shop pay bigger profits—by letting **SONMAN SMITHING COAL** bring new life to your forge fire.
 Find out about **SONMAN SMITHING COAL** without delay. Talk it over with your dealer or write us direct.

Thorne, Neale & Company, Inc.
 Old Colony Bldg., Chicago, Ill.

Why Buy Two Sets When One Will Do?



It is no longer necessary to buy two sets of screw plates. You have all the sizes and pitches you can possibly require when your shop contains a

BUTTERFIELD

Combined Automobile Screw Plate Assortment

No Blacksmith or repair man doing automobile work can be without these screw plates if he would have a properly equipped shop. The assortments are equipped with the ever-dependable Derby Dies. Each die is in a collet with guide attached.

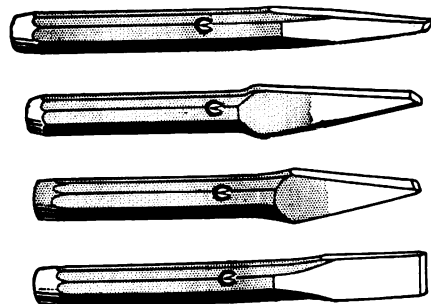
Smiths who are using Butterfield sets write us that Derby Dies are the easiest and smoothest cutting dies on the market. Have you tried them? They are adjustable for tight or loose fits by a simple screw arrangement.

It will pay you to know which one of the several Butterfield screw plate assortments you need in your shop. Write us for complete information and let us help you become better equipped for your auto trade.

Butterfield & Company, Inc.

Derby Line, Vermont, U. S. A.

New York Store: 126 Chambers Street



Atha "HORSESHOE" Brand Chisels

HAND COLD—CAPE—ROUND NOSE—DIAMOND POINT
 —all are made of high grade forged tool steel, and in a variety of sizes.

To insure perfect satisfaction, be sure those you buy bear the famous "Horseshoe" brand. It is a guarantee of quality. Catalogue No. 15 (just published) will interest you. May we send you one—no charge.



THE ATHA TOOL CO.,

NEWARK, N. J., U. S. A.



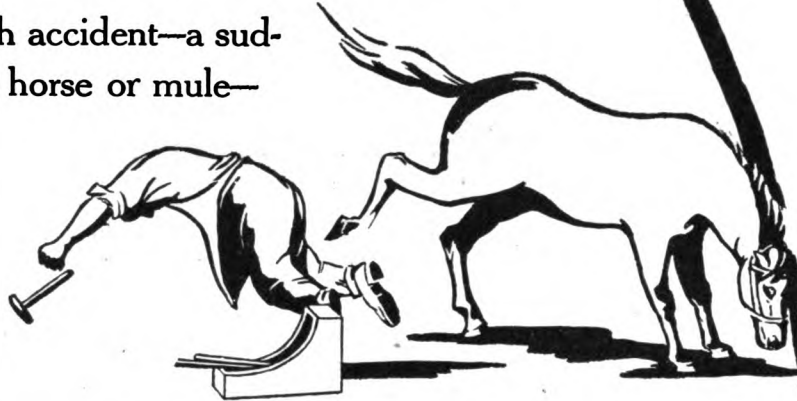
Safety First

WHY TAKE THIS CHANCE?

Only one such accident—a sudden kick from a vicious horse or mule—and you may be injured for life or laid up so that you cannot work for many months.

No matter how many years you've been a Smithing—no matter how familiar you may be with "ticklish horses"—you are always in danger of just such a disastrous accident.

Here's the first place to apply the "Safety First" rule in your shop—and its easily done with



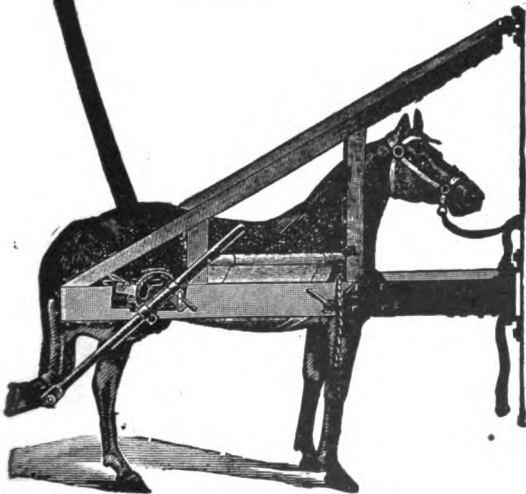
BARCUS HORSE STOCKS

Not only does a *Barcus Horse Stock* give you absolute protection from a high tempered animal but it also helps you to do better and *faster* shoeing.

Your work is simplified. The Barcus Stock has *automatic* working parts instead of bothersome ropes, straps and blocks.

Thousands of Smiths use Barcus Stocks. There's no inducement you could offer them to go back to the dangerous old days of shoeing when they were at the mercy of every high strung horse that might be brought to their door.

There's excess strength and long wear in Barcus Stocks—they'll last as long as the shop itself. Don't be without them this fall—just send us the coupon for a little straight talk on this vitally important subject. Mail us the coupon NOW.



THE BARCUS MFG. CO., WABASH, IND., U. S. A.

COUPON

THE BARCUS MFG. CO.,

Wabash, Ind., U. S. A.

Gentlemen: Please send me at once catalog and full particulars about your Barcus Horse Stocks FREE.

Name

Town

(A. B. 9-15) State

Your wholesale house can give you some valuable pointers about your need for Barcus Horse Stocks—don't forget to ask about them the next time you see your jobber.



Oh, Look Here, What's This?



Why, it's the Justrite Plow Blade and Disc Sharpener, that every blacksmith ought to have. Does more and better work than power trip hammers, leaving the plow-lay rolled to a sharp, smooth edge and free from nicks. It's the best yet. Ask your jobber, or write us direct.

What a user has to say:

Fairmount, N. D., Aug. 20th, 1911,

Gentlemen:—I have found the Justrite machine just what they claim it to be, and I wouldn't be without one. I had a trip hammer, but I sold it the first chance I had as soon as I owned this machine. I think the Justrite is O. K.

(Sgd.) G. A. WELGE.

Address,

Strite Governor Pulley Co., 304 So. 3rd St., Minneapolis, Minn.



THE MOST POWERFUL

And the Only Machine of its Kind on the Market
We guarantee this machine to be 35% better than any other.
Sold by a guarantee and not by testimony. Any manufacturer can get testimonials—what you want is a guarantee of Money Back if not satisfactory. We have yet to hear the first complaint. Every one is working satisfactorily.
Can be operated by one man weighing 135 lbs. Length of lever only 4 feet, 8 inches.

SEARS Open Cut COMBINATION PUNCH AND SHEAR

READ THIS STRONG GUARANTEE

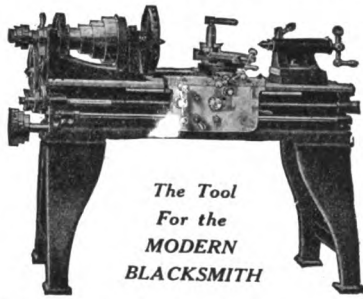
We guarantee this machine to cut soft steel 3 1/4 x 1/2 inch, to cut iron 4 x 1/2 inch, to punch 5/8 inch hole through 1/2 inch soft steel, to punch and cut angle iron, to be in every respect 35% better than any other machine when properly worked. All we ask is a fair trial. Order any or all machines, place them against our machine. If our machine does not prove to be the best we will pay freight charges on same both ways, and we will pay the jobbers their regular commission.
Write for full particulars and price.

GEORGE SEARS COMPANY

Patent Applied For. Manufacturers of Punches and Shears Onslow, Iowa

"MORE WORK AND BETTER WORK"

Why You Need A Sebastian Lathe



The Tool For the MODERN BLACKSMITH

WHEN you install a good Lathe you open the way to new profits. You must have a Lathe to properly handle Automobile and General Repair Work. And you want the best at the right price. Better than any other Lathe on the market today, the "SEBASTIAN" Lathe supplies the need

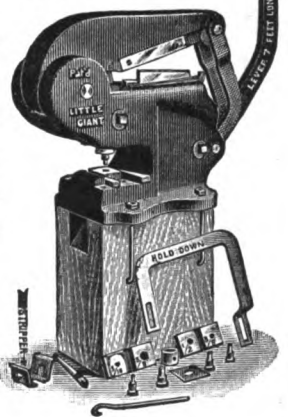
of the Blacksmith Shop. With few parts, it is simple and easy to operate. It is a high-grade tool, accurately made by skilled workmen in a factory equipped with the latest and most approved machinery. We make nothing but Lathes.

Drop us a card for our latest illustrated catalog.

The Sebastian Lathe Co.
124-126 Culvert St. CINCINNATI, OHIO

Get the New Little Giant CATALOGUE.

We have just issued a New Catalogue which completely describes our full line of Punches and Shears.



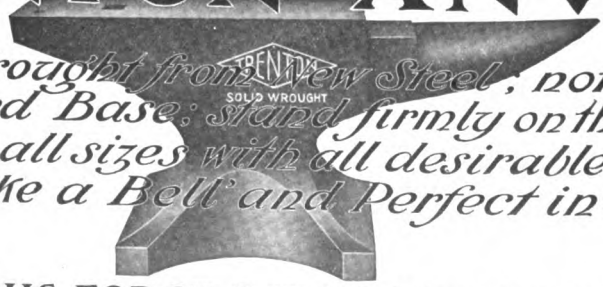
Write for it AT ONCE.

It will pay you to look it over before buying.

Little Giant Punch & Shear Co.
210 S. Market St. SPARTA, ILL.

TRENTON ANVILS

Solid Wrought from **BENTON** New Steel; not cast.
Recessed Base: stand firmly on the block
Made in all sizes with all desirable Clips.
'Ring like a Bell' and Perfect in Shape.



THE COLUMBUS FORGE & IRON CO. COLUMBUS, O.



When You Order Shoes or Calks

REMEMBER

PHOENIX

Horse and Mule Shoes

and

BULL DOG

TOE CALKS

**Are the Best. Try
them the next time
you are ordering
and you will see why.**



No. 100 Royal Forge



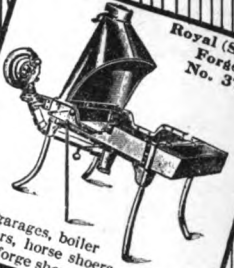
The most popular forge of to-day.

Western Chief Forge, Size XBB



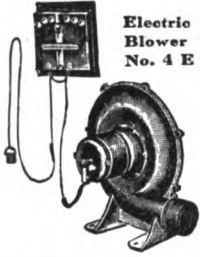
For power shops, or where a forge for heavy work is desired.

Royal (Steel) Forge No. 37



For garages, boiler makers, horse shoers or any first-class forge shop.

Electric Blower No. 4 E



One fire variable speed blower.

When the Name

CANEDY-OTTO


is found on a Forge Blower, Drill or any other Blacksmith Tool that is all the guarantee necessary

We Warrant All Articles of Our Manufacture

SOLD BY JOBBERS AND SUPPLY DEALERS EVERYWHERE

CANEDY-OTTO MFG. CO.
CHICAGO HEIGHTS, ILL. U.S.A.

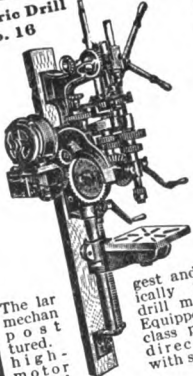
Royal H. Blower



Fire Pot 8x9 1/2 x 4 in. inside.
The successful blower.

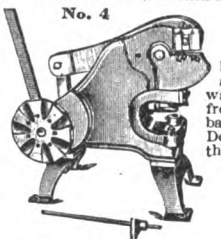
Spur gears used only. Ask the man who owns one.

Electric Drill No. 16



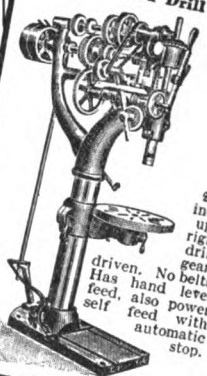
The largest and most perfect drill manufactured. Equipped with high-motor connected drive.

Combination Punch and Shear No. 4



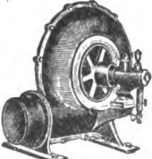
It can be operated toward the front or back. Depth of throat 6 inches.

No. 31 Drill



20-inch upright drill gear driven. No belts. Has hand lever self feed with automatic stop.

Power Blower



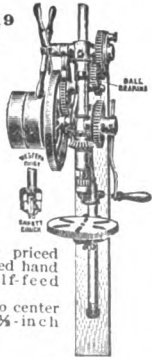
Made in 5 sizes. Adapted to forge fires and light Cupola work. Built for service.

No. 1 1/2 Western Chief Tiro and Axle Shrinker



The easiest operated shrinker in the world.

No. 19 Drill



A low priced combined hand and self-feed drill. Drills to center of 1 1/2-inch circle.

COUPON

CANEDY-OTTO MFG. CO.,
Chicago Heights, Ill.

Gentlemen:

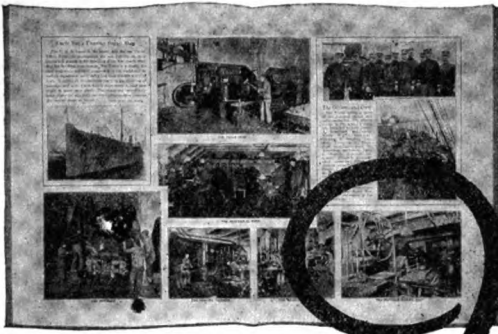
Please send me a free copy of your 160-page Tool Catalogue.

Name _____

P. O. Address _____

State _____

Give name of your jobber or supply dealer here _____



Uncle Sam Uses the Crescent Woodworker to Help Keep his Navy in Fighting Trim

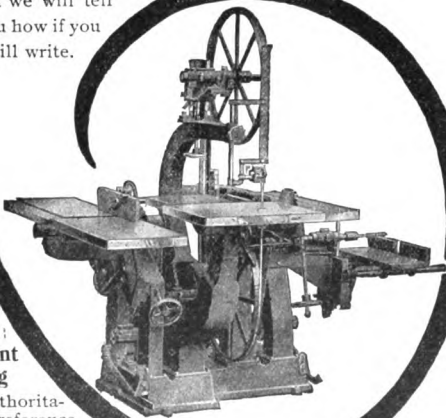
Noticed these two pages in the last issue of "Our Journal," didn't you?

Take another glance at the pattern-making shop and you will see that Uncle Sam's repairmen use a Crescent Woodworker.

Every bit of machinery on the Vestal, the Navy's repair ship, was selected with the knowledge that it might play an important part in the nation's defence. Price was no consideration—what was wanted was the most satisfactory tool or machine obtainable for each line of work. And that's why, when it came to woodworkers, that the Crescent was chosen.

The whole ship looks mighty business like, doesn't it? You can't make a mistake in following the example of these jackie Smiths and use a Crescent Woodworker yourself.

What's going to be your new move this fall? Why not let a Crescent Woodworker double your shop's profits? You can win with a Crescent—just as hundreds of other Smiths have done—and we will tell you how if you will write.



The Crescent Catalog

is an authoritative reference book on modern wood working machinery. Have you a copy! It's free, you know, simply write for one.

The Crescent Machine Company
245 Main Street, :: Leetonia, Ohio

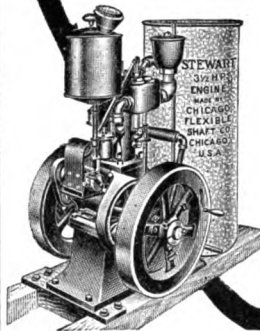
SELL STEWART ENGINES AND PUT EXTRA DOLLARS IN YOUR POCKET

You can make a big addition to your profit ledger by acting as our agent—and you can make this extra money without doing a bit of work outside your own shop.

