VOLUME 7 NUMBER 1

THE AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

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OCTOBER, 1907

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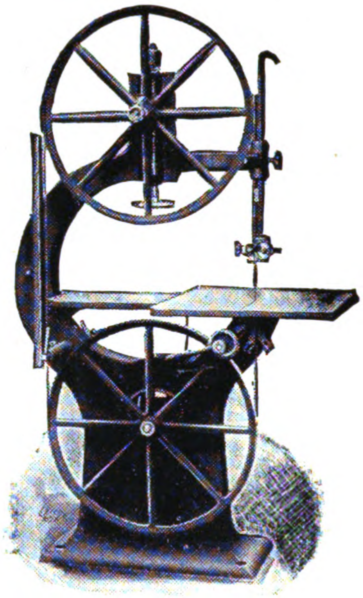

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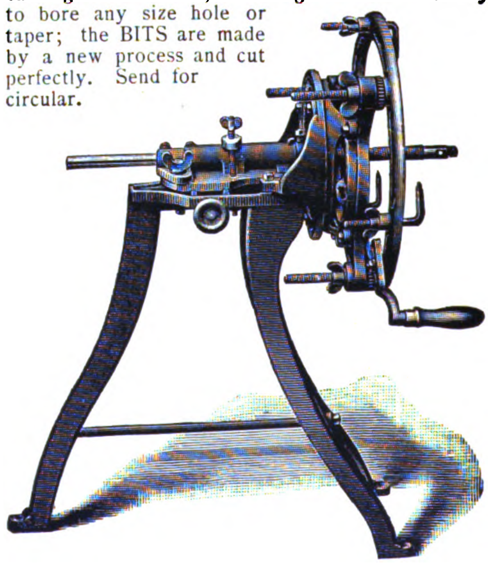

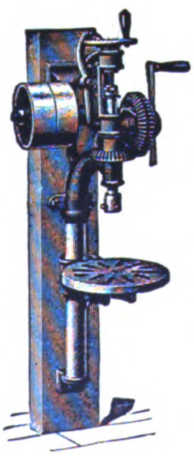

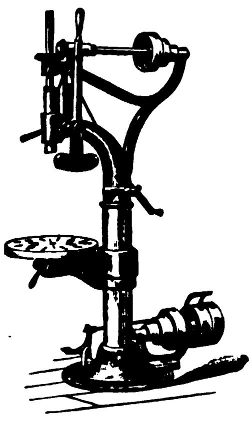

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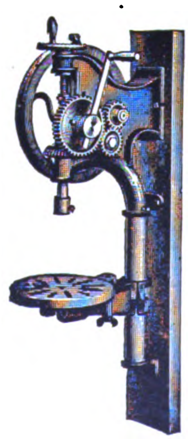

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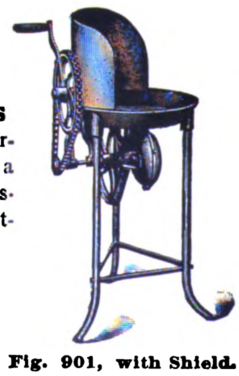

Fig. 901, with Shield.

"Intercourse and Progress always go hand in hand."—Buxton.

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The Literary Bill of Fare.

A magazine, like a smith shop, needs a "housecleaning" once in a while. The old bench is replaced by a new one, the shear is moved to the other side to make room for a new machine, and so it is with the modern magazine—it needs changing a bit to keep it from getting rusty. Here we are beginning a new volume with a few changes, not for the sake of change, but to serve you better by bettering the paper. Some say, "You are giving us an excellent paper now." Granted—but we are not satisfied, and we hope we never will be. Of course, we are constantly improving the paper. We firmly believe the last issue always the best. And we hope and work that it may always be so to the end of time. We want to be constantly dissatisfied, so that we may steadily improve.

As to the "menu" for the coming year, we can promise several surprises. The past practice of featuring some branch of the craft each month will be continued. Arrangements for several especially strong features are now being completed. The list of contributors will contain several new names, besides those of Perrin, Markham, Richardson, Bacon, Petersen, Hillick, Woodside, Lamons, Metcalf, Wenke, Van Dorin, McCoy, Shaw, Harnwell, and Googerty, which are so well known to "Our Folks." To this list will be added the names of A. F. Libby, with articles and photographs on diseases and anatomy of the horse's foot; E. F. Lake, with practical information on the repairing of automobiles; W. Hudspeth, with solutions to puzzling blacksmith problems; and other contributors as the seasons for their writings open. Thornton's letters will be continued, as the plain talk of this old son of Vulcan proved popular from the beginning. "Around Our Forge Fire" is also filling its place without rattling and will continue through this volume. To make that column more valuable than ever, readers are requested to suggest subjects for discussion by Benton and the Editor.

Contents, October, 1907.

A Few Bouquets.

We always feel that the first issue of each new volume gives us a license to point with pride to the growing influence and prestige of THE AMERICAN BLACKSMITH, and its standing in craft circles. Its position today is the result of six hard years' labor on the part of the boys and the old man; an honest endeavor to give the best and biggest return possible for the subscription dollar. The encouragement of our readers is our chief source of inspiration in this work.

We thoroughly and earnestly believe that the coming year will find THE AMERICAN BLACKSMITH bigger and better than ever before. We hope to serve our readers with more and better articles and to constantly add to our Satisfactory Service to Subscribers. How we succeed is for you to say, Mr. Reader, and we want you to tell us.

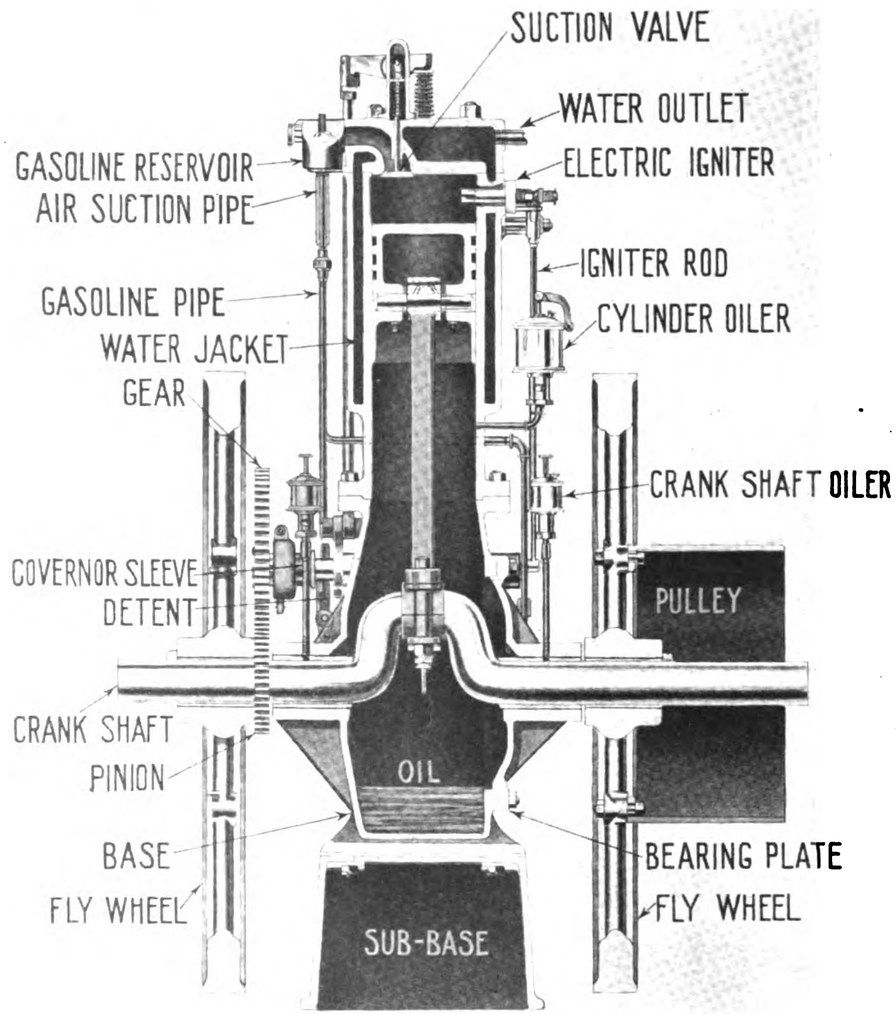
And right here let us say that we firmly believe THE AMERICAN BLACKSMITH enjoys the patronage of the fairest, the most honest, and, although blacksmiths, the whitest set of subscribers that any periodical can boast. And hence we say that no paper can be too good for them. We take off our hats to the American blacksmiths, as a class, and particularly to the friends and readers of THE AMERICAN BLACKSMITH.

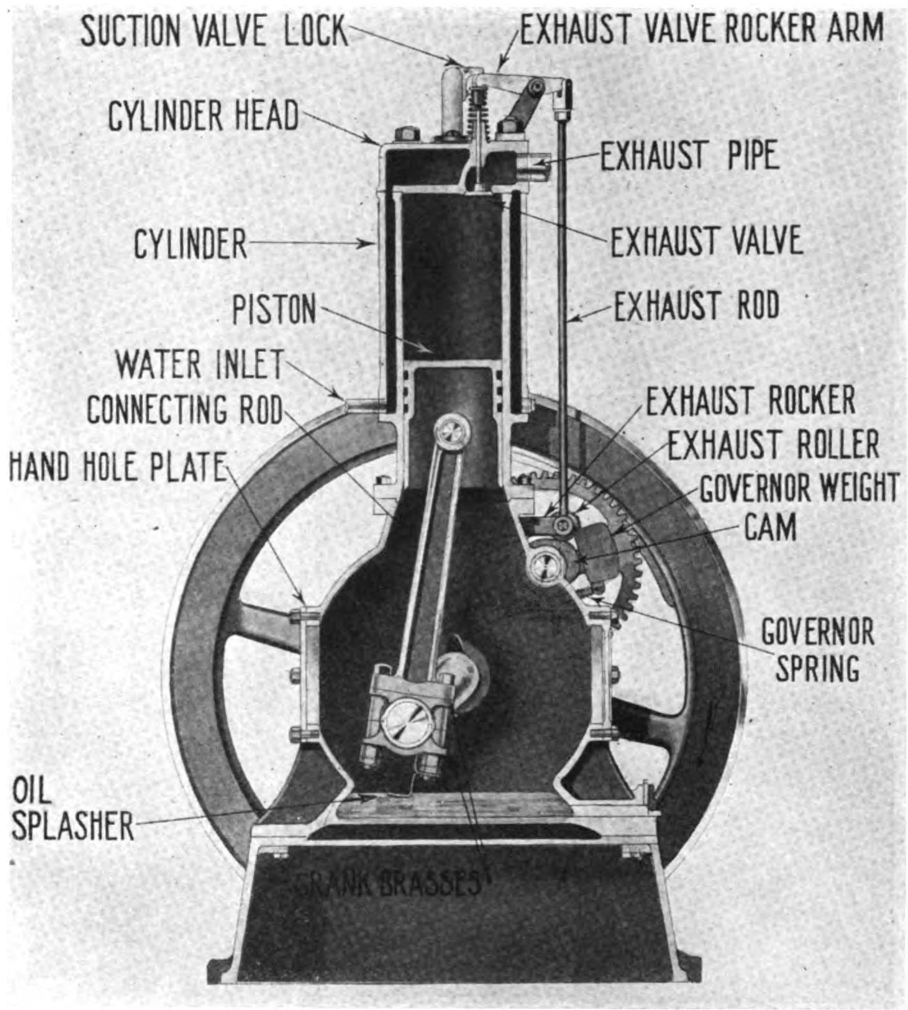
Association Matters.

The Secretary of The American Association of Blacksmiths and Horseshoers will continue his talks on organizations and craft betterment, and he earnestly requests the co-operation of every one of our readers in making the season of 1907–08 a banner year in craft circles.

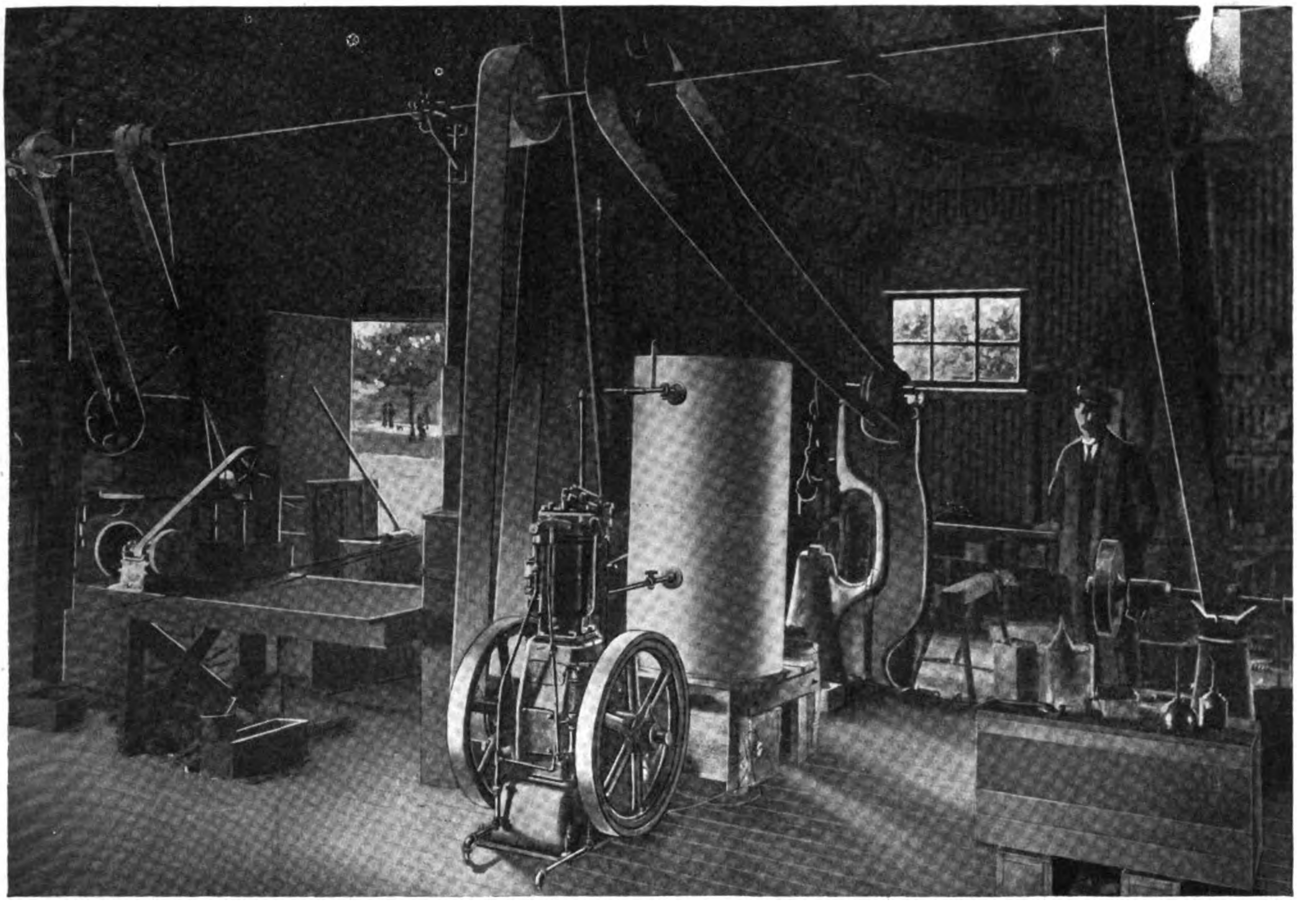
Where Credit is Due.

Thankful acknowledgment is here made to Fairbanks, Morse & Co., Chicago, Ill., for the loan of photographs and drawings used in this gas engine number, as also to The International Harvester Co., of Chicago, The New Way Motor Co., of Lansing, Mich., and The Kansas City Hay Press Co., Kansas City, Mo., for coöperative interest in making the number a success.





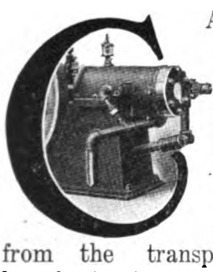
THE GAS ENGINEER, TO OPERATE HIS ENGINE INTELLIGENTLY AND ECONOMICALLY, SHOULD KNOW SOMETHING OF ITS WORKINGS. THESE ENGRAVINGS SHOW SECTIONAL VIEWS OF A VERTICAL TYPE OF GAS ENGINE



THE GAS ENGINE IN A GENERAL SHOP OPERATING A POWER HAMMER, EMERY WHEELS, DRILL, SPOKE MACHINE, AND BLOWERS

A Few Hints and Instructions on the Installation of Gas Engines

A. E. SAGE.



CAREFUL test and check of every part of the engine is made by the manufacturer before the engine leaves the factory. Therefore, before accepting the engine from the transportation company, be absolutely certain that everything about the machine is exactly as you want it. If anything is broken have the railroad company make a memorandum of such damage on your freight bill, so that you can claim the damages.

After receiving the engine and getting it into the shop, see that it has plenty of room to run properly. It should, of course, be properly installed in a room by itself. There should be sufficient room on all sides of the engine for cleaning and adjusting it easily, and there should be plenty of light on all sides. Should space be limited it is best to have the left or pulley side of the engine nearest the wall. In these few hints the flywheel end of the engine will be known as the front, and the cylinder end the rear. And to determine the right and left side of the machine imagine yourself standing at the cylinder end of the engine and facing the fly wheel; the left side of the machine is then on your left and vice versa. In placing the engine always leave sufficient space between the pulley and the wall, equal to at least the width of the belt. The rear end of the engine should never be nearer than 2½ feet to the wall.

In setting up the engine bear in mind that the dirt and grit in the shop air will cause excessive wear on the working parts. It is therefore advisable to place the engine in a fairly well-built room. If it is impossible to do this, keep the emery wheel, the grindstone, and the filing bench as far away from the gas engine as possible.

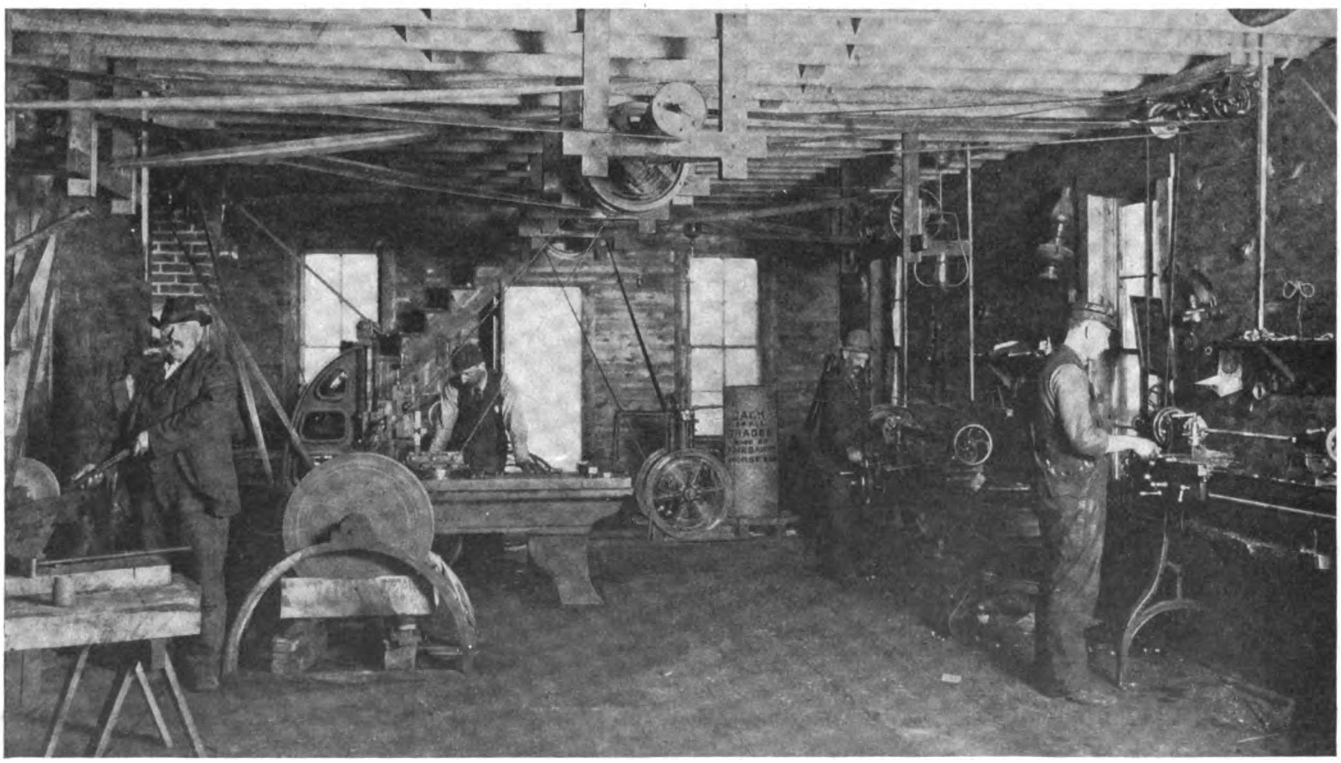
In belting the engine to the line shaft never run the belt with a twist, and see that the distance between the engine shaft and the line shaft is at least five times the distance of the engine pulley. While the belt from the engine may be run in any direction, it is preferable to have it go forward, as the pull of the belt holds the shaft against the same side of the belting as the thrust of the explosion. See that plenty of light shines on that side of the engine on which most of the working parts are located, and avoid placing the pulley on that side, if possible.

Many manufacturers furnish blue prints with their engines, so that the purchaser will be able to install his engine with little or no trouble. These blue prints usually show how to build the foundation, where to place the pipes, etc. In building the foundation for a gas engine, it is, of course, advisable to reach good, solid ground. It is unnecessary to say that the more rigid the foundation, the better service can the engine deliver. Do not place the engine on the foundation until the masonry has had at least forty-eight hours to harden. When thoroughly hard, clean the top before placing engine in position. The engine is then carefully leveled from the main shaft and side shaft by the use of wedges, and all spaces underneath the engine are filled up with a grouting of equal parts of Portland cement and sharp sand.

As many engines are ruined by a lack of care or knowledge in the proper installation of the exhaust piping, careful attention must be given to this part of gas engine installation. The exhaust piping should, of course, never be smaller than the opening in the engine, but, on the contrary, it should be increased in size every 25 feet from the engine. Place a ⅜-inch drain pipe at each pocket in the exhaust to allow any condensed water to drip away, thus preventing suction of engine from drawing water into the cylinder. Water must not be allowed to get into the exhaust, as it will ruin the cylinder and valves. It is not advisable to run exhaust pipes into a flue or chimney without extending the pipe up into the open air. Gas sometimes accumulates in the exhaust system and is exploded by hot gases from the engine, and if the flue or chimney forms a part of the exhaust system the explosion will result in the breaking of the chimney.

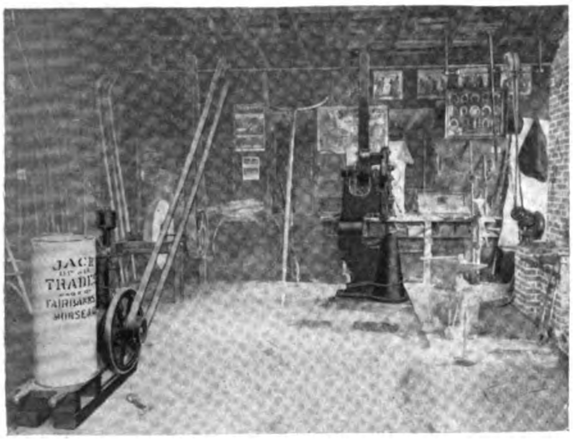
The water connections for the gas engine are usually explained fully by the blue prints. The piping should, if possible, be arranged so that by opening one valve the entire water system is drained, as well as the cylinder of the engine. Never fail to drain the water from the engine at night. If water remains in the cylinder the condensations collecting on the walls of the combustion chamber and ignitor will make the engine difficult to start. To insure easy starting it is important that the draining of the cylinder be done at all seasons of the year. In adjusting the flow of water arrange it so that the temperature of the cylinder at the hottest place will be slightly warmer than can be borne by the bare hand. See that the water runs into the bottom of the cylinder and out at the top and never place a valve or any obstruction to the flow of water in the outlet pipe from the engine. In piping the water connections see that no pockets are formed between the engine and the tank. Upper connections to the tank must always be inclined toward the tank, and in no case nor at any point in the pipe should the connection incline toward the engine. Always keep sufficient water in the tank to cover upper connections. When the circulation is good, the water at the bottom of the tank will be cold while that at the top is hot or may even be steaming. When the bottom of the tank gets warmer than the hand can bear change the water. In connecting water pipes with the engine care must be taken not to turn them in so far as to close the circulation by letting them come in contact with the inner wall of the water jacket.

The gasoline connections are also clearly given in the blue prints, but these pipings may be altered to suit special conditions. The gasoline tank should be located below the pump of the engine, allowing no less than one foot for each 10 feet of distance between the engine and the tank. The pipe for the overflow should never be smaller than a half inch, and black pipe is recommended for all gasoline connections. But care must be taken to clean it thoroughly so as to remove all dirt and scale on the inside. Any foreign matter left in the piping of tank will lodge in the pump and mixer and stop the engine. Where galvanized piping is used the scale is very liable to loosen, even after a thorough cleaning. Pack all joints and fitting with shellac that has been standing in the open air for a few hours to become fatty, and use care not to clog the pipe where joints are made. Do not cover the gasoline



THE GAS ENGINE IS ALSO A HELPER FOR THE MACHINIST-SMITH; LATHES, PLANER, DRILLS, EMERY WHEELS, AND ALL LABOR SAVERS ARE RUN BY THIS IDEAL POWER pipes until they are thoroughly tested for leaks.

Of course, the present-day user of a gas engine will use electric ignition in preference to the hot tube system, and to insure success in the wiring the sys-



THE GAS ENGINE AS A HELPER WILL SHOULDER THE BIGGEST PART OF THE LOAD

tem recommended by the manufacturer should be carefully followed. Use No. 14 insulated electric light wire. Scrape connecting ends clean of insulation and attach under binding post of battery or dynamo, using pinchers to tighten firmly.

It makes no difference which wire is connected to the stationary electrode of the engine. The current may flow in either direction so long as it passes through the coil, battery, and dynamo. Do not run both wires together under one fastener, nor allow them to come in contact with pipes or other metallized substances. Copper wire sometimes breaks under the installation, thus causing a broken circuit. This is one of the most difficult troubles to locate, so great care must be used in selecting the wire, in its handling, and also to have it exposed for easy inspection at all times. The dynamo electric sparking device is recommended in preference to a battery system of ignition, and after trying this system the gas engineer will voice this recommendation.

Power for the Smith Shop.

FAIRBANKS, MORSE & CO.

There are many important questions which a blacksmith has to solve in connection with his daily work, one of the most important, perhaps, is the value of power for operating his tools.

It was supposed in former days that a blacksmith had nothing to do while the iron was heating, and that no time was lost in pumping the bellows. Present day competition and the necessity for improved methods in order to get the greatest output, have led some to install power, and careful tests have shown that power is, without question, an absolute necessity.

A little careful figuring on the part of anyone operating a smithy will convince him that he should install some power; the next point then is to decide what kind or class of power shall be used. One then only has to look around and be guided by the experience of thousands of others who are using power for various purposes, and he will at once realize that the greater number of power users are obtaining their power by means of gasoline engines, and by careful investigation he will be able to learn which engines are most extensively used and the satisfaction they are giving, together with the small operating cost, which should be in all cases considered when investigating the make of engine to buy.

We would suggest in selecting a type of engine that the conditions as to where it is to be installed be carefully kept in view, and where there is more or less dust on the premises, the engine should be of a type least affected by dust. The engine best suited for such places is one of the enclosed type, with the working parts thoroughly protected from dust and dirt.

The oiling of this type of engine is usually effected by means of a small oil splash or spoon, attached to the bottom of the connecting rod, and arranged so as to dip slightly in the oil when the engine is running, and in that way a quantity of oil is continually splashed over the working parts and up to the bottom of the cylinder where the piston can reach the oil.

An engine of this type requires the minimum amount of attention and is entirely free from any danger of being damaged by dust or dirt, and the oiling, as above described, is perfect, giving a surplus of oil to all the working parts. Further, no oil is wasted, as the same oil is used over and over again.

Another point—do not buy a cheap engine. Buy a good one, from a good, responsible firm. If you buy some unknown engine because it is perhaps $25.00 or $50.00 less than another good engine, and which is known to do good work, you will very likely lose your $50.00, which was saved at first, in repair bills within the first year, to say nothing of the time, patience, and possible business lost by not being able to get work from the engine. There are good engines in the market—many of them. You would not think of buying a ten-cent hammer for your regular work; don't buy a "ten-cent" engine.

The accompanying illustration shows a small vertical engine, belted to a line shaft operating a modern blacksmith shop, which, it will be seen, is equipped with a small power hammer, emery wheel, grindstone, and drill press. With an equipment of tools as above, the ordinary blacksmith would be in position to make repairs on engines or any modern farm machinery which might be brought to his shop.

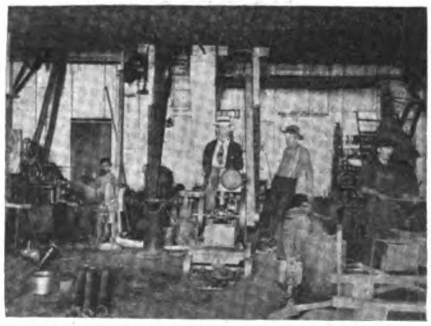
It will also be noticed that a power blower is used to take the place of the old-style bellows. One can readily understand that with a power blower the fire has greater capacity and the service is continuous, so that one piece of metal can be heated while another piece is being worked. This alone will practically double the capacity of the average smith shop.

A word on the subject of fuels is appropriate at this time. While we have mentioned gasoline engines, it is well to add that in our estimation the coming fuel is not alcohol nor gasoline, but kerosene. The price of kerosene today throughout the middle states is about one half the cost of gasoline, and the same quantity of kerosene will produce the same horsepower as if the engine were operated on an equal amount of gasoline.

Advantages of an Air-Cooled Engine.

THE "NEW-WAY" MOTOR CO.

Quite often in winter, when the shop is none too warm, the blacksmith has considerable trouble with his water-



AN IOWA GENERAL SHOP OPERATED BY GAS POWER

cooled engine. If, during the night the fire is allowed to go out and the temperature drops to the freezing point, a water-cooled engine is in danger of freezing and bursting the water jacket, so that it necessitates the drawing out of the water every night. Oftentimes of the engine is shut down for an hour for two during the day, you run the same risk of it freezing, and this often means an expense of twenty-five to fifty dollars to the shop owner.

All this is avoided in an air-cooled engine, which generally takes up less room in the shop, having no cumbersome water tank. Every shop owner should appreciate the advantages of running a forge, blower, emery wheel, and drill press, all by power. Let an engine do your work for you, and save time, money, and labor.

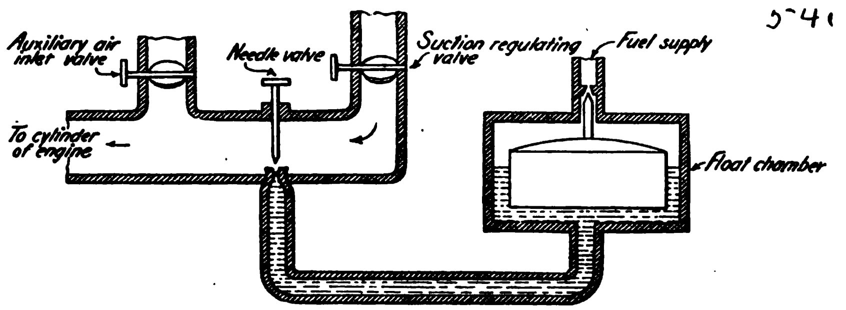


FIG. 1—SHOWS SECTION OF CONSTANT LEVEL CARBURETER, WITH NEEDLE VALVE ADJUSTMENT

The Use of Alcohol and Gasoline in Gas Engnies—6.

C. E. LUCKE AND A. M. WOODWARD.

Limits of Proportion.

The liquid fuels available for use in exploding engines—that is to say, for vaporizing and mixing with air in a properly constructed mechanism—have quite different characteristics. With respect to their source they can be divided into two classes: the first crude petroleum and its distillates, which have some characteristics in common; and the second alcohol, which is quite different from any of the petroleum distillates in all of its characteristics. When crude oil is boiled or refined, vapors are evolved which may be condensed. These condensed vapors are called "distillates." In a refinery the temperature of the vapor coming off is measured and the distillates collected either between two limits of temperature or two densities, for as the boiling proceeds the temperature of the liquid and vapor continuously rises and the density of the distillates also continuously rises. The first distillates are light and the last heavy. The last distillates constitute lubricating oils; the first and intermediate distillates constitute gasoline, naphthas, kerosene, etc., available for revaporization for use in exploding engines. These distillates are not simple fuels, but are mixtures of different chemical composition, always containing carbon and hydrogen. They comprise all the material that goes over in the boiling between two limiting densities, the mixture having a sort of average density.

Gasoline is far different from a simple substance which would have a fixed boiling point, and therefore theoretical calculations on the heat of combustion, air necessary, and conditions for vaporizing or carbureting air are of little value. On the other hand, alcohol is a simple substance, or, more properly, there are many alcohols of each, which is a simple substance; but they are not so used in an engine. The alcohol which it is proposed to manufacture for industrial uses under the recent laws is ethyl alcohol, having a definite chemical composition. This material is seldom, if ever, obtained pure, it being generally diluted with water and containing other alcohols when used for engines. The alcohol present is in an impure condition. Thus 90 per cent alcohol means alcohol and water mixed so that there is 90 per cent of alcohol by volume present. The density of the alcohol depends upon the amount of water present, of course, and upon the temperature as well, as it varies considerably with temperature.

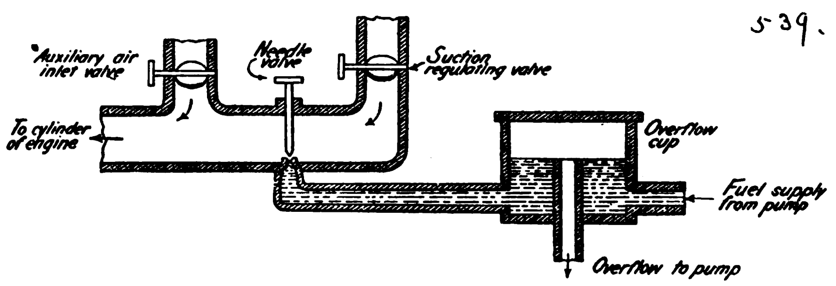


FIG. 2—SHOWING SECTION OF CONSTANT LEVEL CARBURETER, WITH OVERFLOW CUP

Vaporization of Fuel.