Let your farmer customers see how sturdily and powerfully your Stewart Engine works for you and they will be keen to order Stewarts from you for pumping, corn shelling, feed grinding and the other farm tasks for which these economical, sure-acting engines are especially fitted.

Three sizes, 1/2, 2 and 3 1/2 H. P. Furnished either with batteries or magneto.

Send for Our Special Offer. We want one Blacksmith in every town to act for us upon especially favorable terms—write now, while you still have the chance, and let us send the details.



Chicago Flexible Shaft Co.

186 Ontario Street
Chicago, Ill., U. S. A.

BLACKSMITHS: INSTALL A FAMOUS WOODWORKER AND MAKE MORE MONEY

You want more profits. Other shop owners have bought our woodworkers and are making big money with them. **You can do the same.**

The Tongue and Pole Rounder shown in the illustration, can be used on all Famous Woodworkers.—adjustable for all sizes of felloes. This is one of the many attachments used on the Famous Woodworkers, such as The Tongue and Pole Rounder, Spoke Tenoner, Rim Borer and Wheel Equalizer.

Reasonable Prices From \$125 to \$500
Depending on Size and Equipment



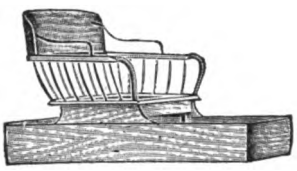
Write To-day For Circular

Giving full description. *Liberal Terms of Payment Arranged if Desired.*

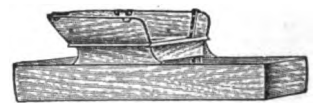
SIDNEY TOOL COMPANY
DEPT. 13,
SIDNEY, OHIO, U. S. A.



No. 244. BODY AND SEATS
 Price, no seats...\$5.75 and up
 Price with seats... 7.75 and up



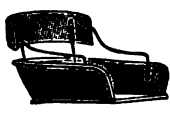
STICK SEAT BODY
 \$5.90 and up



PIANO BODY
 With seat.....\$3.85 and up
 Without seat.... 2.95 and up



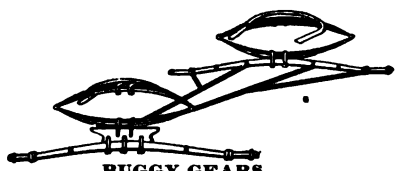
AUTO SEAT
 Untrimmed \$2.65 and up
 Trimmed . 7.48 and up



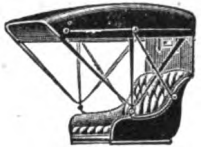
ROUND CORNER SEAT
 Untrimmed . \$2.90 and up
 Trimmed ... 6.05 and up



PANEL SEAT
 Untrimmed . \$0.75 and up
 Trimmed ... 3.85 and up



BUGGY GEARS
 Each\$5.90
 With Wheels and Shafts \$14.40 and up



AUTO SEATS—Top Seats
 Seat \$2.65 and up
 Top 7.75 and up
 Cushion and back 4.55 and up
\$14.95

Our Profit Sharing Plan

Special Inducements

On order of \$25.00 or over we allow a 3% cash discount and 1/2 freight charges if you live in Me., N. H., Vt., Mass., R. I., Ct., N. Y., N. J., Del., Va., W. Va., Pa., O., Md., Ind., Ky., Tenn., Ills. or Mich.

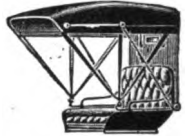
All other States 1/4 freight charges and 3% cash discount.

On orders of \$40.00 or over, we allow a 4% cash discount and full freight charges if you live in Me., N. H., Vt., Mass., R. I., Ct., N. Y., N. J., Del., Va., W. Va., Md., Pa., O., Ind., Ky., Tenn., Ills. or Mich.

All other States 1/4 freight charges and 4% cash discount.

On orders of \$75.00 or over, we allow a 5% cash discount and full freight charges if you live in Me., N. H., Vt., Mass., R. I., Ct., N. Y., N. J., Del., Va., W. Va., Md., Pa., Ohio, Ind., Ky., Tenn., Ills. or Mich.

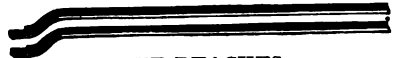
All other States 1/4 freight charges and 5% cash discount.



TOP SETS
 Seat \$0.95 and up
 Cushion 1.50 and up
 Back 2.75 and up
 Top 5.75 and up
\$10.95



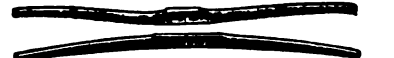
DOUBLE TREES WITH SINGLE TREES
 Buggy and Surrey size... Each 75c



BENT REACHES
 Assorted sizes.....6 for 60c



STRAIGHT REACHES
 Assorted sizes.....10 for 60c



AXLE BEDS
 Assorted sizes—drop.... 14 for 60c
 Assorted sizes—arch.... 8 for 60c



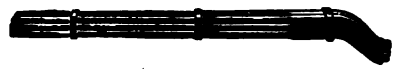
SPRING BARS
 Assorted sizes.....14 for 60c



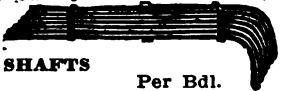
BUGGY AND SURREY SINGLE TREES
 Assorted.....6 for 60c



BUGGY SPOKES
 Per 100
 1 1-16 in., Sar. Pat..\$2.95
 1 in., Sar. Pat..... 1.90
 1 1-16 in., C. B. 2.25
 1 7-16 in., Sar. Pat.. 3.50
 15-16 in., Warner Pat 1.25



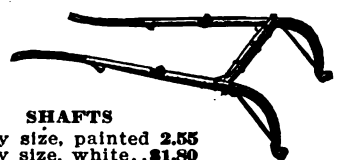
POLES
 Buggy or Surrey size..Per bundle, \$6.95



SHAFTS
 Per Bdl.
 Buggy size.....XX, \$5.95
 Surrey size.....XX, 6.75



BAILEY BODY LOOPS
 30 cents and up



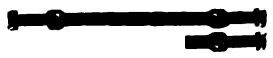
SHAFTS
 Buggy size, painted 2.55
 Buggy size, white..\$1.80



ELLIPTIC SPRINGS
 75c and up



POLES
 In the white.....\$2.75
 Painted 3.60



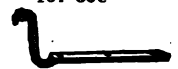
BUGGY AND WAGON AXLES
 50 cents and up
 We carry all sizes



RIMS
 We carry all sizes
 Plain Rims...\$1.15 and up
 Beveled Rims 1.40 and up
 Bored and Rounded Rims \$1.60
 5 pieces bored and rounded rims, assorted sizes, for 60c



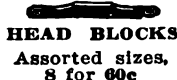
LIGHT WHEELS
 With Steel Tire on \$5.90 and up
 With Rubber Tire on \$12.55 and up
 We make all sizes.



BODY LOOPS
 2 Sets (8 pieces) for 65c



DASHES
 20 in. drill...\$0.20
 18 in. leather. 0.45
 22 in. leather. 1.18
 25 in. leather. 0.95



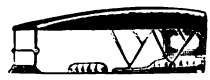
HEAD BLOCKS
 Assorted sizes,
 8 for 60c



WHEEL HEAD RIVETS
 Assorted sizes
 12 lbs. for65c



WOOD HUB SPOKES
 per set
 2 in.....\$2.00
 2 1-4 in..... 2.30
 2 3-8 in..... 1.90
 2 1-2 in..... 2.75



Ford Tops. \$19.95
 Ford Roofs. 7.95

Send for our Large Catalog and learn how we do it.

Adjust your wants to the sizes and styles we furnish at the above prices and save money.

A WHEEL, TOP & HDWE. CO.

1100 Sycamore Street

CINCINNATI, OHIO.



THE ROCHESTER HARD HITTING HELVE HAMMER

Made in many sizes to fit the exact requirements of your work. Write for illustrated booklet.

Here's a hammer that will make money for you, Mr. Smith, day in and day out. It will do the work of any other hammer, and then some. Made in six sizes—one of them is the hammer *you* need.

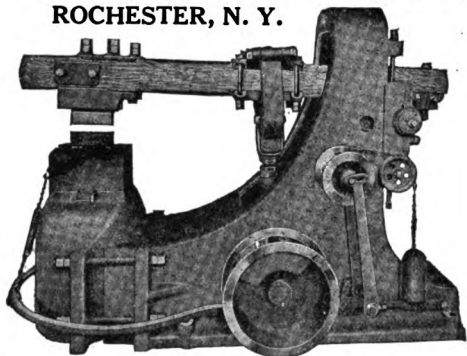
The ROCHESTER HELVE HAMMER is strongly made of first class material throughout. First grade hickory helve; exceptionally heavy anvil, giving greatest resistance to blow struck; steel base; long bearings for helve pivot. Fine for welding tires, work which cannot be done under most upright hammers. Dies can be furnished either lengthways or crossways of helve without additional cost, if specified with order.

Send for our illustrated catalogue free.

Makers of the Celebrated WEST HYDRAULIC TIRE SETTERS

THE WEST TIRE SETTER CO.

ROCHESTER, N. Y.



You Ought to Know These Facts

about the screw plates and dies you use. You know that hammering always improves the quality of steel and one reason for the superiority of



O. K. SCREW PLATES

is that they have O. K. Hammered Dies. These dies are hammered out of flat bar steel, which is better than round steel. The hammering process further toughens and refines the steel; giving it a denser grain.

O. K. Dies, with their large spaces for chip clearance, are more convenient to use. There is plenty of room to supply oil direct to the cutting edges.

All these facts are important for the shop owner. And there are a dozen other good features. Want to know them? Ask your dealer or write for Catalog 7-A.



F. E. Wells & Son Co.

Greenfield Mass. U. S. A.

DO YOU TAKE PRIDE IN YOUR SHOEING?

Do you strive, when shoeing a horse, not merely to do the work as quickly as possible, but to have the shoe accurately fit the horse's hoof? That's the honest pride of the successful smith but his careful work can be made much easier by using

PERKINS HORSE SHOES

"The Shoe That's Easy to Fit."

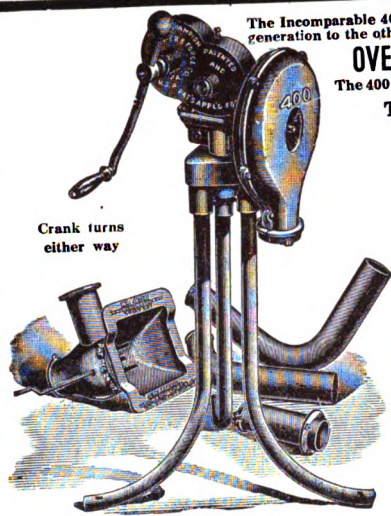
You will always find a Perkins shoe to give complete satisfaction—to make the horse more workable and make the horse's owner have even more confidence in your shoeing judgment and care. And you will appreciate Perkins shoes when you are in the midst of a rush—as they are already stamped, creased and punched they are much simpler to put on and you won't lose any time by refitting.

Just consider that by using Perkins shoes you can save nearly an hour on every ten horses you shoe—that's time worth saving, isn't it? You have 300 styles and sizes of Perkins shoes to select from—you are certain to choose a superior stock.

You will recognize that Perkins shoes are better shoes as soon as you examine them—let us send you free samples together with our instructive catalog.

RHODE ISLAND PERKINS HORSE SHOE COMPANY PROVIDENCE, R. I.

"Famous in '67 and Famous NOW"



Crank turns either way

No. 400

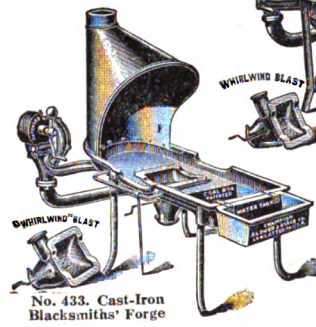
The incomparable 400 Blower, the one great Heirloom that will be handed down from one generation to the other. Ask what the owners say. **MADE WITH BALL BEARINGS ONLY.**
OVER 750,000 CHAMPION 400 BLOWERS IN USE.
The 400 is the Blower that has Revolutionized the World in making Hand Blast.

Tuyere Iron That Makes a Whirlwind Blast



The "Whirlwind" Blast Anti-Clinker, Heavy Nest Tuyere Iron produces a circular, rotary whirlwind blast and concentrates the heat in the tuyere nest, not permitting it to blow up and out of the chimney, therefore makes a hotter fire and heats the iron one third quicker; saving much coal.

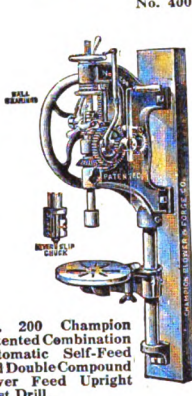
The No. 400 "Whirlwind" Blast, Anti-Clinker, Heavy Nest Tuyere Iron is furnished with all 400 Blowers WITHOUT EXTRA COST.



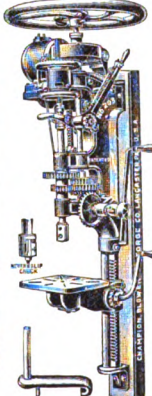
No. 433. Cast-Iron Blacksmiths' Forge



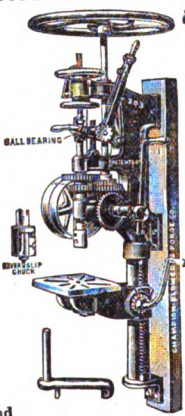
No. 408. Steel Blacksmiths' Forge



No. 200 Champion Patented Combination Automatic Self-Feed and Double Compound Lever Feed Upright Post Drill.

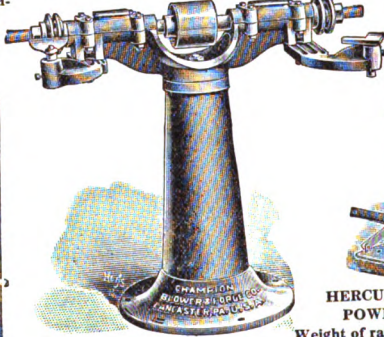


No. 203. Self-Feed and Double Compound Lever Feed, Electrically Driven Post Drill.

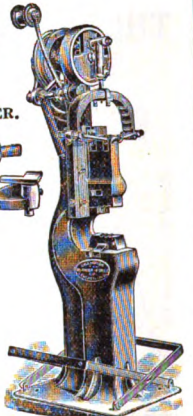


No. 203. Self-Feed and Double Compound Lever Feed Drill.

NO. 1 CHAMPION COLUMN GRINDER.

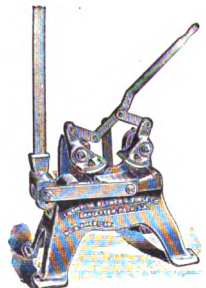


No. 1 Champion Upright Column Grinder. Capacity two 18 by 3 inch wheels.

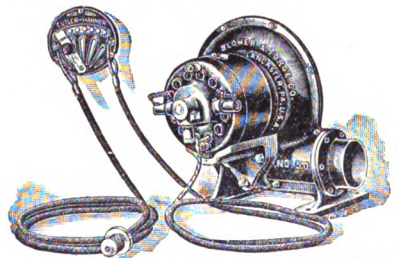


HERCULES PATENTED POWER HAMMER

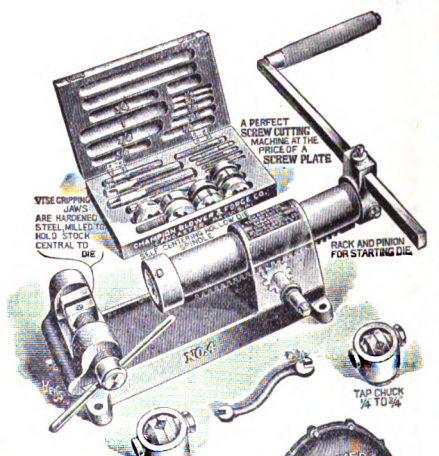
Weight of ram, 65 pounds. The Power Hammer with the flexibility in stroke of a Hammer in a Mechanic's hand.



No. 4. AMERICAN TIRE AND AXLE SHRINKER. Will shrink up to 4x1-inch round edge tire, and axle up to 1-4 in.

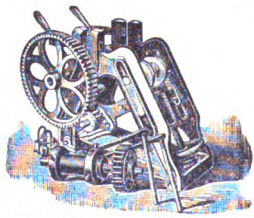


No. 50. Champion One-Fire Variable Speed Electric Blacksmith Blower with a Universal Motor for Both Direct and Alternating Current, either 110 or 220 volts, with Detached Rheostat for six speeds, and Steel Pressure Blower Case, for all kinds of general Blacksmith work.

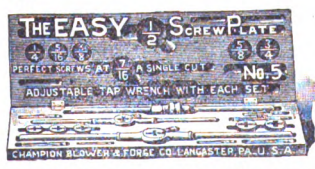


THE CHAMPION THREAD-CUTTING MACHINE

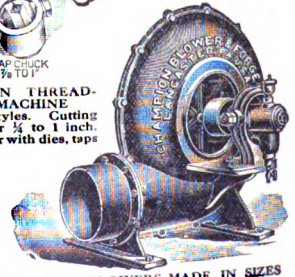
Made in four styles. Cutting from 1/4 to 1 inch. With dies only, or with dies, taps and tap chuck.



THE CHAMPION "COLUMBIAN" TIRE BENDER. Made in three sizes.



SCREW PLATES IN FOUR STYLES, CUTTING UP TO 1 1/2 IN. Before purchasing a Hand Blower, Forge, Drill Press, Tire Bender, Tire Shrinker, Screw Plate, Power and Electric Blower, Hammer, Punch, or Shears, write for our free catalogue, which always shows the greatest variety of improved Blacksmith tools built under one control in the world.



FAN BLOWERS MADE IN SIZES UP TO 44 INCHES IN HEIGHT

THE CHAMPION BLOWER AND FORGE CO., Lancaster, Pa., U. S. A.



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Pages
of
Bargains

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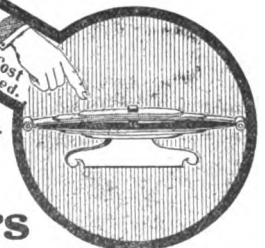
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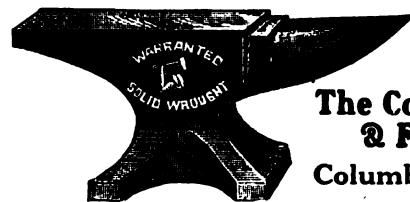
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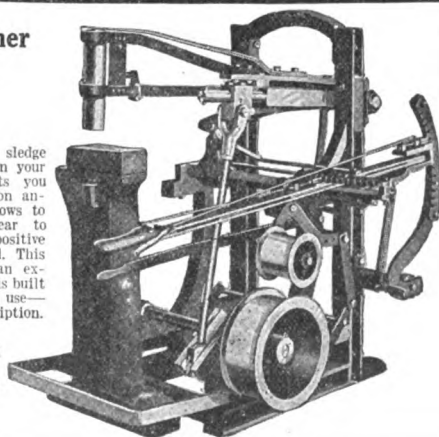
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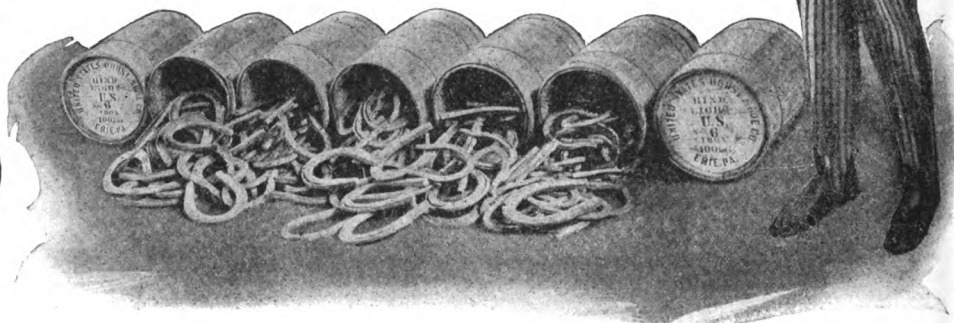
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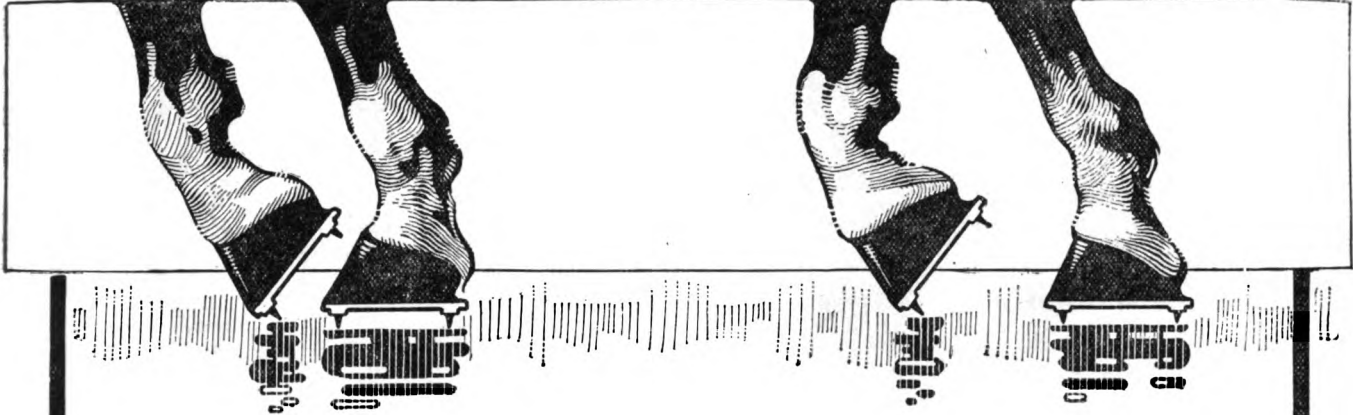


HIGHBALL RIGHT HIND



HIGHBALL LEFT HIND

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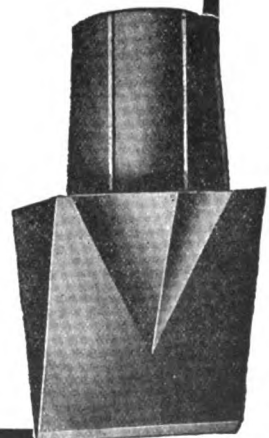
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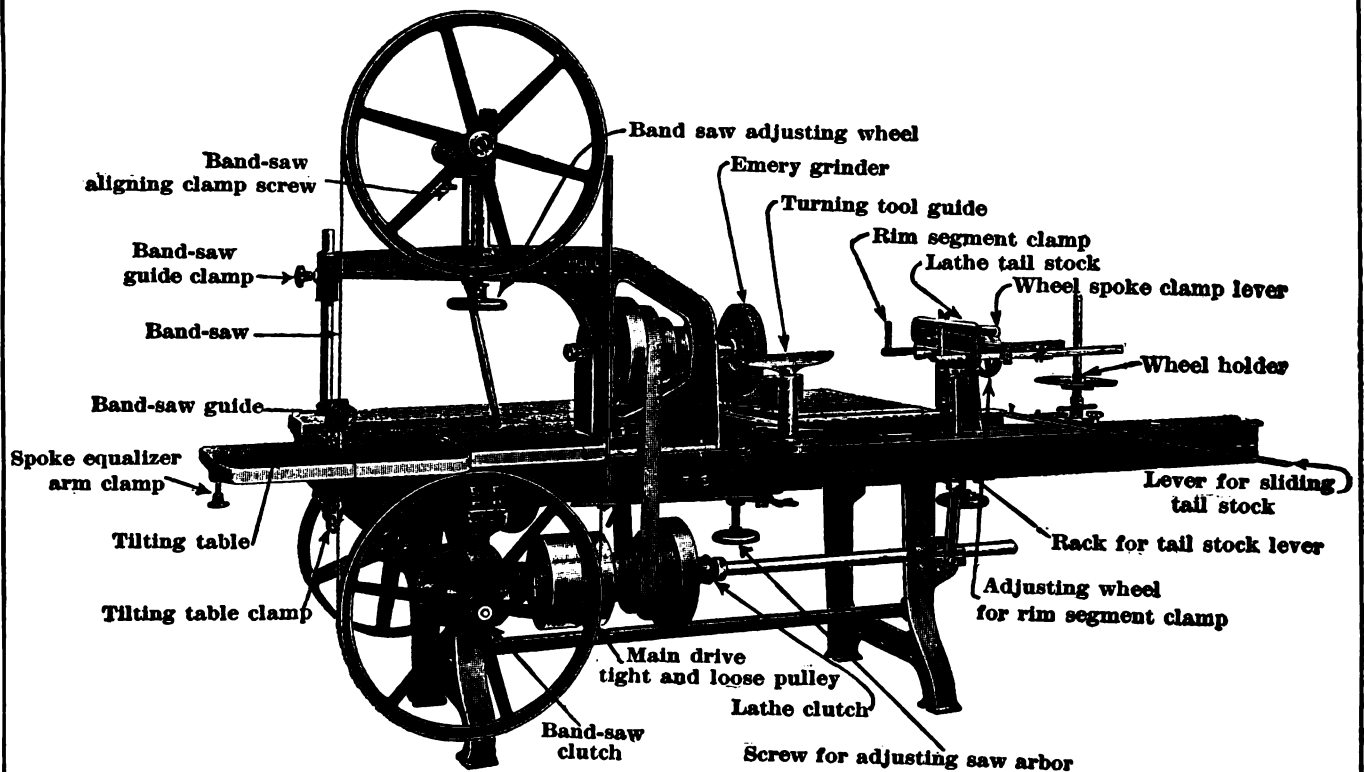
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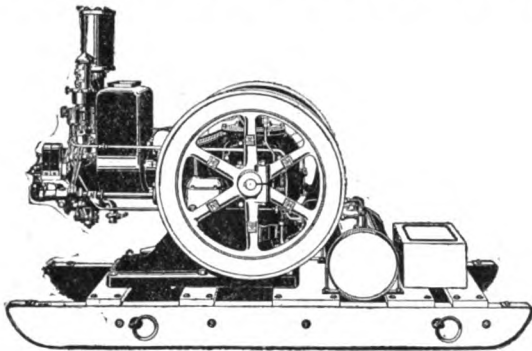
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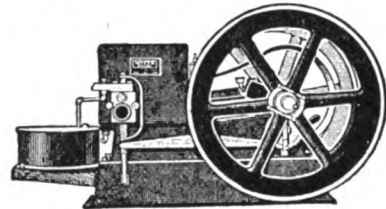
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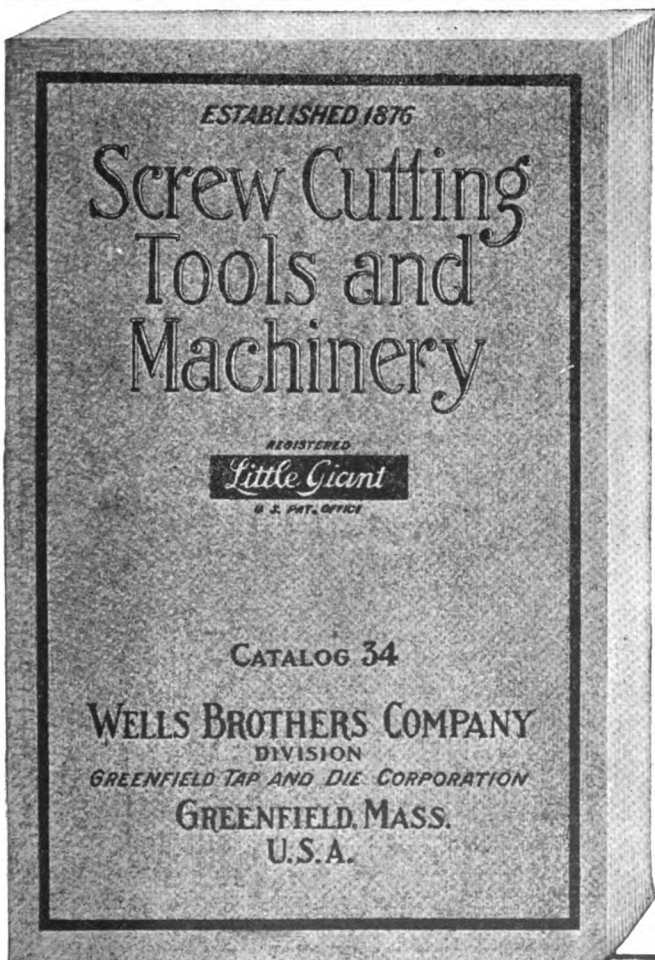
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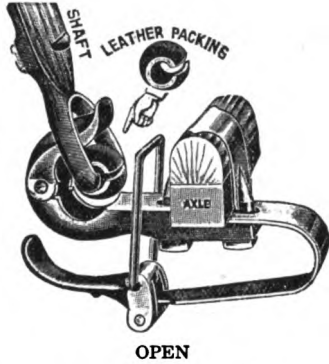
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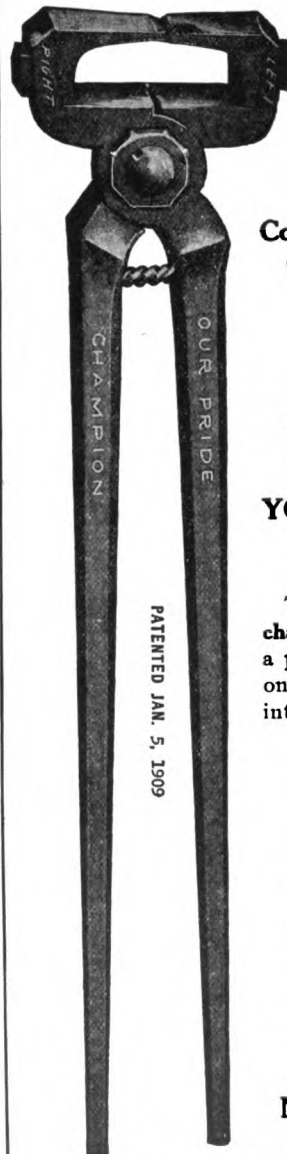
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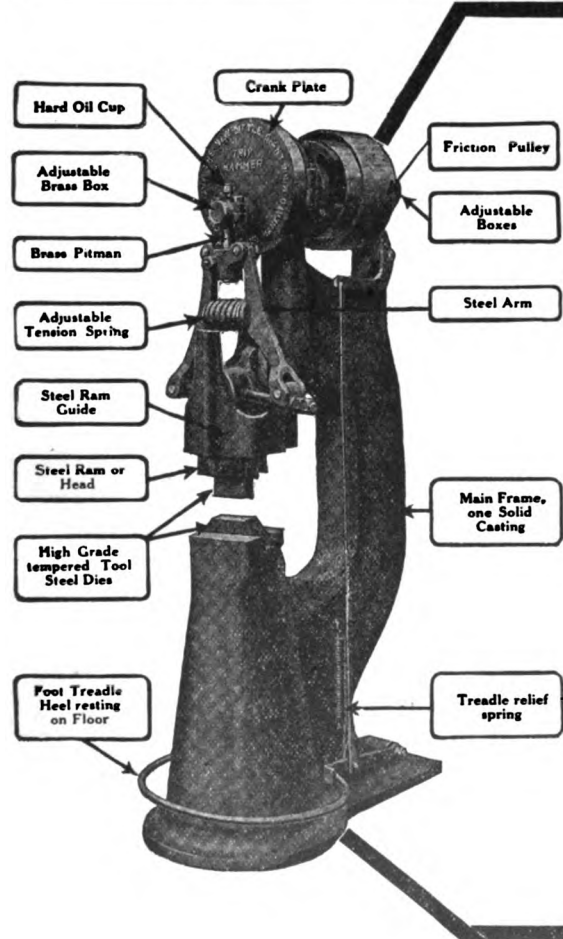
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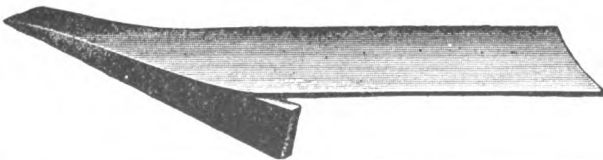
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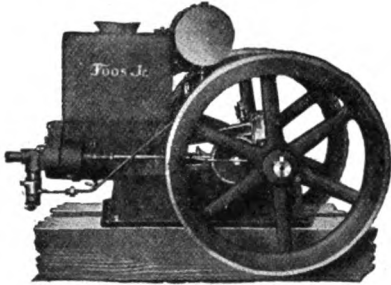
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Toe Calks

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FOR SALE—Blacksmith and Woodshop in town of 6,000. Good business, work for three men, run with electricity. Invoice about \$2500.00. Shop 50 x 110 ft., two stories. Also good modern seven room house. Write **JOHN L. STEELMAN,** Chehalis, Wash.