Before any liquid fuel is available for use in an exploding engine it must be vaporized, and this vapor must be mixed with air in the proper proportions—that is, as near the chemical proportions as may be possible. Thus the preparation of the fuel for use in an exploding engine involves three steps: First, vaporization; second, mixing with air; third, adjustment of proportions. The devices used in the engines to accomplish these things show the widest variation of detail design. In some of these devices the fuel is boiled in a chamber, which is then known as a vaporizer, and the vapor is allowed to flow into a stream of air entering the engine, the amount of vapor being regulated by a valve, just as is done in a gas engine. During the process of vaporization the air is not in contact with the vapor as it forms. In the next type of vaporizer the fuel is dropped on a hot plate, over which the air flows on its way to the engine, and the proportions are fixed by the rate of air flow or by the rate at which the fuel is supplied to the hot plate or by the temperature of the plate. When the fuel will vaporize at a low temperature below that of atmospheric air, it is not necessary to have any heated plate, and the fuel may be dropped directly into the entering stream of air, the proportions being adjusted by the opening of a small valve. Kerosene requires a plate or chamber quite considerably heated to completely vaporize it, as the boiling point is high. Gasoline requires nothing of this sort, as it easily vaporizes at atmospheric temperatures. Alcohol lies between these two fuels in this respect. It requires temperatures higher than the usual atmospheric temperatures, but not so high as those necessary for kerosene.

A device for preparing the mixtures in these engines, which performs three functions—vaporizing, mixing, and proportioning—is called a carbureter. Carbureters are universally used for gasoline and similar easily vaporized substances. Vaporizers in one form or another are almost universally used for kerosene, although some kerosene carbureters have been devised differing from the gasoline carbureter chiefly by the addition of a heating part. Alcohol is used in both of these devices—that is to say, alcohol carbureters are common and so are alcohol vaporizers, but the carbureters more common than the vaporizers. An alcohol carbureter may differ not at all from a gasoline carbureter, but by reason of the high temperature of vaporization of the alcohol some method of heating either the air or the mixture is necessary to insure complete vaporization, and the more water present the higher the necessary temperature.

Two styles of carbureters are shown herewith. The maintaining of a constant level just beneath the gasoline nozzle was found to be rather difficult if the float stuck or the float valve leaked. When the engine to be used is not in a boat or automobile, subject to shocks or oscillations, but is at rest, the carbureter in Fig. 2 can be employed to keep the fuel level constant in the nozzle and to prevent flooding the carbureter. A small chamber is fed by a pump attached to the engine and working with it. Gasoline is supplied much in excess of what the engine will burn, and the excess is allowed to run back to the tank through an overflow pipe. This overflow pipe fixes the level of the gasoline in the spray nozzle.

This arrangement is selected as a desirable one, because it is effectual and because the fire underwriters' rules require that the gasoline tank be placed below the level of the engine to minimize the danger by fire. In some of the latest types of carbureters the valve between the carbureter proper and the suction, which is intended to open at high speed, is made automatic and opens by a spring. This has given rise to the name "automatic carbureter." In order to more intimately mix the spray with the air various devices have been introduced above the spray, such as cones, plain and corrugated, pieces of wire gauze at rest and spinning around under the influence of a fan driven by the entering air.

Conclusions.

The following conclusions regarding the use of alcohol as fuel for engines as compared with gasoline are based on the preliminary results of the Department's experiments, upon results of the European experiments and investigations which have been presented in the foregoing pages, and upon the general knowledge of the authors:

(1) Any engine on the American market today, operating with gasoline or kerosene, can operate with alcohol fuel without any structural change whatever with proper manipulation.

(2) Alcohol contains approximately 0.6 of the heating value of gasoline, by weight, and in the Department's experiments a small engine required 1.8 times as much alcohol as gasoline per horsepower hour. This corresponds very closely with the relative heating value of the fuels, indicating practically the same thermal efficiency with the two when vaporization is complete.

(3) In some cases carbureters designed for gasoline do not vaporize all the alcohol supplied, and in such cases the excess of alcohol consumed is greater than indicated above.

(4) The absolute excess of alcohol consumed over gasoline or kerosene will be reduced by such changes as will increase the thermal efficiency of the engine.

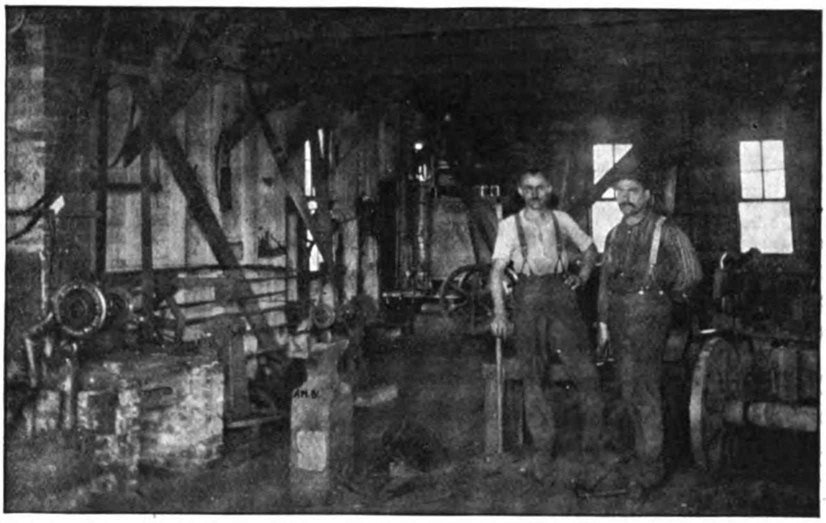
(8) Because of the increased output without corresponding increase in size, alcohol engines should sell for less per horsepower than gasoline or kerosene engines of the same class.

(9) The different designs of gasoline or kerosene engines are not equally well adapted to the burning of alcohol, though all may burn it with a fair degree of success.

(10) Storage of alcohol and its use in engines is much less dangerous than that of gasoline, as well as being decidedly more pleasant.

(11) The exhaust from an alcohol engine is less likely to be offensive than the exhaust from a gasoline or kerosene engine, although there will be some odor, due to lubricating oil and imperfect combustion, if the engine is not skillfully operated.

(12) It requires no more skill to operate an alcohol engine than one intended for gasoline or kerosene.



A NEBRASKA GENERAL SHOP—SHOWING THE POWER CORNER

(5) The absolute excess of alcohol consumed over gasoline or kerosene will be reduced by such changes as will increase the thermal efficiency of the engine.

(6) The thermal efficiency of these engines can be improved when they are to be operated by alcohol, first by altering the construction of the carbureter to accomplish complete vaporization, and second, by increasing the compression very materially.

(7) An engine designed for gasoline or kerosene can, without any material alterations to adapt it to alcohol, give slightly more power (about 10 per cent) than when operated with gasoline or kerosene, but this increase is at the expense of greater consumption of fuel. By alterations designed to adapt the engine to new fuel this excess of power may be increased to about 20 per cent.

(13) There is no reason to suppose that the cost of repairs and lubrication will be any greater for an alcohol engine than for one built for gasoline or kerosene.

(14) There seems to be no tendency for the interior of an alcohol engine to become sooty, as is the case with gasoline and kerosene.

(15) With proper manipulation, there seems to be no undue corrosion of the interior due to the use of alcohol.

(16) The fact that the exhaust from the alcohol engine is not so hot as that from gasoline and kerosene engines seems to indicate that there will be less danger from fire, less offense in a room traversed by the exhaust pipe, and less possibility of burning the lubricating oil. This latter point is also borne out

by the fact that the exhaust shows less smokiness.

(17) In localities where there is a supply of cheap raw material for the manufacture of denatured alcohol, and which are at the same time remote from the source of supply of gasoline, alcohol may immediately compete with gasoline as a fuel for engines.

(18) If, as time goes on, kerosene and its distillates become scarcer and dearer by reason of exhaustion of natural deposits, the alcohol engine will become a stronger and stronger competitor, with a possibility that in time it may entirely supplant the kerosene and gasoline engines.

(19) By reason of its greater safety and its adaptability to the work, alcohol should immediately supplant gasoline for use in boats.

(20) By reason of cleanliness in handling the fuel, increased safety in fuel storage, and less offensiveness in the exhaust, alcohol engines will, in part, displace gasoline engines for automobile work, but only when cost of fuel for operation is a subordinate consideration. In this field it is impossible to conveniently increase the compression because of starting difficulties, so that the efficiency cannot be improved as conveniently as in other types of engines.

(21) In most localities it is unlikely that alcohol power will be cheaper or as cheap as gasoline power for some time to come.

A Short Talk on Electrical Connections.

WILLIAM T. EVERTS.

The purchaser of a modern gas engine will, of course, insist upon electric ignition. Hot tubes, while thoroughly practical, have been relegated to the scrap heap long since. In speaking of electrical connections for ignition I wish first to mention a few general rules to be observed.

Before attempting to make connections carefully scrape the ends of all wires clean of insulation and dirt.

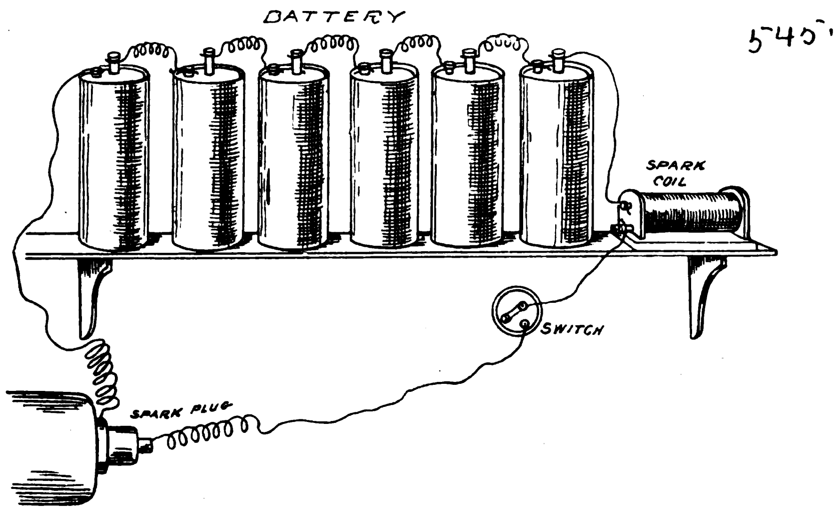


FIG. 1—SHOWING METHOD OF WIRING WITH BATTERY AND SPARK COIL

Before wiring be sure that all wire is in perfect condition and is not broken under the insulation. Of course, it is understood that heavily insulated wire must be used, otherwise all wiring would need to be held free from metals at all times. In running wires along the wall do not place both wires under one staple or fastener. Care should also be taken so that the staple or fastener will not cut through the insulation. Keep all wires free from contact with pipes or other metal articles, as the vibration transmitted to the wire from the engine will gradually wear through the insulation.

If batteries are used for the generation of the electric current, they may be either wet or dry, according to which is more suitable to meet existing conditions. Manufacturers of wet battery cells usually furnish instructions for the care and renewal of the battery as each particular type has its own special instructions. In testing the battery for renewal, test each cell separately with the spark coil. It often happens that one poor cell will weaken an entire battery; the poor cell should be removed and the engine operated on the remaining cells. If these do not generate a sufficient spark, a new cell will, of course, need to be added. Never attempt to use an old cell with new ones. The old one will diminish the strength of all of the others. It would be better to run the new ones without the old one.

If dry cells are used, the same method of testing will apply as in the case of a battery made up of wet cells. It is also unnecessary to say that dry batteries should always be placed where they will be free from any dampness, and they should always stand on end. When dry cells are exhausted new ones should be supplied. The dry cell can be renewed by punching holes in the top, or insulated cap, and soaking the cell in strong salt water until it is thoroughly saturated, but this renewing process is not recommended for the dry cells used in the battery of a gas engine. This method of renewing will do for cells used on light work, such as the ringing of bells, etc. In this connection I would advise users of dry cells to purchase their batteries at first hand as far as possible. The average dealer in electrical goods carries his dry batteries on a shelf so long as to impair their strength considerably. It is a good plan to purchase dry batteries of the manufacturer or a reliable dealer.

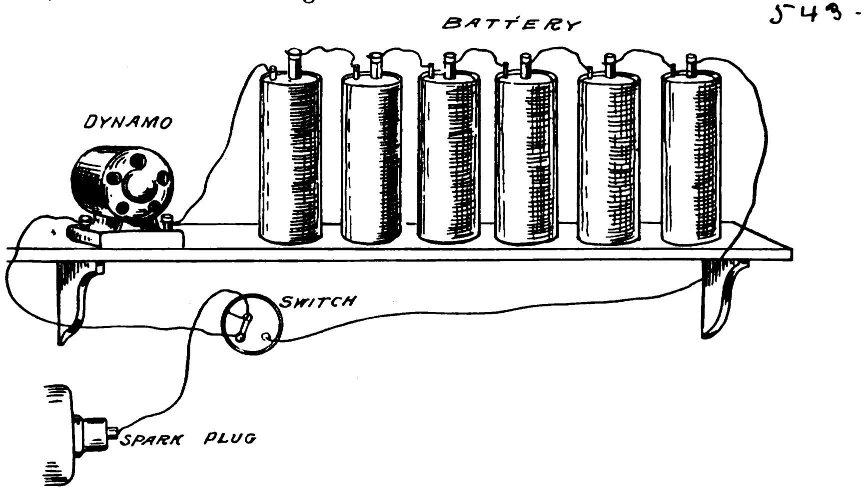


FIG. 2—THE SECOND WIRE TO THE SPARK PLUG IS RUN FROM THE CONNECTION BETWEEN THE DYNAMO AND THE BATTERY

If it is desired to use a magneto for the generation of the igniting sparker, the gas engine owner will do well to consult with the manufacturer of his engine. The maker is usually well posted on what type of magneto will meet the requirements of their particular engine. The method of wiring for connecting a magneto with the ignition system is usually fully explained by the magneto manufacturer.

The location of the switch in the ignition system may be most anywhere to suit the convenience of the gas engine operator. The gas engineer must bear in mind that to prevent the wasting of the battery the switch must always be open when the engine is stopped. Should a magneto be used a two-point switch is, of course, necessary, as the engine is started on the battery and then after getting a good start switched to run from the magneto. The several engravings herewith will aid the reader to a better understanding of the electrical ignition problem.

Testing the Engine Before it Leaves the Factory.

W. H. SPILLER.

A great many people do not know that the modern gas engine has to undergo prolonged and severe tests in the factory, far more critical than the majority of steam engines ever pass through. The duration of these tests vary from one week to fifteen days, according to the size of the engine, the work it has to perform, and the distance it will require to be shipped.

It can readily be seen that in a piece of mechanism weighing from 25 to 50 tons some of the parts will weigh from one to five tons, and that these various parts must represent a great deal of money expended for making and the high-class labor of finishing, to say nothing of the cost of the splendid grade of material required for this type of power machinery.

As these engines are sold under a positive guarantee covering consumption of fuel per horsepower per hour, workmanship, material, and general efficiency under actual operative conditions, the reason for the excellent exhaustive testing is at once apparent.

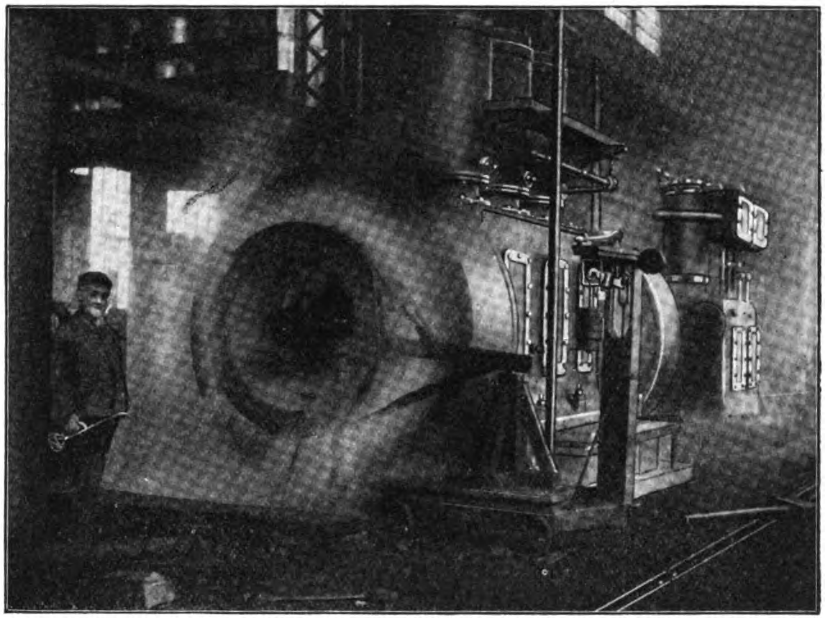
The manufacturer cannot afford to run any risk of a shut-down of a plant from any cause after installation on the customer's foundations.

The expense of shipping, the services of the erecting engineer, and his expenses from the factory are considerable; therefore the manufacturer takes the trouble and expense of assuring himself, as well as protecting his customer, that there will be no flaws, no trouble of vexatious delays, but a perfect working, economical, and absolutely reliable up-to-date power, placing the engine in a field distinctively its own, acknowledging no competition, bowing to no other power.

The first tests are made by the chemist when he analyzes the pig iron or steel as received from the mill. This analysis must tally with the specifications calling for the particular grade required for certain parts of the machine. When a heat is run a test piece is made and put under test until it is fractured and the ultimate or breaking strength known, and then the unit stress per square inch with a proper factor of safety for the material is determined. After the casting is made this is tested severely, and if any defects develop the piece is immediately rejected. After the cylinders have been finished, and before assembling the engine, they are tested under a high water pressure with a special device, and the pressure and number of the cylinder and engine recorded.

Some manufacturers have been in the habit of cataloguing their engines under the indicated horsepower, and we have seen records of test runs having been made of gas engines and the fuel economy per horsepower credited as being a great deal higher than that of other engines. Had these same engines been tested under a brake load and that test been published, it would have been the correct way to list and sell an engine, as the purchaser would know how much power he is going to have actually delivered to the belt after consuming a certain amount of fuel. As the brake test is the most important test from the purchaser's standpoint, we will now consider it in detail.

In making this test of the B. H. P. or delivered H. P., it is determined by means of a type of dynamometer, known as the prony brake. This consists of a large cast-iron ring, having both inwardly and outwardly projecting flanges. The inner flanges serve as a trough to hold the water necessary to keep down and absorb the excessive heat developed when the engine is delivering a great amount of power. A small pipe standing at the proper height allows the water to flow into the ring, maintaining a constant amount of water necessary to supply the loss from rapid evaporation, and the heat is partly dissipated in the form of steam, and the excess of water carried away by means of an overflow pipe.



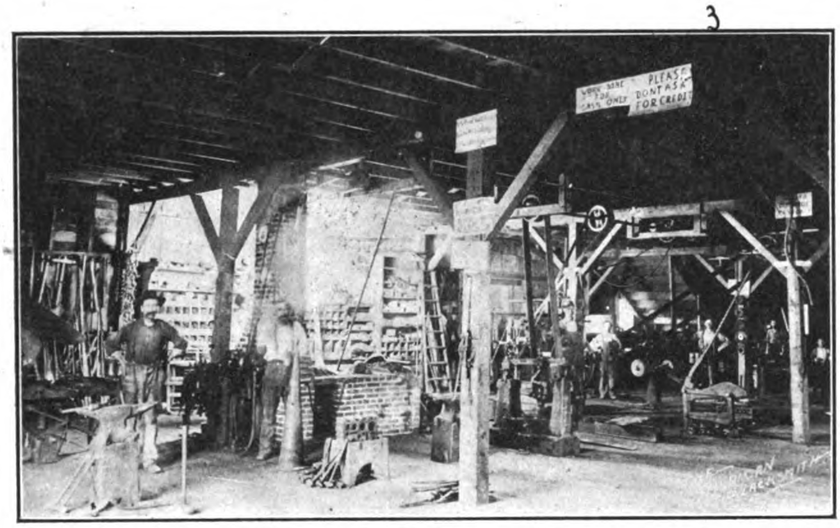
TESTING A 300-HORSEPOWER PRODUCER GAS ENGINE OPERATING ON PEA COAL

We have secured a photograph, reproduced on this page, showing a test being made of a 300-horsepower producer gas engine operating upon pea coal and consuming less than one pound per brake horsepower per hour, in the manufacturing establishment of the Weber Gas Engine Co., of Kansas City, Missouri. At the time the picture was taken the engine was delivering about 360 H. P., and the clouds of steam from the brake obscured part of the view.

The outer flange on the ring serves to hold in position the brake strap of steel, to which shoes of wood are riveted. This strap is provided with two powerful hand wheels at the back for tightening and increasing the friction on the ring or drum. Lubrication is supplied from pieces of tallow placed between the blocks of wood. The band or strap has a lever rigidly attached and firmly braced to it at different points. The drum is bolted to the fly wheel and revolves with it. The brake arm, resting upon a knife edge on top of the wooden stand on the platform scales, prevents the brake from revolving when the strap is tightened and allowing the downward push to be weighed in pounds and fractions on the scale.

The engine is run at normal speed and the strap is tightened until the speed of the engine remains constant and carries the proper load in horsepower, as indicated by the weight necessary to balance the scale.

The brake horsepower is computed by multiplying the pressure upon the scale in pounds by the length of the brake arm in feet, times the revolutions of the drum per minute by the decimal .1110904. The length of the arm is taken as the distance from the center of the engine shaft to the knife edge on top of wooden stand on the scale. The weight of brake arm and wooden stand is deducted from the total weight as registered by the scale.



A LARGE GENERAL SHOP OF ARKANSAS OPERATED ON GAS POWER

Shop Power.—Some Advantages of Internal Combustion Engines.

INTERNATIONAL HARVESTER COMPANY.

There seems to be a prevailing impression in the minds of the general public that the gasoline engine is of recent development, and has not, therefore, been brought to perfection, nor is it supposed to be as dependable as steam power.

The facts in the case, however, are that inventors were experimenting with internal combustion motors almost a century before the steam problem was even considered. After the invention of steam power, inventive genius turned its attention in that direction and ceased for a time to experiment with the internal combustion engine. Its development, therefore, was practically at a standstill for nearly one hundred years.

In 1791 John Barber began experimenting with gas as an explosive in the cylinder of the engine. The results of this experiment completely revolutionized engine construction and made the gasoline engine of today the most economical of all power producers.

The gasoline engine is especially desirable as a power producer in blacksmith and wagon shops, as it possesses many advantages over steam outfits. For instance, it is well adapted to carry the varying loads that are certain to be imposed upon it in shops of this character. An intermittent power is unquestionably the most satisfactory and economical for operating the various machines found in these shops, such as shapers, sanders, planers, lathes, drill presses, trip hammers, power shears and punches, hub-boring machines, bolt cutters, etc. The power required may vary from a few to several horse, according to the number of machines being operated at the same time. As it is apparent that the load thrown upon the engine varies greatly, it is necessary to have an engine capable of quickly picking up and releasing it with a corresponding increase and decrease in fuel consumption.

Economy of fuel consumption is due to two facts: first, there is an economical fuel consumption when working; and second, the fuel is consumed only when the engine is actually operated. There are no stand-by losses.

The gasoline engine is so governed that should the load be thrown off suddenly, there is no charge admitted to the cylinder, while if the load is heavier, a charge is admitted each revolution or every second revolution, depending upon whether the engine is of the two-cycle or four-cycle type. These engines are very economical in fuel consumption, using fuel only for the load handled.

One tenth of a gallon of gasoline will develop one horsepower per hour. If the smith wishes to operate a six-horsepower gasoline engine per day of eight hours, he will use only about 4½ gallons of gasoline, at an expense of from 60 to 80 cents a day.

In regard to the low cost of fuel consumed per unit of horsepower generated, a large portion of the expense of manufacturing is incurred through cost of fuel; consequently the use of a gasoline engine makes a great reduction in the manufacturing cost.

If a man were operating a steam plant to develop this same horsepower it would be necessary to use a considerable amount of fuel to generate steam necessary to start the engine. Then fuel must be continually used throughout the day to keep up the steam pressure regardless of the load that the engine is pulling.

The low cost of maintenance of a gasoline engine deserves special consideration. It costs practically nothing to maintain a gasoline engine and there is no engineer required to operate it. The cost of maintenance with a steam outfit is a considerable item and the fact that a gasoline engine eliminates this cost recommends it very strongly.

There is a certain element of danger connected with the steam outfit, which the use of a gasoline engine also eliminates. Where the internal combustion engine is used there can be no boiler explosions to endanger life and property.

There are many other features which deserve careful consideration, and all of which recommend the gasoline engine for use in blacksmith and wagon shops. Those who have had experience with both classes of power producers unhesitatingly recommend the gasoline engine, not only because of the low cost at which it produces power, but also because of the convenience, the ease with which it may be started and stopped, and the entire safety with which it may be used.

The Necessity of Shop Power.

KANSAS CITY HAY PRESS CO.

A few years back the question of power did not bother the average artisan.

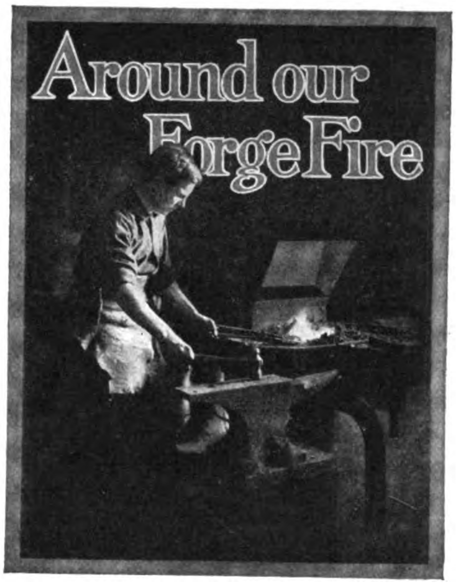
He simply went ahead doing his work by hand mostly, and what little machinery he did have was of light construction, designed to be operated by hand power. He was on an equal footing with his competitors in business, and secured his share of the trade. Today however, conditions are different; machinery has been designed for doing almost every sort of work, and will do it better and much more economically than in the old way, but this machinery must have some power to operate it. The more progressive blacksmiths and machinists have already installed this machinery and power, and it is necessary that others fall in line if they expect to get their share of the trade and profits. Gas engine power up to this time is the most economical, simple, and satisfactory power to be had for this class of work. A man cannot afford to install steam in a small plant, nor can he afford electricity, and about the only question is, what kind of an engine to buy. If there is any one thing a man should have of the best, it is a gasoline engine, and he should expect to pay the price of good machinery. This will give him a strong, durable engine, one that he can depend upon. Then he should look to the special features, getting an engine with as many advantages as possible.

That High-Low Wheel Discussion.

D. FOSTER HALL.

Mr. Van Dorin says, "The pulling of a wagon is likened to the pulling of a post." I don't agree with him, for there is a great difference in the two principles. The one is a stationary resistance, the other a moving one; the one has a resistance at the ground line, the other at the axle line. When we raise a wheel from the ground, the axle is the center, but when the wheel is on the ground, the part on the ground is the center and the wheel becomes a lever, a moving one, the top part of the wheel moving forward and downward, the bottom backward and upward. The argument is that the resistance is at the ground line, as in passing over an obstruction; but I say that it is at the axle, for here is the load and here the power applied. It is not the obstruction, but the load, which offers the most resistance to the power, which we should take into consideration.

It matters not whether the load is hung near the ground on crank axles; it all comes on the axle. Don't forget for a moment this important point! The load, the resistance, and the power are at the axle line! For example, here is a heavy load resting on four wheels (four levers) of, say, twenty inches long; now, if we increase the length of these to twenty-five inches, can the load be moved more easily? The load is the resistance, and, increasing the height of wheel or lever, we carry the load higher, and on approaching a hill what is the result? Why, we simply have all this extra leverage to overcome. In increasing the height of a wheel, we present a larger radius to obstructions, and, therefore, we pass them more easily with a high than with a low wheel; so this is all the advantage gained. I fail to see how anything is gained by using the high wheel. Give me the medium-sized one every time.



"Well, what's new in the new volume?" asked Benton, tossing his hat on a table and addressing the Editor.

The Editor, however, showed no interest except to hand Benton a bundle of proofs. After making himself comfortable, Benton looked through the pages and said, "Where do I come in on this affair? You get your picture at the head of this column, remove your glasses to disguise yourself and never a word about me. Don't think it fair, old man." and Benton threw down the sheets rather roughly.

"What's this?" asked the Editor, looking up. "Your picture in the paper! Why, Benton, old boy, do you think we want all our readers to quit," and the Editor leaned back with a hearty laugh in which the helper and even Benton finally joined.

"This is the thing, right here, Benton," continued the Editor. "Your items and valuable kinks are published in the paper. So, to even things, why, of course—"

"I see," broke in Benton. "I guess it sort of evens matters up." Then, changing the subject, he asked, "Well, what do you promise for the coming year?"

"As I told you before, Benton," replied the Editor, "I don't care to promise anything, or, rather, tell readers what is coming. I prefer to surprise them."

"I see this number here is a genuine gas engine number," returned the other. "That is an excellent idea. Gas power is certainly an important factor in the success of the smith shop. The only trouble with some smiths is that they think they have to know how to build an engine before they can really know how to run one. But a smith does no more need to know how to make one than a woman needs to make a sewing machine before she can use one. All the woman needs to know is to apply oil when the machine needs it and to keep the machine clean."

"Yes, I guess there are quite a few smiths who are afraid they will have more trouble with an engine than it's worth," replied the Editor. "Then, again, there are some owners of engines who abuse their machines until you would think the engine would quit because of mistreatment. An engine will stand an awful lot of abuse at times and not balk, but it is certain that a reasonable amount of care is necessary to get full value out of it."

"Well, it's just laughable the way some men go about their engine when anything happens to it," said Benton. "I was down to see Jack Hoover the other day, and while there he told me about the trouble he was having in purchasing battery cells. Said he had bought about all the brands on the market, but there weren't any of them any good. I thought I rather scented his trouble, so I asked him where he kept his battery. He pointed to a box, and in lifting the cover I found a couple of big wrenches, a screwdriver, and a piece of pipe laying on top of the dry cells. Of course, I told him that the trouble was not with the battery cells, but with his own brain cell."

"Well, Jim Horn came rushing in here one day last week," said the Editor, "and wanted somebody to examine his engine. He had a shopful of work and couldn't start the engine after the stop for dinner. He was kicking something awful about a certain make of engine and saying all kinds of things. I questioned him about what he had done to the engine, but the fact remained—it wouldn't go. Well, I called Art. in and told him to look at the engine and also to incidentally look into the gasoline tank. Sure enough, the only trouble was lack of fuel. Of course, Jim kicked himself well and called himself all kinds of a fool. But that just shows that the less fussing around a man does when the engine refuses to go and the more good horse-sense he uses, the better and easier it will be for both himself and the engine."

"Yes, a man certainly wants to have a cool head rather than a hot one around an engine," returned Benton. "But for all—"

"You'll have to excuse me today, old man," broke in the Editor. "I've got a big batch of work to turn out. But you'll find papers and magazines on that table if you want to read." And with a wave of his hand the Editor turned to a large pile of photographs and manuscripts, while Benton, after lighting his pipe, settled into an easy chair and prepared to interest himself in a current copy of his favorite journal.

Chiquita.

BRET HARTE.

Beautiful! Sir, you may say so. Thar isn't her match in the country.
Is thar, old gal—Chiquita, my darling, my beauty?
Feel of that neck, sir,—thar's velvet! Whoa! Steady—ah, will you, you vixen!
Whoa! I say. Jack, trot her out; let the gentleman look at her paces.

Morgan!—She ain't nothin' else, and I've got the papers to prove it.
Sired by Chippewa Chief, and twelve hundred dollars won't buy her.
Briggs of Tuolumne owned her. Did you know Briggs of Tuolumne?
Busted hisself in White Pass, and blew out his brains down in 'Frisco.

Hedn't no savey, hed Briggs. Thar, Jack! That'll do—quit that foolin'!
Nothin' to what she kin do, when she's got her work cut out before her.
Hosses is hosses, you know, and likewise, too, jockeys is jockeys;
And 'taint ev'ry man as can ride as knows what a horse has got in him.

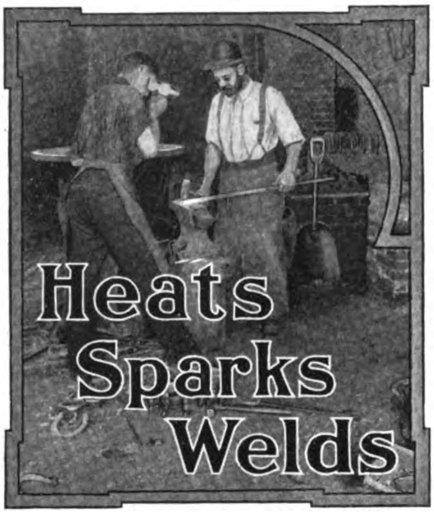
Know the old ford on the Fork, that nearly got Flanigan's leaders?
Nasty in daylight, you bet, and a mighty rough ford in low water!
Well, it ain't six weeks ago that me and the Jedge and his nevey
Struck for that ford in the night, in the rain, and the water all round us:

Up to our flanks in the gulch, and the Rattlesnake Creek just a bilin',
Not a plank left in the dam, and nary a bridge on the river.
I had the grey, and the Jedge had his roan, and his nevey, Chiquita;
And after us trundled the rocks, jest loosed from the top of the cañon.

Lickity, lickity, switch, we came to the ford, and Chiquita
Buckled right down to her work, and afore I could yell to her rider,
Took water jest at the ford, and there was the Jedge and me standing,
And twelve hundred dollars of hoss-flesh afloat and a-driftin' to thunder!

Would ye b'lieve it? That night that hoss, that ar' filly, Chiquita,
Walked herself into her stall, and stood there all quiet and dripping;
Clean as a beaver or rat, with nary a buckle of harness,
Just as she swam the Ford—that hoss, that ar' filly, Chiquita.

That's what I call a hoss! And—what did you say? Oh, the nevey?
Drownded, I reckon,—leastways, he never kem back to deny it.
Ye see the derned fool had no seat,—ye couldn't have made him a rider;
And then ye know, boys will be boys, and hosses—well, hosses is hosses.



Do it and stick.

Pare the frog and spoil the foot.

Faking jobs are never taking jobs.

Don't wrestle with your conscience.

Make a business of being in business.

Spend your time saving your money.

It's an ill job that brings not a second one.

Push your business and pull your profits.

The more work you do the more you can do.

Your excuse for being in business—what is it?