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FOR SALE—Blacksmith shop in good town. New building. Will sell cheap.
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BLACKSMITH WOOD SHOP and garage for sale, or will rent to right party. Shop stock and tools. Sell tools and stock at invoice. Complete line of power tools. Shop 30 x 120 ft. Cement floor, barn, wood and coal shed. Work for three men year around. Fire in busy season. Bargain if taken at once. 55 miles of Chicago, 2 RR's. Would trade for small farm not more than 150 miles from Chicago.
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 Tell at a glance how much stock to use for oval or elliptical hoops of any size, the circumferences of circles, weight of flat, square and round stock, and the weight and strength of ropes and chains
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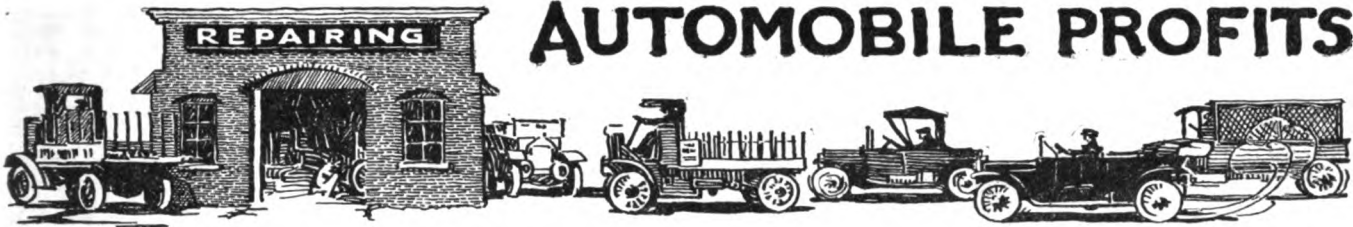
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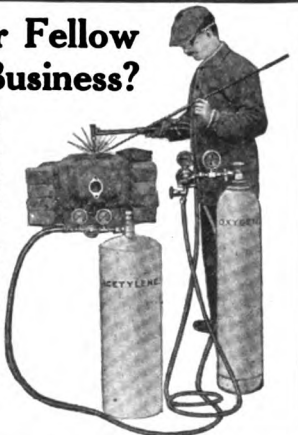
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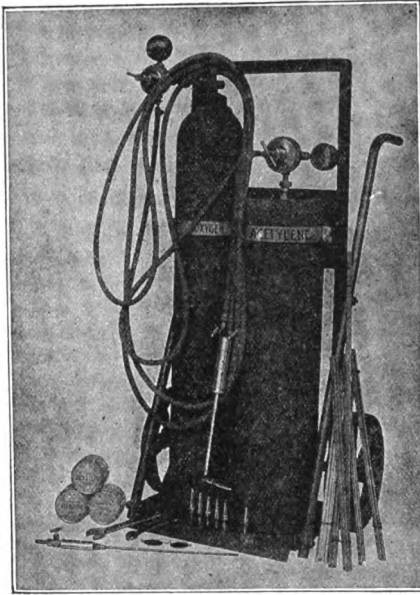
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Showing Outfit Mounted on Handy Truck.

Begin making the extra money *this month* that oxy-acetylene welding stands ready to bring to your door.

You know you ought to take up this profitable line of work—in fact you've got to if you're going to prevent your customers all going to your competitor's shop.

You Need Only Twenty Dollars to Put This Peerless Outfit in Your Shop

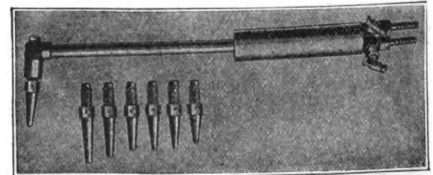
You can place this complete PEERLESS WELDING OUTFIT in your shop—note just what the set contains—by sending us \$20 cash and paying the balance in 30 and 60 days.

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The Carbon Remover Torch



The Peerless Welding Torch

WHAT YOU GET

- | | |
|---|---|
| 1—Peerless Welding Torch, with 7 Welding Tips, Nos. 1, 3, 4, 5, 6, 7 & 8. | 1—Can Aluminum Flux. |
| 1—Economy Carbon Remover Torch. | 1—Can Brass, Copper and Bronze Flux. |
| 2—10-foot lengths of hose, with clamps. | 1—lb. 3-16 in. Cast Iron Welding Rods. |
| 1—Acetylene Pressure Regulating Valve, with gauge graduated 0 to 50 lbs. | 1—lb. 1/4-in. Cast Iron Welding Rods. |
| 1—Oxygen Pressure Regulating Valve, with gauge graduated 0 to 250 lbs. | 1—lb. 5-16-in. Cast Iron Welding Rods. |
| 1—Pair Welders' Spectacles. | 1—lb. No. 9 Swedish Iron Wire. |
| 1—Torch Wrench. | 1—lb. 1/4-in Tobin Bronze Welding Rods. |
| 1—Can "Dicksteph" Cast Iron Flux. | 1—lb. 1/4-in. Aluminum Welding Rods. |
| | 1—Set Instructions. |

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Economy Welding Machine Company

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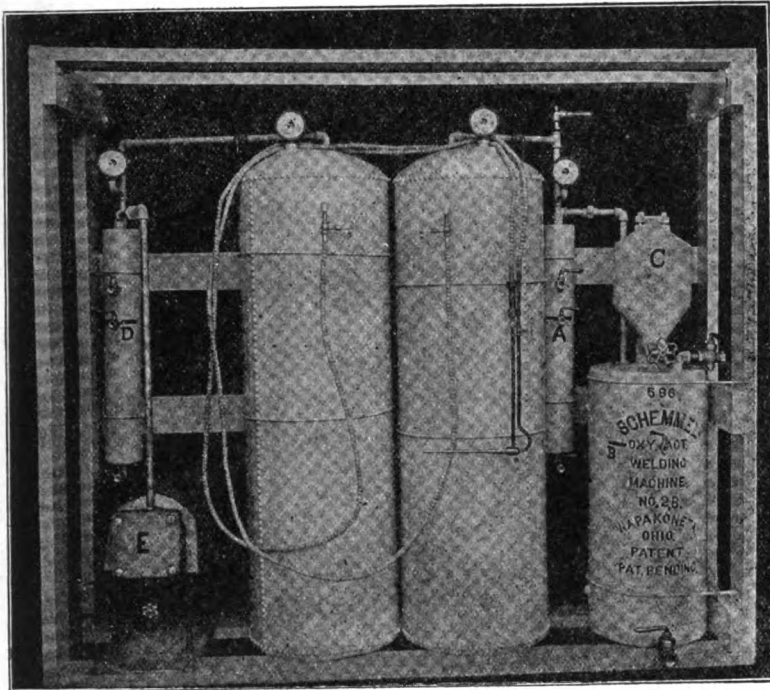
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U. S. A.



THE WELDING OUTFIT YOU NEED

Start NOW and START RIGHT



You are sure of satisfaction when you buy a Schemmel outfit because it is a complete machine. In generating its own gases you are saved the annoyance of sending empty drums to the factory, shipping delays and the constant bother of changing drums while welding, and it is far cheaper to make your own gases.

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Nor will you have the least trouble with the Schemmel torch—the only torch with a **DOUBLE MIXING CHAMBER** which neutralizes the flame and keeps the metal in its original state. Not only can you use the Schemmel outfit for welding and carbon removing but it will also do babbitting and cement cutting.

If you have a welding outfit but are not satisfied we will arrange to exchange your outfit for a Schemmel. We carry a full line of oxygen, chemicals and welding supplies—write for prices. The Schemmel machine will weld anything—nothing too large or small—everything guaranteed.

If you believe in making all the money you can, don't hesitate longer, don't lose another day, but write now for the complete details about making more money with a Schemmel outfit.

We also manufacture a Regulator Outfit. Write for prices. We do all kinds of welding; send us all the work you can gather up, we allow you a liberal commission. If you have a welding machine send me the work you do not care to do.

Schemmel Welding Machine Works

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WAPAKONETA, OHIO

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To have real Smithing success these days a dependable welding plant is just as essential as a forge or blower. For if you can't handle the welding jobs and your customers have to take them to the smith who does oxy-acetylene welding, it won't be long before all their other work is going to the up-to-date smithy.

But this rule works both ways—put in a Rice & Dayton welding outfit and it will draw many new customers for general smithing as well as bring you a big increase in welding profits.

Nor do you need to spend a lot of money to start. You can make big money by beginning with the cheapest portable GEM welding equipment. The truck mounting makes it the handy outfit to use and while it is in no sense of the word, "cheap," it is **low priced**. Be sure to send for the details.

Of course, if you are going into welding in a big way or are located where there is no convenient oxygen supply you want the complete GEM NO. 1. OR

LITTLE GEM WELDING MACHINE

They make their own oxygen and let you pocket ALL the profits. Portable, neither bulky nor complicated, they take up little room and are easy to use. The oxygen generator is **SAFE BUT SIMPLE** to operate—note the absence of a series of cylinders generally necessary on this type of machine. And for a complete outfit their price is remarkably low. Write at once and let us point out how you can go into oxy-acetylene welding **ASSURED OF SUCCESS**.



PRICES

\$40.00 to \$65.00

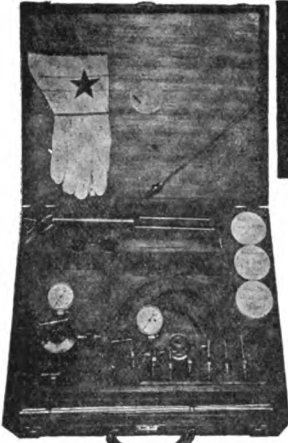
Most for Money Always

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:: U. S. A.

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THREE OUTFITS IN ONE

CUTTING WELDING DECARBONIZING

Not a toy, but a low priced, high quality welding plant—the only one furnishing a combination welding and cutting torch.

Inserting the cutting nozzle converts it into a cutting torch that will cut steel plate or "I" beams up to 1/2-inch in thickness at the rate of 12 inches in 50 seconds. Also cuts heavier metals up to 3 inches.

Blacksmiths find it the economical but efficient equipment for successfully welding cast iron, steel, copper, brass, aluminum, bronze, and malleable iron. An even pressure of both the oxygen and the acetylene is maintained by our high pressure Metal Diaphragm Regulators. Carbon from automobile or gas engines can be quickly removed by using the carbon cleaning nozzle.

We also are manufacturers of acetylene pressure welding generators approved by the Underwriters' Laboratories.

Write today for complete information about this portable outfit that will soon pay for itself and earn a substantial income for its owner.

No. 2 Portable Welding Equipment Includes

- 1—Beginner's Text Book on Welding.
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- 1—No. 10 Acetylene Welding Torch.
- 6—No. 10 Welding Nozzles, No. 1 to No. 6.

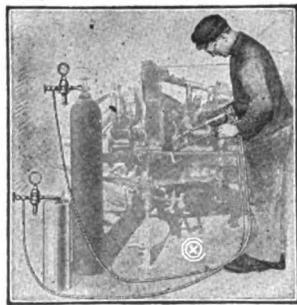
- 1—No. 10 Cutting Nozzle.
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- 2—10 ft. Lengths of High Pressure Hose.

- 2—Hose Connections.
- 10—Copper Asbestos Gaskets.
- 1—Torch Wrench.
- 1—Nozzle Reamer.
- 1—Pair Welding Glasses.
- 6—Cast Iron Welding Rods.
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- 3—Aluminum Welding Rods.
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Complete, in case, without tanks, \$75.00

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That is why you cannot afford to buy any welder without first finding out what the **COX WELDER** is. The **COX** complete outfit sells for only \$75.00.

Let us tell you what the **Winton Motor Company** says about the **COX** outfit—what a **big Chicago** repair shop has to say, and what has been the experience of the **Edwards Auto Co.** of **Watertown, N. Y.**, and many others.

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OXY-ACETYLENE PROCESS

QUALITY

A Big Money-maker for Blacksmiths

Welding of automobile and wagon parts and general repair work—seemingly impossible repairs—can be made quickly and at a big profit with Imperial Equipment—a few jobs will pay for it.

Blacksmiths with their previous knowledge of metal work are the logical ones to profit by the ever increasing demand for Oxy-Acetylene welding and cutting.

The right kind of Oxy-Acetylene equipment will bring high class, profitable repair work to your shop.

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It is safe, reliable and portable—can be taken anywhere—always ready to use. Sold under the broadest guarantee of all.

Quality First: In the selection of Oxy-Acetylene Equipment, economy and efficiency of operation, combined with safety, durability and reliability should outweigh ALL other considerations. Experience has shown that IMPERIAL Equipment affords the utmost in these vital characteristics.

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IMPERIAL Oxygen and Acetylene Regulators each have two gauges to indicate the tank pressure as well as the working pressure, so that the operator knows what he is doing.

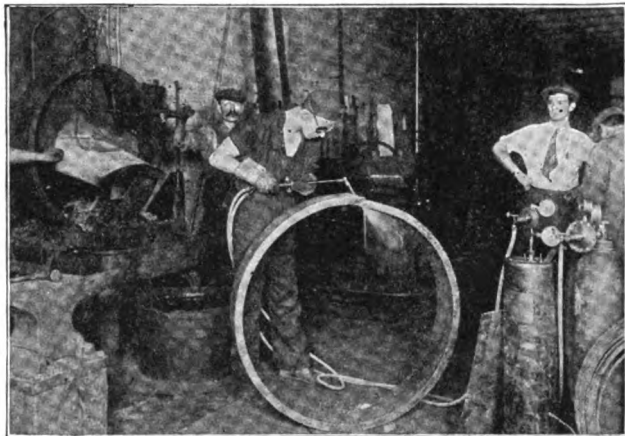
IMPERIAL Torches, Regulators, Gauges—in fact EVERY detail that goes into our outfits—are the best that money can buy. Our torches work satisfactorily on high, medium or low pressures. Each tip is plainly stamped with the gas pressure for its proper use.