A horse in the shop is worth two on the road.

"Time enough'' generally proves little enough.

It's the man with pluck who plucks the business.

Slow pay never was and never will be good pay.

An ounce of conscience is worth a pound of reputation.

Nor does a well-filled purse indicate a well-filled mind.

It's the little things that count, so count the little things.

The other fellow—if you were he, how would the contract read?

In the realm of business there is more coasting up hill than down.

Think hard before cutting the price—you may be cutting your throat.

Divorce is the thing for the smith who is married to easy-going methods.

Take care of your conscience and your reputation will take care of itself.

A true mechanic is the smith who thinks more of his product than his job.

There's lots more to horseshoeing than forging the shoe and nailing it on the foot.

The boss who suggests rather than orders gets most out of his men and with least trouble.

There's certainly some point in which you excel your competitors—harp on it and keep harping.

Economy is not only the saving of money, but the saving of what you get for the money you spend.

Some take life as a struggle to defend prejudice or personal opinion. True life is a search for truth.

After Jamestown comes the Alaska-Yukon-Pacific Exposition at Seattle, Washington, June 1 to October 15, 1909.

Some men are more persistent in kicking about their hard luck at not finding a job than they are in looking for the job.

Another volume—seven—starts with this issue. Does it find you better off in a business way than October a year ago?

The fault-finder is at least interested in your work. Better one fault-finding customer than a town full of disinterested folk.

A first-class smith can find a good opening in Washington State by communicating with Mr. A. F. Wheaton, of Raymond.

Talking against your competitor is like throwing a rubber ball; the harder you throw, the harder and quicker it comes back.

The shop kid who burrows into the "why and wherefore'' of the trade and business is on the road to a shop with his name over the door.

If Tom Tardy's tools held an "old boy's reunion'' they would certainly have a rousing time—they've known each other for so long and not one newcomer among them.

Any readers interested in locating in Mississippi State are asked to write Brother J. I. Blansett, of Darbun, Miss., who advises us that there are two excellent openings for shops near his town.

Two good openings for blacksmiths in Missouri are reported by brother F. X. Zahringer. Any reader interested in locating here will do well to write Mr. Zahringer at R. F. D. No. 4, Bunceton, Mo.

"A smith comes into direct contact with some fifty-seven varieties of people,'' says Thornton, "and it's up to the smith to have some fifty-seven varieties of tact on tap all the time. He may be successful without tact, but he'll find it easier going with a good stock of it on hand.''

"Somewhere back there in the shop,'' replied Tom when asked about his shop sign. "You see, rough weather'll set in soon, and snow and ice is the mischief on nice painted signs. Oh, no, I ain't had time to get it painted yet, but I'm goin' to 'fore I hang it. So I guess I'll wait till spring.''

Tom's not so slow as some may think. He started to get the old shop stove ready for winter—it's been up all summer but contained the remains of last winter's fires, so he made a start at cleaning it out, when the rickety old thing fell over and smashed one of his toes. "It's just my luck,'' says Tom as he sits in the easy chair at home with his foot in a cushion.

A paint experiment is told by a writer in an agricultural exchange. He says: "Thirty years ago I tried an experiment on two carriages. I treated both in the same way, giving both same time to dry, but on one I used raw oil and on the other boiled oil. Both had about the same usage and care. At the end of five years the difference in appearance was largely in favor of raw oil.'' What is your experience?

The largest egg farm in the world is said to be owned and managed by Mr. E. L. Hayward at Hancock, New Hampshire. According to an exchange it has at this time over eighty-four hundred hens, kept in six hundred small houses, fourteen in each. The hens are never allowed outside their eight-foot square coops, and are never fed green feed, contrary to the teaching of all other poultry keepers. Each hen gets about a quarter pound per day of beef scraps, gluten, hominy feed, wheat, etc., with a little salt, ground shells, grit, charcoal and plenty of clean water. They average one hundred eggs each during the year, for which the high average of twenty-six cents a dozen is received, or a total of two dollars and seventeen cents. It costs about one dollar and seventeen cents each for feed, so that the profit on each hen is about one dollar. The droppings go to fertilize a large orchard and are a source of profit. Only young hens are kept; the second year they are sold, and pullets bought for the next year's egg crop.

Shoeing Knowledge a Crying Need.

A short time ago the Editor had occasion to put a series of ten questions on the fundamental facts of shoeing to a considerable number of craftsmen. The answers which were received in a number of instances revealed a deplorable lack of exact knowledge about the essential characteristics of the foot. For instance, one question was, "What organ secretes the wall of the foot?" Almost half of the replies gave "the frog" as the answer, probably because the following question happened to mention the frog. One man, slightly more independent than the rest, gave "gristle" as his answer.

No matter how well trained his hand, no man can expect to shoe intelligently unless he knows the foot like a book, understanding clearly and accurately the functions and normal characteristics of each part and their relation one to another.

It is a matter of considerable gratification to us to be able to add that none of the parties whose ideas of shoeing were so vague were subscribers to THE AMERICAN BLACKSMITH, and also that many of the answers displayed an exact and minute knowledge of the art, which was most commendable.

Why a man will attempt to follow a trade without laying at least some kind of foundation so as to pursue his craft intelligently we cannot understand. Craftsmen who are unacquainted with the fundamental principles of their trade can find no excuse in these days of correspondence schools, trade papers, books, and authoritative craft literature for remaining in ignorance on any points concerning their trade. We are always glad to assist our readers. Any craftsmen who desire to take advantage of the coming season of long evenings will upon inquiry be advised as to just what books are best suited to intelligently study his particular branch of the trade. If you are working in the dark on anything connected with the smithing craft, don't let the winter evenings pass without making an effort to put things in a clearer light for yourself.

Shall I Buy a Gas Engine?

The question of power in the shop is one for each craftsman to solve for himself, many considerations entering. The answer will usually be in the affirmative, especially if there be much heavy work to be done, the prospect or opportunity for expanding the business, or a scarcity of shop help. An engine will do all manner of heavy work with facility, it will permit an increased amount of work to be turned out by the simple expedient of adding new machinery for it to drive, and it will also come beautifully to the assistance of the man who has difficulty in securing or retaining helpers, for the engine is always ready and willing to put its "shoulder to the wheel," so to speak, in time of need.

In these days the purchase of an engine is no experiment; they have been carefully perfected, so that if one buys of a reputable maker and bestows a decent amount of care upon it, the engine is almost certain to give good service, and to prove a satisfactory investment. Indeed the uniform testimony of a great many AMERICAN BLACKSMITH readers, as indicated by our correspondence extending over six or more years, has shown us that those who have installed power in their shops have been at a loss to understand how they were able to get along before without it.

American Association of Blacksmiths and Horseshoers.

October—fall—and nothing doing in the association line in your county. Is that the situation in your neighborhood, Mr. Reader? If it is, it's your own fault. I've hammered on this associotion question all summer and I'm still at in. Will you get busy this fall? There is still time if you will start now to get things in tiptop shape for the snow and ice season. But get busy now. A quiet smoke in the shop won't stir things in craft circles. And not even the reading of this column will do you any good without action. Just put the paper aside for a minute. That's all the time it will take to address a postal card to me for a request for easy plans for forming a county association.

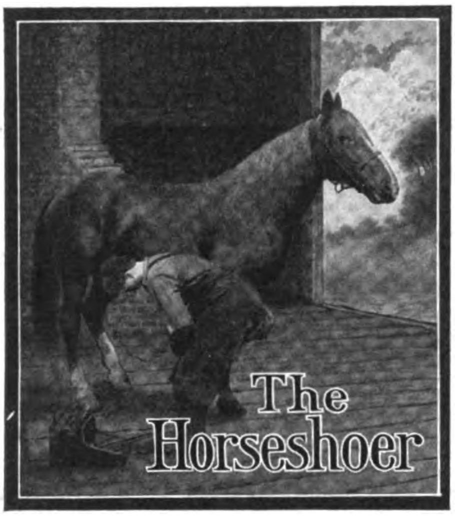
Just consider, Mr. Horseshoer, what an advance of but five or ten cents a shoe means to you. It means that much extra profit, that much more money at the end of the day, and this without one extra cent of layout or cost. You owe it to yourself and your family to get a fair profit for your work. You certainly cannot expect to support yourself and family by working for prices which show a loss at your end of the proposition. I don't expect you, Mr. Reader, to raise your prices sky high within a week, or to require your customers to pay you an exorbitant profit on your work. I don't want you to even go into the organization movement with the idea that you will then as a county association be able to charge "trust prices." That idea is just as wrong as to think that by cutting prices you can get all the trade in your locality and run your competitors out of the town. The American Association of Blacksmiths and Horseshoers simply wants every smithing craftsman to get what is due him. We want him to get an honest price, a fair profit, fair treatment and protection. And an organization is the only way the smithing craftsman gets what is due him. If there were some other way of getting the protection which the craft demands I would be the first to recommend it. United action among the craft appears to be the only remedy. So it is up to the individual craftsman to get the protection he deserves by starting an organization in his county. Won't you start the ball rolling in your vicinity? My plans for forming county associations are so easy as to surprise you. Will you not send your request for them today? If you start now you can have many needed reforms in working order by the time of the busy fall rush when you can reap the biggest profit. Address me P. O. Box 974, Buffalo, N. Y., *today*, and by return mail you will get my easy plans for forming county branch associations.

THE SECRETARY.

Prices and Price Lists.

W. J. JULIAN.

The boys in this town, leaving out the writer, will measure up and tower above any bunch anywhere. They are good workmen and good fellows generally. We got together some time ago and raised prices where we can live and have some of the comforts of life. I see one of your correspondents found fault with the printing of price lists. Now, these prices are those which are made for the public, and I don't think it will do my customers any harm to know the prices of all the smiths east, west, north, or south. If they are above us he certainly learns that our trade is considered of some value in those places anyway. If they are below us he can pat himself on the back and say, "Our smiths are good ones and know their value." I believe any trade degenerates to a level with the money value put on it. For the money value represents the value in the thought of the person fixing the price. There could be a great deal written on this subject, but I will close with this. Keep on printing price lists. It has a tendency to raise prices and thus raise respect in both ourselves and others for our trade.



By placing nails near heels a good many horses get contracted feet. Give the hoof plenty of spring, then there will be no contraction and no corns. The man who spreads the shoes on a horse's feet after they have been nailed on, wants spreading himself to see how he likes it. Some men have some funny ideas on horses and shoeing. W. T. P., Australia.

Shoeing for Corns.

E. W. PERRIN.

I have recently received some inquiries for a cure for corns which suggested the subject of this article. It is surprising to find the number of stablemen and shoers who think that there is some cure-all, some specific drug for corns. I have recently been favored with some recipes never known to fail (?), which will be of interest to your readers.

Prescription No. 1.—Pare out the corn down to the flesh, then saturate a piece of cotton wool with aqua fortis (nitric acid), and place it in the hole.

Prescription No. 2.—Pare out the corn, then fill up the hole with hot tar and tallow.

Prescription No. 3.—Pare out the corn with the drawing knife, then burn with a red-hot iron.

In the first place, I have not put any of these cures (?) to a practical test, and for obvious reasons I am not likely to do so; but I have seen horses on whom such empiricisms had been practiced, and in each case the corns were seriously aggravated, and in one particular case sloughing of the tissues and caries of the os pedis had resulted.

Cause and Effect.

Again I must call your attention to the relation of cause to effect, for it is only upon an understanding of this fundamental principle that the shoer can scientifically apply his art to the cure of corns. Corns are so common in street horses that every horseshoer and horseman knows them at sight; but a large number of shoers and horsemen do not understand the physiological causes which produce them; for, if they did, they would know that caustics, corrosive acids, or hot iron would do much harm instead of good. Then let us ask ourselves the question:

What is a Corn?

A corn consists of a bruised condition of the tissues at the heels of the foot; the inside heel of the front foot being most commonly affected, sometimes both heels of the front foot, and occasionally it is met with in a hind foot.

As a result of concussion to the sensitive tissues of the heel, there is extravasation of blood, that is, blood oozes from the capillary vessels and stains the horn red, so that a corn is known by the horn in the angle formed by the wall and bar at the heel being red. This blood stain may be limited to the size of a pea, or it may cover two or three inches in extent; it may be a bright red, or a deep, livid color, according to the severity of the case.

It is quite common for a corn to suppurate—form matter—in which case if the imprisoned pus be not given free vent at bottom it finds its way along the course of least resistance and breaks out at the coronet. In old cases of suppurative corn, the horn at the affected part becomes black and cheesy. Occasionally you will see a case where the seat of corn is characterized by a deep black hole, which emits an offensive, watery discharge; this condition is usually the result of malpractice, from the application of the cures (?) above enumerated. When you pare away the horn from the seat of corn and then apply a hot iron or some corrosive acid to the sensitive part, the horn-secreting tissue at that part is often absolutely destroyed and no more horn grows at that part. Instead, you have a hole emitting a discharge from the diseased tissue. Corns cause more or less soreness with loss of elasticity of step, or even lameness, more or less acute, according to the severity of the case.

Causes.

Broadly speaking, the main cause of corns, like many other ailments of the foot, is to be found in the vast change of condition and work in the domesticated as compared with the natural state of the horse. The first and most important factor in the production of corns is our system of shoeing *without*

FIG. 1—IF THE HOOF IS GREATLY CONTRACTED USE AN EXPANSION SPRING

frog pressure; next is the hard and unyeilding nature of roads and streets, together with the pace we drive over them; third is paring the sole too thin and fitting the hoof to the shoe; fourth, the want of moisture; fifth, the use of heel calks, which accelerate concussion at the heel; and sixth, the use of seated shoes. Three or all of these factors may be acting together. Just think: if you take a colt from the pasture, in all probability the hoofs are stuffed with clay; the wall, the outer margin of the sole, and the bulbs of the frog are sustaining the greater weight of the animal. Now note the outline of the hoof. The quarters will be round, with wide-open heels, with a well-developed frog, the texture of the hoof being tough yet moist; the frog and sole cut easily.

When you have prepared the hoof for the shoe, lay a piece of white paper on the ground, set the foot upon it, draw a line around the hoof with a pencil, write the name of the horse

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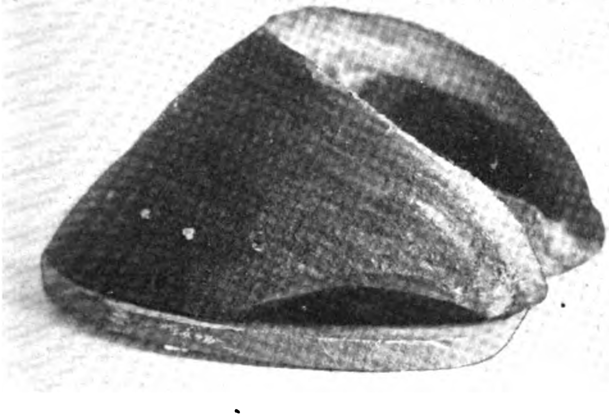

FIG. 2—AFTER PROPERLY PREPARING THE FOOT, SHOE WITH A BAR SHOE AND LEATHER OR RUBBER PAD

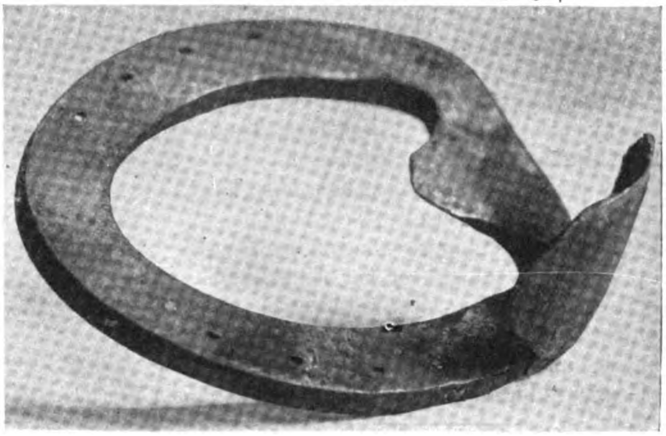

FIG. 3—IT IS NECESSARY TO PROTECT THE DENUDED PART OF THE FOOT BY A THIN PLATE AT THE HEEL

and the date upon it, then file it away for future reference. Having prepared the hoof, the next thing we do is to shoe it in the ordinary way; that is, we proceed to put the whole weight of the animal on the wall (which was in its natural state borne by the sole wall and frog); then we take him from the grassy pasture where his hoofs got a wet bath every night and put him in a dry stable and when broken in he is sold to the butcher, grocer, or baker, who drives him from six to eight hours a day over the paved streets as hard as he can travel. Then, when your colt has done six months' street work, prepare the hoof in the usual way, get the diagram which you made at his first shoeing, draw another, compare the two, and you will hardly believe your eyes, the hoof is now so altered. The quarters are less round, and the heels are a quarter to a half of an inch narrower. Now a question suggests itself: "If this hoof fitted the foot when it was four and one half inches wide at the heels, how does it fit now that it is only four and one fourth?" This hoof, soft and tough when taken from the pasture, is now dry, hard, shrunken, and brittle. The frog, being deprived of its natural stimulus of pressure, is now dwindling; there is some contraction at the heels; the feet feel hot and dry, and the horse goes out sore first thing in the morning; the elasticity of step is gone, perhaps he stumbles; and when we rasp down the hoof at the heels we see the familiar red spot and know that he has developed a corn.

The Cure.

Again I say to you—there is no specific, no secret charm, no patent lotion to cure corns. Just restore as far as possible the natural condition, just remove as far as possible the cause for the corn. The presence of a corn is readily detected by lightly tapping the wall of the suspected heel with a shoeing hammer. The animal betrays great pain when you strike the sore spot; there may be lameness with or without the presence of pus, but where there is pus the lameness is more acute even at a walk. The presence of pus may also be detected by pressing the coronet with the thumb just above the affected heel. If the corn is slight and without lameness rasp down the affected heel, wall and all, and shoe with a bar shoe or rubber pad; if the horse be lame, rest him, remove the shoe, and poultice the foot with warm, wet bran until the lameness has subsided; then shoe as directed. If there be pus cut down the hoof at the heel and give it free vent, then poultice. If there is much contraction at the heels use an expansion spring after you have softened the hoof by poulticing (see Fig. 1). In some chronic cases it is good practice to dissect all the wall away at the heel right up to the coronet, thus laying bare the vascular structure for treatment. Don't be afraid to remove any diseased horn, but take care not to injure the horn-secreting tissue. If, however, the shoer is not posted on the anatomy of the foot, he had better not attempt this operation without the advice of a veterinary surgeon. Having laid bare the inflamed tissue, poultice with antiphlogistine until the lameness has subsided, then shoe with a bar shoe and leather or a rubber pad. (See Fig. 2.)

Where this operation is performed the animal may return to work as soon as the lameness has subsided and the foot is properly shod, but the part thus denuded of its natural hoof must be protected from injury by welding a thin plate to the heel of the shoe. (See Fig. 3.) As the new growth comes down from the coronet you will find it from ¼ to ½ inch wider at the heel. When this new growth reaches the ground surface the cure is complete.

The main chance is to relieve the affected part of concussion; this is best accomplished by using a bar

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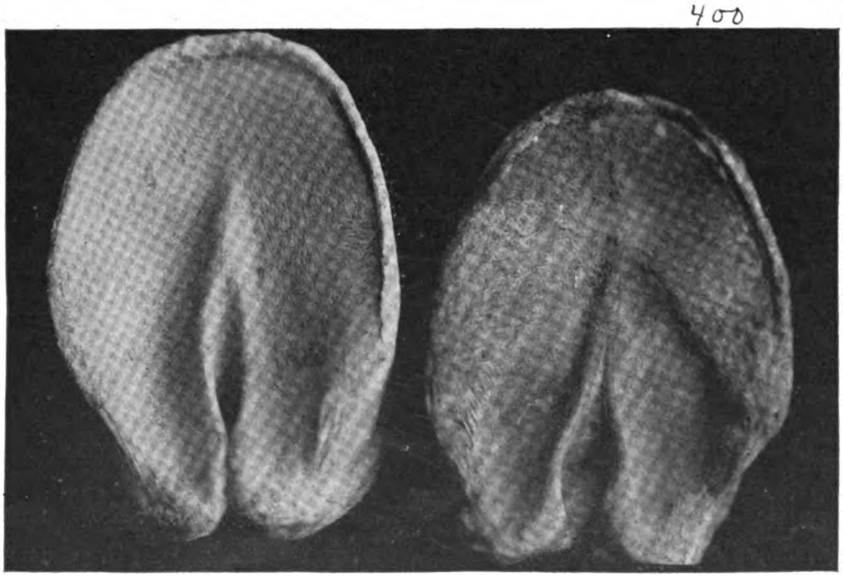

SHOWING THE GROUND-BEARING SURFACES OF A CONTRACTED HOOF, AND ALSO A NORMAL FOOT shoe applied as shown in Fig. 2. It is of no avail to dig a hole in the seat of corn. Cutting away the bloodstained horn does not cure the corn; on the contrary, by digging a hole you take away the support of the heel, thus facilitating further contraction. The only excuse for digging a hole is to let out imprisioned pus.

If all horses were shod with frog pressure by the use of bar shoes and the hoofs stopped with wet clay every night the number of corns and many other ailments of the foot would be largely reduced.

Contraction: Its Cause and Cure.

A. F. LIBBY.

One of the causes of contraction is neglect and mismanagement of the foot. In most cases, however, the foot will return to a normal state by dressing the foot properly and applying a shoe that is not too heavy. Aim to restore the foot to its proportions. Have the length of the frog and the front of foot the same. From point of frog to point of toe one half the length of frog, and that should be the same as the height of the heels. If very much altered from these proportions do not make any radical changes, but rather make it in two or three shoeings, instead of all at once. Any change over five sixteenths of an inch at one time in the ground bearing surface of the foot might strain some ligament or tendon. Most of these cases, if properly treated, will return to a normal condition.

We have a second kind of pinched foot that goes with the horse that is called "chest foundered." I consider this a diseased condition of the nerves. You will find that this horse is of a nervous temperament. By making a

A SECTIONAL VIEW OF A HORSE'S FOOT, SHOWING PEDAL BONE

closer examination you find the muscles above the knee, those which work the perforans and perforated tendons, are contracted, while those of the extensor tendon have become elongated. By dissecting a contracted foot we find the laminæ cramped, with the points turned upward. The laminæ being controlled by the sympathetic nerves, it proves that there is a diseased condition of the nerves. In the foot shown in the engraving you will see that the point of the pedal bone presses on the shell and

RELIEF IS OBTAINED BY THE USE OF A BLOCK-HEELED SHOE

prevents perfect circulation; it also shows why a foot of this kind grows faster at the heels than at the toe. Around the lower edge of the pedal bone we have the circumflex artery. In the foot in the engraving no blood can pass through that, so it must pass through a branch that comes out of the side about halfway up. For this kind of contraction I know of no cure by shoeing. But we can give relief by the use of the old-fashioned block-heel shoe. For internal treatment of such cases I use "Humphrey's Veterinary Specifics," which give relief and in most cases make permanent cures.

Thornton's Letters.—11.

Being "Straight-from-the-shoulder" Talk from a Prosperous Self-made Smith to his Former Apprentice, now in Business

Dear Jim:

Yours of the 29th hits me all wrong. I don't like to hear you say that you deserve to be "somebody" in that association. You are somebody, but you'll be less than a nobody if you go trottin' around "with head up and tail over the dashboard," as old Si Poover used to say.

I know all about what they're doing at the meetings. I know, too, that if you don't mind your P's and Q's you'll be in a veritable hornets' nest. Of course, you worked hard and long for association matters. You started it, practically speaking, and should have been shown the courtesy of being elected the first president. But you weren't, Jim, and there's no use in getting hot under the collar about it. And, when you come right down to it, it's the best for you that you got it in the neck. I want to say right now, Jim, that you surprised me a whole lot by talking the way you did in your last letter. You reminded me of a mule that we had in the shop about six months ago. This mule was a moth-eaten, dreamy-eyed little cuss that didn't look as though he had ambition enough to wriggle his ears. But when big Tom Beesley went to pick up one of his feet that little bundle of mud-colored fur did more acrobatin' 'round the shop than a whole circus full of trained animals. Of course, we had to put the little cuss in the stocks. And, as one, of the boys said, "It seemed a shame to do it—he didn't seem bigger than a good-sized dog."

Now, I'm not sayin', Jim, that you've got any mule make-up in you, but your talking the way you did 'bout that association election "looks powerful 'spicious," as Deacon Bronson used to say when he found a bottle of "licker" on anybody else.

I'm a little disappointed in you, Jim. I didn't suppose for one minute that you would come that "hull 'ting Willie" act. I thought you were too big and broad for that. Of course, I know that it would perhaps help you in the town to be known as the president of the association, but you can do more genuine work, more boosting, gain more friends, and become just as well known by being on the crowd's level and working just a little harder than the rest of the bunch.

APPEARANCE OF FOOT AFTER SHOEING WITH BLOCK-HEELED SHOE

Now, Jim, you just get over this cry-baby notion of yours right away. Chuck it, Jim, and forget it. Get right in the association spirit and keep there. Work for the association and the craft as you have never worked before. Let the boys down there see that you are a whole heap better than they thought for. Now that the association is started and working fairly smooth, stay in the harness, and don't for one minute think that you are going to do anything but boost and boost for all you're worth.

An association to be successful must as individual members forget the little petty differences, the little wounds and sores of the other fellows. You chaps up there have made an excellent start. Now, Jim, don't play the spurned villain act and spoil it all. Give your support for all you're worth and make up your mind to show them just what you're made of. You've got it in you, but you've had a slight attack of stage-fright. We all get it once in a while—every man shows his yellow streak some time, and his success or failure depends on whether he fights it or makes friends with it.

Yes, I suppose I am rather rubbing it in, but I want you to make good—to measure right up to the mark. I don't ever want anyone to say anything about "poor Jim Harper." That's why I'm harping on this—that's why I keep at it.

Now, don't say, "Well, there goes the old man preachin' again." It may be preaching, Jim, but this old head knows a few things that are not written in the books, and never will be, for they can't be written.

Keep a stiff upper lip, old boy, and don't for one second think of doing anything but fight that yellow streak.

Yours for harmony,

Thornton

Some Practical Hints and Suggestions.

F. E. POBST.

The accompanying engraving shows "my busy corner," which explains itself. The hammer is homemade, as well as the band saw and the emery stand. I have also a few other ideas which I gleaned from "Our Journal" from time to time, as well as some of my own ideas. The trip hammer is from the specifications sent me by Brother McCoy, of Kansas, whose offer to give specifications to any brother I noticed in "Our Journal." So, to keep the ball rolling, I wish to say that I will gladly give any information I can to any brother in regard to any of these homemade contrivances if stamp is enclosed with inquiry.

Now I will give a few "wrinkles" I have picked up from time to time. Being annoyed with the delay in getting old tenons out of hubs I learned to drive out the box, then use a punch to drive from behind and inside all old spokes and tenons that I want removed. When setting buggy tires it quite frequently happens that there are some holes to rebore before we can get the bolts in; to avoid this, be sure to shrink the tire at the same place that you sawed the felloe (if it was rim bound), and in replacing tire put punch in hole on opposite side of wheel from place that was shrunk. I take out the rivets in sarven wheel. The other way doesn't look good to me.

I would like to say that I enjoyed Brother A. C. Harrington's article in the August number on page 264, and took time to read it twice; and if you, brother, have not read it, get down your paper and do so and accept every word of his advice. I honestly believe that if the members of the craft would follow his advice it would do more to push the brethren along to true happiness and true success than anything I have yet seen in one article at any time in "Our Journal."

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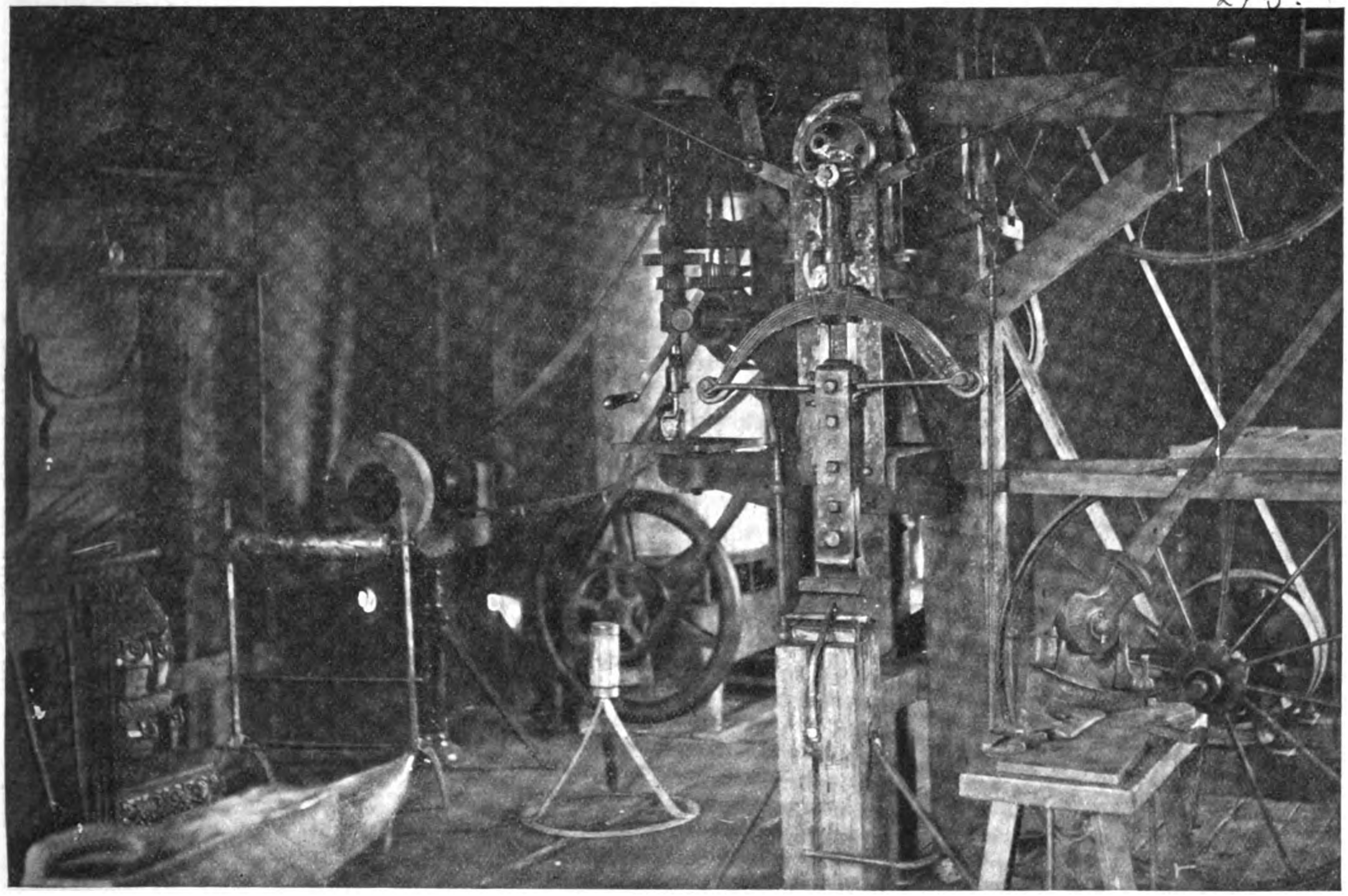

A VIEW OF BROTHER F. E. POBST'S "BUSY CORNER," SHOWING SEVERAL OF HIS SHOP-MADE MACHINES

I wish to say here that I can trace back almost a hundred years to find our family in the craft continuously,—a fact which I am proud of. Let us hear from those that can beat that.

I love the trade and am pleased to have an opportunity to help my brothers, and if this article proves to be the means of doing so it has filled its mission.

A Letter from Washington State.

JAMES NEWTON ROGERS.

I think your paper the best smith paper I have ever seen, and I cannot express to you the satisfaction I have had from its pages. I can assure you that your paper has been more help to me and I got more kinks from it than I can begin to tell now. I am free to say that I can now do nearly any kind of a job that turns up on a ranch. What success I have made at this work is largely due to your paper. I also found the advertisements very helpful in buying things, and they also keep one up-to-date in all new things that come on the market. You have an exceptionally fine list of advertisements and I am free to say that in every case where I have purchased I have been well satisfied.

Automobile Repairs.

E. F. LAKE.

Many of the breaks which occur in automobiles are of such a nature that the ordinary methods in vogue in the average blacksmith shop are of but little use. This is owing to the parts being fitted to and connected with others in such a manner that a variation of one eighth of an inch in their size is liable to disturb the entire mechanism of the car and destroy its running qualities. But if the smith keeps up to date with his methods and appliances for doing the work that is brought to him he can repair as well as any other mechanic many of the parts which cause break-downs to the automobile.

Take, for instance, the front axle of an automobile. Most of these are of a design similar to that shown in Fig. 1, and they are liable to break at A or B, or in any other part of their length. To weld these at the breaks by the ordinary methods would throw the holes CC out of their centers, and the steering reach rod, which is directly back of the axle, would not fit into the holes in the steering knuckle jaw at E, Fig. 2, or the spring seats as shown at D, Fig. 1, would not fit as they should. Then, again, the steel might be of a composition that does not lend itself readily to the ordinary methods of welding, in which case the weld could not be made strong enough to carry the car very far. 263.

If the smith will provide himself with the apparatus for thermit welding which has been described in THE AMERICAN BLACKSMITH, a full outfit of which can be purchased for from $25.00 to $30.00 that is large enough for this class of work, he will be able to weld all of these parts and keep them the exact size that they were before broken, as well as to weld them no matter what kind of steel or iron they may be composed of, as the thermit process melts the metal and runs it together, which is fully described in the instructions sent with the apparatus.

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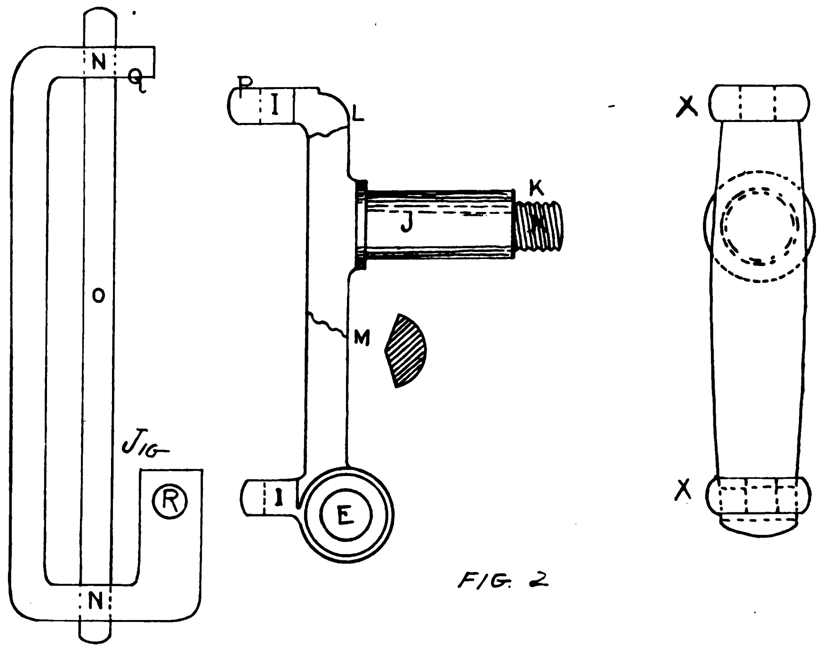

FIG. 2

THE STEERING KNUCKLE IS ANOTHER SOURCE OF TROUBLE TO THE AUTOMOBILIST

To weld the axle a jig would have to be made that would hold it in position. This could be done by taking a flat bar of iron as shown by F, drilling two holes in it at GG, and driving two pieces of round iron in them that would be a good fit in the holes CC; then two pieces of iron could be fastened to F that would be the right size for the spring seats DD to rest on and allow the axle at HH to rest against the bar F. The axle could then be clamped to the jig, the mold built around the axle at the break, the thermit steel melted and poured into the mold, and the axle taken off the jig and filled up to complete the job. The materials composing the jig can then be used for any other job which may come in, as the smith would probably never get another axle of the same size to weld.

The steering knuckle, as shown by Fig. 2, is another source of trouble to the automobilist, owing to the hard usage which it gets. This fits over the ends of the axle, and a bolt is passed through

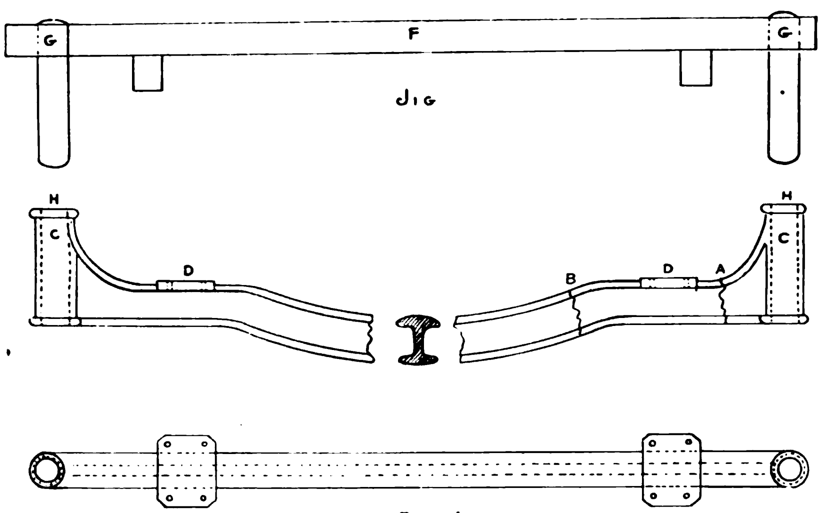

FIG 1

SHOWING HOW THE FRONT AXLE OF AN AUTOMOBILE IS REPAIRED

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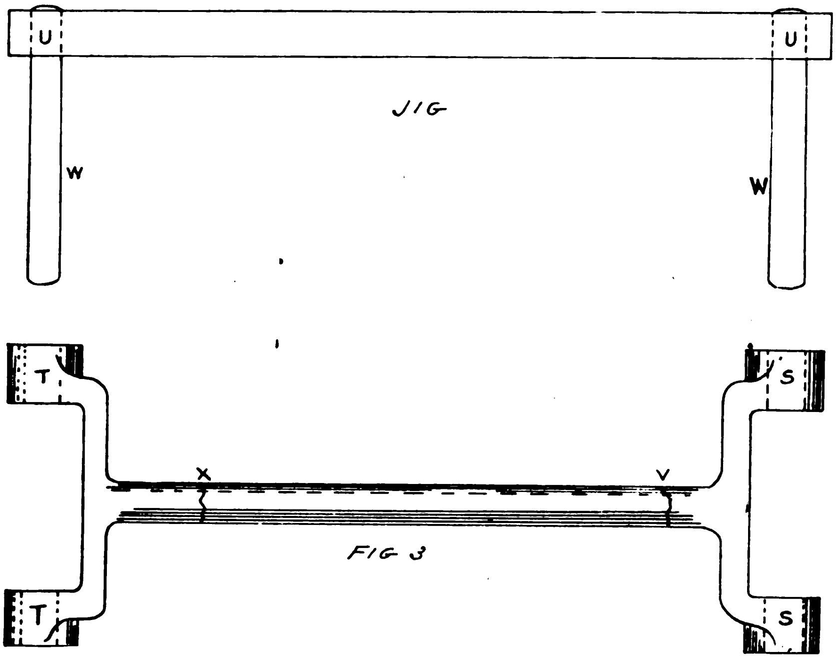


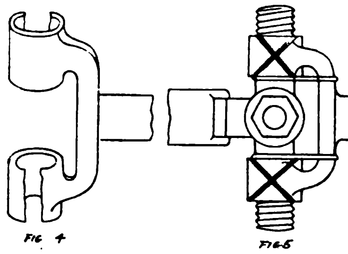
THE DRIVING SHAFT HAVING A UNIVERSAL JOINT AT EACH END MUST BE KEPT TO EXACT SIZE

the holes I I of the steering knuckle jaw and the hole C of the axle, and this bolt holds them together. The wheel runs on the round part marked J and is held on by a hub cap and nut at K. Breaks in the steering knuckle jaw usually occur at the places shown by L and M, and a simple jig can be made to hold this while welding by taking a flat piece of iron or steel and bending it around in the shape as shown at XX. After bending it a hole can be drilled through at NN, and the rod O put through the holes NN in the jig and the holes I I in the steering knuckle jaw. The surface P should be pressed up against the surface Q on the jig, the hole R drilled and a pin put through this and the hole E. This will hold it in position while the mold is being built and the thermit steel poured in.

Another piece that can be welded successfully only by the thermit process is the driving shaft shown by Fig. 3, as this has a universal joint connection at each end and must be kept exactly to size, as well as the holes S and T, parallel. For these reasons the jig as shown, must be made by taking a flat bar of iron, drilling the holes UU in it, and driving the pins WW into them. Care must be used in drilling the holes as the pins must be perpendicular and parallel and of the correct distance between centers. Breaks in this piece are liable to occur, as shown at V and X, and after clamping the piece to the jig it can be welded the same as the other pieces described.

If the different parts that need welding are accessible, they can be welded as they are assembled on the automobile, thus saving the work of taking down the car and setting it up again, which is a considerable item of time and expense, but many parts which can be welded by the thermit

265.



ANOTHER CAUSE OF TROUBLE IS THE WEARING OF THE UNIVERSAL JOINT BEARINGS

process will have to be taken off the car, as there is not room to surround the break with the mold that is necessary.

Another cause of trouble is the wearing through of the universal joint, as shown by Fig. 4. This can be fixed permanently by the blacksmith only when a machine shop is handy. Then the smith can forge a new end and the machinist can drill the hole out and face off the lugs to make it fit the other parts. A temporary repair can be made by the smith who has no machine shop available by wiring up the joint as shown in Fig. 5. This can be done by allowing the shaft to make a half revolution so that the pins of the universal butt on the outer faces of the yoke; then it can be wired into place with any strong wire, and as long as the car is not reversed and only the hub brakes used it can be made to complete its journey, or until a new part can be secured to replace the one worn out.

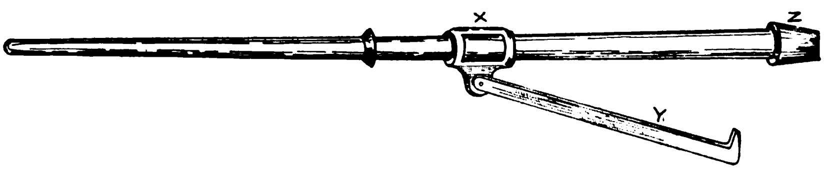
All things taken into consideration, such, for instance, as the machinery and fitting of the parts after they are welded, the thermit process of welding is about as cheap as the ordinary welds used by the smith for automobile repairs. The process is very simple, although it takes some practice and experience to get the best results, the same as any other kind of mechanical work does; and the directions sent out with the outfit must be closely followed, as its action is instantaneous, the labor that is attached to it being the preliminaries, such as making the mold, cleaning the joint to be welded, melting the thermit, etc. Thermit is not an explosive, and requires a temperature as high as that of liquid steel to even ignite it; therefore it is perfectly safe for storing and handling. It becomes liquid in less than a minute after the ignition powder is lighted and has a temperature of twice that of liquid steel running out of a converter; therefore it thoroughly fuses with the pieces to be joined.

A Shop-Made Bolt Holder.

GEORGE D. WOODS.

The accompanying illustration shows a very serviceable bolt holder for holding plow bolts and any others that you can get hold of and want to hold. The bar consists of a piece of $\frac{5}{8}$-inch round iron, 12 inches long, welded onto a piece of $\frac{5}{8}$-inch square steel about 15 inches long. The point of welding between the iron and steel carries a shoulder. A slide as shown at X is made to slide over the piece of $\frac{5}{8}$-inch, square steel. The dog at Y is six inches long and the turn on the end is one inch long. The point of the bar at Z is two inches wide and drawn to a chisel edge.

363.



A SHOP-MADE BOLT HOLDER THAT IS EASILY MADE

Bending Stock at Right Angles.

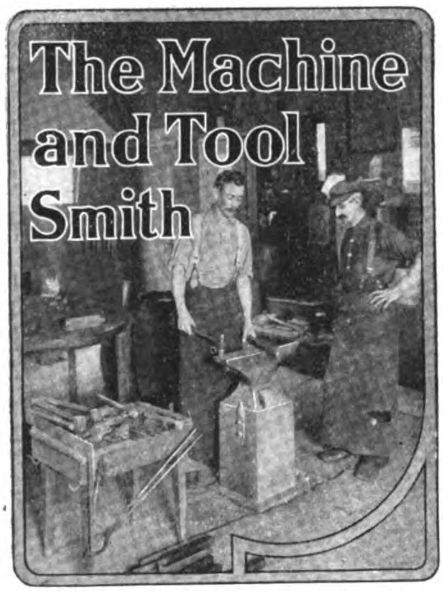
J. M. FIX.

Not more than one smith in eight or ten will make a perfect weld; not one in ten can bend an iron at right angles

256.

and make a square corner without spoiling it on the inside. Most of them run to the vise to bind it over. Some bind it over the square part of the anvil and spoil the inside or the sharp corner of the anvil. It can be done without either of these ways. Heat to a white heat and reduce the heat with water rapidly on each side of the mark at which you wish to bend. Then stick the hot part of the place where you want the bend past the further edge of the anvil or on the horn and strike with the hammer hurriedly till it is at a right angle on the anvil. If you want a perfectly square or sharp corner, heat the corner well and cool one end close down to the corner. Then set the angle on the anvil and strike down on the end or reverse this operation and place the end on the anvil and strike down on the angle. Use good common sense and you can make a perfect corner often at one heat, and quickly, too.

I have a tire measuring wheel which has nine welds in it, and not one can be found by filing or sandpapering. I worked at the trade long before I knew this could be done.



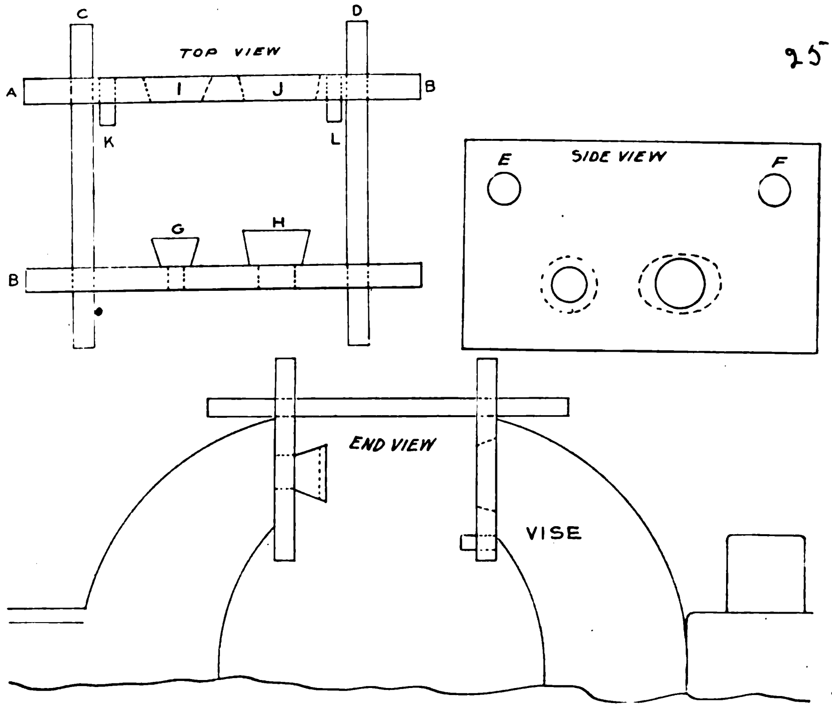
To Harden a Milling Cutter heat slowly and evenly to a low red, plunge in water about 70 degrees Fahrenheit until vibration is nearly finished, then plunge into oil and allow to cool off until entirely cold. W. P. WOODSIDE, Michigan.

The Fifteenth Annual Convention of the I. R. R. M. B. A.

The fifteenth annual convention of the International Railway Master Blacksmiths' Association was held at the Bath Hotel, Montreal, Canada, August 20, 21, 22. The meeting was called to order by President J. S. Sullivan. The association was welcomed to the city by Aldermen J. B. Clearhue, the Rev. W. D. Reid, of Taylow Presbyterian Church, and Mr. H. H. Vaughan, Superintendent of Motive Power of the Canadian Pacific Railway. The Secretary's report showed an increase in membership of thirty-six new members and a balance in the treasury.

Cincinnati was chosen as the next meeting place, and the following officers were elected:

President—G. H. Judy, B. & O. R. R., Allegheny, Pa.
First Vice-President—J. W. Russell, Pa. R. R., Renova, Pa.
Second Vice-President—G. W. Kelly, Cen. R. R. of N. J., Elizabeth, N. J
Sec. and Treas.—A. L. Woodworth, C., H. & D. R. R., Lima, Ohio.
Chemist—G.H. Williams, Medford, Mass.



A PUNCH PRESS THAT IS VERY SERVICEABLE FOR CERTAIN JOBS

A Simple Punch Press Easily Made.

L. A. CUPP.
Mexico.

The accompanying engraving shows a punch which I made and have used with satisfaction, and which may be of use to some reader of THE AMERICAN BLACKSMITH.

A job came to the shop which required a large number of pieces to be punched all the same. One of the holes was to be round and the other elliptical, ⅝ of an inch long and ½-inch wide. The round hole was ½-inch in diameter.

The holes were about ¾ of an inch apart, and the stock which was to be punched was $\frac{3}{32}$ of an inch thick by 1 inch wide.

Not having a hand or power punch I put into use a vise which is represented in the end view of the punch and die.

The plate A is 3½ inches long by ¼-inch thick and 2 inches wide. The plate is of steel.

Plate B is the same dimensions as A but is of iron. At the upper side of the two plates two ¼-inch holes are drilled, E and F, through these holes two ¼-inch iron rods are inserted. The rods must not fit very tight, but just so the plates slide easily on them. The purpose of the rods is to serve as guides, so that the punches G and H will go through the stock and hit the dies I and J square. The top of the punches are not parallel with the plate B but at a slight angle. The purpose is to get a shearing cut. H is also a little higher than G so that the higher one will cut through before the other one begins its work. The two little studs or pins, K and L, are only guides for the stock.

The complete punch press is now dropped in between the jaws of a parallel jaw vise, the stock put into position, the vise tightened up, and when the stock is punched through you will have a good, clean cut.

A Few of the Leaks in the Average Smith Shop.

J. M. FIX.

The object of this article is to assist the smith in finding the leaks in his

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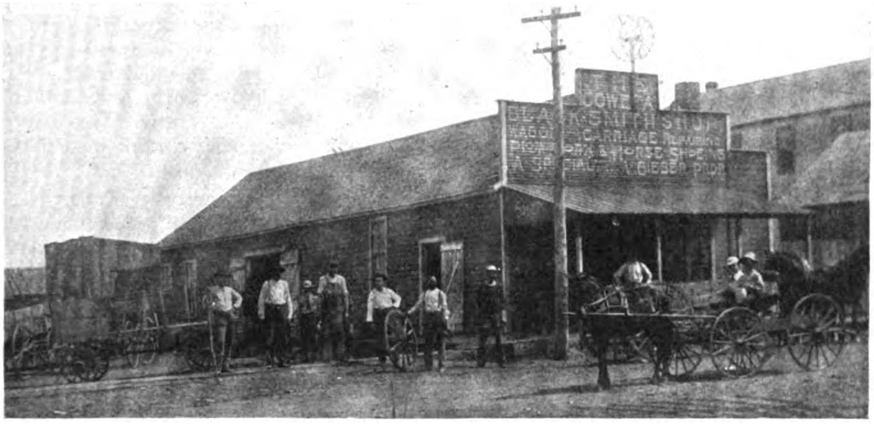


A LARGE GENERAL SHOP OF INDIAN TERRITORY RUN BY GAS POWER

shop—the little tiny holes that slowly but surely drain his already small profits. If the cases noted hit you, brother, heed them. If you can honestly say "Not guilty" to every case—well, you are a remarkable smith.

Most smiths after using a drawing knife or plane, will lay it down on a file or some other iron and dull it. It takes a man from 10 to 20 minutes to grind, and it will cost the time of the man in grinding and that part of the tool worn off at each grinding. Many crowd a good bit through wood or iron and save a half minute on one hole and lose 30% of their time on the next 100 or 1,000 and expend 50% more energy in turning them through. When drawing gasoline from a tank, the vent plug has to be loosened. When through, the smith leaves it open, and gasoline evaporates very rapidly. In this locality the water contains lime and alkali. In using galvanized or tin pails and setting them down with a little water in them, they soon rust through. But if the pail is turned bottom up they will dry out instead of rust out. The writer has turned buckets over dozens of times, immediately following someone just setting it down, and, notwithstanding the oft-repeated lesson, they will continue the old way. Take it in the use of materials: One man wants to use a piece of iron: he will cut off two or three inches longer, and when it is finished the two or three inches is wasted. Perhaps 10 to 25% look at the loss with a "Better to have plenty than too little" rule. But when it is not required what is the excuse for wasting it? In oiling a bit when drilling holes they will put a lot of oil right down on the work. Here it will spread out and 99% of it is absolutely wasted, while if they would put the oil way up on the bit it would run right down in the hole almost continually and at least 50% of it would be used to best advantage. When cutting threads they will smear the tools all over and leave them in that condition. The vise, too, is dobbed all over and left in that state. When they take a bar of iron out of the rack to use a piece, if they put it back at all they will put it in some other division out of its class. Then when a similar bar is wanted they will perhaps take another or new bar instead of the same one and perhaps put that in still another division where it does not belong.

In setting tires here, where wood costs $8.00 a cord, anyone who is familiar with this branch of the business will know there is almost always from 10 to 25% of the wood which is not burned up when you take out your tires. If their attention is not called to the fact, what will nine out of ten do? Let the wood burn into ashes in place of throwing water on it just as soon as possible, saving 10 to 25% for your next lot. In ten settings you would have saved enough fuel to make one complete setting, and in many instances you would do so in four or five. We could go on multiplying these examples by the dozen, and still some smiths wonder where their profits go and why they are not better off.

A Large General Shop of Indian Territory.

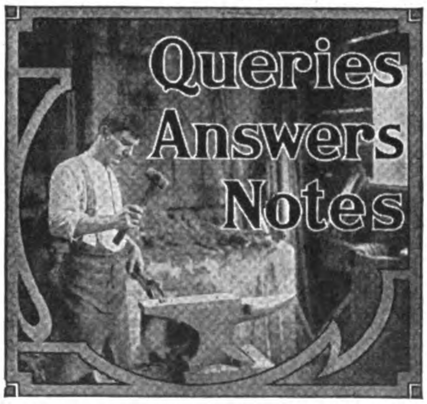
V. GIEBER.

The size of my shop is 24 by 72, all floored and inside walls whitewashed. We have a paint room at the back, also a coal house and a stock house. This is the best-equipped shop in the Indian Territory, and the largest one with power. Our equipment consists of a Little Giant trip hammer, a duplex iron shear, three forges with blast, a drill, a boring machine, an emery stand with rip saw combined, a hub-boring machine for buggy and wagon, a 10-horse power International gas engine, a Barcus shoeing stock, a four-fire Western Chief power blower. I carry a large stock of plows, wagons, and buggies, and buy coal in car lots.

I will give a list of my prices.

New 12-inch cru. plowshares ...	$2.50
New 14-inch cru. plowshares ...	3.00
New 16-inch cru. plowshares ...	3.25
Pointing from 12 to 16-inch $.65 to	.75
Sharpening shares .... .15 to	.25
Setting wagon tires	2.00
Setting buggy tires	3.00
Horseshoeing, plain	1.00
Horseshoeing, toed	1.25
New spokes in wagon, each	.20
Buggy spokes, each	.20
New wagon backs, 3-inch, with box seat	1.75
New wagon axles:	
Front	4.00
Hind	3.50
New wagon tongues	2.75
Buggy tongues	3.25
New wagon felloes	.25
New buggy rims	1.25
New axles .... 6.00 to	7.00
Four new wagon skeins put on, 3-inch	7.00
Four new wagon skeins put on, 3½-inch	8.00
New wagon box with side boards complete	14.00
Lower box, all new, painted....	10.00
Setting a spring buggy axle....	1.00

I do a cash business and pay cash for everything I get, and I pay my help every night.



The following columns are intended for the convenience of all readers for discussions upon blacksmithing, horseshoeing, carriage building and allied topics. Questions, answers and comments are solicited and are always acceptable. Names omitted and addresses supplied upon request.

To Shoe an Interfering Trotter.—In reply to Nat Doherty, of Nova Scotia, will say that I have found the following method a success for shoeing an interfering trotter. Weight the outside of the front shoes and the inside of the hind. J. W. MILES, Utah.

A Note from the Pacific Coast.—I like "Our Paper" very much. Would not be without it. I have a good shop and the best of tools. My shop is 50 by 70 feet. I have three fires and use electricity for power. I have a five-horsepower motor. I did $5,000 business last year with one man and myself. C. M. HILL, California.

Can Some Experienced Smith Reply?—Will some brother smith tell me what to put on the wagon axle where the skeins go and how to prepare it? The wagons that are put up in the factory have something on the end of the axle. It looks like red lead and is as hard as the thread. I want some brother to tell me how to prepare this stuff for use. W. H. TEDFORD, Tennessee.

Worth Five Times Its Cost.—Here is my renewal for the paper. I am certainly glad to make its acquaintance, for I have received more information from its pages than from any other paper I ever read. And any brother who takes the paper and will read and study it will receive valuable information just as I have. One copy brought me five times its cost. I could not get along without THE AMERICAN BLACKSMITH, "Our Journal." F. W. HERTEL, Oklahoma.

Wants to Cure Quittor.—I would like to inquire of someone who knows what to do for a quittor in a horse's foot. It cracks off from the wall or fleshy part of foot and seems to be half rotten. The horse is lame in spells and foot smells like thrush in a bad form. The shell starts off each side of frog and peels off up as far as the hair, letting in dirt, and it bleeds some. I would like to find out what to do for it. The horse has had large corns. Can some brother help me? W. B. MILLS, Maine.

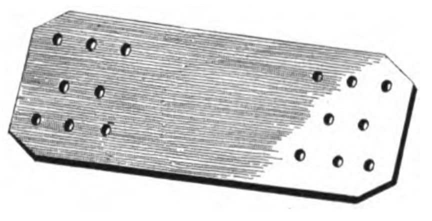
He Knows a Good Thing.—I must say that you have an excellent journal. I have been approached several times to change my paper for something better (?), but I can't see it that way. You certainly deserve the hearty support of every true craftsman; you have mine and I will do all I can to have others see it the way I do. I am somewhat of a reader and I am pretty sure that I know a good thing when I see it. JOHN M. PFEIFFER, Wisconsin.

A Colorado General Shop.—I have the best shop in Morgan County, all new tools and up-to-date. I have a five-horsepower Alamo gasoline engine, a Little Giant trip hammer, a band saw and circular saw, a Little Giant bolt threading machine, an engine lathe, and an emery stand. I have purchased all of these tools since I came to this town. Prices are good here and there is plenty of work. I do all of my own work. I do not shoe horses; I quit this branch of the trade about a year ago, but, then, I have all I can do without the shoeing. MR. JESSE HAND, Colorado.

A General Shop of South Dakota.—I came here nearly three years ago, and, while I started with almost nothing, I have done real well. I have a homestead adjoining the town and a well-equipped shop in a good location in a thriving town. I have a Michigan gas engine that furnishes power for a polisher, a hammer, and a plow disk sharpener, and carry a large stock of supplies. The accompanying engraving shows a busy corner in my shop. There is work in here for two men the year around, but as I can't depend on help, I have to go it alone. G. A. TAYLOR, South Dakota.

Wants More Brazing Hints.—Allow me space in "Our Valuable Journal" to make a little inquiry. I am very much interested in the brazing art. I have seen those that could do it and those that have done it, but have never seen it done; still, that is not saying it can't be done. Brother S. J. Pemberton, in the August issue, seems to be very successful at the art. Now, I know the work has to be thoroughly cleaned and clamped, but how under all creation are we to get a clamp that will answer all purposes without making a clamp to hold every piece of work? I have tried some brazing methods for cast iron, but without success. A little more information will greatly oblige. JAS. D. ENNIS, Florida.

Appreciation and a Quarter Crack.—I have been a reader of THE AMERICAN BLACKSMITH for only the past four months, but very glad I am, as the journal is a good helpmate in the shop. Many a time you are in need of information and you can fall back to "Our Journal." I would like to see every American blacksmith read it, as no blacksmith can be without it and get along successfully unless he has the journal. I wasted a great deal of life without any journal until I heard of THE AMERICAN BLACKSMITH. Now I am continually looking for the next issue, and I can hardly wait until it comes.



A PLATE OF HOOP-IRON TO KEEP THE HOOF CRACK FROM SPREADING

I saw in one issue of your journal that a brother would like to heal a quarter crack. He should put on the foot a stiff, common shoe with not too much pressure on the sore heel. Then take a piece of hoop-iron, one inch wide, put 12 or 14 holes in it, countersunk enough for screws No. 1 by ¼. Place the plate within ½ inch of top of hoof and never allow horse to be ridden or galloped, or to be let loose in pasture until healed. He should be reshod every four weeks, and success is yours. In case the plate grows too near the bottom of hoof renew as before. G. W. H., Ohio.

A Question on Steel.—I want to ask a question of the steel workers. Have they ever tried to work steel when it is overheated, or do they simply cut it off? One day when I had nothing else to do I overheated and worked every hand punch and cold chisel, both head and point, and I can't say I found any difference in them. When you take them out of the fire give them a light, upsetting blow on the point until you see them work together. Then upset and hammer on the anvil quick and hard. The first time you may not catch it, but there is a time in the heat when they will work together. I do not say that it is of practical value, but a burned place in steel may be restored if it is in a shape to be hammered. C. L. MOULTON, Washington.

An Interesting Letter from Missouri.—I have only been here a little over two years, but have built up a splendid trade. I do no shoeing or plow work, and the only helper I have is my wife. We can do $150.00 worth of buggy work in a month and not work hard.

I only have two fingers on my left hand, so cannot handle iron and tongs, like a full-fingered man can. So my wife helps at the fire, takes out the bolts and rebolts wheels. We have taken off four old tires, bent, welded, set, drilled, and bolted four wheels, and delayed the customer but four hours. I use hand power only in the shop. I have a drill with a drive wheel from a corn sheller on it, and can drill 72 holes and countersink them in ⅝-inch steel tire in one hour and ten minutes. Some of my customers come 22 miles; in fact, I have the buggy work of the county. My shop is 36x50 feet. The wood shop 20 by 50, is lathed and plastered, so I have a warm shop for winter work JAS. F. BOYD.

An Australian Letter.—It may be interesting to you to know a little about this place. It is a seaside place. I am the only blacksmith. I do all the work myself with the help of a boy. There are four hotels, four stores, and scores of boarding houses here. For business we depend upon people from other places, so there is very little doing here in the winter season. This is a farming district, but the farms are small. In Maryborough there is a sugar factory, a butter factory, a flour mill, three sawmills, a door and sash factory, and two foundries. This place is about twenty-five miles from here and we are connected by rail. In the summer season it is nearly all horseshoeing and repairing buggies and traps, and in the slack season I build new buggies and surreys. I get from $14 to $30 for surreys. I notice, in your paper, that buggies are turned out in the States far cheaper than we can do them for here. N. ANDERSON, Australia.

How to Harden Shares and Shovels.—In answer to Daniel Jones's inquiry in regard to hardening shares and cultivator shovels, I would say: First, it is necessary to use soft center shares and shovels. For plow shares take a piece of 1½ by ½ inch wagon tire and bolt on back of share. Then heat to cherry red and sprinkle while in the fire with pulverized cyanide of potassium on face of share, being careful not to inhale any fumes, as cyanide is poison. Then plunge in slack tub edge first. The tire iron on back of share prevents share from warping. Leave in the tub until cool, then polish.

For cultivator shovels: Heat to cherry red and sprinkle with cyanide of potassium all over face, then cool slightly each cutting edge of shovel ⅜-inch from edge, then plunge in tub. Take a baking powder can and perforate the lid like a pepper box and nail it to a stick. You can easily sprinkle shovels by this means without danger of inhaling fumes. W. T. WELCH, Illinois.

A Wisconsin Letter.—You perhaps know that I think "Our Journal" the best paper of the kind that I know anything about. I could not get along without the journal. I learn something new in every number. As I have been shoeing horses for thirty years I am very much interested in the shoeing department. My shop is located on the main street of a beautiful little city of 35,000 inhabitants with a good farming community around and plenty of work to be done. We have six shops here, but are not organized. Some of the shops here get 20 and 40 cents per shoe, while others shoe for 15 and 37½. My shop is 32 by 60 feet and of solid brick. As to tools I have two blowers, a Plymouth punch and shear that I like very much, a Champion drill, a Stoddart tire shrinker and a Shaw cold tire setter, and such other tools that go to make up an outfit for general work. As to a side line, I sell a few buggies and implements, mower repairs, such as sections, guards, cultivators, shovels, etc., which all help to keep me busy about all the time. N. P. PETERSEN, Wisconsin.

AN UP-TO-DATE GENERAL SHOP OF WISCONSIN

Some Texas Prices.—I am a reader of "Our Journal" and I would not be without it for anything. I am located in a little new railroad town. My shop is well equipped with tools. I have a 5 H. P. Fairbanks Gas Engine that I pull my tools with, a two-fire power blower and one steel blower, a wood-turning lathe, one emery stand, three grindstones, two drill presses, one Edwards shear, one Stoddart upsetter, one jig saw, two vises, and plenty of other tools. The shop is 24 by 42 feet. Here I can make anything of wood or iron. I also have a little waterworks for a side line. Have made me an automobile and use it to run about with and pump water for my waterworks. I should like to know through "Our Journal" what chemical to use to melt brass, also the cost. Will someone send me the name of such chemical and the amount required for one hundred pounds of brass, and cost? I should also like plans for building a home-made furnace that could be easily made. I will give some prices:

4 Horseshoes	$1.50
1 Wagon Tongue	3.00
2 Buggy Shafts	2.50
1 pair Cross Bars	.75
4 Wagon Tires Set	2.00
4 Buggy Tires	3.00
1 Wagon Axle	3.00
1 Wagon Hound	1.50

All other work in proportion. I hope I will soon hear through "Our Journal" regarding the questions I have asked about melting brass. J. M. ROBBINS, Texas.

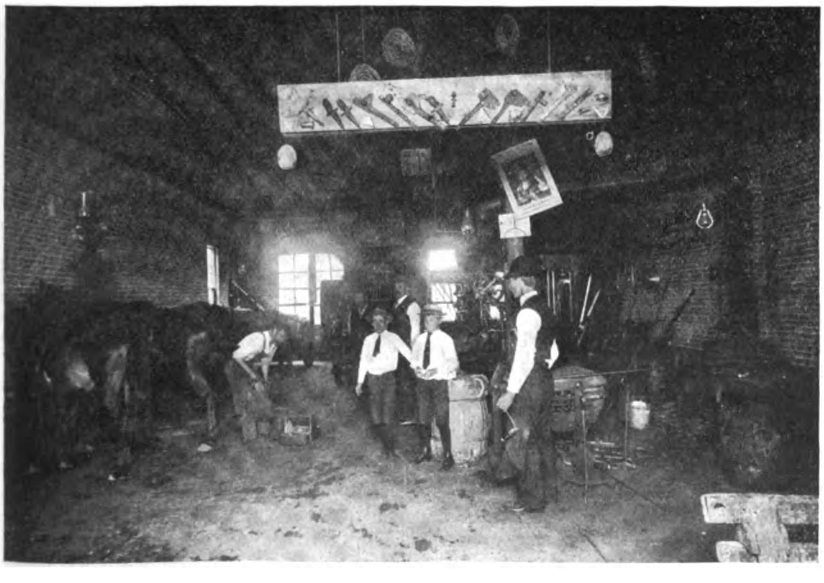
A Letter from a Texas Smith.—I am a lover of THE AMERICAN BLACKSMITH, and in looking over my August number and reading the good letters from different ones who are young in the business, I thought I would write a few lines from this part of the world. I am located on the line between Texas and New Mexico. I have been in the blacksmithing work three years and like the business very much. I want to become a first-class horseshoer, as I would rather to that kind of work than any other in the shop.

I have a broncho, a narrow-heeled mule, that limps all the time when he is on hard road. I shod him this way: I cut the heel low, put a shoe with a thin heel on and put on oil of spike and oil of turpentine. The mule was better within ten days, but a man began working him to a wagon on a hard road and he limped again. I shod him the second time, pared the foot good, fit the shoe with light, low calks, turned them out, and put a piece of leather packed with cotton under the shoe. I put oil of spike and oil of turpentine in the cotton. He seems to be a great deal better. If I am wrong in doing this way I would like some brother smith to tell me. I have another mule with the seedy toe; at least, the outside wall is loose for two inches from the inside sole. What must I do in a case like this?