DO NOT BE MISLED BY LOW PRICES. It is a well recognized fact among users that the best apparatus is the cheapest, as cheaply made and cheaply priced apparatus is money wasted, as lack of efficiency, short life, inferior work and excessive consumption of gas quickly turn the apparent saving in first cost into a direct loss. Take the advice of experts and get the IMPERIAL proposition BEFORE you buy.

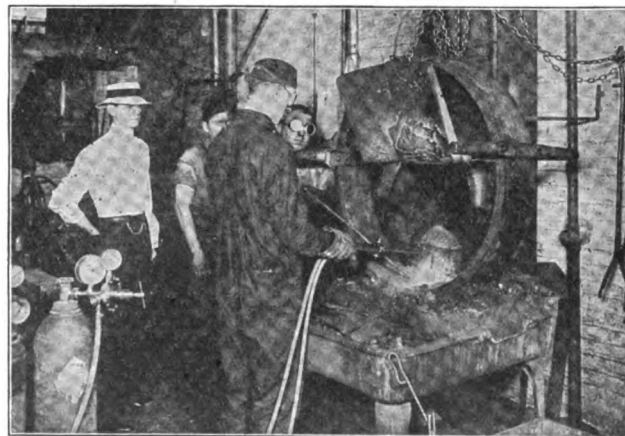
Ease of Operation The actual experience of users has proved that, with a few days of practice, it is possible for any intelligent mechanic to make strong welds of ordinary pieces and that careful observance of the instructions furnished with each outfit soon enables the operator to successfully handle the largest welding work. The cutting operation is even more quickly learned.

Our Engineering Department will gladly assist users of IMPERIAL Equipment in solving any welding or cutting problems.

FREE Write today for valuable data giving costs of operating, pictures of work actually done and other interesting information.



Preparing 15 Ton Truck Tire, 10" wide x 2 3/4" thick, for Autogenous Welding with Imperial Cutting Torch



The same tire placed in charcoal fire in forge for pre-heating, and being welded while in the fire with IMPERIAL Welding Torch

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Choose a Winner!

BEFORE you make that important oxy-acetylene welding decision, find out about the HENDERSON-WILLIS equipment that has just been awarded the Gold Medal at the Panama-Pacific International Exposition and also won the Gold Medal at the Mechanics Fair at San Francisco in 1913.

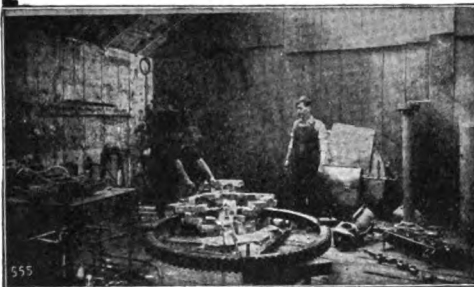
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Write for our story NOW.

HENDERSON-WILLIS WELDING & CUTTING CO.

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Buckeye outfits are made especially for the Blacksmith-Repairman — complete generating plants or regulator outfits as low as \$25. When the rush jobs come, a Buckeye outfit will let you get at the work in a few seconds and finish it up with the least delay.

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Is of Superior Strength and Quality. We can prove it. Write us.

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**YOU CAN'T BUY A BETTER
OUTFIT AT ANY PRICE**

We Conduct the Largest Welding Shop in the West and Use this Outfit Exclusively. Personal Instructions Free. Write for Booklet.

Admiral Welding Machine Company
1330 Walnut Street, Kansas City, Mo.

THE HORSE RASP OF QUALITY



Ask your dealer for the IMPROVED HELLER RASP with keen cutting hard teeth. Made in all patterns and cuts. "Slim," "Light," "Slim Light," and "Fine Cut." Insist on getting the size, kind and cut best suited for your work. It will pay you to give them a trial. New catalogue mailed free on application.

ESTABLISHED IN 1836

HELLER BROTHERS COMPANY

NEWARK, N. J.



AN ANCIENT GREEK BLACKSMITH

BREAK AWAY FROM ANTIQUATED METHODS WELD WITHOUT HAMMERING

Get in line with people who are making money. There are thousands of blacksmiths today who are making big money with one of our modern oxy-acetylene welding plants. They have found that since they purchased a Vulcan welding plant their profits have more than doubled, and with the assistance and co-operation we gave them the work was easy. Many write that their

VULCAN OXY-ACETYLENE WELDING PLANT

has paid for itself in the first thirty days. It is built for hard usage, to stay on the job and do good work from start to finish. They are shipped to you complete and ready to use. Nothing is left to the judgment of an inexperienced person.

We build plants in all sizes to suit every requirement. Send for Catalogue A-4. It is free. If this subject interests you, get

A BIG NEW TEXT BOOK ON WELDING

Practical men say "Best ever published." A mine of valuable information, explaining in plain language the How and Why of every operation. 150 pages, 64 illustrations.

PRICE POST PAID \$1.50

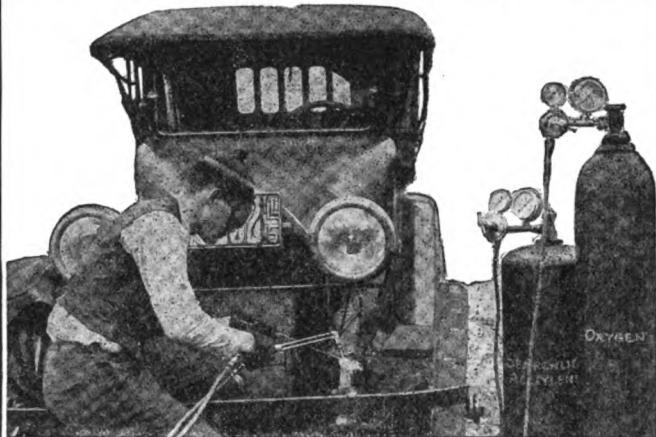
VULCAN PROCESS CO.

2427 UNIVERSITY AVE. S. E.
MINNEAPOLIS, MINN.

136 W. SECOND ST.
CINCINNAT I, OHIO

"Under the spreading chestnut tree The village smithy stands—"

And that's about all he does do unless he has a Searchlight Welder. He just stands. The new style blacksmith has a smaller arm but a bigger head. He uses two steel cylinders of gas and a little torch and makes his biggest money sitting down.



The blacksmith in the picture above is up-to-date. An automobile with a broken frame ran up to his door. He brought out his Searchlight Welder, welded the broken frame in forty-eight minutes and charged \$18.

He welds broken castings and other parts for the factories in his neighborhood. When factory machinery breaks down a \$50 bill looks as small to the owner as a copper cent in the hat of a beggar compared to what it is going to cost him until he gets that machinery running again. And so this blacksmith charges the price and gets it. The

Searchlight Welder

will do as much for any blacksmith or any machine shop as it is doing for this man above. Oxy-acetylene welding beats the old-style all hollow. A Searchlight Torch will shoot six thousand degrees of heat into a broken part and make the edges run together like water. It will produce more heat in one minute than your old forge can produce in a week. It will weld anything from a brittle casting to an aluminum tank.

Hundreds of machine shops and blacksmith shops have already put in the Searchlight Welder and if they had to give up their shop or give up their welder, they'd keep the welder. Let us send you some of their letters showing what they think about it.

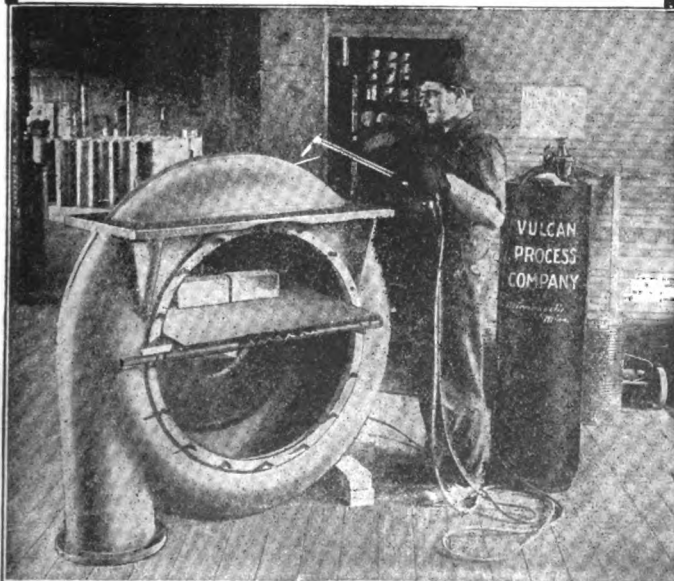
Here is our great offer:

A \$100 Outfit for \$50

and sent on Free Trial. (Cylinders extra, of course). An outfit that will make you more money and easier money than you have ever made before. Send for our booklet, The Searchlight on Welding. It will throw the searchlight on bigger profits for you. Hundreds of blacksmiths are living easier and making more because of it. Write for it today and it will come to you by return mail.

THE SEARCHLIGHT CO., 1010 Karpen Building, Chicago, Ill.

Branches and refilling stations in all large industrial centers.





CLASSIFIED BUYER'S GUIDE.

For Alphabetical Index to Advertisers, See Page 17




ABSORBINE **STOPS LAMENESS**

from a Bone Spavin, Ring Bone, Splint, Curb, Side Bone, or similar trouble and gets horse going sound. Does not blister or remove the hair and horse can be worked. Page 17 in pamphlet with each bottle tells how. \$2.00 a bottle delivered.

Horse Book 9 K free.

ABSORBINE, JR., antiseptic liniment for mankind. Reduces Painful Swellings, Enlarged Glands, Goitre, Wens, Bruises, Varicose Veins, Varicosities, heals Old Sores. Allays Pain. Will tell you more if you write. \$1 and \$2 a bottle at dealers or delivered. Book "Evidence" free. Manufactured only by **W. F. YOUNG, P. D. F., 230 Temple St., Springfield, Mass.**

50.WEEK VULCANIZING TIRES



Any shop owner can make big profits. Business cash. Only small space needed. Vulcanizes any make automobile, motorcycle or bicycle casing or tube. Business easily and quickly learned. Thousands coining money. Unlimited possibilities in vulcanizing business. Miller's Rubber Instruction Book, price prepaid \$1.00. Send for free circulars and prices

CHAS. E. MILLER, Dept. A.B. Anderson, Ind.

THE IMPROVED EASY HOOF TRIMMER



Will cut a hoof easier, quicker and better than any tool you have ever had. Weight 2 1/2 pounds, opening, 2 inches, cuts one inch. Thousands of shoers are using the EASY HOOF TRIMMER with great satisfaction.

SEND A DOLLAR TODAY
Delivered to any part of the U. S. by Parcels Post.

Muncie Wheel Company, Muncie, Ind., U.S.A.

WE MANUFACTURE SHEARS AND PUNCHES



Hand or power, for shearing and punching plates, bars and angles. Send for Catalogue C.

BERTSCH & CO. Cambridge City, Ind.

Do Business by Mail

Start with accurate lists of names we furnish—build solidly. Choose from the following or any others desired.

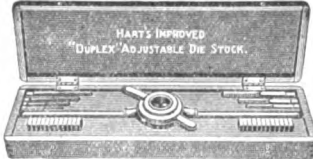
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Cheese Box Mfrs.	Ice Mfrs.
Shoe Retailers	Doctors
Tin Can Mfrs.	Axle Grease Mfrs.
Druggists	Railroad Employees
Auto Owners	Contractors

Our complete book of mailing statistics on 7000 classes of prospective customers for the asking.

Ross-Gould 800 S. Olive St., St. Louis

Ross-Gould Mailing Lists St. Louis

"DUPLIX" BOLT DIE STOCK SETS.



They contain dies that adjust without a wrench and require no reversing after cutting.

THE HART MFG. CO.
2325 E. 20th St. Cleveland, O.

Greenfield Drill Chuck



Strong, accurate, well made, and sells at a popular price. Try them without delay.

Especially suitable for the blacksmith. We will send you descriptive circulars upon request.

Ask your Jobber or write us direct
GOODSELL MFG. CO. Greenfield, Mass.

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WELDARINE

An Absolute Necessity to Every First-Class Blacksmith, Automobile or Machine Shop

WELDARINE will braze cast iron and will give better results than when done with expensive plant.

Weldarine, the best compound ever discovered that will braze cast iron. Weldarine has been on the market for ten years. Weldarine has never failed to give satisfaction. Weldarine is sold under a positive guarantee. Weldarine is sold by leading Heavy Hardware Jobbers the world over.



BEFORE Jumbo set weighs 25 lbs., costs \$12.
Will do \$400 to \$600 worth of work. Large set weighs 4 lbs., costs \$4. Will do \$75 to \$100 worth of work. Small set weighs 2 lbs., costs \$2.25.
Will do \$30 to \$40 worth of work.

WELDARINE MFG. CO.,
TOPEKA, KAN., U. S. A.



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Engine Users

Don't throw your old Grindstone in the junk pile, you can mount it on one of our new Power Grindstone Shafts and make it an up-to-date tool, we will tell you how to hang and true up your old stone and make it as good as new again. Also ask for circulars on our Wood Worker's Friend Jointer Heads, made in five different styles with 8", 12" and 18" knives. We also make the best all around Nut Splitter on the market. Splits all size nuts from 1/4" down. Manufactured by



JOHN WHISLER, GIBSON, LA.



MAKE MORE MONEY OUT OF BROKEN SHAFTS



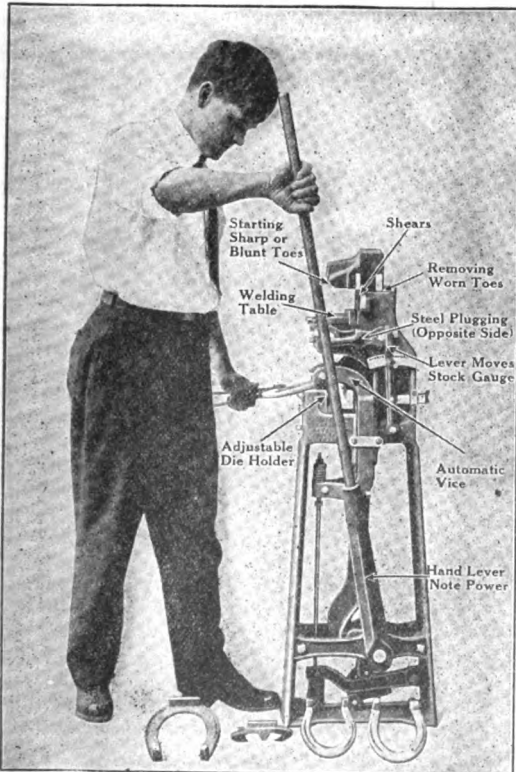
Every time a customer brings you a broken buggy shaft you can make a BIGGER PROFIT out of the job if you use one of my QUICK REPAIR SHAFT IRONS. I'll supply you all you need at \$1.00 a dozen and I also make shoer's tongs at 35c each. Special Offer: Send me \$1.25 and I will send you 10 pairs of shoe irons and one pair of tongs, sent prepaid to Smiths within 600 miles of Hagerstown or by Express charges collect for Smiths further away. Also maker of chisels and screw-drivers. WILLIAM WEDEKIND Hagerstown, Wayne County, Indiana.