I will give you some of our prices here:

New shoes	$1.50
Resetting	1.00
Buggy tires set	2.75
Wagon tires set, hot or cold	2.50
Buggy stubs, per set, 1-in.	8.00
Wheel filled	$4.50 to 5.00
Wagon tongues	3.50
Plow sharpening	.25 to .45
Pointing	.75 to 1.00

We have a band saw, a rip saw, an emery stand, a trip hammer, a lathe, a 2½ horse-power Weber engine. I don't see how I could do without THE AMERICAN BLACKSMITH. W. H. SMITH, Texas.



THIS WISCONSIN SHOP IS LIGHTED BY ELECTRICITY AND IS WELL EQUIPPED

Some Plain Talk on Changing Locations in General and Going to New Mexico in Particular.

I'm considerable smarter than I was before I wrote that article about a chance for a good blacksmith in San Rafael, and the particular point of smartness consists in having a clearer idea as to the extensive circulation of THE AMERICAN BLACKSMITH. Letters from smiths have been rolling in on me from all over the Republic and from Canada. Every mail keeps bringing 'em.

I will write personally to those that enclosed stamps, and if you will kindly favor me with a small space in your most widely-read publication, I'll reply to the rest in a general letter.

To begin with I want to say to all,—don't think for a minute of selling out your property, giving up a good place or otherwise committing yourselves to a move to this or any other new place, where the conditions are so entirely and utterly different from those you have been accustomed to for years. There are excursions every little while that will enable one to go to and from any part of the United States for a moderate sum. And these rates carry with them stop-over privileges that will enable you to look over the ground and see just what the location is, the cost of living and how prices run. Although as to prices here I can say in a general way they are about once and a half what they are in the middle states. This for both living expenses and prices for work. Under no circumstances would I advise a man to burn his ships behind him and come out here or anywhere else.

This country is a lonesome one for women and children. The Mission school is good as far as it goes, but it don't reach above the primary and intermediate work and the teachers are too overloaded with work to do much extra for American pupils, although they are conscientious about doing their duty as well as circumstances will allow. The water is fairly good, but has some alkali, and for awhile after a person comes here he is apt to have some diarrhœa. There are days when we don't speak half a dozen English words outside our own family, and we don't mind it, either, for "we are used to it now." There was a time, however, when my wife and daughter were not accustomed to life as we find it here, and many times I've come in to find them hastily wiping signs of tears from their eyes. But partly through force of circumstances and through our firm belief that this was a good point and had a future we have hung on till now we are doing well and picking up business every year. A blacksmith locating here would in one respect have an easier time than I had at first, because he would find the people unanimously awake to the worth of blacksmith services. When I came they didn't know that an American doctor was any better than their own medicine woman, and I had to work mighty hard to show them that an American's word was as good as gold and that his medicines would relieve, if there was any chance at all. My wife and daughter have both learned to speak Spanish pretty well and have formed friendships with some of their neighbors that enable them to have a good deal more social pleasure than at first. But it was long, slow work, and we were here two years before we could begin to notice a difference and to feel that the people really were taking us into their confidence and treating us as neighbors.

"What! neighbor with Mexicans!"—I can just see the contemptuous expression with which some of the Americans back east will utter these words; and I will simply say that I am well content with Mexican neighbors, and, judging from our own experience, I'd rather live here than in the average American community of similar size. They are better pay and expect less. They are not so prone to kick and fuss about what one does, as Americans are. Of course, there are mean people among all races and the Mexican race is no exception, but, as I've said before, taking them as they come, they're pretty good chaps. If a man will come here, settle down to business and stay for six months the chances are he'll never want to live outside of New Mexico again, although he'll have his spells of the "blues," when he'll cuss New Mexico and everything in it, just as he'd do anywhere else. But, just the same, if he does get up and pull out he'll wish he was back and will probably come back if he can borrow the price of the move. At least that's been the experience I've had with people during the last twenty-five years of life out here.

San Rafael has about 400 families. There are many ranches in the country about and the owners and employees all come here and to Grants, which is on the railroad four miles from here, to do their trading and outfitting. The income from the sheep industry alone won't fall much short of $200,000.00 a year, and besides, there are a good many cattle and other industries that bring money into the country, and a good proportion of all is spent here. Wages are getting better all the time and, while a majority of the men work at herding or something else connected with sheep, most every one has a wagon, a little strip of land, which though they farm in a haphazard way, it wears out tools and makes work for a smith. But there'll be mighty little time for a good smith to fool with a farm, for as soon as folks find that he can do good work and will do it with some sort of neatness and despatch, they'll give him all the active employment he wants.

The work as nearly as I can judge will run about three-quarters wagon and buggy work and the other quarter divided between mowing machines, pumps, windmill, gun, and general repairing. I feel confident it will keep one smith and a good helper busy all the time. A small engine and two or three power tools would be useful. The smith that has been here and is here yet buys most or all his material from Albuquerque in small lots, and, of course, gets skinned. When anything goes to the shop you may get it that day or a year from that day, or he may let it stay there till you get disgusted and bring it home. He has had up till here lately a good equipment of hand tools, which were furnished by an American, who was in the general store. But about three months ago the merchant went smash and since that the smith has had mighty little to work with. He told me a few days ago that he'd ordered a first-class outfit, and there was everything that a smith could possibly need. It is undoubtedly a complete (?) lay-out, for it cost $69.00, besides the freight. Figure it out for yourselves. This man is a good fellow all right, but he's not a regular smith and, besides that, he drinks so there is no regularity about his working, and lots of people have taken to sending their work clear to Albuquerque or else just letting things go as long as they will and finally, when they fall clear down, buying new implements.

We are not on the railroad, because when this was laid out San Rafael was only about half a dozen mud houses, laid right up against the foot of a high mesa whic railroad had to dodge. The climate is delightful, except when we have an oc sional sand storm, and they are a frig There are no bad Indians, no outlaws, a in general I should say life was as safe he as it could be anywhere. The country i healthy. There is wood in the mountains to be had for the hauling, and it costs tw dollars for a big wagonload, if you want to buy it. Rents are reasonable. Fresh meat is fairly plentiful and is about ten cents a pound. Gardens do well here most years, and we've raised some of the finest cabbage, beets, onions, and other things that will grow quick and are not tender to cold, that I ever tasted. Fruit is brought in by the Pueblo Indians and is pretty high. The schools are good as far as they go, but they can't take a pupil past the common-school grades. There is one Catholic church, the service is in Spanish, the father is French, and speaks English perfectly. He is a most charming man and comes regularly once a month. There are half a dozen stores, a postoffice, a telephone line connects the town with the railroad station and is being built to surrounding towns. These surrounding towns are tributary to San Rafael and a lot of trade would come from them to a good smith, as they are too small to support one of their own.

In short I will say to all who have a good home and an established business that is paying fairly well, don't sell out and come here or any here else. If you've already got a start, stay right with it. Your knowledge of local conditions, of who is good pay and who is bad pay, of whom to humor and whom to bluff is capital invested in your business that is just as valuable as are your anvil or other tools. If you move you lose all that. If you have children that are approaching man or womanhood and need high-school and social advantages, if you yourself are middle aged, or even a little more, if your wife is a woman that would be likely to take the change pretty hard and miss the thousand and one little comforts and pleasures incident to the middle or eastern states, or to anyone who looks down on other people just because they are not white, or to people that are not accustomed to look at things as we do, **don't come.**

If you are a young man or have only a small family, if you and your wife are willing and ready to put up with some discomforts and to try to adapt yourselves to entirely different conditions of life, if you have faith in the future and will try to build yourself and your community and business up, and are fixed so you can start up a moderately good shop, as far as tools and work go, or if you have asthma or your wife or someone of your family has consumption in its earlier stages, and you can depend upon the family to go slow and take it easy till they get their bearings so to speak, then come out here and look this place over. I know you can do well and live easy compared to what I've seen of the lives of blacksmiths in locations in the older states. There is practically no competition, there are no walking delegates to boss you or your customers, there is no gas, electric light, and other high taxes. There is no bad company for the smaller children and there would be work enough to keep you busy and your mind off your troubles.

CHAS. M. GROVER, M. D.

VOLUME 7 NUMBER 2

THE AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

BUFFALO
N.Y. U.S.A.

NOVEMBER, 1907

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"Intercourse and Progress always go hand in hand."—Buxton.

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In Prospect.

Of course, the numbers are planned in advance—it is necessary to a successful program. But the success of the issues depends upon you, Mr. Reader. The shop number, the ones on ornamental work and shop-made machines, cannot be a success unless we have your coöperation. We want photographs of shops, ornamental work, and shop-made machines. We want interior and exterior views, floor plans, pencil sketches, and items of explanation to go with them. Never mind about the language, just explain your photograph, sketch, or lay-out as best you can, and we'll do the rest. Send in your contribution early, so that it can be published in its own particular issue. If you haven't a photograph of the shop, send a pencil drawing of the floor plan, or the shopmade machines, but do let us have something from every one of "Our Folks."

We Want More Names.

We would like every English-speaking smith in the wide world a subscriber to The American Blacksmith. This, we admit is something of a daydream, because, no matter how clearly the advantages of taking a good craft paper are presented, there will always be some men who are so nearsighted as not to be able to realize the benefits.

We have an ambitious scheme, however, which can be more or less effectually carried out, and that is to put a sample copy of the paper in every shop in the land. But we can do this only with your help. We will stand the heavy expense which this will mean, but we must first have the names, and here is where your aid is necessary.

We would like every reader of The American Blacksmith who has the interest of the good old craft at heart, and who would like to do a little to raise its standard, to sit down the very day his eye meets this and send us a list of the names and addresses of every blacksmith, horseshoer, and wagon builder he knows of. We will promise to send to each of them a sample copy of the paper. We will, furthermore, promise you a substantial reward for your kindness in sending in the list. It will cost you about ten minutes' time and a two-cent stamp. Will you help us in our effort to spread knowledge and elevate the craft?

Contents, November, 1907.

The Missouri Contest.

The contest in Missouri, which came to a close September tenth, showed that the following smiths were entitled to awards: First, Mr. John E. Beatty; second, Mr. William P. Calvert; third, Mr. A. A. Schaeffer.

Those Long-Time Rates.

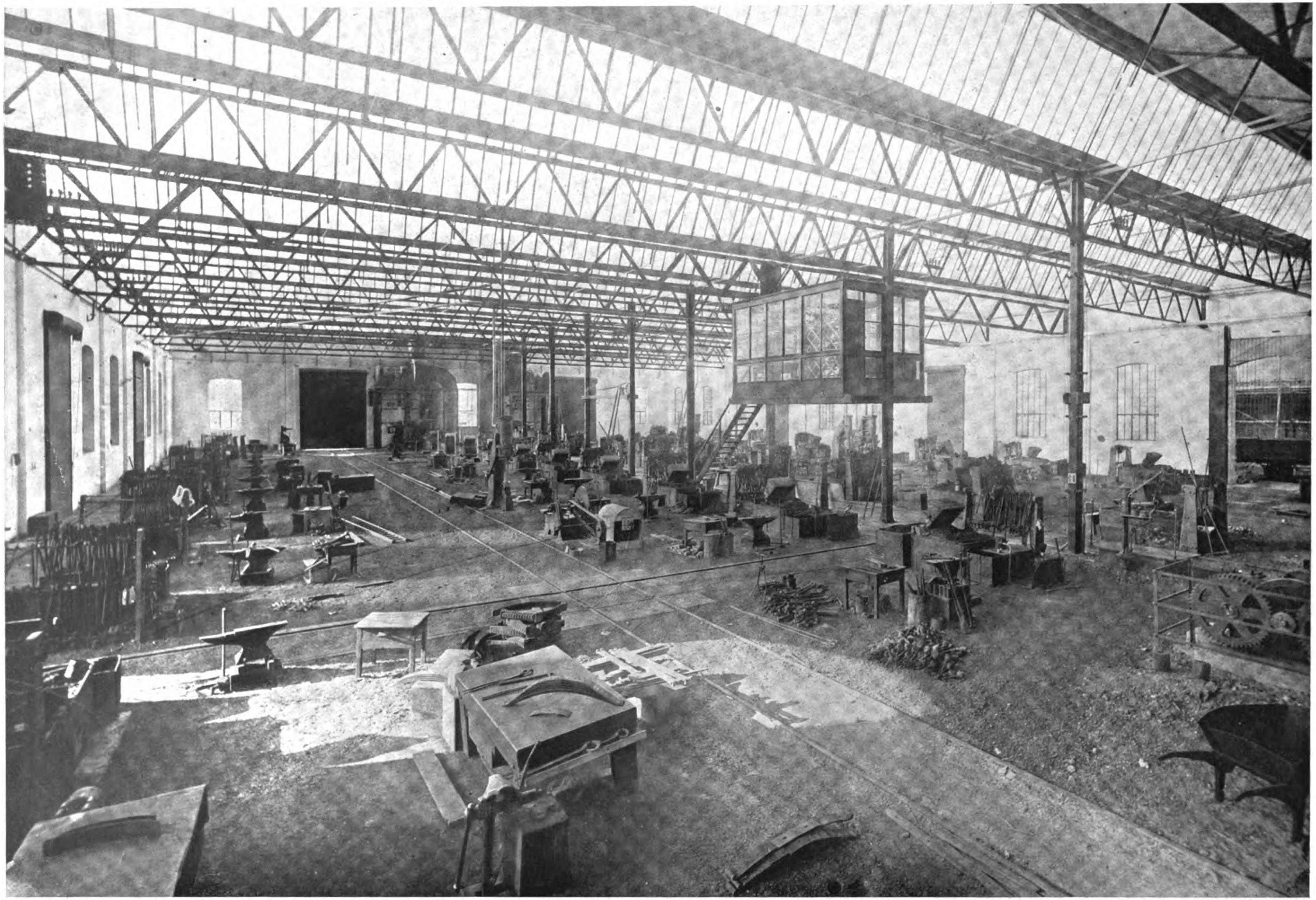
Probably our readers have all noticed that a great many publications of late have been substantially increasing their subscription prices. This is only fair and proper when you bear in mind that material, labor, and other items entering into printing a periodical have in the last few years increased anywhere from forty to sixty per cent. The cost of publishing The American Blacksmith has been heavily increasing for this reason, and still another big advance in our expenses takes effect with the October issue.

In spite of these considerations, however, we have decided not to make any increase in the subscription price of the paper. We believe that you, as a reader, and as a person to whom we look for steady support, will appreciate knowing the facts in the matter. The subscription price of the paper will not be raised for the present, which means that you get a greater value for your dollar, especially in view of the steady improvement which has been effected in the character of the publication.

We have even decided to continue our present long-time rate schedule, under the terms of which we offer two years for $1.60; three years for $2.00; four years for $2.50, and five years for $3.00. But our friends are especially desired to take note that these long-time rates are strictly and only for payment in advance. They are not good unless you renew your subscription within one month of the date that you receive notice of its expiration. Therefore, we would urge you to renew promptly.

Giving Credit.

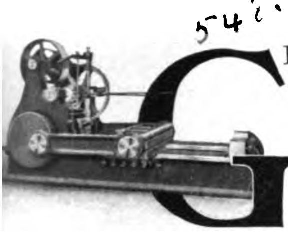
We are indebted to the E. W. Bliss Company, of Brooklyn, New York, and to the National Machinery Company, of Tiffin, Ohio, for the illustrations of bulldozers and forging machines shown this month.



THE QUEENSLAND GOVERNMENT RAILWAY FORGE SHOP, AUSTRALIA, IS A MODERN SHOP WITH A MODERN EQUIPMENT. HERE WE SEE THIRTY-FOUR FIRES AND FIVE STEAM HAMMERS UNDER ONE ROOF

Doing Work on the Forging Machine and the Bulldozer

S. J. UREN*

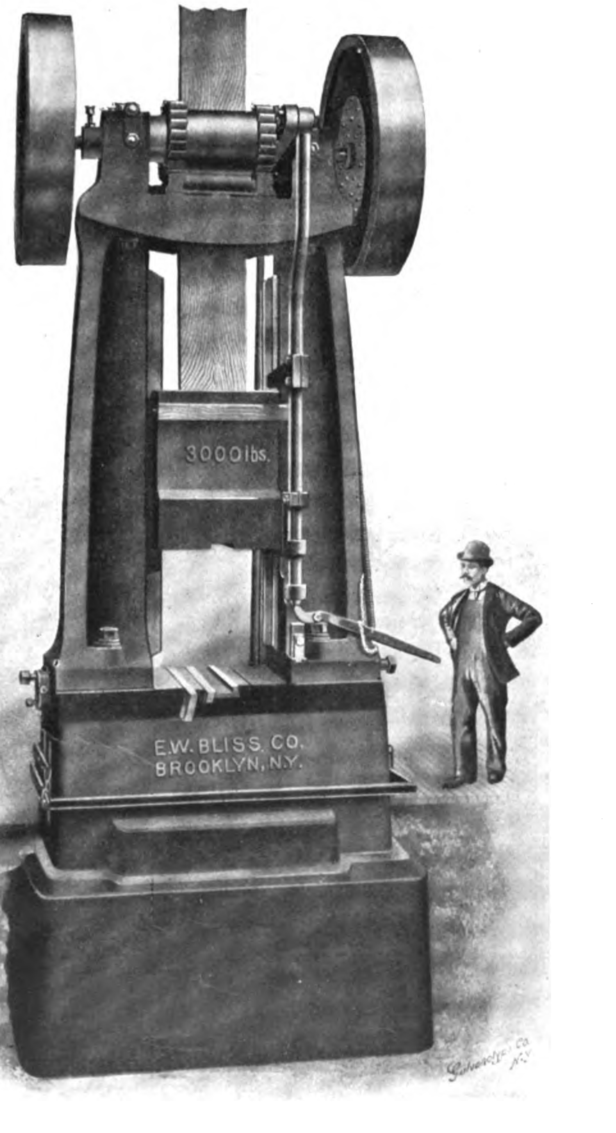


GENERALLY the first thing that enters the foreman's mind in a shop where there are orders for a large quantity of car and locomotive forgings coming in daily is how to get it done quickly, and I find by experience the best way is by the forging machine and bulldozer. The large amount of forgings that can be turned out of these machines daily is surprising, and no well-equipped shop should be without them. In our four-inch forging machine we are turning out the following: Swing hangers for passenger car trucks; bolsters for all baggage and postal cars; crown bars for locomotive boilers; crowfeet for locomotive boilers; drawbar straps foi baggage and freight cars; connecting rods for switch stands; slide plates for switches, and other forgings too numerous to mention.

In designing the dies for the different work that can be done on these machines, the first thing to do is to figure out the amount of stock it takes to make the piece required, which will give you the length of die to use. In making swing hangers for passenger car trucks, we use two pieces of iron $\frac{7}{8}$ inch by three inches by 19 inches long. We lay them together, put them in a small oil furnace, and in a very short time we have a welding heat about 10 inches long on them. We take them to the machine, place them in the dies, and press the lever down. The header enters the dies, the back-stop on the machine holds the iron from slipping back, and the head on the hanger is made. We then turn it around, put it in the same die a little higher up, and press the lever down. The mandrel in header block enters die, pushes the wings of the hanger apart, and the hanger is completed. We make from fifty to sixty of these hangers per day, so it does not take long for a machine of this kind to pay for itself. Care must be taken in setting dies in the machine, and all bolts must be tightened before starting.

The engravings show the dies used for making these hangers the length of headers and size of dies required. The die seat is twenty-one inches long when dies are closed and header-block is up to end of stroke. The space between header-block and dies is $4\frac{1}{8}$ inches. When shorter dies are used, the punch or header must be increased in length in same proportion. As the length of dies is decreased when headers, punches, or mandrels enter the dies, the distance they go into the dies must also be increased.

In making the bolsters for the tea and silk cars recently built in the Sacramento shops, we take our one by 12-inch bars, cut them off two inches longer than the length required, lay a piece of one by five by 12 inches on the end—this allows one inch on each end of the bar for upsetting and welding,—get a nice, white heat on the end of the bar, place it in the machine and press the lever down. The dies close; the header comes up, hits the end of the bar, welds and presses it into shape; and



AN AUTOMATIC FRICTION ROLL DROP HAMMER FOR FORGING DUPLICATE PARTS

*Mr. Uren is Assistant Foreman Blacksmith for the Southern Pacific Company, at Sacramento, California, and read this paper before the Foreman Blacksmith's convention at Montreal.

we have one end of the bolster completed. Reverse the end, go through the same operation, and we have a bolster completed in quicker time than it takes to explain it. I find by testing this class of work by the steam hammer process that it will stand a better test than similar work done by hand, and these ends are put on at the rate of twenty to twenty-five per day.

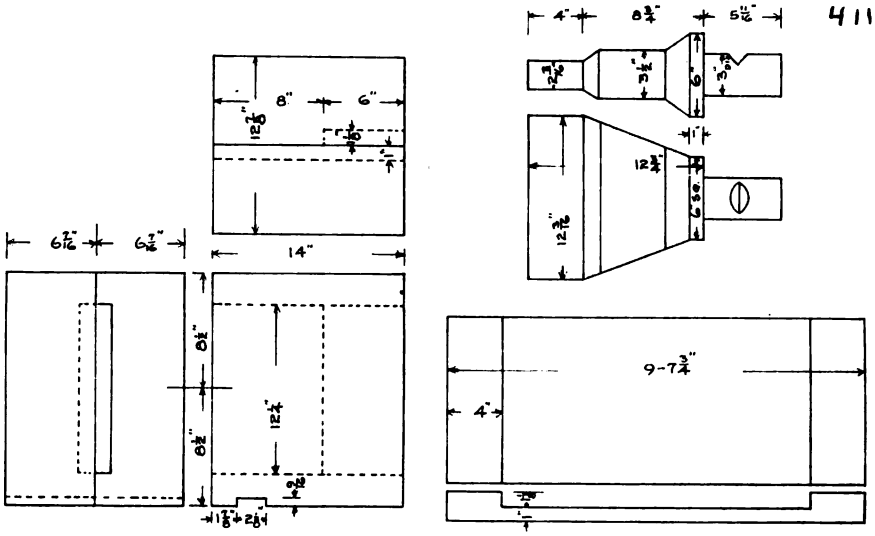


FIG. 3—WHEN SHORT DIES ARE USED, THE PUNCH OR HEADER MUST BE LONGER IN PROPORTION

Crown bars for locomotive boilers are made in a similar manner, by laying a piece of 1⅛ by three by nine-inch stock between two pieces of ⅜ by five-inch by any length required, and are welded and pressed into shape by one operation.

We have a great many target connecting rods for S. P. switch stands to make in the Sacramento shops, and this is a simple job made on the machine. We take our bar of 1½-inch round iron of the required length, get a white heat on end of it about eleven or twelve inches long, place it in the lower portion of the die, and press the lever. The plunger comes up and makes an end on the bar 2⅛ by 2 by 4½ inches long. We then take it out of the lower portion of the die, place it in the upper portion in a vertical position, and the punch comes up and punches the jaw. Now we have the jaw on the rod completed. We then take the rod to a three-inch forging machine that we have close by for the upsetting of the other end. This takes but a very short time, and we have a target connecting rod completed, without a weld. The idea in taking these rods from one machine to the other is to save the time of changing and setting dies.

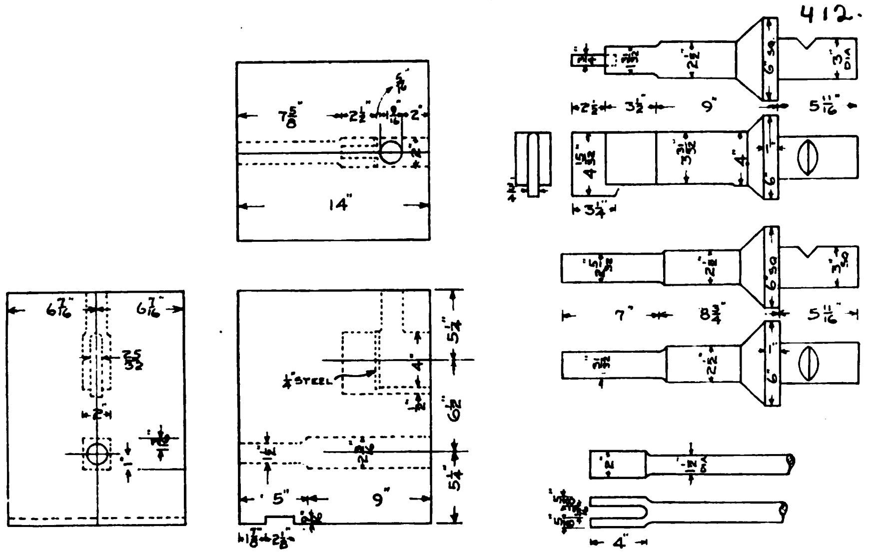


FIG. 2—IN DESIGNING THE DIES, THE AMOUNT OF STOCK TO FORM THE REQUIRED FORGING MUST BE CONSIDERED

The bulldozer, as well as the forging machine, is a machine that should be in every blacksmith shop where there is a large quantity of bending and forming to be done, such as draw-bar straps for passenger or freight cars, arch-bars for freight or tender trucks, side-sill steps, uncoupling levers, carry irons, corner irons, links, and a large quantity of other wrought-iron work that is used on cars and locomotives. The face of the machine which is constantly in use in the Sacramento shop is 14 inches high, five feet four inches wide, and has two grooves running the width of the face cut out the same as the grooves in the bed of a planer. We have two rollers, simply constructed, that we fasten to the face of the machine with the bolts slipped in the grooves. Consequently we can shift these rollers to bend straps from ½-inch width of opening up to five feet. When any material has to be bent at right angles we slip one of the rollers out. The plate on the back-stop of the machine is constructed similarly to the face plate, and we fasten all dies, formers, and mandrels to this. The material is held in the formers, or mandrels, before

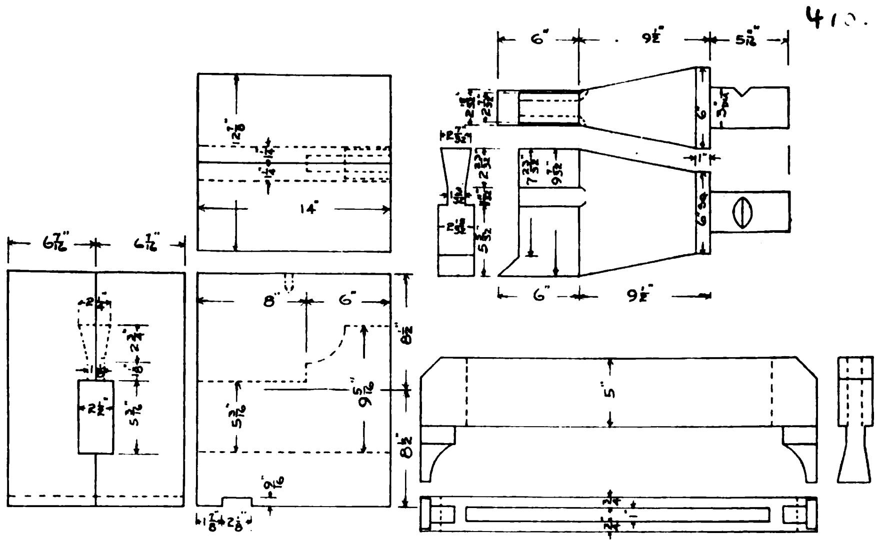
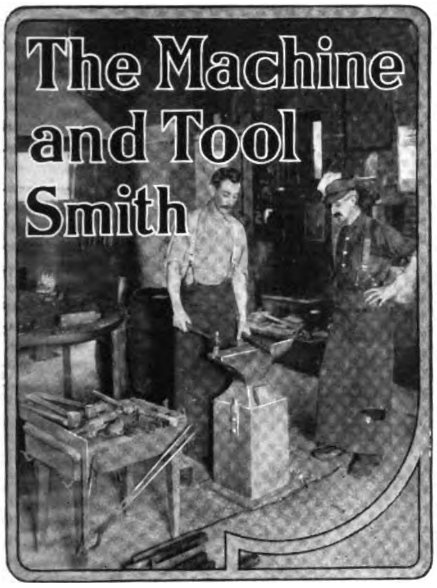


FIG. 4—CARE MUST BE TAKEN TO SET DIES IN MACHINE, AND ALL BOLTS MUST BE TIGHTENED BEFORE STARTING

bending by a hinged clamp made for the purpose. The bulldozer we use is a No. 7, and I think is large enough for all railroad purposes.

I hope that this article with the engravings will be instructive to railroad blacksmiths.



When cutting threads with dies put turpentine in the lard oil. About two tablespoonfuls of turpentine in one quart of lard oil is about the proportion. It helps a lot, and I give it to my brothers for what it's worth. I just happened to stumble onto this little kink.

C. B. STAPLES, Maine.

Tools and Formers for Bulldozers.

G. M. STEWARD.

As chairman of the committee on dies and formers for bulldozers, forging machines, etc., I will endeavor to express to you my views in condensed form. This being a subject that cannot be covered in a limited article, the questions selected as seemingly the most important are—the use and abuse of the die.

We are living in an age of machines and machine tools. The benefit derived from the use of the die is obvious alike to the seasoned veteran and the novice, the latter being able to grasp the most significant point in connection therewith, namely, increased output at a minimum cost of production. Occasionally the argument is advanced that the advocate of machine work is possessed of selfish motives and cares nothing for the welfare of the man who works with his hands. This is undoubtedly a very biased view to take of the matter. In a great many places throughout the country the ironwork is being turned out at the present time in the same buildings that were erected for the purpose more than a quarter of a century ago.

As the railroads have grown, owing to the ever increasing volume of business, the subordinate departments have, of necessity, kept pace with them and have undoubtedly been enabled to do so only with the aid of the various machines used and their accompanying dies and formers. Take away now the present-day equipment and compel us to return to the more primitive methods of working iron, and what would result? In the first place, we would be obliged to have buildings at least fifty per cent larger than the ones we now have, and unlimited difficulties would be encountered in the way of securing sufficient labor to turn out the material required to meet the demands of the day.

In the smithing department of the car shops at Altoona, Pa., we now have complete dies and formers for steel car work, and at the present time we are making on our bulldozer all the parts for steel passenger, baggage, mail, and dining cars, from the deck molding at the top to the remotest parts of the trucks, excluding the welding of the rods, etc. This line of work is only in its infancy as yet, and the cost of our first lot of cars was high, as the expense connected with fitting up our dies was added, but at the present time we can press all the parts for these cars at one-tenth the amount it would cost to make them by hand, flanging in the boiler shop, etc., and at the same time get better results, as the material coming from a die is bound to be uniform.

Included also in our equipment are dies and formers for the making of all the smaller parts for steel freight cars, probably the most successful being those on which we make the Carmer uncoupling levers, which we are now turning out in large quantities at a saving of 90% over the cost of making on the anvil, the method used when the device was first introduced.

A review of the situation from the time when machines were first introduced for the making of iron, down to the present, serves to bring to our notice forcibly the magnitude to which this branch of our work has grown; for instance, when we consider that in one department alone, the one in which I am located, leaving out of the question all dies pertaining to obsolete types of wooden cars, we have in service at the present time 1,054 dies. These are used principally in connection with steel car work, although a number are for the making of miscellaneous articles, notably engine scrapers and hooks, which we are now making in large lots, having by the use of dies reduced the cost of producing to a trifle.

A subject that is perpetually forging to the front and one that at all times demands attention and opens a wide field for discussion is, What is the best material to use for the making of dies, durability and economy always considered? We almost invariably use cast iron for the purpose, having to resort to steel for drop hammer and machine dies for forging moldings where angles are required to be brought up to sharp corners, as cast iron will not stand the strain.

The abuse of the die, or former, is a matter of considerable importance also. In a great many cases the designing and using of dies has been abused, resulting in a loss to the employing companies, where the intention was just the opposite. In an up-to-date shop when an order is received for forgings the first move on the part of the foreman generally is the consideration of the most practical as well as the least expensive method of turning out the work.

It frequently happens that orders are received for material in very small quantities, say one, two, three, or a half dozen pieces. The drawings furnished may show some very complicated forgings, difficult to make if required to make by hand. The natural drift of the foreman is to his machines, and after a little, or, perhaps, considerable, study, he has before his mind's eye a die that will simplify the problem. But on account of the order being a small one, unless the article in question is one that is likely at some future time to be made in large quantities, the expense connected with casting, machinery, fitting-up, and experimenting with a die would be far in excess of what it would cost to make the article by hand. While unquestionably the results attained by the use of the die in the smithing departments have been gratifying, both as to quality and quantity

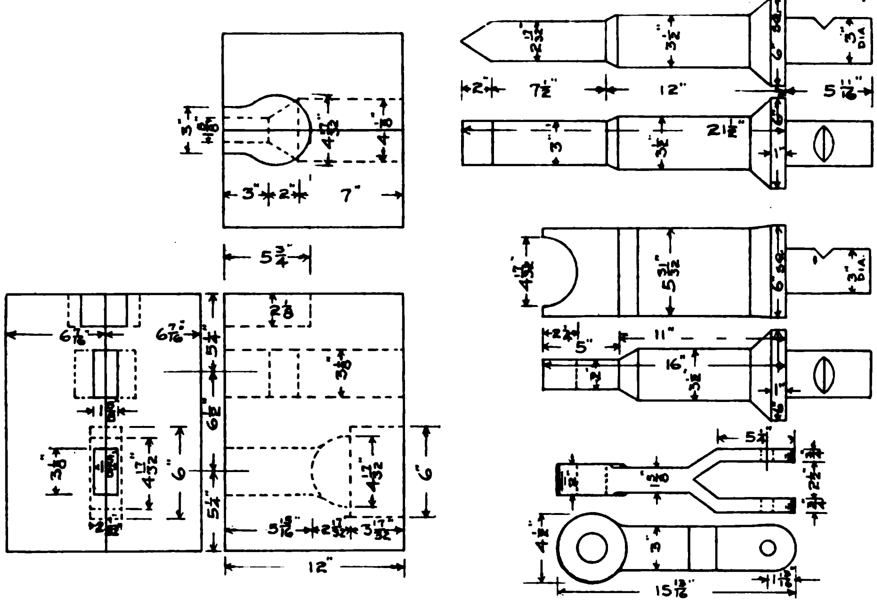
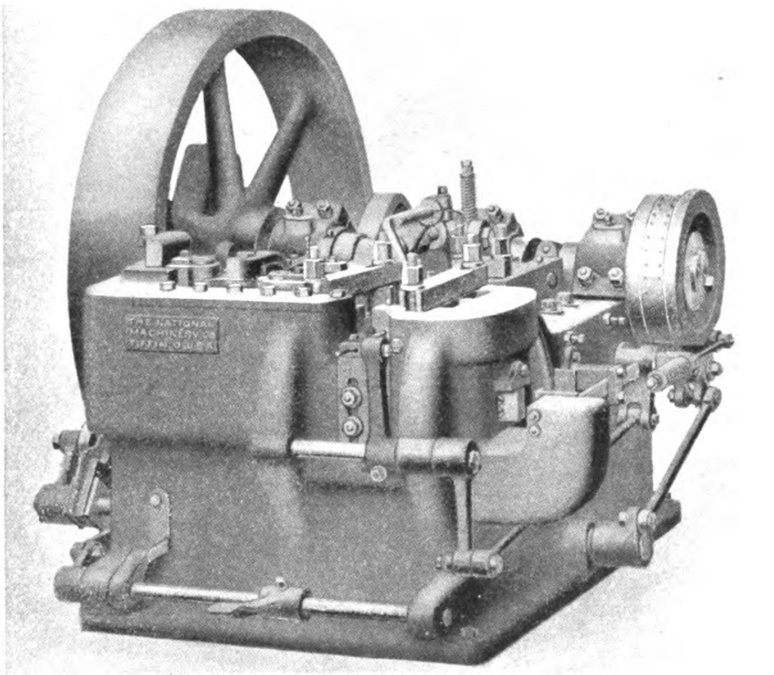


FIG. 5—THE LARGE AMOUNT OF FORGINGS THAT CAN BE TURNED OUT OF THESE DIES IS SURPRISING

of the material turned out, and the cost thereof, yet it is possible to make the use of dies an expensive proposition to the companies, unless due judgment is used as to what constitutes a job for a machine,



THE BULLDOZER IS NECESSARY FOR THE QUICK AND ECONOMICAL FORGING OF DUPLICATE PARTS

never allowing ourselves to forget that we are still blacksmiths and have blacksmiths who are competent to meet all requirements.

Nothing is lost—in fact, I am satisfied that a great deal is gained—by devoting a portion of our time to the comfort and convenience of the men. Our line of work requires great qualifications of endurance on their part, especially in the hot weather, and it is much better to have matters arranged so that they can stick to their work ten hours per day than to have them down and out at noon on account of lack of fresh air or piles of hot iron around them.

In the shop where I am located we have had large arches set in the walls directly opposite to each other, allowing the air to circulate freely through the building and incidentally furnishing us an opportunity to pass our hot iron to the outside, the men thus escaping that portion of the heat.

Inviting at all times our earnest consideration is the principal tool with which we all work—the shop itself. In order to properly handle the output as it is increased by the addition of machinery and tools, our facilities for keeping the work continually on the move, completing and shipping should be of the very best, for a shop that is littered with unfinished material or finished material that is not shipped promptly presents a very untidy appearance.

It does not seem to be just the proper thing to end a talk on the die question without some reference as to what, in our opinion, is the most satisfactory as well as economical method of construction. In the regular routine of our work we are frequently called upon to make numerous articles which are alike in general outlines, although varying in size. We have found it to be a profitable practice in cases of this kind to make one die serve for the forming of several articles by having it of sufficient size to accommodate the largest of the lot, using it for each in turn by the application of wearing plates, these being adjusted with bolts, very little machinery being required, increasing their size as that of the article to be made decreases. In this way we get the output of four or five pairs of dies at practically the cost of one.

In constructing dies for hot work, particularly for pressing, our plan is to use plenty of material, so as to have them sufficiently strong, as a loss of both time and money is entailed when a die breaks at

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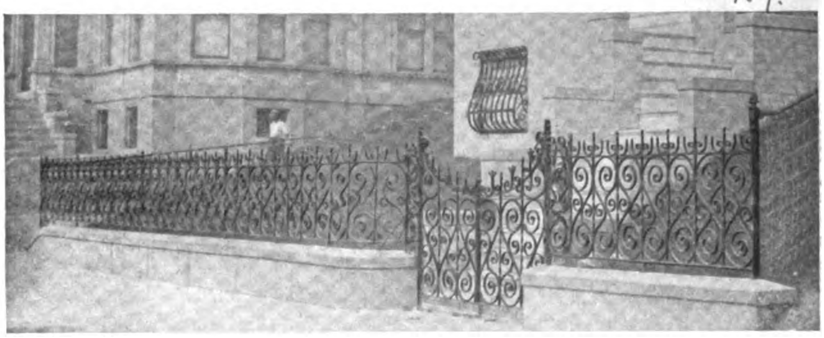


HALF SCROLLS ARE ATTACHED TO THE TOP BAR TO FORM PICKETS, WHILE THE TWISTED BARS EXTEND THREE INCHES ABOVE THE TOP RAIL

some weak point, possibly before a dozen operations have been effected with it.

We have our large dies cored out, this operation reducing the weight, while it forms air chambers, an important point in itself, as they assist materially in keeping the back part cool, and through which water can be kept passing if required, as unsatisfactory results have occurred at times from the expansion of dies when hot.

In conclusion, while much remains to be said on this subject, time and space will not permit. I thank you, gentlemen, for your attention, and trust that what I have said may be of interest, possibly of benefit, to some of the members of our convention.

The Big Four's First Blacksmith Dead.

Graham Stewart, a pioneer resident of Cleveland, died September 28th at his home. He was more than eighty-seven years old. He settled in Cleveland in the early forties.

For many years he had a blacksmith shop, but later he entered the employ of the Big Four as that company's first blacksmith. He served through the Civil War in the Army of the Potomac as a blacksmith. Mr. Stewart was a member of the Masonic order for more than sixty years.

A Traveling Railroad Blacksmith Shop.

Early in August there was installed on the central division of the Iron Mountain Route out of Van Buren an innovation that promises to fully meet the expectations of division engineer Emmerson, who, as a young man, is making a reputation for himself as one capable of getting out of the old ruts common to all railroad managers.

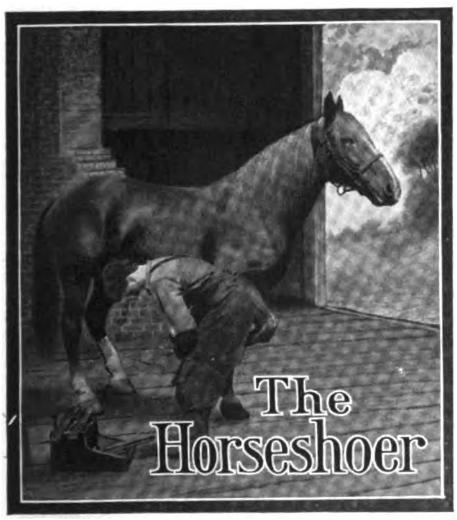
Mr. Emmerson evolved the idea and put into practical operation the first traveling blacksmith shop ever installed on any railroad. He had fitted up in a box car in the shops at Van Buren, Ark., a complete blacksmith shop and sent it west over the line in charge of blacksmith J. C. Bradley and one helper; and as it goes over the line it is set out at every siding, and all frogs, switch stands, targets, etc., that are found in bad order are taken out and repaired instead of sending them to the Van Buren shops, where they are always overcrowded with work of more importance.

As soon as the car completes the work between Van Buren and Coffeyville, it will start over the line between Van Buren and Little Rock. Mr. Bradley declares it astonishing the amount of defective parts they are finding and putting in first-class repair.

An Ornamental Fence and Gate.

JOSEPH PICURI.

The accompanying engraving shows a recent order for ornamental work which we executed. The fence and gate shown are constructed of one by ¼-inch iron for scrolls, the perpendicular rails being 1½ by ½ inch, twisted at center with a zigzag top. To the top rail half scrolls are attached with sharp point to form a picket, while the twisted bars extend three inches from the top rail and form a zigzag picket, which, together with the half scrolls, form a neat design. The engraving also shows one of the window guards constructed of ⅝-inch square iron with scroll work at top, side, and center. There is a number of these guards and doors on the building. There is also a very high tower on this building, and around this we built a wrought-iron scroll balcony. The work pictured was forged for C. F. Harms' residence, Castle Point Terrace, Hoboken, N. J.



In shoeing interfering horses I have found by experience that some loose, slushing-gaited horses can be stopped of ankle and knee knocking by leaving the foot as large as possible to get a good bearing for the shoe and putting on a good big heavy shoe. But don't try this on short, quick-stepping horses.

C. B. STAPLES, Maine.

For contracted feet an excellent shoe is one with the hoof-bearing surface beveled toward the outside. This shoe prevents the hoof from growing in, and slowly but gradually spreads the foot. Too much slant in the beveled surface of the shoe should be avoided, and the shoe need be reset but once every two months until the abnormal condition is relieved.

A. C. BARRETT, New York.

Some Causes of Interfering, and the Correct Method of Holding Reins.

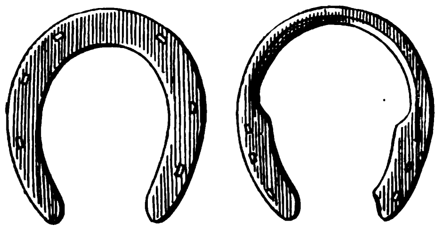
ALBERT F. LIBBEY.

We have a number of direct causes for interfering in the horse that can not be laid directly to shoeing. First: Having the breeching so low down that it pulls the horse's legs together on a down grade when the weight of the load crowds on the horse. For a remedy, shorten the straps which hold the breeching all that is possible and see that the horse has plenty of room in harness to travel.

Second: A high-bred horse will often strike either his knee or below it, because the driver does not have perfect control of the reins. After the animal has been driven a few miles the clear, fresh air seems to give the horse new life, and he quickens his stride. The driver naturally wishes to shorten his hold on the reins and slackens either one or the other. The horse takes the advantage of this and throws his head to one side. This throws his body out of balance, and he strikes either his knee or below. Hold the reins properly; take, first, the right-hand rein, pass it between the little finger and third finger, over the finger and then under the three other fingers and up over the thumb. The left-hand rein is held in the left hand exactly in the same way, but the bight of the slack of the reins is also held between the thumb and forefinger of the left hand. A firm grasp on each rein, with the backs of the hands up and without a wrap, is thus obtained.

It is a great point in driving to be able to shift the reach, i. e., the length of the hold you take, without for an instant letting go of the horse's head. With this way of holding the reins, it is easily done.

If I wish to shorten the hold on the left-hand rein, I take hold of that rein just behind the left hand with the thumb and forefinger of the right hand and steady it. The near rein being thus steadied behind the left hand, I slide that hand forward on the rein, which is kept over the little finger, under the three other fingers and over the thumb all the time and then shut the grasp again on the new reach. A shift with the right hand is made just the same way, by taking hold and steadying the rein behind that hand with the thumb and forefinger of the left hand. With other methods of holding the reins there is great difficulty in shifting the reach. If the shoer will mention these facts to his patrons it may appeal to them and at the same time be a great benefit to him.



A PLAIN FRONT SHOE AND ONE FOR DEADENING THE STRIDE OF THE HIND OR FRONT FEET

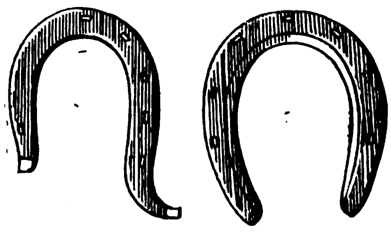
Horseshoeing and Interfering.

L. VAN DORIN.

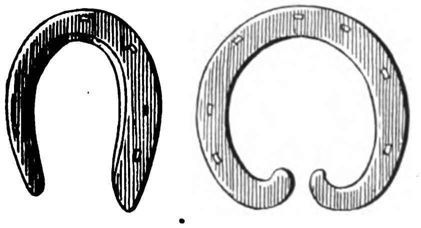
I never intended to say a word on horseshoeing, but since seeing the picture of brother Wherry's practical shoe styles on page 226 of the July number, I want to say just a few words.

I commenced to serve my time in 1858 and was fortunate in serving under a man who was an expert on shoeing interfering horses. He never had any trouble in stopping a horse from cutting his ankles. I shod horses up to 1874, during all of which time I never had any trouble in stopping the interferer.

All that's necessary is to exercise a little common sense and stop what I call playing to the gallery by putting something on the horse's foot that has no semblance to a shoe, to make the owner of the horse think they are "way up in G," and when they get through telling the customer all about side-weights and toe-weights, etc., thinking they have made a great impression. The chances are they could not turn a decent shoe or make a good nail. Now, remember what I am going to say. Most shoers in trying to prevent a horse from interfering, commence by trying to get that portion of the foot and shoe that interferes with the other leg or ankle out of the way. That is



A SHOE TO PREVENT CROSS-FIRING AND SOME FORMS OF INTERFERING, AND A SNOW SHOE WITH CONCAVED INNER EDGE TO PREVENT BALLING



AN OLD-STYLE SIDE-WEIGHT AND A DOUBLE HALF BAR SHOE FOR CORNS AND WEAK HEELS

all wrong; the reason the horse interferes is because his hoof is lacking on the inside, at least that is the cause nine times out of ten, though wide-toed horses are most liable to strike. So stop trying to get the shoe tucked under the foot out of the way. Shoe him so he steps past the other leg without touching by raising the inside of the foot and lowering the outside, and set the toe on shoe well to the inside. The shoe generally should be much thicker on the inside. Try this method and report.

The Pasterns of the Horse.

N. Z. FARMER.

The pastern which assists to form the fetlock joint is situated between it and the coronet. The points of special interest attaching to this region are its length and its obliquity, in both of which excess or deficiency will constitute a defect of conformation proportionate to its extent.

The longer the pastern the more the reaction of the soil against the weight of the body augments and fatigues the muscles and taxes the tendons and ligaments which are connected with the sesamoid bones.

Deficiency of length of the pastern evidently has inverse drawbacks. The short-jointed horse surcharges his bones beyond measure. He lacks suppleness in consequence of the insufficiency of the fetlock as an apparatus of dispersion, and has, from this fact, hard reactions; besides, he is more predisposed to osseous blemishes of the bones of the limbs, as ringbone, etc.

The direction of the pastern is intimately allied to its length; that is to say, a long pastern (fig. 2) is in most cases too horizontal, while it becomes more vertical when it is too short. An exception is illustrated in fig. 3, where the pasterns are both short and sloping.

The close relationship which associates long-jointedness with low-jointedness is easy of comprehension, the pastern becoming less and less a column of support in the one, and more and more an elastic spring in the other in proportion as its length increases.

A spring gives all the more, as it is more elastic and as the pressure which it supports is greater. This is precisely what takes place in a long-jointed pastern, which is at the same time nearly always low-jointed because it is relatively weak and flexible under the weight and the reactions of the body.

The long and oblique pastern renders the horse more supple and more pleasant to ride; it enables him to dispose more easily the violent reaction of locomotion at great speed, and it would be very desirable in the saddle horse, the driving horse, and the race horse, were it not a source of danger to the integrity of the tendons.

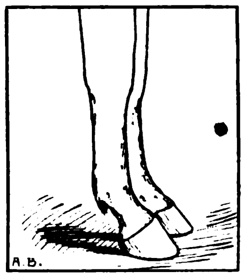


FIG. 1—WELL-SHAPED PASTERNS

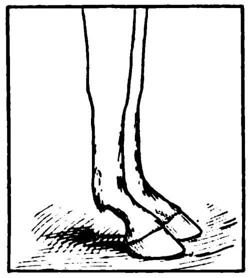


FIG. 2—LONG SLOPING PASTERNS

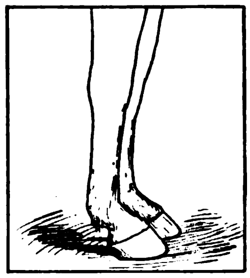
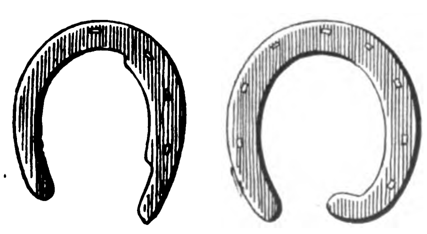


FIG. 3—SHORT SLOPING PASTERNS

"The short and straight pastern is strong, it has no very prejudicial influence against heavy draught services, but it renders the reactions hard and jeopardizes thereby the integrity of the osseous apparatus; hence it unfits a horse for fast riding."—Goubaux and Barrier. It need hardly be said that to appropriate length and direction must be added ample width from front to back and from side to side, affording space for broad articulations and co-extensive ligaments and tendons.



A SIDE-WEIGHT SHOE FOR INTERFERING, AND A HALF-BAR SHOE FOR CORNS OR QUARTER CRACK

A School of Horseshoeing to be Established at Colorado Agricultural College.

Colorado is to inaugurate a new school of applied science, that of horseshoeing. A bulletin is out announcing the opening of the first term in this new course at Fort Collins, Col., on November 1. It is to be a five-months course, leading to a certificate. E. H. Grubb, of Carbondale, Col., a member of the state board of agriculture and an old blacksmith and farrier, is responsible for this new department.

"The horse's foot is the most important part of the animal," says Mr. Grubb. "The care of that foot is highly important, and the blacksmith who shoes the horse has it in his power to either ruin the horse or make it a valuable and long-service animal. It is necessary that the farrier know what he is about when he attempts to nail a shoe to the horse's foot. He must be familiar with the anatomy of the horse's foot and have a general knowledge of the anatomy of the animal. As far as I know we have no school in America where this is taught to any but veterinarians.

"We propose to make it a part of our course at the Colorado Agricultural College with the idea that we will enable our farmers and stockmen to understand how the horse's foot should be shod and cared for, and those who desire to embark professionally in the business can here gain the foundation, which, with practical experience, will enable them to do scientific work.

"The course will be very practical. We have but few text-books, and the students will be taught by lectures and practical demonstration in the shop. The construction and anatomy of the foot will be explained, and they will be taught how to make shoes and fit them. I believe that the course will be practical and is sure to become popular with our students."

"A few of us in Denver," says a prominent Denver horseshoer, "have been trying to have some restrictions placed upon unscientific farriers in this state. We had a law passed providing for a board of examiners and preventing any blacksmith from practicing farriery unless qualified. That law is a dead letter because the horsemen of the state will not assist us. They regarded it as an attempt to form a horseshoe trust. As a result they continue ruining their horses with cheap blacksmithing and imagine that they are saving money. The proposed course at Fort Collins is a step in the right direction. It will enable a few horsemen, at least, to understand the necessity of practical and scientific farriery. Such a movement should have the active support of every horseman and every humane man in the country."

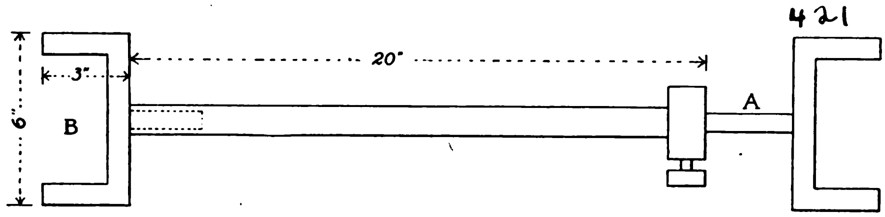
Secretary Wilson, of the Department of Agriculture, was informed regarding the new departure at Fort Collins, and gave the plan his heartiest approval. "It is just what we have been needing," said he, "and if you can turn out some educated farriers, the United States government will be glad to engage them all at good salaries, for the loss of horses because of poor shoeing is becoming a most serious item in the cavalry service and in other branches of the government where horses are used."

The new course will be under the direction of Professor Lawrence of the mechanical department at the college and Dr. George H. Glover, professor of veterinary science, and Dr. Charles G. Lamb, state veterinarian and a lecturer at the Agricultural College veterinary school, will assist. Prominent Denver farriers will take an interest and will assist with lectures and demonstrations. Since the announcement of the new course other agricultural colleges are taking notice, and Dean Carlyle is flooded with letters asking for particulars. It is probable that the other agricultural colleges will follow Colorado's lead in this matter.

An Adjustable Helper for the Smith.

D. FOSTER HALL.

The accompanying engraving shows a very useful helper for the blacksmith. It can be used in many places and in many ways, and is adjustable. The 20-inch piece is of ¾-inch pipe with a collar welded on one end. This collar carries a handscrew by means of which the piece A is held rigid. The end B is welded or riveted to the pipe, as shown, the part of B going into the pipe being long enough to hold B solidly when in use. The sliding part is of ¾-inch round iron with the head welded on. The rod A may be of practically any length, as determined by the uses to which the contrivance is to be put. The practical smith will find use for this contrivance every day and new uses will suggest themselves as work comes in to be done.

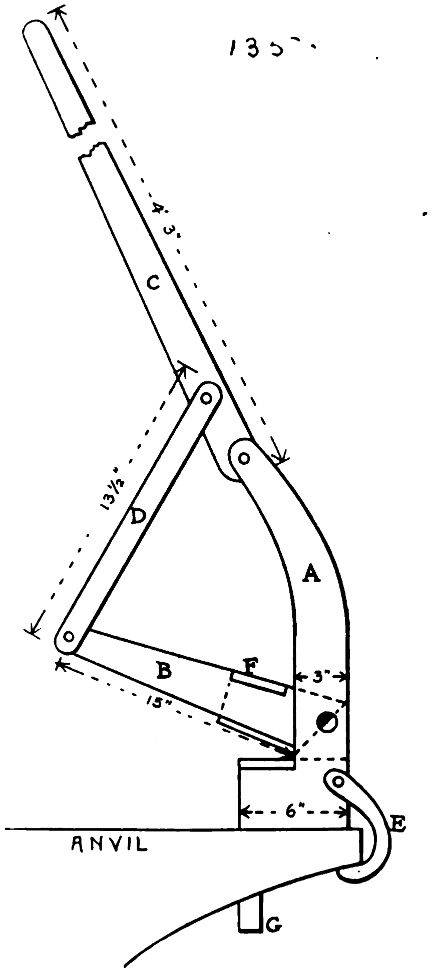


AN ADJUSTABLE HELPER FOR THE SMITH EASILY MADE

A Handy Bar Shear for Use on the Anvil.

J. H. BATEMAN.
Australia.

The accompanying engraving shows a shear for cutting bar iron at the anvil. It is a very handy tool, as it can be put out of the way very easily when not in use. It will cut up to one inch by one-half shoeing iron, and up to ¾-inch round stock. The shear is constructed as follows: A is of ¾-inch stock, and is 6 inches wide at the base or widest part; B is of ⅞-inch stock, is 2½ inches wide at the widest part and 15 inches long; C is made 2½ by ½-inch at large end and four feet, three inches long. The straps D are two in number, one on each of C and B. They are 1¼ by ½ inch and 13½ inches long. E is a stay or hook to grip end of anvil and steadies the device when in use. The piece marked F is welded to B, and is for the knife to rest against. The knife is held to the upper jaw of the shear by means of bolts. The bottom knife is backed by the anvil, and is bolted to the piece marked A. The hole for cutting round stock is one inch in diameter, while those for bolts which hold the shear together are ⅝ of an inch in diameter. The anvil upon which this shear is used must, of course, be bolted or strapped firmly to the block, and the block in turn must be firmly bolted to the floor. The part G of the shear-base is made to fit the hardy hole and thus to assist in steadying the device.



A HANDY BAR SHEAR FOR ANVIL USE

Beware of the "Knocker."

R. E. MOCKFORD.

In a small town one day, while I was traveling for a gas engine company, and had to change trains at a junction, I had a very amusing experience. This town consisted of station, general store, blacksmith shop, and five houses. My train was two or three hours late, so I started out to do some missionary work for my firm.

I met another traveling man, and he also was selling gas engines and stated that he had just sold the blacksmith a 6 H. P. engine. This traveling man told me his entire family history in about ten minutes. He talked so much that I could not help but doubt the veracity of his story. I excused myself and went to call on the blacksmith.

After introducing myself I asked the smith if he would object to my explaining to him the construction of my engine. I said nothing about the other salesman, nor did I even ask the shop owner if he was in the market for an engine.

After I had fully explained the advantages of my engine the blacksmith asked me what I knew about a number of other makes of engines, including the one this other salesman was selling. I told him that I knew every one of them and met them in competition very often. He wanted to know how much better my machine was. I told him that I had all the faith in the world in my engine, and that it did not have a superior on the market, but as for the other engines, I left it to their salesmen to tell what they knew, and if they could convince a man that their engine was better than mine, it showed that they were better salesman than I, but as for me, I had plenty of good points in the construction of my own engine to talk about without having to run down another make of engine.

Within an hour I had the man's order and a check for half the price of the engine, together with the respect of the man as an honorable salesman.

He told me before I left that the other salesman gave him a catalogue and prices, and then started to knock every other engine on the market, instead of trying to talk his own engine, and convince the man that he knew what he was talking about.

Every blacksmith should be careful what engine he buys. Be sure that the salesman knows his business and how to talk about the merits of his own engine, for if the blacksmith should buy an engine from a salesman such as I met that day, the chances are that he would be greatly disappointed in the engine and it would never be satisfactory, for a high-class gas engine company will not have such a salesman on the road. A man of that type will misrepresent the goods to the customer to secure the order, and he will in turn misrepresent the transaction to the company to keep the blame off his own shoulders.

This may be worth a great many dollars to some good smithy, and a good motto for you to follow is—Beware of the man who can't talk his own line intelligently and spends most of his time trying to knock some other firm's products. You may be sure there is something wrong with the salesman or his product. The knocker's hammer is always bright, so beware of him, for he knocks not on his own anvil, but on the anvils of others.

A Wisconsin Power Shop.

E. A. LINDNER.

I have been a reader of THE AMERICAN BLACKSMITH about two years and think it the best practical journal I have ever taken. I read its columns with interest and find many helpful things and suggestions. I read with much interest of the brothers who are thinking of putting in power to do their work. I would say right here that I would just as soon think of harvesting a field of grain with a cradle as to be without power in my shop. I can do twice the work, and a larger variety which would not otherwise come my way. I have a Stover 24-horsepower engine and it gives me very little trouble, except when the gasoline tank gets empty. My shop is 24 by 30 feet, with a 14 by 20 foot wood shop, connected main shaft running through both. I have a power hammer, a drill press, a rip saw and boring machine, a band saw, and an iron lathe. I shoe horses, but not so many as I did before I installed this machinery. The power hammer is one of my own make and works to perfection. I have been in the business ten years. When I started there were four shops, some not very good; now there are just two, and they do good business. I have the only power in town, so I have the advantage. I would say right here that I wouldn't stay in the business fifteen minutes if I had to fiddle around doing work the old way. I will not ask for any more space this time, but if any brother wants to make some of the machines I mentioned, a boring machine or a power hammer, I would gladly give him the descriptions. I am ready to assist my brother craftsmen at any time, and hope that my little contribution may be of interest.

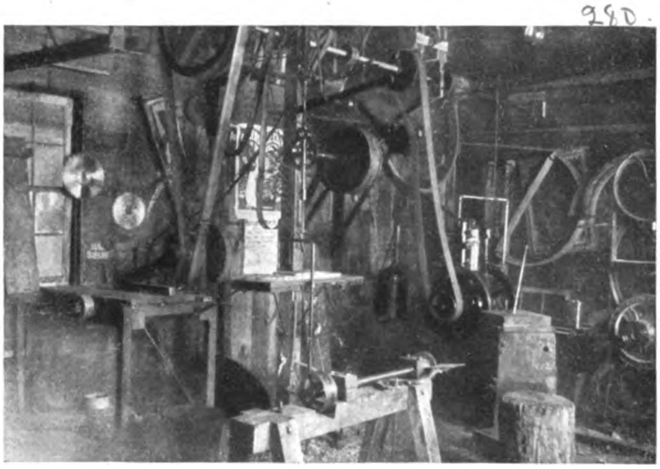
An Interesting Letter from South Africa.

OTTO LIETZ.

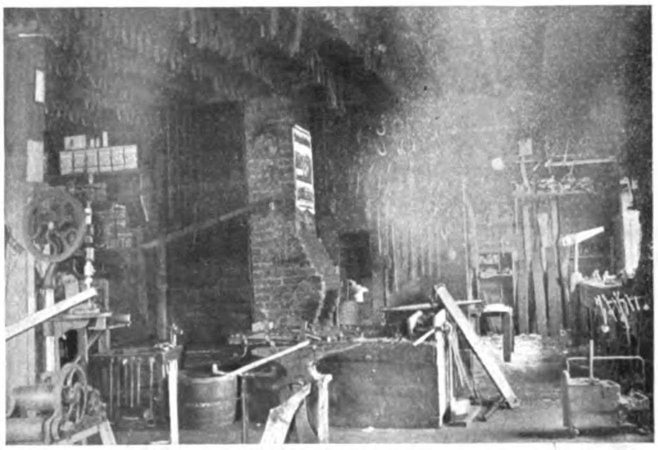
When I gave up my shop in Natal I made up my mind never to start in business again, but to work in the gold mines, as there are a good many up here in Rhodesia. Always being very unlucky in finding a job, I saw my only chance in taking over a vacant shop in a little township in a mining center. Living is rather expensive here; £9 ($41) to £12 ($56) for a month's board and lodging. Wages for blacksmiths are 22s. 6d. ($5.40) and 25s. ($6.10) for nine or ten hours on the mines and about ¾ of this for eight hours in the railway shops. I started making tools and horseshoes out of old tires, but the jobs I had this first month do not cover my expenses for board, and I gave notice to my creditors that they had to find me jobs before I leave if they want their accounts settled. Now the leading people of the place send work and they have promised more in the near future, as horses are on the way to replace the ones lost in sickness. Most of the horses here die between February and May every year.

I have an order now to build a wagonette for the plan of which I thank your number of August, 1905. It will cost £48 ($233) or £50 ($243) to be made here without painting and trimming. Material is tremendous in price here. I have made six new front gears for traction trailers and a new four-seated cart, but without any plan. The jobs came out pretty good, but the cart could have been more solid.

This is a funny country; they expect a blacksmith to do the wheelwright's



THE POWER CORNER IN A WISCONSIN SHOP WITH ITS BELTS AND MACHINES



THE FORGING CORNER OF THIS SHOP SHOWS THAT FEW IDLE MOMENTS ARE SPENT work, even in the shops in town, to say nothing about the village blacksmith, who can't afford to pay high wages. There is a wheelwright about twenty miles away who does all of his own smithing, and well, too. There is plenty of good timber here, not in big trees, but bushes. There is a kind of wood they say does not want seasoning; felloes and spokes made of the bush and put in wheels will last for years.

Carriage material and nearly all ready-made wheels are American imported all over South Africa. I will state some prices here:

Bar iron here in Rhodesia is ....30s. ($7.20) cwt.
Bar iron at Cape Town or Natal........10s. 6d. ($2.25) cwt.
Horseshoes in Rhodesia ....55s. ($13.38) 100 lbs.
Horseshoes in Natal 24s. ($ 5.84) 100 lbs.
Set of four wheels 1¼-inch, Rhodesia £12 ($58.44)
One foot of hickory 3 by 15 inches........6s. 6d. ($1.58)
Pair of axles, 1¼-inch, plain, Rhodesia......£2 15s. ($13.39)
Pair of axles, 1¼-inch, Natal 12s. 6d. ($3.04)
Pair of axles, patent, Rhodesia £4 ($19.48)
Pair of axles, patent, Natal £2 ($9.74)

I don't know what causes the great difference—transportation is only about 25s. ($6.00) per cwt. But the prices we get are as follows:

Shoeing horse, four feet..14s. ($4.41)
Welding tire, three-inch ..14s. ($4.41)
Set of four wheels and axles, 3-inch £42 ($204.54)

Most of our work is done according to time. There are still places where they get 20s. ($4.87) for shoeing horse or welding tires. The country is surely progressing, but everyone's idea seems to be to make as much as he can and clear the country, because some places are very feverish. But fever mostly affects those who live careless, and those who take to alcohol and sleep outside. It very seldom affects the inhabitants of townships. The ground is rich in gold, copper, chrome iron, and diamondiferous in most parts of the country. But there are no big mines here. Many prosperous outfits of five or ten-stamp batteries and a few places with thirty and forty stamps. The railway goes on a main line through the country from Beira to Cape Town with a few branch lines. If I tide over the first three months successfully, I believe I will make this place pay well. I will order material from Cape Town, then import my tools from America. There is another shop here about a mile away, and they seem to do very well.

How to Build and Handle a Forge Fire.

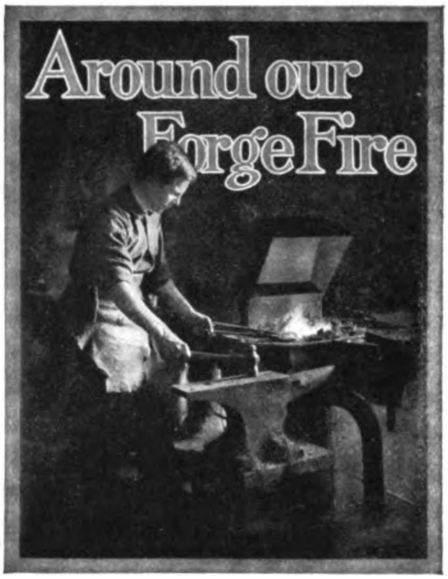
R. T. WOODSON.

In building a new fire clean the forge out well, leaving the old material around the edge of where the new fire is to be built, but taking out all of the ashes, cinders, and dirt, clear down to the tuyère. You will then have a good, clean hole in which to construct the fire.

Shavings, fine chips, and waste are now placed on the top of the tuyère iron and lighted; gradually add larger sticks to the fire and start the blast. When the fire is well lighted coke may be added, a small quantity at a time. This should be taken from the top of the forge as there is always more or less coke produced and left from the old fire. After the coke has become well ignited, spread green coal over the fire. Do not attempt to use the fire until all of the coal on top has been coked, and in adding new fuel to the fire use the coke around the edge. When the fire is in use, add green coal to the edge of the fire, wetting it well and stamping it down hard. This will insure a plentiful supply of coke at all times. Never attempt to use green coal directly in the fire when it is being used for heating; use coke only, and that which has been formed around the edge of the fire hole.

Perhaps the greatest difficulty the beginner will experience in attempting to operate a forge fire is to build his fire rather too shallow than too deep. There should be plenty of burning fuel between the blast outlet in the tuyère iron and the metal which is being heated. Should the cold blast strike the metal, a scale or oxide will form. This oxide is also often produced by blowing too much air into the fire. There is no set rule by which the beginner can determine just how hard to turn his blower, except to watch his fire closely.

Another important point for the amateur to consider is to keep his fire as clean as possible, always. Should it clog with ashes and cinders, his willingness to clean out the fire-box and to build a new fire, may, perhaps, determine the success or failure of the job in hand. One of the first points the successful smith must learn is to keep his fire clean, and this point is especially emphasized when working steel. And it should be considered as important in the treatment of steel as careful heating when forging this particular metal.



"What's — all — this — talk — about — a — blacksmithing — trust?" queried Benton between puffs in attempting to light his pipe.