KEROSENE Gas Lamps

300 to 1000 Candle Power. Nothing complicated. Children can light and operate. Guaranteed not to clog, smoke, smell or carbonize. Safest, simplest, most reliable, economical light for home or business use. Write for Particulars. Brilliant Gas Lamp Co., 1009F So. Wabash Ave., Chicago, Ill.

The Greatest LABOR SAVING Machine on Earth

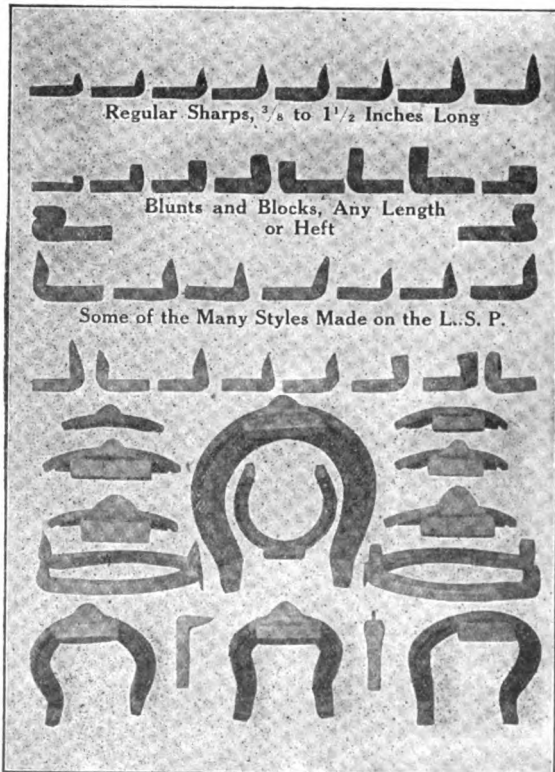
THE L. S. P. CALKING MACHINE



Our 1916 MODEL is far superior in every way to our former styles, doing a much larger range of work and a more finished job, much handier and easier to operate.

It is a strong, handsome, well-made machine, weighing 60 pounds more than our former style, but only takes up 8 x 15 inches floor space. No foot Treadle to bother, both feet on the floor. Automatic Vise which holds the shoe rigid. It does all kinds of Sharp, Blunt and Block Heeling. Starts the Toe Calks without use of hammer, removes the worn toes, welds Sharp and Blunt Toes, does Steel Plugging, rolls out a perfect, finished Clip. Work better than done by hand, with ease and in a fraction of the time. The Greatest Time and Labor Saving and Money Making Machine that ever went into a Shoeing Shop.

Write at once for full description and prices.



The above is an actual photograph of some of the work, just as it came from the machine without a hammer touching it.

1916 MODEL—AN ENTIRELY NEW MACHINE. Fully covered with Patents.

L. S. P. CALKING MACHING COMPANY WYALUSING, PA., U. S. A. NATIONAL MACHINE CO., BRIGHTON, ONT., CANADA



CURRENT HEAVY HARDWARE PRICES.

The following quotations are the lowest prices generally prevailing August 27, 1915. They are subject to change without notice, and higher prices are charged according to quality, specifications and other conditions. The price on steel bars has been advanced five cents per hundred pounds to the large trade though no advance has yet been made to the blacksmith. It may be well to look for an advance, however, as far western points report advances to the blacksmith trade.

Galvanized sheets are slightly lower, while bolts and bolt items are reported firm with a prospect of higher quotations.

The unfavorable weather general throughout the entire country has affected business to a considerable extent and reports of the past month's business show a decided leaning toward poor rather than good business. Crops have been considerably curtailed by the bad weather and the harvest, while promising good, will not be the bumper and record figures anticipated at the beginning of the season.

Collections are reported fair only.

Horse Shoes—						
All Iron Shoes	.....					\$4.00
Steel Shoes	.....					4.00
No. 0 and No. 1, 25c extra. 15c. per keg additional charged for packing more than one size in a keg.						
Mule Shoes	.....					4.90
X. L. Steel Shoes	.....					5.50
Countersunk Steel Shoes	.....					5.25
Tip Shoes	.....					5.75
Goodenough, heavy	.....					6.00
Goodenough, sharp	.....					6.50
Toe Weight	.....					7.00
Side Weight	.....					9.25
E. E. Light Steel	.....					5.00
Steel Driving	.....					5.50
O. O. Mule Shoes, extra	.....					1.50
Anvils	.....					.11
Merchant Bar Iron—						
\$1.80 rates, full extras, and 20 cents per 100 pounds extra for broken bundles.						
Steel Bars—						
\$1.80 rates, full extras.						
Toe Calks—						
Blunt	.....					Per Box \$1.25
Sharp	.....					1.50
Screw Calks—						
5-16	.....	%	7-16	.....	1/4	5/8
Blizzard M.	\$18.00	\$18.00	\$20.00	\$20.00	\$22.00	\$22.00
Sure Grip M.	18.00	18.00	20.00	20.00	22.00	22.00
Bl. D'mond M.	18.00	18.00	20.00	20.00	22.00	22.00
Red Tip M.	20.00	20.00	22.00	22.00	22.00	24.00
Rowe, Jr. M.	18.00	18.00	20.00	20.00	22.00	22.00
R. Rg. Pt. M.	20.00	20.00	22.00	22.00	22.00	24.00
Plow Lays—						
Solid Cast	.....					\$.08%
Crucible	.....					.09%
Soft Center	.....					.13
Fitted Plow Lays—						
Crucible, 12"	.....					\$1.20
Crucible, 18"	.....					1.80
Soft Center, 12"	.....					1.95
Soft Center, 18"	.....					2.60
Quick Repair Lays—						
Crucible, 12"	.....					\$1.30
Crucible, 18"	.....					1.60
Soft Center, 12"	.....					1.70
Soft Center 18"	.....					2.15
Hickory Lumber—Per Foot—						
1 to 2 1/4	.....					\$.10
2 1/4 to 4 1/4	.....					.12
Ash and Oak Lumber—Per Foot—						
1 to 1 1/4	.....	\$.08	2 1/4 to 3	.....		\$.09
1 1/4 to 2	.....	.08 1/2	3 1/2 to 4	.....		.10
Yellow Poplar Lumber—Per M. Feet—						
6 to 12	.....		13 to 17	.....	18 to 24	
3/4"	.....					\$75.00 \$ 85.00
1 1/4"	.....					\$75.00 80.00
2"	.....					78.00 85.00
3"	.....					85.00 90.00
4"	.....					85.00 90.00
5"	.....					85.00 90.00
6"	.....					85.00 90.00
7"	.....					85.00 90.00
Rough Hickory Axles—						
3 x 4 x 6 ft.	.....					\$.75
3 1/2 x 4 1/2 x 6 ft.	.....					1.00
4 x 5 x 6 ft.	.....					1.30
5 x 6 x 6 ft.	.....					2.40
4 x 5 x 6 1/2 ft.	.....					1.75
4 1/2 x 5 1/2 x 7 ft.	.....					2.30
5 x 6 x 7 ft.	.....					2.80
5 x 7 x 7 ft.	.....					3.40
Finished Hickory Axles—						
For 2 1/2 and 2 3/4 Skeins	.....					\$.95
For 3 Skeins	.....					1.10
For 3 1/4 Skeins	.....					1.35
For 3 1/2 Skeins	.....					1.50
For 3 3/4 Skeins	.....					1.80
For 4 Skeins	.....					2.10

Rough Oak Bolsters—						
3 x 4	.....	\$.36	\$.40	1.20	1.35	\$1.75
4 x 5	.....	.60	.70	2.20	2.25	3.00
5 x 6	.....	1.00	1.20			
Finished Oak Bolsters—						
2 3/4 x 3 3/4 and under	.....					\$.60
3 x 4	.....					.85
3 3/4 x 4 3/4	.....					.80
Rough Oak Wagon Tongues—						
4 x 4 x 2 x 4 x 12 and smaller	.....					\$1.15
Finished Oak Wagon Tongues—						
3 1/2 and smaller	.....					\$1.35
3 3/4	.....					1.45
4	.....					1.55
Two-Inch Sawed Hounds						
Tongues	.....					Per Pair \$.35
Front	.....					.40
Hind	.....					.50
Wheels—						
Sarven Patent—white—not tired	.....					50%
Tiring—No. 13 and less	.....					45%
Tiring—No. 17 and larger	.....					30%
Screws 1 1/4" Thread and less	.....					50%
Rivets 1 1/4" Thread and less	.....					40%
Screws or rivets 1 1/2" and heavier	.....					40%
Boring or Boxing less than 10 cent lots	.....					40%
Boring or Boxing 10 sets or more of one size	.....					60%
Priming Wheels, net	.....					25c
Oiling, not tired, set	.....					20c
Allowance of 25c per set on all special tired wheels with three or four piece rims						
Oiling, not tired, No. 17 to No. 39	.....					25c
Oiling No. 45 and larger	.....					40c
Special Wheels Tired—"E"						
0 3/8 x 3/4	.....	\$6.95				Grade. 2 piece Rim. \$ 9.35
1 1/8 x 3/4	.....	7.20				9 1 1/2 x 5-16" 9.80
3 1 x 3/4	.....	7.65				13 1 3/4 x 5-16" 12.00
3 1 x 5-16"	.....	7.90				13 1 1/2 x 3/8" 12.40
Cupped Oak Hubs.						
7 x 8 x 9	.....	\$1.15				10 x 14.....\$ 3.30
7 x 9 x 10	.....	1.25				11 x 14..... 4.20
8 x 9 x 10	.....	1.25				11 x 15..... 4.50
8 x 10 x 11	.....	1.50				11 x 16..... 5.10
9 x 10 x 11	.....	1.69				12 x 18..... 5.75
9 x 11 x 12	.....	1.80				12 x 17..... 6.30
10 x 12 x 13	.....	2.75				13 x 18..... 7.00
11 x 13 x 14	.....	3.80				
12 x 14 x 15	.....	4.50				
Rough Sawed Fellos—						
1 1/2 x 2"	.....	\$1.70				2 x 2 1/2".....\$2.10
1 3/4 x 2 1/4"	.....	1.90				2 1/4 x 2"..... 4.80
1 3/4 x 2 3/4"	.....	2.00				3 x 3"..... 5.60
3 x 3 1/2	.....					\$5.75
Ironed Poles, White, XXX—						
3/4 x 2 1/2" No. 2	.....					\$3.80
2 x 2 1/2" No. 3	.....					3.80
Ironed Shaft, White, XXX—						
1 1/2 x 2" and smaller	.....					\$1.95
1 1/2 x 2"	.....					2.20
1 1/2 x 2 1/4"	.....					2.70
Farm Wagon Bows—						
Round Top, 1/2 x 2"	.....					\$.60
Flat Top, 1/2 x 2"	.....					.75
Round Top, 5/8 x 2 1/2"	.....					1.35
Standard Size Piano Bodies with Seats—						
Each	.....					\$4.25
Plow Beams—						
1 Horse	.....					\$.60
2 Horse	.....					.75
3 Horse	.....					1.10
Spokes and Rims—						
Oak and Hickory Spokes, net on Wels & Lesh List No. 6.						
Finished Rims—XX—7/8"	.....					\$1.50
Finished Rims—XX—1"	.....					1.85
Oak Rims—Discounts	.....					40-10%
Hickory Rims	.....					40%
Wagon Neckyoke Woods—						
Keller & Tamm's List—Discount	.....					25%
Wagon Whiffletree Woods—All Grades—						
Keller & Tamm's List Discounts	.....					25%
Oval Plow Doubletrees—						
2 1/2 x 38".....	\$1.60					Flat Plow Doubletrees—
2 x 40".....	2.40					1 1/2 x 3 1/2 x 42".....\$2.75
Wagon Evener Woods—						
2 x 4 and 2 x 4 1/2—Keller & Tamm's List—						
Discount	.....					30%
Larger	.....					25%
Buggy Evener Woods—All Grades						
Keller & Tamm's List—Discount	.....					25%
Buggy Whiffletree Woods—						
Mixed Second Growth and Second Growth—						
Keller & Tamm's List—Discount	.....					20%
Buggy Neckyoke Woods—All Grades						
Keller & Tamm's List—Discount	.....					20%

ENGINE PRICES LOWER

200,000 customers testify to quality of Galloway-built goods. Our engines made in our factories. Modern design. Built for long, hard, continuous users' satisfaction. Don't buy until you investigate these heavy weight, long stroke, large bore, low speeded, heavy duty engines. Engine hook free. Wm. Galloway Co., Box 17, Waterloo, Iowa.

17 95
1 1/2 H.P.

9875-7750-3950-3475-2675

SIMONSEN Hot Trimming Shear

Handiest Tool For Cutting Hot Iron And Plow Steel About The Forge. Ask any jobber or write us for circulars showing this, and our all wrought shears for cold shearing.

SIMONSEN IRON WORKS
Box 671 Sioux Rapids, Ia., U.S.A.

WE MAKE STEEL WHEELS TO FIT ANY AXLE PLAIN OR GROOVED TIRE

STEEL OR HICKORY AXLES ANY SIZE

OUR GROOVED TIRE A FULL LINE OF WOOD AND STEEL FARM TRUCKS

With Steel or Wood Wheels

WRITE FOR LARGE CATALOG and PRICES

ELECTRIC WHEEL CO., Box A, Quincy, Ill.

WAGON MAKERS' SPECIAL No. 88

This is one of our Safety First woodworking machines. It will get out the greatest part of the wood work used in a wagon by MACHINERY, FAST, NEAT and at a LOW cost.

Get acquainted with this line of machinery.

W. L. SHERWOOD, Kirksville, Mo., U. S. A.

Best Gasoline Brazing Forge

IN THE WORLD

Thousands sold in last ten years. Four sizes. Send for Catalog.

The National Cement and Rubber Co.
308 S. St. Clair Street Toledo, Ohio, U. S. A.

"NEW EASY" 4 Sizes BOLT CLIPPERS "EASY" 2 Sizes

THE GENUINE TOOL

KNOWN AND PREFERRED EVERYWHERE

H. K. PORTER EVERETT, MASS. U. S. A.



BETTER THAN THREE SLEDGE HAMMERS

Little Iowa Power Hammer No. 3

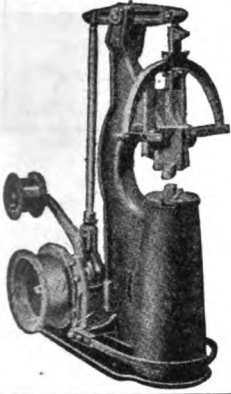
No three men can hammer out as much work as this easily operated, powerful hammer. And it has an even stroke, and accuracy impossible to attain by human efforts.

Powerful 35-pound hammer head with a total weight of 850 pounds and a compact base, 22 inches by 38 inches. Guaranteed to satisfy. If it fails, send it back at our expense. We'll refund your money. Price, \$75.00. Send for descriptive booklet.

Every United States jobber represents us. Canadian Agent: D. Ackland & Son, Ltd., Winnipeg, Can. Agent for Montevideo-Uruguay, Caso en Pando: Ambrosia Bertolotti.

MODERN SALES CO.

Hampton, Iowa U. S. A.



PARKS' IDEAL WAGON SHOP COMBINATION SOLD IN COMPETITION WITH THE HIGHEST PRICED COMBINATIONS—WHY PAY SUCH BIG PRICES AND GET LESS?

Circular rip and cross-cut saw; raising and lowering mandrel; 12-inch jointer; tilting guide; 22-inch band saw; swing cut-off saw; reversible spindle shaper; friction clutch to stop circular saw; all saws and belts.

Write for New Catalog

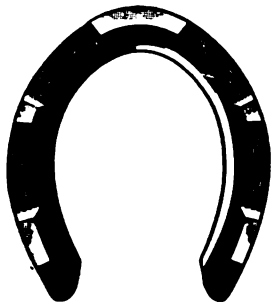
PARKS' BALL BEARING MACHINE CO. 4100 Fergus St. Cincinnati, O.

No. 367-D Felloe Boring and Spoke Tenoning can be added.



IMPROVED Heavy Pattern GOODENOUGH

With Drawn Clips



Size	Front	Hind	Size	Front	Hind
No. 2	16 oz.	15 oz.	No. 5	28 1/2 oz.	27 oz.
No. 3	21 oz.	20 oz.	No. 6	32 1/2 oz.	31 1/2 oz.
No. 4	25 oz.	24 oz.	No. 7	37 oz.	36 oz.

Acting upon the suggestion of Horseshoers throughout the country, our well known and service-proven Goodenough Shoes are now sold with drawn clips. The plain Goodenough Shoe, itself always a winner, will give way to the greater popularity of the new style with drawn clip.

BOSS TOE WEIGHT



BOSS COUNTERSUNK STEEL SIDE WEIGHT



OUR FREE TRIAL OFFER

Just send us your name on a post card and we will send you complete samples without charge so that you may give them a thorough test in your own shop.

Size	Light	Medium	Size	Light	Medium
No. 1	11 oz.	13 oz.	No. 1	9 oz.	10 1/4 oz.
No. 2	14 oz.	16 oz.	No. 2	10 1/4 oz.	12 oz.
No. 3	16 1/2 oz.	19 oz.	No. 3	11 1/4 oz.	13 1/4 oz.
No. 4	19 oz.	22 oz.	No. 4	14 oz.	16 oz.

In order to make it more convenient for the Horseshoers to use our Toe Weights and Side Weights, we are now furnishing both styles in boxes instead of kegs. Each box contains ten pairs of a size.

BRYDEN HORSE SHOE CO., CATASAUQUA, PA.



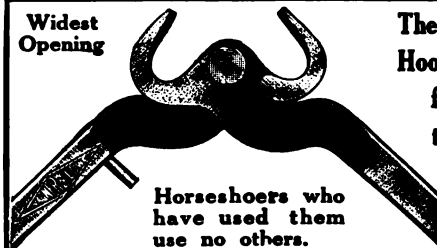
TRY BORAX-ETTE

For Welding Toe-Calks. THEY WON'T KNOCK OFF

It Makes Steel Weld Like Iron. It Has No Equal for Welding Tires, Axles and Springs.

FOR SALE BY ALL DEALERS. SAMPLES FREE. Cortland Welding Compound Co. CORTLAND, N. Y.

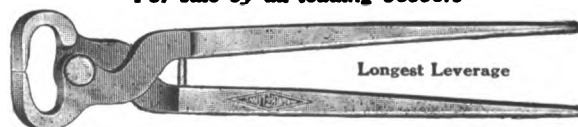
Widest Opening



Horseshoers who have used them use no others.

For sale by all leading Jobbers

The Wagner & Lowe Hoof Nippers are drop-forged from the best tool steel, hand tempered and hand finished throughout.



Longest Leverage

The Lowe Manufacturing Co., Enderlin, N. Dak.

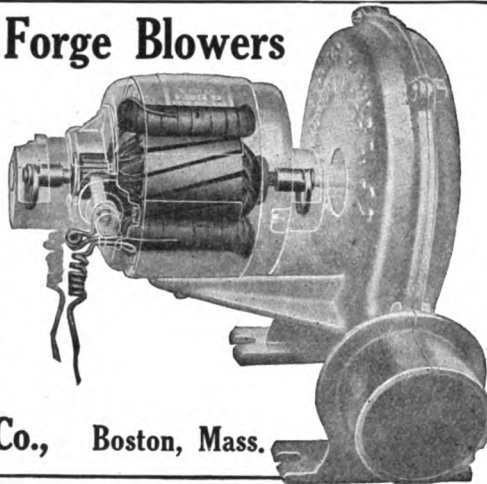


"MARVEL" Forge Blowers

This cut shows you the RING OIL BEARING design and construction of the motors used in our "ONE FIRE" \$28.00 MARVEL and on our No. 23 MARVEL \$23.00 Blowers, the windings being different.

Note the large oil rings which revolve with the CASE HARDENED shaft, keeping it running in a perfect bath of oil on the bearings. Perfect lubrication means long life.

Shipped on 30 days' trial through your dealer.



Electric Blower Co., Boston, Mass.



Prentiss Patent Vises
BEST MADE
Large Illustrated Catalog Free
Prentiss Vise Co., Hardware Bld., New York

Distributing new complete Auto Supply Catalogue
If interested write on your business stationery
The Campbell Iron Company, Ltd.
811 D. Cass Ave. St. Louis, Mo.


Butcher Knives Made for Blacksmiths



Stamped With Your Own Name in \$5.00 Assortments.
We sell by mail only, and to only one smith in each town.
Every knife warranted. Write for information and send for catalog. WOODWORTH KNIFE WORKS, Nunda, N.Y.

"Bay State" Carriage and Tire Bolt Ratchet Wrenches

Labor Savers! Money Savers!



Three Sizes Take Hex and Square Nuts

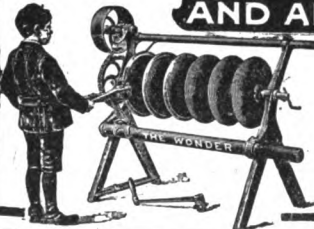
GEO. A. CUTTER, Sales Agent, Taunton, Mass. Ask Your Dealer

HONEST DEALINGS

Before a display advertisement is accepted for this Journal, inquiry is made concerning the standing of the house signing it. Our readers are our friends and their interests will be protected. As a constant example of our good faith in *The American Blacksmith* advertisers, we will make good to subscribers loss sustained from any who prove to be deliberate swindlers. We must be notified within a month of the transaction giving rise to the complaint. This does not mean that we will concern ourselves with the settlement of petty misunderstandings between subscribers and advertisers, nor will we be responsible for losses of honorable bankrupts, nor can it include advertisements under the head of "Wanted and For Sale."

WONDER DISC SHARPENERS

SAVE 1/2 THE TIME AND ALL THE LABOR



THE WONDER is the only machine adjusted to all conditions.
Can shear any part of edge to any bevel.
Can shear back from edge as far as required.
Can use tool on either side of disc.
Can shift from one disc to another.
Can do all this without the turn of a set screw or nut, is a positive feed, automatically adjusts itself to wobbling or bent discs; knives made of best grade settempered steel, will last a lifetime; for hand and power. For prices, write to your jobber or

A. E. DURNER, Manufacturer
Main Office: Evansville, Wisconsin, U. S. A.
Made in Evansville, Wis., and London, Ont., Canada

EMPIRE STEEL WHEELS



Plain or Grooved Tire
To Fit Any Wagon
Farm Trucks
All Standard Types
Write today for Proposition to Blacksmiths.
Empire Mfg. Co.
P. O. Box 305
QUINCY, ILLINOIS

EVER-READY BLANK SHARE

THE BLACKSMITH'S FAVORITE

Can be fitted to more styles of plows than can any other pattern.




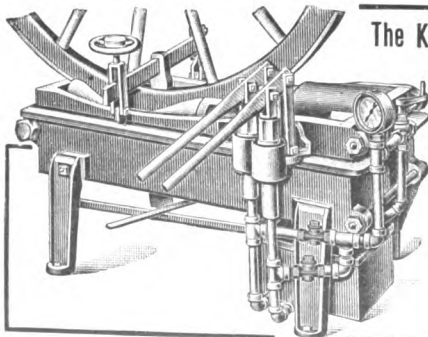
To save labor use our Fitted Shares for all makes of plows.

Write for Catalog
CRESCENT FORGE & SHOVEL COMPANY
MANUFACTURERS OF HIGH GRADE PLOWSHARES AND BLACKSMITHS' BLANKS
HAVANA, ILL., U. S. A.

Edwards Shears

For twenty years the Two Leading Low Priced Shears in the U. S., representing the Greatest Value for the Least Money.
No. 5, weighs 200 lbs., cuts 4 x 1/2 inch soft steel
No. 10, weighs 430 lbs., cuts 4 x 3/4 inch soft steel
At their price you should have had one long ago. Order One from the first iron man that calls on you. They All Sell Them.
Write for descriptive circular and prices.

C. D. EDWARDS,
Albert Lea,
Minn.

The Keokuk Hydraulic Cold Tire Setter

- 1 Set of Tires.
 - 9 Operations Required to Set the Old Way
 - 1 Little Giant and Disher Mean
 - 5 Sets of Tires Set in the Same Length of Time.
- 1-Cut Bolts.
 - 2-Drive Out Bolts.
 - 3-Remove Tire.
 - 4-Straighten Wheel.
 - 5-Build Fire.
 - 6-Heat Tire.
 - 7-Shrink On.
 - 8-Put in New Bolts.
 - 9-Tighten and Cut Off.

Manufactured by
The Keokuk Hydraulic Tire Setter Company
KEOKUK, IOWA.



This is our New Machinery Catalog No. 60. Send for your copy TODAY.

THE SILVER MFG. CO.

365 BROADWAY

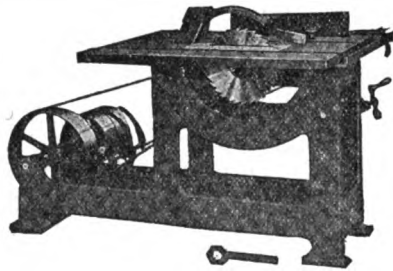
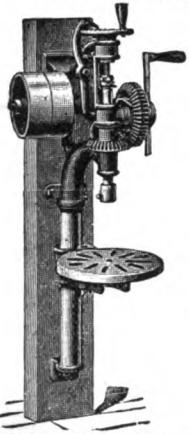
SALEM, OHIO.

Send for Your Copy Today!

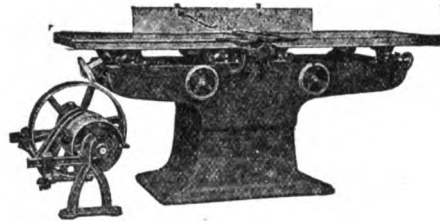
Just write a postal card "Send me your Machinery Catalog No. 60." It will come by return mail.

This beautifully printed catalog illustrates and describes our complete lines of Carriagemakers' and Blacksmiths' tools, including Hub Boring and Spoke Tenoning machines, Band Saws in four sizes, Jointers or Buzz Planers in five sizes, Saw Tables and Swing Saws, Ball-Bearing Hand or Power Post Drills, 20-inch Power Swing Drills, and Portable Forges in a variety of styles.

There are some surprisingly good opportunities in this catalog for better, quicker and cheaper work in your shop. It's a wise move to get a copy and see for yourself.



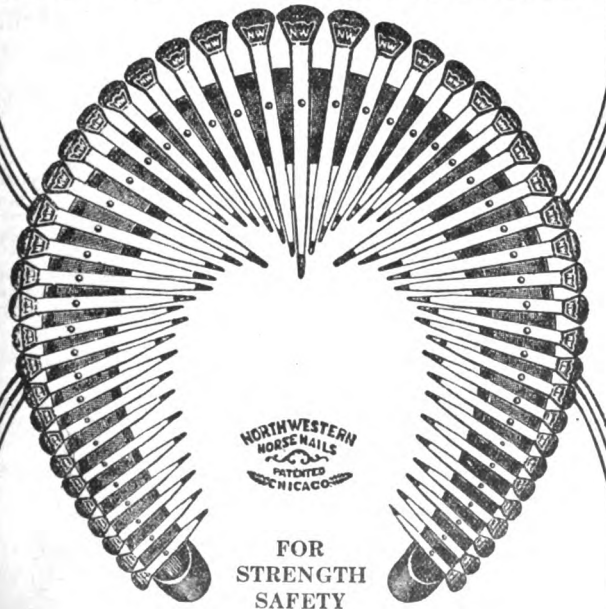
SILVER'S SAW TABLES



SILVER'S NEW JOINTERS

Five sizes—8, 12, 16, 20 and 24-inch.

NW Northwestern Horse Nails ARE THE BEST ALL AROUND

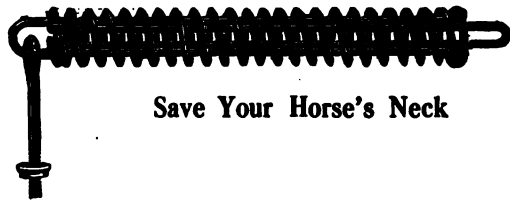


FOR STRENGTH SAFETY AND QUALITY OF MATERIAL

The most perfect in form and finish. Made of the highest grade material to our own analysis. Will hold a shoe longer than any other nail made. Note the re-enforced point—makes it easiest to drive and the safest to use.

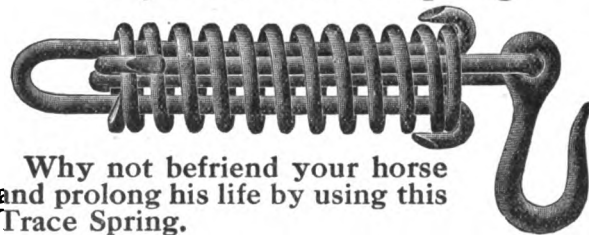
Union Horse Nail Co. Chicago, Ill.

RAYMOND POLE SPRINGS



Save Your Horse's Neck

Keystone Trace Spring



Why not befriend your horse and prolong his life by using this Trace Spring.

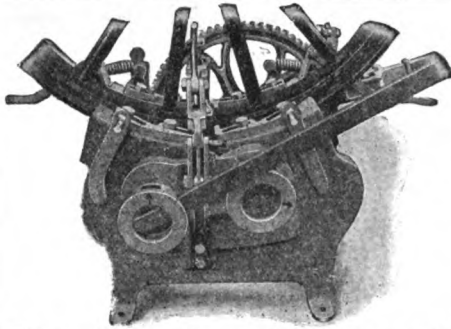
Keystone Brake Springs



Write your Jobber for Circular and Prices

RAYMOND MANUFACTURING CO.

CORRY - LIMITED - PA.



The Brooks Cold Tire Setter

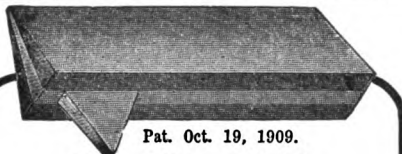
Sets tires cold on the wheel and is the pioneer edge-grip hand-power cold tire setter. Used and officially endorsed by the United States Government in the Department of War and Interior. Thousands of blacksmiths in the U. S. consider it the most profitable machine in their shop. The Brooks does the work quicker and better than any other cold tire setters on the market and should be in every blacksmith and carriage repairer's shop. Write for catalog and prices.

We are also manufacturers of the latest improved Oxy-Acetylene Welding machines and generators, equipped with our famous Safety Flash Back Valve. It prevents explosions.

We also build Welding Outfits to be used with cylinder gases.

Our catalog will interest you and is free for the asking.

The Brooks Machine Company, Wichita, Kansas



Pat. Oct. 19, 1909.

Use These Self Sharpening Toe Calks

Ludvigsen Bros. Welded Steel Center Calks are the choice of MANY horseshoers because they always give satisfaction.