"Why, that's all there is to it—just talk," replied the Editor. "It's simply hot-air talk of some few who think that because the smith has worked for less and less profit as costs go up, that he should still work for the same prices when the advance in costs takes every vestige of profit out of his work. It's simply preposterous," and the Editor brought his fist down on his desk top with a bang. "I'll tell you right now, that the smiths everywhere are beginning to realize that they must advance their prices. They simply can't bear the advances any longer. The consumer should have shouldered them long ago. And I am going to do all I can to get smiths to get together, to join hands, and to raise prices where they should be. The smith deserves better treatment at the hands of the public. Just let me read you what the smiths in a certain Kansas town are being handed, Here's what a Kansas editor says about it: 'The blacksmiths found that through the advanced cost of materials they would have to increase the price of horseshoeing. Now, as all were working for one price, the thing that seemed best was to get together and agree upon the amount of the advance. They did so and posted notices in their shops. Immediately they were notified that they were violating the anti-trust law, and subject to the penalties thereto. Of course, the notices had to come down.' Now what do you think of that, Benton? Seems to me that there's something the matter somewhere."

Then, continuing, the Editor said, "Here we have a few village smiths—good, honest, hard-working citizens—the price of whose materials advances. The advance continues and an advance in selling prices is essential to a profit and a living. They, therefore, go about getting only what they deserve, mind you, in a business-like way and—what happens? Some molly-coddle yells 'TRUST.' "

"It certainly is all wrong," said Benton. "If any man deserves to get more money for his work, the smith certainly does."

The Man Worth While.

ELLA WHEELER WILCOX.

It is easy enough to be pleasant
When life flows by like a song,
But the man worth while is the one who will smile
When everything goes dead wrong.
For the test of the heart is trouble,
And it always comes with the years;
And the smile that is worth the praises of earth
Is the smile that shines through tears.

It is easy enough to be prudent
When nothing tempts you to stray,
When without or within, no voice of sin
Is luring your soul away.
But it's only a negative virtue
Until it is tried by fire,
And the life that is worth the honors of earth
Is the one that resists desire.

By the cynic, the sad, the fallen,
Who had no strength for the strife,
The world's highway is cumbered today.
They make up the item of life,
But the virtue that conquers passion,
And the sorrow that hides in a smile,
It is these that are worth the homage of earth,
For we find them but once in a while.

Contributed by D. FOSTER HALL, Massachusetts.

The driver of a good horse saves money on whips.

Now what do you think of power in the shop?

Do unto the tools of others as if you were the others.

It's the man that counts—not his name or his father.

Men who never talk shop usually have no shop to talk.

The best time to do that which must be done sometime is now.

The dreamer to be all right must be awake while he's dreaming.

The man worth while is he who recognizes Miss Fortune in misfortune.

Make your mark by marking what you make, but be sure that what you make is worth marking.

Ever think, Mr. Employee, that your pay envelope may be affected by the supplies you waste?

The man who is always telling you how to run your business generally makes a failure of his own.

A good smith will find a Texas opportunity awaiting him by writing to brother J. T. Fields, of Staff, Texas.

Don't let your farmer customers tuck away their harvest money without paying what they owe you. Get after them now.

Don't forget that the apprentice didn't come simply to take out bolts and to pick up the nails you drop. Give him a chance.

"**I think** I enjoy reading 'Our Journal' fully as much as my husband does, if not more," says a Michigan smith's "helper."

"**Why a man** should object to a horse interfering with himself I can't understand," said Mrs. Newlywed to her husband, who is a horseshoer.

When a man says, "There's so much room at the top of the ladder that it's lonesome up here," you can bet that everybody is satisfied to let him stay alone.

Tom's back at work again, but the old stove is just where it fell when it smashed Tom's toe. Better hurry, T. T., or the winds of winter will find you without shop heat.

According to an agricultural exchange, the farmers will receive ten per cent more for their 1907 crops than they did for those of 1906—and 1906 was the bumper season previously.

Are you going to allow this next year to slip by without sending in even one item for publication? Better get busy now and send in that article of yours in time for the next issue.

Smithing and sprinting are the two favorite vocations of Dan Kelly, of Dugeue, Oregon. Mr. Kelly is but 23 years old, and is said to be the world's speediest runner. His record is 100 yards in $9\frac{3}{5}$ seconds.

Where the tramp of British cavalry is heard there will be found the imprint of American horseshoes. This is because an American manufacturer has lately secured the contract to supply a hundred thousand sets for use in the British army. The Secretary of War explains that he was able here to get better shoes at a lower price than from English makers.

Until recently there was a partnership existing between two darkey blacksmiths in an Alabama town. The dissolution of this association was made known by a notice, which ran as follows, nailed on the door of the smithy: "The kopartnership heretofore resisting between me and Mose Jenkins is hereby resolved. All persons owing the firm will settle with me, and all persons that the firm owes to will settle with Mose."

Keep at the heels of your debtors and keep collections low. Right now, after a most prosperous season, is the time to send out your collector and keep him after the slow payers until they pay up. The money they owe you isn't buying clothes for the family, and it won't pay the grocer's bill. Be slow in giving credit. It is, perhaps, impossible to run a smithing business on a strictly cash basis, but bring the credit end down as low as possible.

Especially active have been things in association circles—smiths realize that NOW is the time to act. If you are not getting as much money as you should for your work, an organization will enable you to get it. If your neighbor smiths are continually at needle points, if you are up against unfair competition, if you are simply making expenses instead of profits—you need an organization. Take the bull by the horns and turn him your way. Don't be content to work for nothing, without protest. Kick, and kick hard—get your neighbor smiths kicking, and then kick up an organization. Keep at it, persistently, everlastingly always, and get the prices you deserve this winter.

Asbestos horseshoes are used in Hawaii.—Visitors to the volcano of Kilauea, on the island of Hawaii, generally ride on horseback, and in crossing what is known as the "pit" the horses suffer much from the great heat. The earth is so hot that the hoofs of the horses are not infrequently scorched. As some protection became very necessary, a clever blacksmith in Honolulu has recently devised a very successful method by which asbestos may be used. The idea is to provide the hoofs of the horses with an asbestos covering, much after the fashion of the outer shield of iron-studded leather or canvas over the automobile tires. These hoof shields may be put on and removed at pleasure.

"**What! No gas engine** in your shop? Well! that's like a man without a head. The machinery is there, but it needs something to run it. Have I a gas engine? Why, sure—a three-horsepower engine. It costs me only about 68 to 70 cents for a ten-hour run. I run a disk sharpener, a grist mill, an emery wheel, and a rip saw. Why, a rip saw is a little expensive for a blacksmith shop, is it not? No, not the way I did it; I bought me a saw and put it on the emery mandrel, made a folding table, and when not in use I fold it up and put it away. A gas engine makes the difference of an extra man and you can keep the extra man and engine too; it will bring work enough for both," says Brother Larson.

The letterhead of an Illinois subscriber bears the following:

Reasons Why Our Business is Growing.

1—Because we give every man a square deal.

2—Because one man's money is as good as another's, and no better.

3—Because we give you the same five-per cent cash discount that we get ourselves, when you've got the cash to pay for goods.

4—Because (if you take into consideration the extreme high quality of our work and the goods we sell) we're "Price Makers."

5—Because we buy for cash and sell only to responsible parties. This means that we lose nothing on bad debts and can afford to sell high-class goods on close margins. In other words—we do not have to charge you extra money in order that you may help pay for the implements or work that some other "cuss" skinned us out of; nor do we have to put in a line of cheap stuff in order to make greater profits and thereby offset our losses.

6—Because "QUALITY COUNTS."

American Association of Blacksmiths and Horseshoers.

Perhaps the most important happening in the association circles during the past month is the organization of the Iowa State Blacksmiths' Association. While this association has been but recently formed, it is already showing Iowa smiths the value of organized action. A price list has already been agreed upon and a collection department established. The smiths will also use the organization as a protection against the dead beat, and, altogether, the association promises to be pretty near an ideal protective organization.

Have the blacksmiths of your neighborhood raised their prices? Do you know that prices are being raised in all sections of the country? Advices have reached me in the past month which show that the smiths everywhere are beginning to wake up—to realize that they are not able to stand the recent advances in supplies without a corresponding increase in their selling prices. Have you sounded the members of the craft in your locality on the subject? You can be certain that your brother craftsmen are looking for a protective association. The only thing necessary to get them to act is for someone to start the ball rolling. Suppose you appoint yourself organizer and get busy immediately!

Why can you not, Mr. Reader, get busy in your locality with a protective organization? Just let me quote from the preamble to the Iowa Association's Constitution: "It is bad enough to cheat and swindle strangers, but the man who deliberately robs himself and his family of their rightful possessions is the greatest of all rascals. Bricklayers in St. Louis get $8.00 per day for eight hours' work, and they learn their trade in four weeks. Telegraph operators draw from $30 to $100 per week, and other occupations pay handsome profits, while the blacksmith toils and labors and eats the bread of sorrow, his wrongs not righted and his rights ignored. Shall this state of things last forever? Why will blacksmiths work for less than they can afford to when they set their own prices? Is it not time to act?" Read these lines over, Mr. Reader, and let them soak in well. We should like to print all of the matter sent out to Iowa smiths by the Secretary of the State Association, but space prevents us.

Here is more evidence of the need of a raise in prices. The smiths of Cuba, N.Y., announce a raise in the price of shoeing.

"The blacksmiths of Cuba, N. Y., have determined to make a change in the price of horseshoeing, and the following are the prices to take effect on and after September 2, 1907:

Numbers 0 to 5, inclusive, 30 cents for new shoes. Numbers 0 to 5, inclusive, 15 cents for resetting. Numbers 6, 7, and 8, inclusive, 35 cents for new shoes. Numbers 6, 7, 8, inclusive, 20 cents for resetting. New bar shoes, 50 cents; bar shoes reset, 25 cents; hand-turned shoes, 50 cents."

Think about these matters now and act. Call on the smiths in your neighborhood, find out just what they think of the recent raise in the price of supplies and the corresponding reduction of profits. Send to me for my easy plans to form branch associations, and get something started in your county immediately. Address me at P. O. Box 974, Buffalo, N. Y., and by return mail you will receive my easy plans for forming branch associations and any other help you may need in getting the smiths of your county together and working in harmony.

THE SECRETARY.

Nebraska Smiths Will Meet.

The Eastern Nebraska Association will on November 20th hold a meeting at Lincoln, and invites all Nebraska smiths who are desirous of joining this association to be present. This association is now composed of Otoe, Johnson, Nemaha, Pawnee, and Richardson counties, but it has been decided to enlarge the association sphere to include the entire state.

If you are a Nebraskan and wish to obtain better results for your labors write Mr. Thomas Chadwick of Syracuse, Nebraska. Mr. Chadwick is secretary of the Nebraska association and will make arrangements for your accommodation at Lincoln. Write Secretary Chadwick *now*, right away, and get at least two neighbor smiths to do the same. Don't put it off—DO IT NOW.

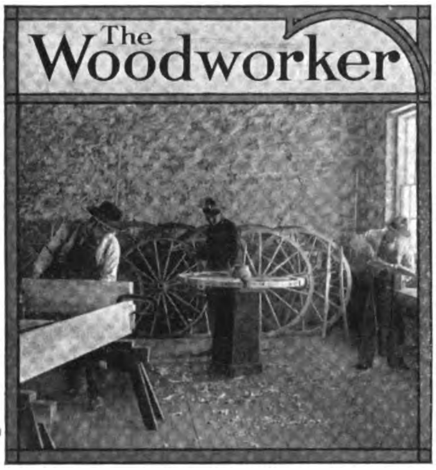
Another Lone Price-Raiser.

JOHN M. PFEIFFER.

I have just read the article about the "One-Man Association." It struck home, as I am in the same predicament. There are three blacksmiths of us in this village. I have been in business about 20 years without let-up—just think, brothers, 20 years, and I am just making a good living, raising a family of four. I talked with my fellow-blacksmiths about raising on shoeing, but I could not induce them to do so. As I am somewhat independent in my make-up, I decided to go it alone. I keep a first-class shop for a county shop, and I cater only to the best of trade. I always endeavor to give my customer the worth of his money, both in material and workmanship, and I have all I can do the year around. As I have said, I raised prices on shoeing about the first of June this year, and I have not yet had one customer say one word against my raising on shoeing. If, perchance, some unreasonable customer comes along (by the way, I have very few of them—don't want them), I certainly have the argument for him. Do not misunderstand me, brothers, to say that I rather would go it alone in this; far from it. While I can hold my own anywhere, I think, I would rather take my fellow-craftsman along with me on prices. They seem to think they would not get so much work. How foolish! I do not see one bit of difference in the amount of work, but I certainly do when it comes to check up. If we blacksmiths would only strive to better our condition, one and all, how beneficial it would be to us and all concerned. Nevertheless, we must go on; perhaps some day, when too late, our no less worthy brothers will see their mistake. As I do only horseshoeing and general blacksmithing, I cannot give prices on woodwork. The following are some prices, alike to all.

New shoes, common, each	$ .40
Recalked and set, old, each	.20
Setting 1 shoe, not calked	.15
Side and toe weights	.50
Bar shoe	.75
Hand-turned shoes	.50
Hand-turned bar	1.00
Neverslips to No. 5, per 4 shoes.	2.50
Neverslips, No. 5 and over......	3.00
N. S. calks, each to 9/16	.05
N. S. calks, 9/16 and 5/8	.06
N. S. shoes, reset, each	.15
Steel-centered shoes, each	.55
Plow Work.	
New 12" lay, cruc. steel, each ..	$3.00
New 14" lay. cruc. steel, each ..	3.50
New 16" lay, cruc. steel, each ..	4.00
New 18" lay, cruc. steel, each ..	4.50
Sharpening plows	.25
Pointing and sharpening	.60
Shin point...................	1.00
Repairing moldboard point	1.00
Sharpening cultivator shovels	.75 to .90
Sharpening and pointing	1.00 to 1.20
Fin cutters, each	.75
Fin cutters, sharpened	.10
New landside steel	1.25
New landside long bar	1.25
Tire Work.	
New tires, 1 in. and less, per set	$5.00
" " 1 1/3 x 1/4, per set	5.25
" " 1 1/3 x 5/16, " "	5.50

New tires, 1¼ x 5/16, per set..... $ 5.75
" " 1⅜ x ⅜, " " 6.00
" " 1½ x ½, " " 7.00
" " 1¾ x ⅝, " " 9.00
" " 3 x ⅜, " " 8.00
" " 3 x ½, " " 9.00
" " 3½ x ½, " " 10.00
Buggy tires reset, per set........ 2.00
Wagon tires reset, per set..$2.00 to 3.00
Cutting and setting tires 2.50
and all other work in accordance with above prices.



A Good Talk on Axle Lengths.

W. A. SHORT.

In the August number of THE AMERICAN BLACKSMITH brother Metcalf asked me what the correct length of the narrow-tread wagon axle is. I suppose that he means the wood axle. Again, he asked if the three and three and a half inch were the same length. Answering the first: The narrow tread is four feet four inches from center to center of tread, another is four feet eight inches, and the standard gauge is five feet. Now, of a three inch by nine inch narrow-tread axle (wood only), the extreme length would be 52 inches to center of bearing on skein. Then, from center of bearing on a three by nine-inch axle to the out end would be 4½ inches on each end of axle, but, since the wood cannot come out as far as bearing on account of the hollow in the skein stopping about ¾ of an inch short of the bearing, we must cut the axle (or wood) that much shorter on each end, or 1½ inches. Then 52 inches plus nine inches minus 1½ inches is 59½ inches, the length of the axle.

The difference in length of a three by nine-inch axle and a 3½ by 11-inch is two inches (length of wood), while the tread is the same. To get length of steel axle, add to the width of the tread the length of the bearing. To illustrate:—Suppose we want to get length of an axle 1½ by seven, standard gauge: 60 plus seven is 67, the length from end to end. However, if axle is to be arched, allow for that extra.

In repair shops the best way to get length of axle is from the old axle, the one broken or the other one on the job, if only one is broken. The engraving gives my idea: line A is length of axle with skein on end, to end of bearing—three by nine-inch axle,—equals 69 inches; B, length from shoulder to shoulder, or 51 inches; C, end to end of wood, or 67½ inches.

Some claim that the correct measurement for any gauge is from outside to outside of tread, but my idea is from center to center of tread.

How to Set Axles.

W. H. GUNN.

Every wheel should have a plumb or perpendicular spoke. Buggy axles should have a "gather" of ¼ to ½ an inch to the front, as speed causes the wheel to fly off at a tangent. I set heavy truck or wagon axles in the center when possible, by heating a place about 12 inches long and putting the wheels on. I now turn the axle over so the bottom part will be up, put a straightedge across wheels, take a set, flatter, or swage, and bend the axle until the inside of the tire is the least bit less than the outside pressure on the straightedge, so that when the weight is on the wheels will be down to a square tread. I gather my heavy axles the least particle to the front by the eye, chalking the center and washer and end of arm; when these three points are on line at both ends with slight gather to the front, you will find by trying on wheels (if boxes are in straight) that the axle is not only properly set, but will hold grease and run nicely between collar and nut for years and almost as easily as roller bearings.

It is a great mistake with nearly all of our factories to track their axles by gauge. The dish of a wheel is very important in setting axles, and unless the wheels are all set to the same angle, the axles will not bear properly on the spoke.

Let us hear from other craftsmen on the subject of axle setting; we can learn from each other only by giving our ideas.

A Talk on Axle Setting.

J. W. DARON.

Brother N. E. Koch states in the September issue that he knows two smiths who differ from each other on axle setting in that one claims all axles should be set so as to give ⅜ of an inch gather to wheels, and the other claims that all spindles should be set so that the front surface of the spindle will be on a straight line with the axle. Now, brother Koch desires to know which smith is correct. According to my understanding of axle setting, neither is right. The first-named gives too much gather to wheels for light vehicles and not enough for heavy vehicles and wagons. The second one sets each point of the spindle too far forward for its taper. Take, for example, a pair of spindles, each of which is six inches long and has ¼ of an inch taper, and set them as above. It will give two inches gather to wheels four feet high, which, as every smith knows, is too much. Now, the reason it is too much is because every time the gather of wheels is increased the sliding friction of the same is increased, which forces the wheels to the collars of the spindles in a much greater degree. So, right here is where the art of setting axles comes in: to know just what angle the spindles should stand in relation to each other so as to equalize the two opposing forces—the one produced by the sliding friction and the one produced by the taper of the spindles.

Now, I have never been able to reason or figure it out just how much the points of spindles should incline forward, but long experience has taught me that about 1/16 or 1/12 of the taper of spindles is as near right as can be gotten to incline the points of the spindles forward from a straight line. It is not 1/16 or 1/12 of an inch, but this much of the taper; thus the more the spindle, the more they should be inclined forward. I haven't said anything regarding the

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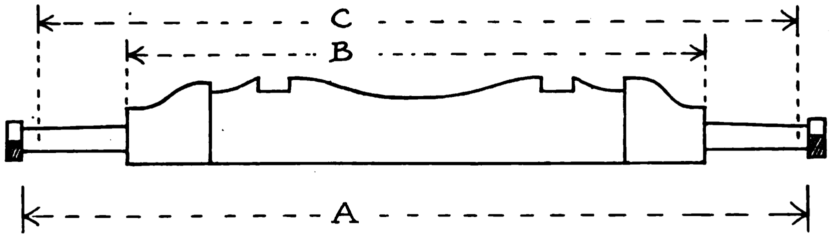


THE BEST WAY TO GET LENGTH OF AXLE IN THE REPAIR SHOP IS FROM THE OLD AXLE plumb spoke rule, as that is another question.

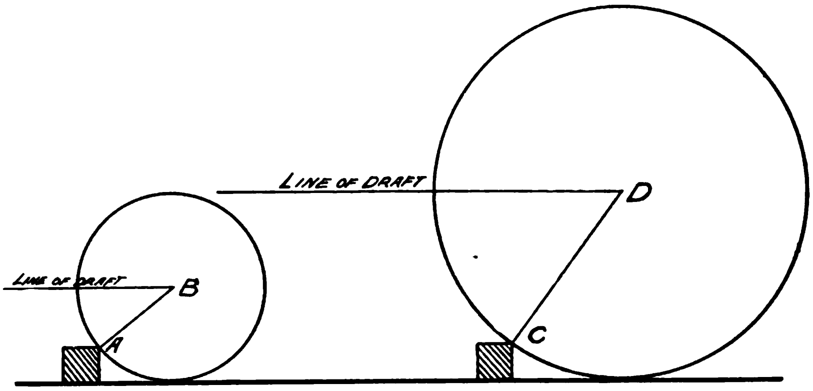
That Wonderful Wheel Problem Again.

A. S. PRIMMER.

In the September number Mr. J. W. Daron brings up the high and low wheel question. He says that Mr. M. A. Wade writes that a wheel 50 inches high has less draft than a wheel with 40 inches height, and will run with less power. Now the question is, which wheel will pull the easiest over a block four inches high, or any other obstacle it may come into contact with? We will take Mr. Daron's sketch: One wheel is three feet and the other six feet; this brings the draft line across the top of the small wheel from D. Now we draw line from D to the ground, and from B to the ground. What is the difference in the angles thus formed?

How to solve the solution: Take a wagon with wheels of the same size as in the example above; put on a load of wheat, sand, or coal, which can be evenly distributed; put your obstacle in the road and drive over it. Now turn around or change your wheels from front to back—i. e., little wheels behind—and drive over the obstacle again and see where your draft is and which will pull the easiest. Let us hear from someone else on this subject. Try this, brother, and see who is right.

Brother Daron says the small wheel will run the easier. If that is the case, how is it that they do not make all the wheels small? On our common wagons three feet six inches and four feet eight inches is the common height for felloes sent out by our jobber and wagon wood material dealers. One wheel cannot have the advantage of the other when one is just half its height. The leverage is equal in both cases if figures do not lie.

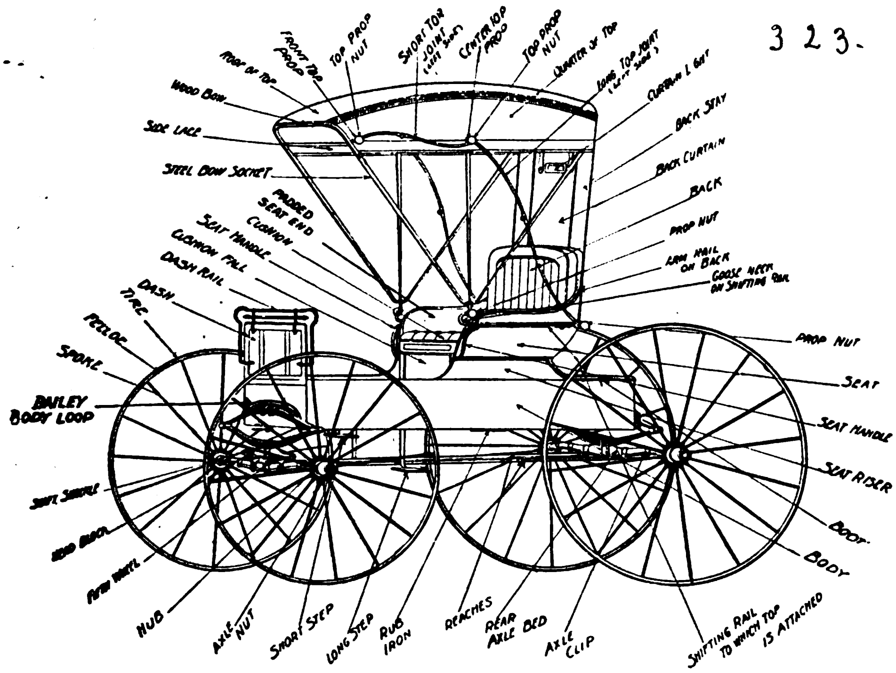


AND STILL ANOTHER SOLUTION TO THE WHEEL PROBLEM

A Practical Talk on Cold Setting.

B. F. TALLEY.

Cold tire setting is all right if you don't abuse it. A cold tire setter is just exactly like good credit. It is simply necessary until you abuse it. What I mean by abusing cold tire setting is this: Don't ever try to set a tire with your machine when you know the tire ought to come off. Anyone that has any knowledge of tire setting has mind enough to know when that is. For instance, if your customer has a wheel that is worn at the tenons, take the tire off, wedge your spokes, and slip your tire back on and shrink it in your cold setter. You can do this while you are measuring your wheel and tire, so you save at least one hour's time on a set of tires, as a rule. You will find that your cold setter will set at least 90% of the wagon tires without taking them off. A man that counts his time worth anything can't afford to have loose tires. If he runs his wagon loaded with loose tires, you know what happens. Another thing I would say: Don't buy a machine to set wide tires unless the tires in your community are thick, because I have had experience and know that tires must be ½-inch thick when they are 3 inches wide to set them cold. If they are not ½-inch thick, you may set one and burst the other. You can't rely on the machine. My experience is, the machine that sets tires from ¾ up to 2 by ¾ is the safe investment. I am telling this from experience and not what someone else said about it. I have made cold tire setting a study and am ready to answer some of the questions that may be asked.



THE CORRECT NAMES OF THE VARIOUS PARTS OF A BUGGY

When to Hit and Where to Hit

C. W. METCALF.

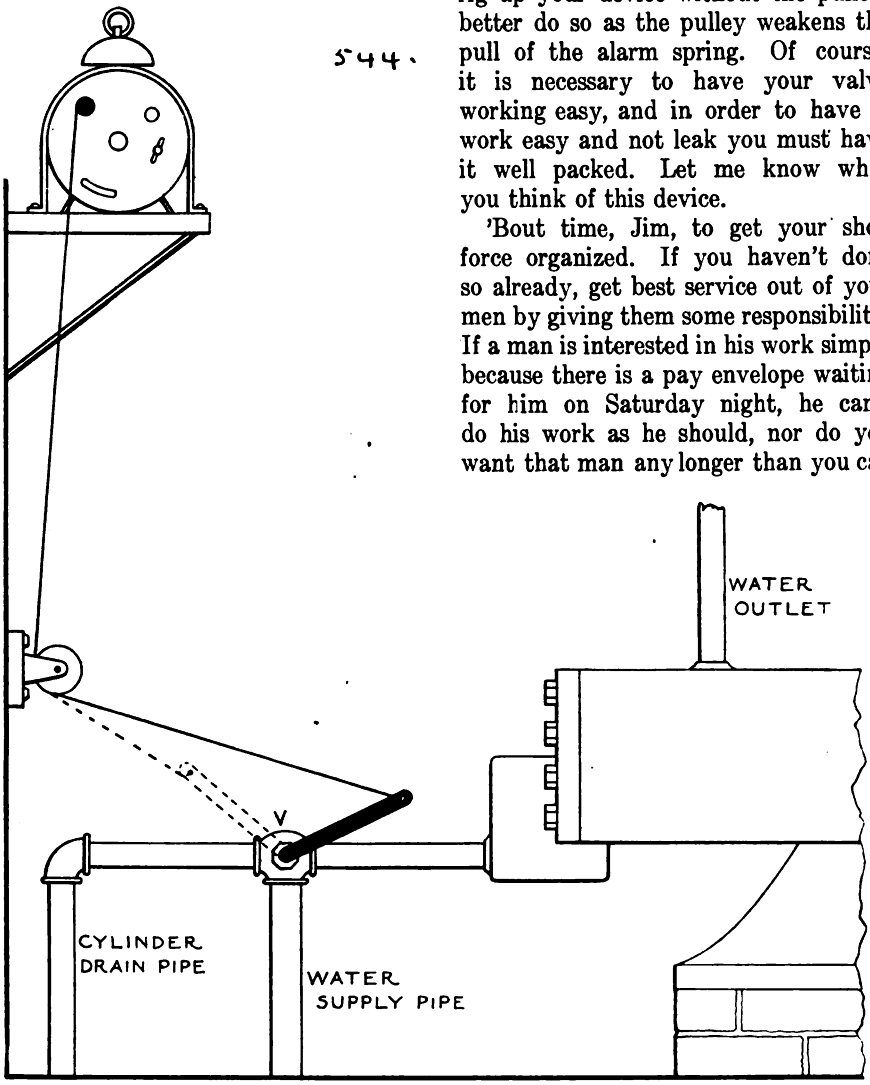
There seems to be a fault with a great many smiths of today in forging any piece of work to know when to hit and where to hit. For instance, I was watching a man forge a piece of difficult work the other day and such awkward work as he was making! He made the remark that he was used to working in a railroad shop where they had tools for such work. He got his piece of work out of shape and I began to laugh, and he handed it over to me, saying, "Please, straighten it up for me, will you?" I threw it into the fire and heated it up, and the one heat was all that was required. Now, I don't want the readers to think that I am the only smith because I knew where to hit that piece of metal to bring it in shape, for I am not, I am only one in ten thousand. But I do say, study your work and see where you want to hit it before you heat it, and then heat your work and bring it in shape with as few blows as possible.

Thornton's Letters.—13.

Being "Straight-from-the-shoulder" Talk from a Prosperous Self-made Smith to his Former Apprentice, now in Business

Dear Jim:

Yes, old boy, you'll have trouble with your engine in cold weather if you don't drain the cylinder jacket every night. We had trouble here until Jack Lyons, our gas engineer, got lazy and rigged up a device for draining the cylinder automatically. It was before Jack got married and he forgot to drain the cylinder jacket several



THORNTON SOLVES THE GAS ENGINEER'S COLD WEATHER PROBLEM

Wednesday nights—that's when he went to see his girl,—and, of course, the next morning found him hopping around like mad. He finally got tired of this sort of thing and fixed up the device we have now. I am sending you a sketch of the contrivance and believe you'll find it just the thing.

The valve V is a three-way valve, so that when the handle of the valve is toward the engine the water is flowing through the supply pipe and into the water jacket. But when the handle is pulled over, the water supply is cut off and at the same time the water in the cylinder jacket is drawn off through the cylinder drain pipe.

The valve handle is operated by an alarm clock. This is mounted on a shelf over the valve and set to operate the valve at any time. The cord connecting the clock with the valve handle is attached to the alarm wind on the clock. The key on the wind is replaced by a spool when the device is put into operation. If you find it possible to rig up your device without the pulley, better do so as the pulley weakens the pull of the alarm spring. Of course, it is necessary to have your valve working easy, and in order to have it work easy and not leak you must have it well packed. Let me know what you think of this device.

'Bout time, Jim, to get your shop force organized. If you haven't done so already, get best service out of your men by giving them some responsibility. If a man is interested in his work simply because there is a pay envelope waiting for him on Saturday night, he can't do his work as he should, nor do you want that man any longer than you can help it. It's the man who is interested in the particular job he's on that you are looking for. And if you place some responsibility on the shoulders of the men now working for you, you'll turn every one of them into an interested partner.

You know how we work the thing down here—do the same at your shop. Give every man from the kid up something to interest him in the shop system. Pick out your best all-around man, the one who can handle a sober as well as a spunky man and appoint him foreman. Take the fellow who has a knowledge of gas engines and who dabbles in machinery stunts, and appoint him gas engineer. Make the kid understand that his department is keeping the shop clean, the forges well supplied with coal and supplies, and such other work as he can do. Let one man take care of repairs to your machines, another keep tally on the stock, and so on, making each of your men responsible for some department or part of the business.

When you advise them of your appointments call a little meeting and give them a talk on coöperation, and tell them about your appointments, beginning with the kid. Give each one of the boys a talk on what you intend to do—tell them that your success means their success. Make it a heart-to-heart talk, an experience meeting, and a meeting of the department heads all in one. Tell them that you are more than anxious to do the square thing by them and that you want them to do the square thing by you. Tell them that the best ad the shop can get is to have them boost for all they're worth—brag about the shop, their brother workers, and the boss. And don't forget, Jim, that the boss wants to act pretty well to be bragged about. I don't want you to treat them like mollycoddles, but to treat each and every man as a man and an equal. What the average workingman wants more than anything else is fair treatment—you can't pay men to take abuse. And another thing, it's cheaper to treat them square.

I'm glad to know that your customers are paying up so well—of course, they should. Crops have been something immense as far as value goes, and the farmers ought to share up when they have a good harvest.

Let me hear from you soon about how the reorganization plan works.

Yours for shop coöperation,

Thornton

Points on the Care of a Gasoline Engine.

BY SIMPLICITY.

The gasoline engine is less complicated than a steam engine, and therefore requires less care to keep it in good order.

Like any other piece of fine machinery, it should be attended to at the right time and in the right way.

If run with dry bearings, loose nuts, and covered with dust, it will be ruined as quickly as any other machine.

A good quality of lubricating oil is necessary. Care in its selection and its regular application will be time well spent.

There is no expense of fuel consumption while getting ready or while cooling off, only while in actual use, and then very little.

For fuel, stove gasoline is usually used. The engine should operate at full load under about one pint per horsepower per hour.

There is a wide difference in gasoline. Some contains water, which greatly reduces its value for use in an engine.

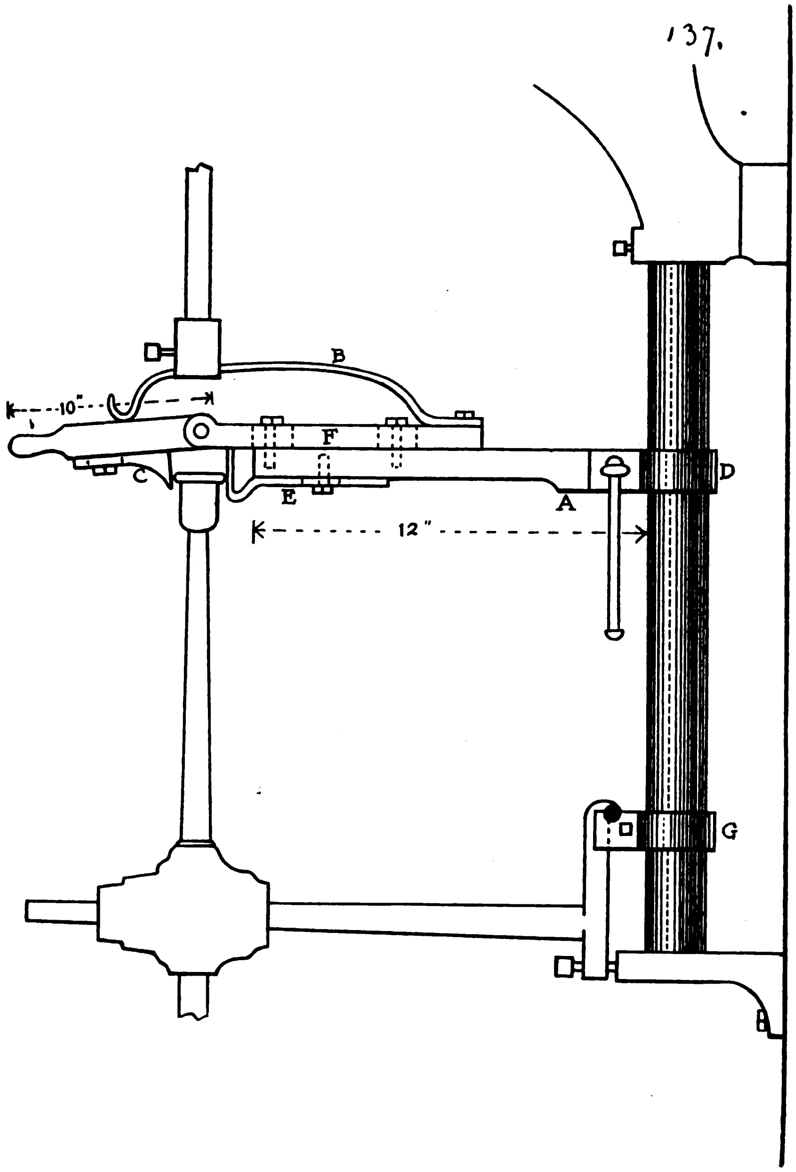
Never load a gasoline engine—or any other engine, for that matter—beyond three fourths of its capacity, for best results.