THE HARD STEEL PLATE in the center and the two outside plates are welded together and shaped to a sharp calk that stays SHARP while it WEARS DOWN.

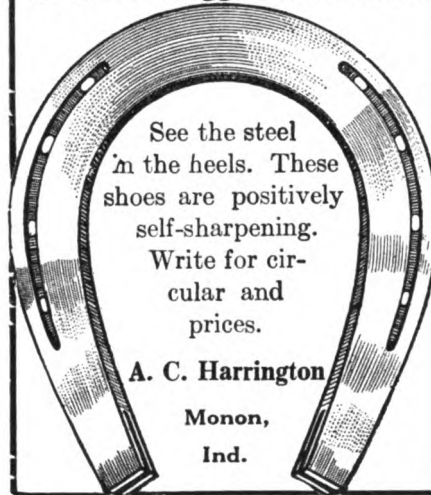
Sizes, 0 to 6.

We will gladly mail a sample of this calk to any reader of The American Blacksmith on request. BE SURE TO TELL YOUR JOBBER you want LUDVIGSEN BROS. WELDED STEEL CENTER TOE CALKS.

LUDVIGSEN BROS.,
JACKSON, MINN.,

or 47 Second St., MILWAUKEE, WIS.

AT LAST A Steel Plugged Horseshoe



See the steel in the heels. These shoes are positively self-sharpening.

Write for circular and prices.

A. C. Harrington

Monon,
Ind.

The Beaver Dam Marsh Shoe

In describing our Marsh Shoes, used on marshy grounds in parks and boulevards, we desire to say that they give perfect satisfaction and have proven a perfect success wherever used. Made in the following sizes: No. 0 will fit horse or mule shoes No. 0 to No. 5; No. 1 will fit shoes No. 2 to No. 5 and No. 2 will fit shoes No. 4 to No. 7. When ordering mention size you wish. Write for special prices and discount.

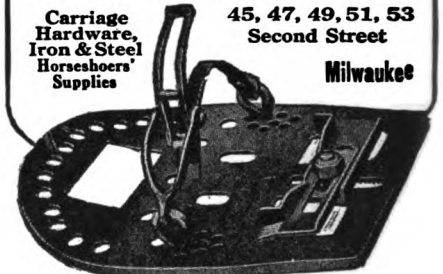
Manufactured by

SUELFLOHN & SEEFELD

Carriage
Hardware,
Iron & Steel
Horseshoers'
Supplies

45, 47, 49, 51, 53
Second Street

Milwaukee



Make \$50.00 to \$100.00 per Week Repairing Automobile Tires

Right now is the time to install vulcanizing equipment and make big money. No experience is necessary to start in this profitable business.



HILL STAGE VULCANIZERS
All sizes for Tires and Tubes
The most complete, compact vulcanizing plants ever made. Larger capacity and low operating cost make these vulcanizers big money-makers for the shop owner.

WRITE TODAY FOR CIRCULARS giving full information. WE OFFER LIBERAL TERMS.

HILL-STAGE COMPANY,
Anderson, Ind., U. S. A.

TRADE LITERATURE AND NOTES

This Oxy-Acetylene Number of "Our Journal" will be of great benefit to the thoughtful Smith, because of the helpful information contained in the advertising sections as well as the excellent editorial articles.

Choosing one's equipment is an important decision and our readers will find this issue especially helpful. By glancing through the advertising pages, the Smith can obtain a very good idea of the chief manufacturers who are making oxy-acetylene welding apparatus and become familiar with the merits of the various equipments.

In order that none of the equipment manufacturers may be overlooked a list of the firms advertising in this issue is here given together with a brief description of each equipment. The reader will find it helpful not only to refer to the advertisements, but also to write to the

manufacturers for complete information. It is advisable to mention THE AMERICAN BLACKSMITH when writing to these firms.

Admiral Welding Machine Company, 1330 Walnut Street, Kansas City, Mo. The manufacture welding apparatus and supplies and do job welding.

American Welding Company, Inc., 2724 Michigan Avenue Chicago, makers of the American Oxy-Acetylene Welding and Cutting Outfits. This company arranges with its customers to loan the necessary cylinders sending as many as may be required, the only charge for this service being the price of the gas. Markle & Lucas, Sheldon, Ia., are their western distributors.

Bermo Welding Company, 210 Harney Street, Omaha, Nebraska. Manufacture welding plants for all purposes and are looking for agents.

The Brooks Machine Company, Wichita, Kansas. The Brooks outfit is a complete portable welding machine which generates both gases. It is equipped with a flash back safety valve and is arranged for mounting on a truck. This company also makes portable and stationary acetylene generators and welding outfits for use with compressed cylinder gas.

Cox Brass Manufacturing Company, Dept. 45a, Albany. One of the first advertisers of welding equipment in THE AMERICAN BLACKSMITH. Produce a tank outfit for welding, cutting and carbon removing. This company has some unusually instructive and interesting literature which will be sent to any reader together with an explanation of how the Cox Brass equipment is being used by Smiths and repair shops in all sections of the country.

Dyer Apparatus Company, Cambridge, Mass. Producers of oxy-acetylene welding and steel cutting outfits. They will send you a catalog of their machines on request.

Economy Welding Machine Company, 213 Southwest Blvd., Kansas City, Mo. Manufacture the Peerless Welding Outfit, which is sold on the partial payment plan. The outfit includes the Peerless Welding Torch with seven welding tips and a carbon remover torch. This company also manufactures a handy truck which makes a convenient mounting for the outfit and is prepared to supply the necessary cylinders.

Henderson-Willis Welding & Cutting Co., 2836 Locust Street, St. Louis, Mo. The Henderson-Willis welding equipment was awarded the Gold Medal at the Panama-Pacific International Exposition. It also won the Gold Medal at the Mechanics Fair at San Francisco in 1913.

The Metals Welding Company, Cleveland, Ohio. Make a combination welding cutting and decarbonizing outfit. They also produce acetylene pressure welding generators approved by the Underwriters' Laboratories. The cutting nozzle inserted in the torch, the makers explain, will cut steel plate or "T" beams up to 1/2 inch in thickness at the rate of 12 inches in 50 seconds.

The Macleod Company, Cincinnati, Ohio. The advertisement of this company in this issue shows two interesting shop views where heavy welding jobs are being done with their Buckeye welding outfits. They make both complete generating plants and regulator outfits. A free book on welding will be sent upon request.

(Continued on Page 50.)




“Foot Sure”
When He's Firestone Shod

No slipping, no hard pounding—just a steady, sure step and a comfortable, healthy hoof.

Firestone Hoof Pads are up to the widely known Firestone standard. The quality means repeat sales.

Ask your jobber for prices

Firestone Tire and Rubber Company
Akron, Ohio—Branches and Dealers Everywhere

Firestone
HOOF PADS



Make Big Money Welding With Our Outfits

We specialize in supplying blacksmiths with Oxy-Acetylene Welding and Cutting Outfits. American Welding Apparatus is noted for its high efficiency and is especially suited to the blacksmith's needs.

COMPLETE WELDING OUTFIT, \$55.00
COMPLETE WELDING and CUTTING OUTFIT, 75.00

These prices include the FREE loan of oxygen and acetylene cylinders—as many at a time as you may require—you paying only for the gas contained in same.

Any smith can easily make the price of this equipment in a short time and then make from \$50.00 to \$75.00 a week or more on welding of all kinds.

Write for COMPLETE Circular Today.

AMERICAN WELDING CO., Inc.
2724 Michigan Avenue WESTERN DISTRIBUTOR
CHICAGO, ILL. Markle & Lucas, Sheldon, Ia.

SQUARE DEALING

EVERY customer of this shop is entitled to a square deal—which means **GOOD SERVICE**. And this shop is entitled to a square deal from each customer—which means **PROMPT PAY**.

HANG THIS MOTTO IN YOUR SHOP

Hang one or more of these up in your shop and let your customers know where you stand. This motto was suggested in “Heats, Sparks, Welds” some time ago, and several readers asked us to print some. If you want one or more, we are willing to supply you.

This motto is 11 by 17 inches in size, printed in black ink on good heavy plate paper (not stiff cardboard) so that we can roll it easily and send it safely through the mail.

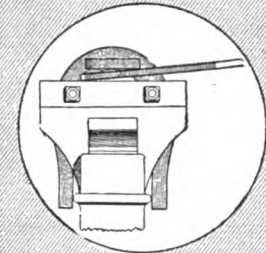
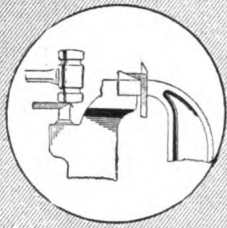
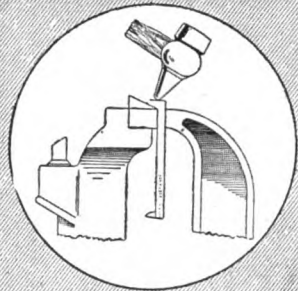
PRICES: Single copies—postage and packing prepaid—10c. or 6d. Three copies for 25c or 1s 3d.

American Blacksmith Company

Box 974

Buffalo, N. Y.,

U. S. A.



\$5.00 SAVED!

Read This Special Offer

The Genuine Latest Improved Fuller Foot Vise at the same price as the ordinary foot vise. During the months of September and October we are going to sell fifty Fuller Vises at the special low price of \$15.00—regularly priced \$20.00

GUARANTEED FOR LIFE

For sharpening heel and toe calks, pulling off old toes, hot rasping, steel plugging, turning ordinary mud calks, knocking out sickle sections, upsetting thin iron bending angles, travelling tires and a hundred other odd jobs about the shop. It has a grip tighter than a screw vise and automatically adjusts itself to any thickness of metal. Write us for further particulars. Act today either direct or thru your dealer.

Remember This Price is Limited to Fifty Vises
C. & E. Manufacturing Company, Marshalltown, Iowa



TRADE LITERATURE AND NOTES.

(Continued from Page 48.)

National Welding & Mfg. Company, 529 Jackson Boulevard, Chicago, Ill., formerly the National Brazing Company. They sell welding, cutting and decarbonizing torches as well as regulators, gauges, hose, goggles and other welding supplies.

Rice & Dayton Mfg. Co., Cedar Falls, Iowa. Producers of the Gem and Little Gem complete portable welding machines. This company has also brought out a tank outfit for mounting on a truck which is illustrated in their advertisement in this issue.

They are in position to furnish considerable practical welding information and will be glad to hear from all Smiths who are interested in the possibilities of this work.

Schemmel Welding Machine Works, Wapakoneta, Ohio. This company manufactures the Schemmel welding machine which is a complete outfit for producing both gases. It is equipped with the Schemmel torch which has a double mixing chamber. With this outfit cement cutting and babbitting can be done as well as welding and carbon removing. A regulator outfit is also made by this company.

The Searchlight Company, Karpen Building, Chicago, Ill., makers of the Searchlight Welder. This company published a little book of welding facts called, "The Searchlight on Welding", which will be sent to every reader writing for a copy.

Vulcan Process Company, 2427 University Avenue, S. E., Minneapolis, Minn., or 136 W. Second Street, Cincinnati, Ohio. The Vulcan Oxy-Acetylene Welding Plant is made in a variety of sizes to meet different requirements. A new book has just been issued by this company which is described as a valuable text book on oxy-acetylene welding. It contains 150 pages with 64 illustrations.

Selecting of Oxy-Acetylene Equipment— J. Schroeter.

The most essential considerations in oxy-acetylene welding and cutting are the thorough and uniform mixing of the two gases employed and the close and accurate regulation of both the volume and velocity of the gases delivered to the torch.

In the oxy-acetylene equipment manufactured by the Imperial Brass Mfg. Co., 1220 W. Harrison Street, Chicago, the torches possess a new exclusive mixing

principle that assures a high degree of uniformity in the mixture of the gases. Before reaching the combustion point in the torch, the oxygen, at high velocity, passes through a spiral groove which imparts to it a whirling motion. This causes the oxygen to mix thoroughly with the acetylene and insures a highly efficient, constant flame that is absolutely neutral and eliminates the cause of most back-firing.

Imperial Welding Torches are fitted with 10 tips and cover all ranges of work within the limits of this process.

The torches are well balanced and very durable, no solder being used.

The gas mixture is controlled by needle valves in the torch handle which permit of fine adjustment and are located so that the operator may readily adjust the flame with the same hand that holds the torch, making it unnecessary to lay aside the welding stick.

Holes in the handle of the torch insure ventilation and prevent any accumulation of gases—an important safety feature.

Both welding and cutting tips are made of a special alloy with an extremely high melting point and all threads and other dimensions are standard.

The Imperial regulators are designed to deliver to the torch a constant volume and velocity of gas, and the movement of the valve with relation to its seat is so limited as to prevent cutting of the seat, thus insuring long life.

The diaphragm in the oxygen regulator is high grade spring tempered bronze while that in the acetylene regulator is German silver to resist chemical action of the acetylene.

In addition to exceptionally strong and careful construction Imperial regulators shut off automatically in case of an emergency—a safety feature possessed by no other regulators.

Imperial Torches have been fully approved by the Underwriters Laboratories of the National Board of Underwriters after the most severe and exhaustive tests.

The manufacturers of Imperial Equipment give a broad liberal guarantee and any equipment that does not fully measure up to every requirement of service may be returned to them without expense to the purchaser.

The Perfect Power Hammer

Note the difference in construction over other makes.

Extra Long Guides, insuring a direct movement of the ram without any side motion, which causes guides and springs to break on other hammers.

The only Hammer made with a disk attachment with special anvil for sharpening barrow and plow disks.

A recently invented **Friction Clutch** fitted with **Ball Bearings** absolutely controls the operation of the Hammer by foot pressure from the lightest tap to the heaviest blow. This ease of operation makes the hammer particularly well adapted for plow work, as you can get as light a stroke as you desire.

Will ship to any responsible party on approval. If not as represented, no sale.

Made in Two Sizes:

3 inch square, 40 lb. ram—

shipping weight, 1,150 lbs.

4 inch square, 80 lb. ram—

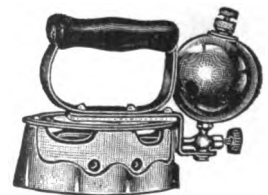
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THE dealer has his experiences with smithing coal as well as the smith. When both agree you can be pretty sure that they are right. For example, take these two letters—one is from a coal firm long in the business while the other is from a blacksmith who has been facing the same problem as you have to solve.

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W. H. Morrison & Son:

The Webster Selected Smithing coal is the best smithing coal we have ever used. We have customers that drive for 15 miles to get it. It is fine; all that you said it was. (Signed)

W. H. MORRISON & SON.

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I gave your coal a good test on two large welds and it worked O. K. It is free from sulphur and dirt. It is the best coal I have ever used for blacksmithing purposes.

(Signed) HENRY KRAFT.

When a disinterested dealer seeking only to hold his trade by giving the most serviceable coal finds that

Webster Selected Smithing Coal

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 SYRACUSE, Union Building

HARTFORD, 36 Pearl Street
 PHILADELPHIA, Land Title Bldg.

PENNSYLVANIA COAL & COKE CORPORATION
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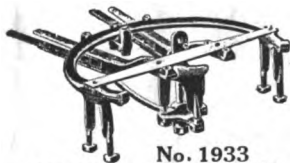


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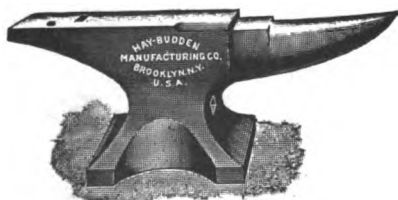
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