A Wheel Clamp Attachment for the Drill.

E. V. WILLIAMS.

The accompanying engraving shows a wheel clamp which I just finished, and which I believe will prove itself worth ten times its cost. The principal dimensions are given in the engraving. The arm D has an offset at A for 1½ inches to the left, so as to bring the arm out of the way of the drill. This arm is 12 inches long on my device, but will probably need to be longer or shorter for other makes of drills. The piece E is fastened to the bottom side and at the end of the arm, as shown, by means of a bolt, the bolt hole in E being slotted so as to allow E to be pulled out or pushed in for accomodating different sizes of tires. The part marked F is similarly fitted, as is also C, which is also fitted with teeth on the edge, which grips the tire. The spring at B is tempered and should be sufficiently strong to hold the clamp C firmly against the tire. The arm D is fitted with a nut and bolt arrangement so as to allow of it being raised and lowered easily to accommodate different sized wheels. By means of the slotted holes for the bolts which hold the various parts together, practically any sized wheel can be fitted in the clamp. The arm at G is also arranged so it can be raised or lowered.

Referring to my shop, I am proud to say that I can show you the best-equipped shop within 50 miles of here. I own my dwelling, shops, and everything pertaining to the business. My outfit is all new and of the best make to be found on the market. I have a large, new two-story shop, with plenty of tools, machinery, and material. I have a three-horsepower gasoline engine, a Buffalo blower, a Hay-Budden anvil, a Western Chief drill press (the best general purpose machine I ever saw), a buzz planer, a rip saw, a sanding machine, a fine assortment of the Green River screw-cutting tools, an emery stand, two Parker vises, a pair of Easy bolt clippers, and many other good, useful tools, including an iron shear of my own make that will shear 1½ by ½-inch tire bars.



A WHEEL CLAMP ATTACHMENT FOR THE DRILLING MACHINE

Power in a Tennessee Shop.

J. T. WATRIDGE.

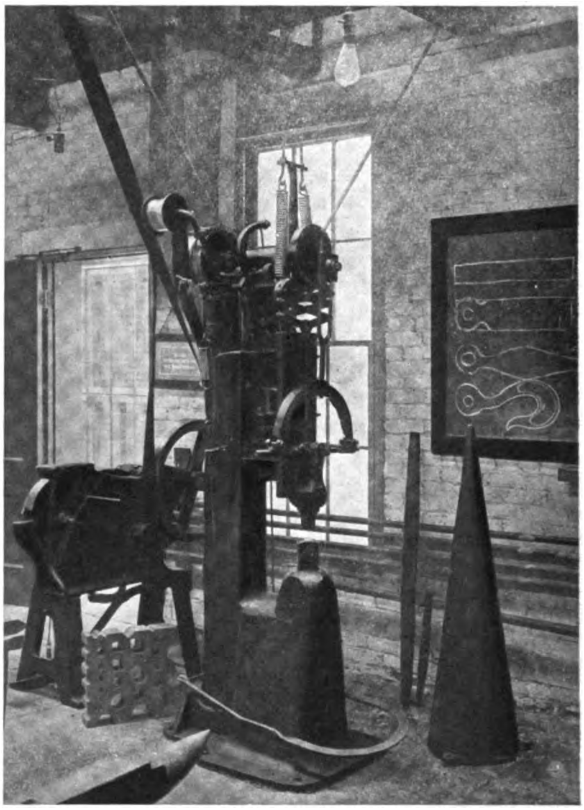
In regard to power in the shop would say that I would not pretend to open my shop doors without first-class power. I have two first-class two-horsepower Fairbanks-Morse gasoline engines. My oldest engine has been in pretty constant use for three years. It has not cost me five cents for repairs, nor have I been stopped more than one hour in the three years on account of it not going. It costs me about 75 cents per ten-hour run for fuel. I can do on an average of about four times the work that I could do before I got machinery. To all doubters I would say consider this—four days' work in one day by one man. Say one man's help costs $2.50 per day; four times $2.50 is $10, fuel for engine 75 cents, a total saving of $9.25. Does it pay to own a power shop? Besides, it is most impossible to do work by hand as good and as nice as by machine. Just last week I had a job of putting in a pair of hind hounds that came from my brother blacksmith's shop who told the party to come to me, as I could fix him up. I went to work, doing it all alone. He fed his team, and in one hour I had him ready to go. He said, "Well, you get all of my work hereafter." This party lives ten miles away, and I could mention many similar cases. Suppose I had no power; it would have taken me nearly a day to do this job. I say my power and machinery have more than trebled my business. Brother, if you haven't got an up-to-date power shop, take steps immediately to own one and stop doing the hard work you are now doing, for it is hard enough at best.

My engine pulls one Silver's band saw, one Crescent jointer, an emery wheel, a three by 32-inch grindstone, a drill, a boring and tenoning machine, a Buffalo blower, a cut-off and rip saw, and I also pump water and do my wife's washing. The two latter items do not interfere with my shop work, as I just put the belt on and go on with my other work.

Ted Thornton's Shop.

How Ted Started—A Short History of Thornton's Quality Shop.

"Theodore Thornton, Blacksmith," was the sign over the door of that shack of years ago. It was a little one-storied frame shop next to the grain elevator, and reminded one more especially of a large piano box than anything else. Jim was nothing but a boy those days—red haired, freckle faced and all the accompanying disfigurements, even to the vacancy in his front teeth. But I am getting ahead of my story, for Jim didn't show up for some time after Ted started. The old place had, I believe, been a barn in its time, but time and many election fires had called upon it far too often for their tax. Before the coming of Thornton the place was occasionally used as a store place for old machines and scrap, and once it boasted of housing one of O'Conner's sailboats. But that was before O'Conner's taste had run to autos and auto boats. When Thornton got the idea of a shop of his own he naturally looked up a starting place. He struck a bargain with the owner of the piano box and started to fix things up. He got the place into fairly good condition, so that there were actually some places in the roof where the rain couldn't come in.



A CORNER OF THE FORGE SHOP, SHOWING THE SHEAR POWER HAMMER AND MANDREL

The equipment of the box-of-a-shop was a collection of odds and ends gathered here and there and everywhere. The drill press looked very much as though it had been used in building the ark. The forge—well, when you are told that Thornton built this himself, and that up to that time he had had no experience at brick laying, you have a fairly good picture of it in your mind. The source of the blast was, of course, a bellows which because of the lack of room, was hung overhead. It was operated by means of a very ingeniously (so thought Thornton, at least) arranged foot lever so that he could use both hands at the fire. The bellows had been a good one at one time, but it was then covered with patches, and it required considerable kicking on the lever to get up any kind of a fair blast at all. The anvil was pretty well chipped and nicked, but was made to do the work.

EXAMPLES OF WORK DONE AT COLORADO AGRICULTURAL COLLEGE

Thornton's launching into the business sea of the lower east side was not calculated to stir that section from end to end, and it didn't. Those early days of Thornton's were not such as could be likened to a bed of roses. If one could take out the flowers, strip the stalk of leaves and have left nothing but sharp spines and hard, stubborn stalks one would have a pretty good idea of Ted's struggles during those early days. But he was not to be discouraged, and hung on like a bull pup at the business end of a tramp's trousers. Price cutting and competition were big rocks in his path, and it was only by persistence that he finally won out.

By very strict saving and judicious buying Ted gradually improved his equipment and the building. He added a side-line of whips, then axle grease, and gradually built up a trade in these channels. Slowly but surely and solidly he was laying the foundation for the big business that is now his. His trait as a careful saver was early demonstrated because of circumstance. It was followed from habit and it resulted in his purchasing one of the most important corners in the wholesale district and building a modern shop.

It was some three years before the building of the new shop that Jim came with his freckles and red hair. And that is practically all the boy had, beside a bright face and an active brain. He came in as an apprentice, and early showed his aptitude for the smithing trade. Thornton treated him more as a son than as the "shop kid," and showed him the ins and outs of every branch of the trade.

Thornton's business was built through continually sticking to it—persistent, everlasting pushing all the time. He says that his dreams of the early days were always of a large brick shop with the machinery on a continual hum. This was in his mind even before the piano box was fitted up.

What's become of the piano box? Why, it's now known as Tom Tardy's, and it houses the same anvil, forge, and bellows that started Ted Thornton on his way.

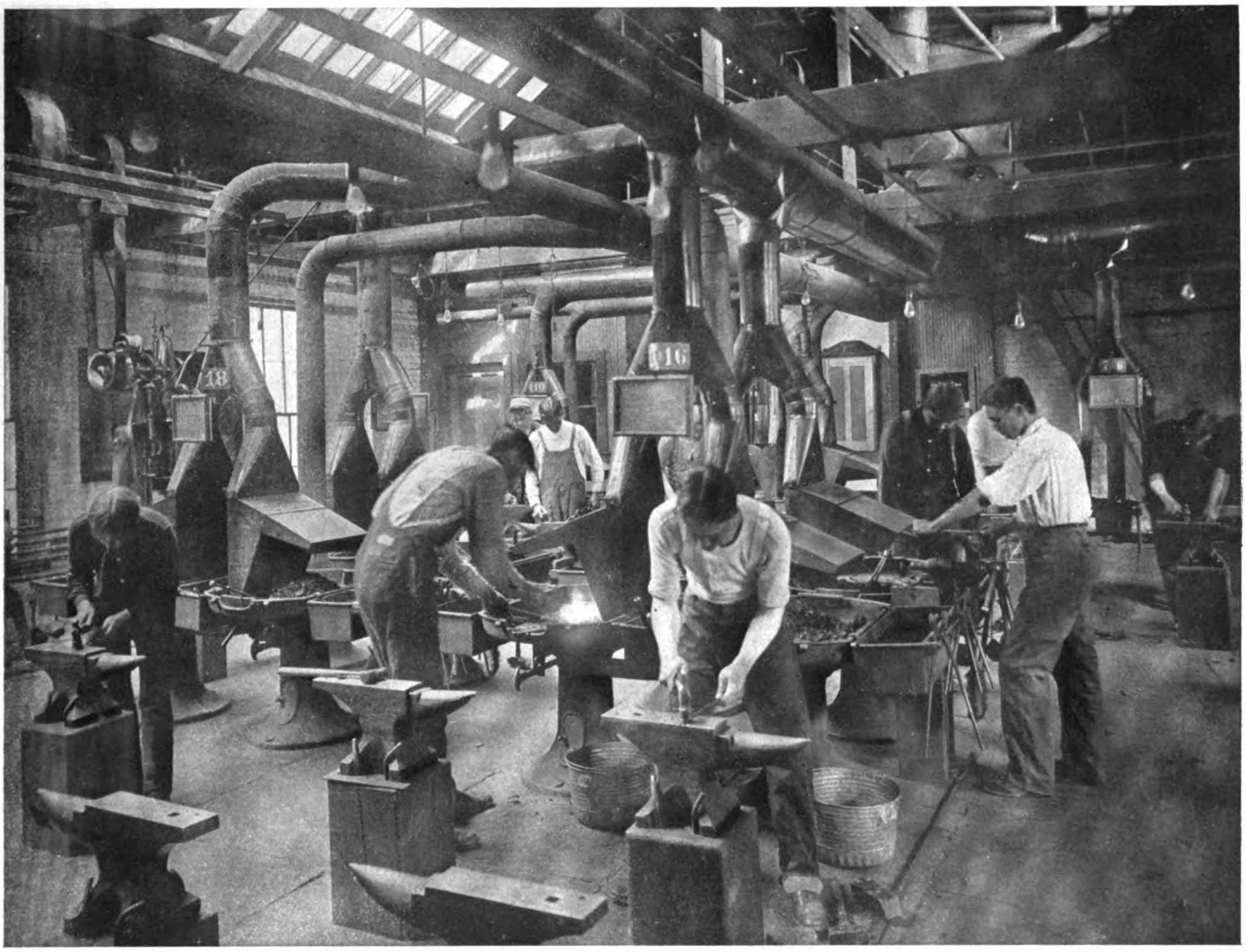
Forge Work in the Mechanical Engineering Department of the Colorado Agricultural College.

W. T. ELZINGA.

It may be of interest to give you an idea of what we are doing in the forge room of the Colorado College of Agriculture and Mechanic Arts.

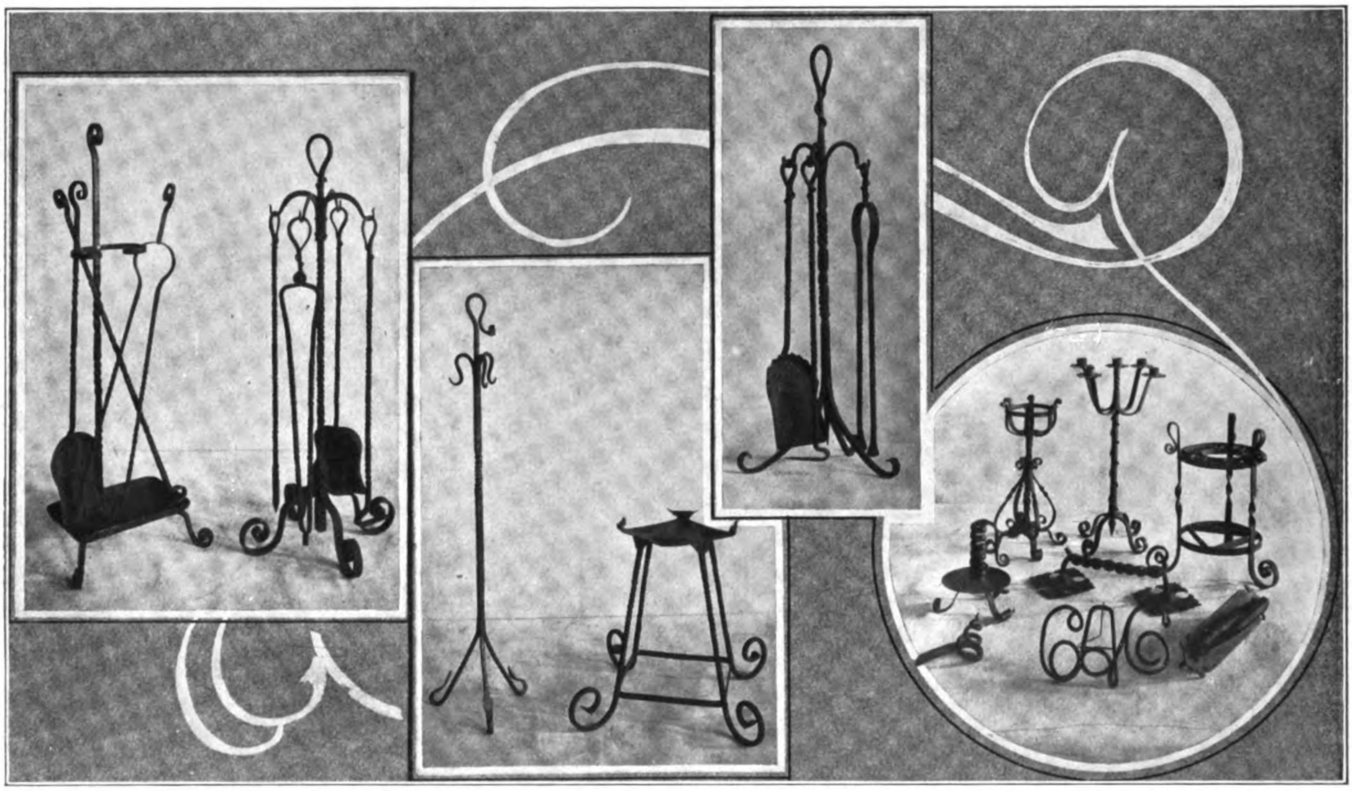
Our blacksmith shop is 35 by 42 feet. The tool and stock room is 13 by 10 feet. We have twenty-five Buffalo forges, with an up-to-date system of plans, a J. D. combination foot and power hammer, power and hand shears, mandrel, foot vise, swage block with stand, emery wheels, etc., and a modern system of stock keeping and handling of blueprints for the use of the students. The last-named may be of interest to those who have trouble in the holding and handling of blueprints in the forge room.

Our forges are in pairs, and as there is very little room between them, the problem of suspending two prints, one for each student, in this small space and away from the fire, and convenient for both students, was rather difficult. For this purpose I designed a frame with two glass fronts and two grooves in one end. In these grooves I inserted a sheet-tin holder, or slide, which holds the blueprint. The frame can be turned about on the bracket from which it is suspended. This bracket is a forging, made of ½ by ⅛-inch iron, and it is fastened around the smokestack. It also forms a frame for a Russia iron stand onto which are riveted aluminum figures, by means of which each forge is numbered. This scheme gives each student a blueprint to work from, and if both men should work on the same job, the frame can be turned face forward instead of sideways. The prints are protected from dust and fire. We made a cabinet with thirty-six shelves spaced about one inch apart, the size of the print, and numbered them so that each can always be found in its proper place. The system works well and has saved us several hundred blueprints a year.



THE FORGE SHOP AT THE COLORADO AGRICULTURAL COLLEGE IS WELL EQUIPPED

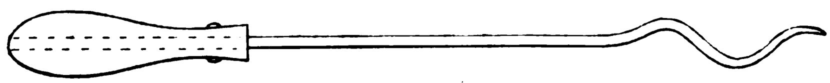
The course in forging lasts three months, ten hours per week. It consists of lectures on iron and steel, hardening and tempering, case hardening, soldering, welding in all of its applications, etc., and the making of a series of carefully graded exercises in iron for about a month. The rest of the time the students are taught the proper use of all the anvil tools, the power hammer, etc., in the making of useful things, such as lathe and planer tools, tongs, hammers, swages, heading tools and cold cutters, chisels for iron and wood and stone cutting, pitchforks, engine cranks, connecting rods, turn-buckles, shackles, clevises, wrenches, center punches, etc. Notes and sketches on the work are taken during the entire term, and thus each student leaves school with a good reference book on forging, of his own composition.



THE STUDENTS AT THE COLORADO AGRICULTURAL COLLEGE ALSO DEVOTE SOME TIME TO ORNAMENTAL WORK

Sometimes a well-advanced student is allowed to design and make something for his home, such as andirons, fire sets, and candlesticks.

The object of the course is not to teach the blacksmith's trade, but to make him rely upon himself in case of need, to use his hands and to develop a taste for practical work—how to do things systematically. That the course is a success, at least with a large percentage of the young men, is proved by the fact that several do blacksmith's work during vacation time, and thus earn money to pay their way through school.



AN EASILY MADE FURNACE AND STOVE POKER OF SPECIAL DESIGN

An Easily Made Furnace and Stove Poker.

D. FOSTER HALL.

The accompanying engraving shows a very easily made furnace and stove poker, for which the smith should find a ready sale. For furnace use, make it of $\frac{1}{2}$-inch round iron and 36 inches long. For stove use it may be made of $\frac{3}{8}$-inch round stock and 20 inches long. This is another simple little article that the smith can manufacture during his spare time and sell at a fair price. The handle may be made of most any wood stock and bolted or riveted to the rod as shown.

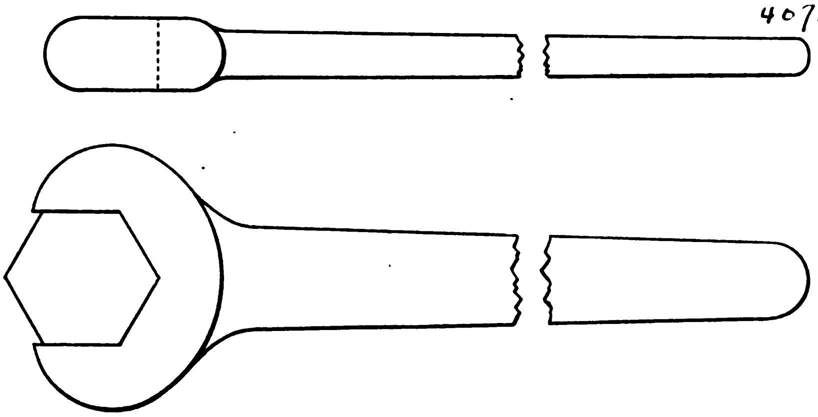
From the Father of the Smithing Craft to the Smith of Today.

TUBAL-CAIN.

Thinking seriously over the thousands of years that have possibly passed since this first and greatest of all artificers commenced his labors amongst the warriors of old, I pause and wonder why we, the descendants of so much mechanical talent, are held in so little esteem at the present day. This great man was a wonder in his day, a veritable god among men. He commanded the respect and admiration of the whole world. Kings and princes were delighted to pay him homage and gold. He was fêted at the dedication of the great temple of the early King Solomon, who summoned him in his soot-begrimed garments to appear before him, and, after learning that the grand edifice of which he was so vainly proud could never have existed had not the blacksmith made the workers' tools, he was so pleased and astonished that he declared him the king of all craft. What an exalted position!

But where is the blacksmith today? Does he still hold this distinguished position? Is he still the leading mechanic? Is he still honored and fêted by his employers? Can he command the highest compensation for his labor as did his great ancestor? Alas, no. The blacksmith of today no longer claims the distinction held by the father of all mechanics. While his knowledge in mechanics has increased, the value of his labor has decreased, and these conditions are truly the result of his own actions. He has severed the affiliations that existed between himself and his employers; he has neglected his work often through dissipation and other vices that lead men to ruin, until a lack of confidence and a spirit of antagonism exist instead of honor and respect. The result of these conditions has been the invention and introduction of the steam drop and forging machinery. Hence the condition of the blacksmith of today, and I am fully persuaded that ere long the competent mechanics in the line of general forging will be few, unless conditions are changed.

For the benefit of my brothers in the craft, I propose, with the limited time at my command and the limited knowl-



CAN YOU GIVE THE CORRECT PROPORTIONAL DIMENSIONS?

edge I have as a machine forger and general smith, to introduce and discuss this very important subject with my brother mechanics under the head of "Tubal-Cain" in THE AMERICAN BLACKSMITH, which I hope all who earn their bread as blacksmiths will promptly subscribe for and introduce to their fellow craftsmen, who, I trust, will enter into the subject of general forging, by which each reader will benefit largely in educating himself through the practical experience of others.

"Tubal-Cain" will endeavor to answer a few questions each month and submit sketches of general forging by which the reader will be able to educate himself in mechanical drawings and figures used in forging with the methods and tools used. In the first article I submit a machine-wrench, which few smiths can proportion right. Please give proper sizes all over as you know them. The correct formula will appear in a following issue.

A Large General Shop of Tennessee.

W. J. DAWS.

The accompanying engraving shows a plan of our smith shop. It is built in the shape of an L. The length of one side is 70 feet, while the other is 50 feet. Our equipment consists of a five horse-power Weber gas engine, one band saw, one Western Chief power drill, one wood lathe, one emery stand, one power grindstone, one House cold tire setter, two forges run by Royal blowers, one hand drill, one Stoddard tire upsetter, one small Ideal tire upsetter and a Barcus shoeing rack. We have most any and all kinds of small tools that a good, up-to-date repair shop should carry. We carry a very large stock of all kinds of material and supplies, such as piping and pipe fittings. We use Etna coal and buy it by the car load.

The prices we get here are as follows:

407.

Log Wagon Work.

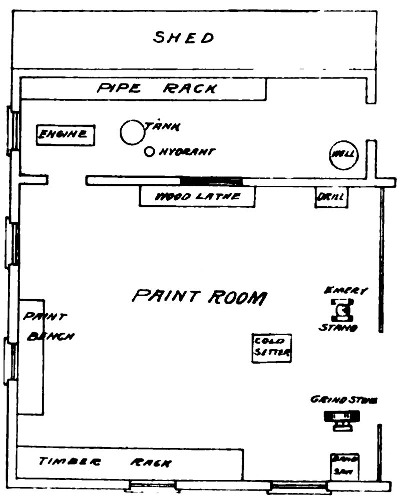
Four-inch tongue	$3.00
Reach pole	2.00
Spoking wheel	$6.00
Rimming wheel	5.00
Refilling wheel	9.00

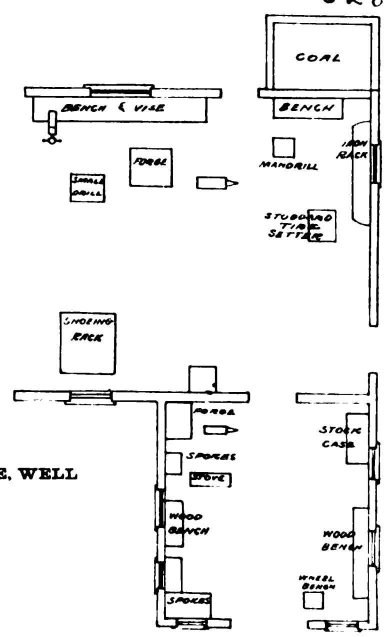
Farm Wagon Work.

Tongue	$2.00
Reach pole	$ .50 to .75
Respoking wheel	2.50
To fill new	3.50
Axle, per inch	1.00

Buggy Work.

Body	$10.00
New panels, each	2.00
Respoking wheel	2.50
To fill new	3.50
Reach	1.00
Shafts, each	$1.25 to 1.50
Crossbar	.75
Singletree	.50
Painting	10.00





A LARGE GENERAL SHOP OF TENNESSEE, WELL EQUIPPED

Horseshoeing.

Plain	$1.00 to $1.25
Toed	1.50
To put in rack	2.00

Miscellaneous.

Shovel plows, complete	$3.50
One-horse harrow	3.50
Two-horse harrow	7.50
Sharpening shovel plows	.10
Coulters	.10
Plowshares	$.10 to .25
Scrapers	15 to .25

This town is 65 miles north of Memphis and has betewen one and two thousand people. It is surrounded by good farming land, and is a well-known point for shipping all kinds of products.

Power in the Smith Shop and Buying a Gas Engine.

E. W. CARTER.

I thought that every reader of "Our Journal" was long ago convinced of the profitableness of power. But in looking over recent numbers I find several questions concerning gas engines and power equipments. Now in the first place I want to say that our gas engine paid for itself the first year we used it. And we bought a big one, too, because as far as we could see that gas engine was going to increase our business by a good big bit. And it did, too. We went into the power question very thoroughly, We didn't take the manufacturer's word for anything, but wrote to users. Without one single exception every smith we wrote to said gas-engine power paid big. And almost

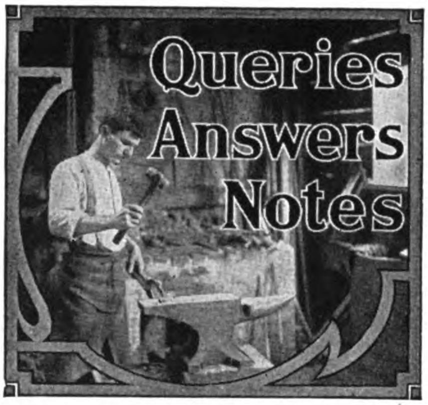
628.

every smith advised us to get a big engine, so that we wouldn't need to exchange for a larger one later. Since the installation of the engine we have had to enlarge our shop twice. Another enlargement is about due and I think we'll build an addition that will take care of our business for some time to come.

I'm not going to say what kind of an engine we have, because I don't want anyone to think that I'm unfair enough to consider it better than any other engine on the market. Our engine is giving perfect satisfaction. We have had the usual little troubles that are likely to happen with anything with which one is not entirely familiar. But, altogether we are more than satisfied. I don't believe that any one engine on the market can be called the best. The rule by which to purchase a gas engine is to not buy the cheapest, nor the prettiest, nor the one with the biggest fly wheels, but to get a line on as many as you can. Look to good material rather than red fly wheels or green cylinders. The good material, the stuff under the surface, is what is going to do your work. It's not the green or red paint, or nickel plating. It's not the pretty brass name plate or the nickel plated oiler. Then, while you are considering the engine it might not be a bad thing to look at the firm's name. Ever hear of them before? If they're a new company, are their engines running right? Don't let a lot of extras influence you to buy an engine you don't want. In finally agreeing upon a certain make don't buy until you are certain that it's the engine you want. And when you do buy make up your mind to make the engine do your work. Don't chase a letter to the manufacturers every time anything goes wrong. It is a good thing to examine the engine thoroughly before you start it up. Don't go tinkering around on it with a hammer and screw driver, but look over the engine carefully and sensibly, endeavoring to learn as much about it as possible. Don't try to take it apart the first day you get it in the shop. Study it first until you feel that you know the engine thoroughly.

After you get the engine in running order keep it so, by keeping it clean and in shipshape. Don't think that the gas engine needs no attention, for it does. It won't give best results unless it has a reasonable amount of attention. Gas engine power in the smith shop pays and pays well if the smith will give his engine fair attention.

What! Your calendar order not in yet? Some of "Our Folks" are going to be disappointed if they don't order soon. Turn to page 15 of the advertising section, and tell us what offer you want.

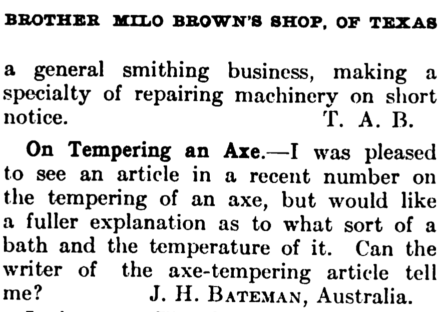


The following columns are intended for the convenience of all readers for discussions upon blacksmithing, horseshoeing, carriage building and allied topics. Questions, answers and comments are solicited and are always acceptable. Names omitted and addresses supplied upon request.

Wants a Wheel Holder. I would like to have some brother smith tell me how to rig a wheel and spoke holder for use on a lever feed power drill. C. B. STAPLES, Maine.

Wants to Handle a Fire.—Kindly give me information on the handling of an ordinary smith's forge. I am a close reader of your journal and have not seen anything in regard to it. Will some good general smith who has had experience in handling different kinds of fires give me information on handling fires. J. H., N. Y.

A General Shop of Texas.—The shop shown in the accompanying engraving is that of brother Milo Brown, of Texas. It is well equipped, and, as shown, is a model of neatness. The equipment consists of a gas engine, an emery stand, a punch and shear, a Mayer tire setter, a grindstone, a power hammer, a tire bender, and small tools as needed. Mr. Brown in speaking of his success says: "We attribute most of our success to your paper." He does a general smithing business, making a specialty of repairing machinery on short notice. T. A. B.



BROTHER MILO BROWN'S SHOP, OF TEXAS

On Tempering an Axe.—I was pleased to see an article in a recent number on the tempering of an axe, but would like a fuller explanation as to what sort of a bath and the temperature of it. Can the writer of the axe-tempering article tell me? J. H. BATEMAN, Australia.

In Answer.—The hardening bath consists of clean water, preferably rain or soft water, and common salt. Care should be exercised to see that both water and salt are clean and free from greasy substances. The temperature of the bath should be as low as 'tis possible to keep it. In adding salt to the water, put in as much as the water will dissolve. A. F. FRANCIS.

Welding Wide Tires and Bands.—I notice in your September number that "J. F. W." of Australia, tells a Mr. Needermeyer that wide tires may be welded by using a fire brick on top of tire, etc. "J. F. W." takes great pains in preparing fire, holding cold iron on sides, etc., and says he welded a band nine inches wide and five-eighths of an inch thick, and six feet in diameter. I had to piece a smokestack a while ago and made a band three-fourths of an inch thick, 12 inches wide, and 16 inches in diameter. I upset the ends, made short scarf, fitted parts well together, took edge heats, and welded both edges first. Then it was an easy job to weld center by keeping wet coal on sides and I made a first-class job of it. Tires welded edgewise do not bend and slip. I have no trouble, however, with thick or wide tires. W. H. GUNN, Virginia.

A Few Questions and Some Praise.—I would like to get a little information on dies for a power hammer. I have the Kerrihard No. 1, but can't do the work smooth. We do not have any plow work here, but I use my hammer to draw axes, weld axes, and do any large forging. I would like to know how brother B. D. Hungerford shapes his dies for such work as drawing large strap bolts from flat stock. My bottom die is flat, the top one is rounded in center and then beveled both ways. I think a talk on dies for hammer and how to obtain them would be interesting to the craft.

Hurrah for Mr. E. W. Perrin! His articles on shoeing are the only articles that ever helped me any. Someone who had worked at the trade 40 years said his way to stop forging was with a rolling motion shoe in front and a side-weight behind. I tried this on the first forger that came along (mind you, Mr. Forty-years said it was a sure cure, never knew it to fail), with the result that before the animal got a mile from the shop he fell down and broke his neck. Now I study into the cause like brother Perrin does and I get along better. C. B. STAPLES, Maine.

A Young Smith's Opinion.—I am 22 years of age, began pulling the bellows lever for my father when I was only eight years old and have been in the business ever since that time. I've got only a small country shop, but do a lot of work.

I notice that some of "Our Readers" are taking up a lot of space discussing the matter of published price lists, and as everyone has a perfect right to his own opinion, I'll give my idea on the matter. I don't know what kind of customers you all have to deal with, but I have several tight-fisted, long-faced customers that can't be pleased. These are the ones that are going to make a complaint about the price of work. I think it is a good plan to publish our prices; then our honest customers can know what their work will cost before they come to the shop. And if Mr. Tight-Fist doesn't want to pay as much for his work, he can stay away from the shop, for we don't want to work for this class of people.

I would like some experienced smith to give me some advice regarding a punching machine. I want some means, which will be faster than drilling, of getting 3/16 inch holes in 1/4-inch, and 1/4-inch holes in 5/8-inch, tire. I have never used a punch in my shop and would like someone to advise me whether an ordinary punching machine will do this work satisfactorily or not. NOAH A. MATTHEWS, S. Carolina.

5 3.

AN OHIO SMITH AND HIS TWIN HELPERS

A Letter with Prices from Missouri.—I reply to your request for opinion in regard to publishing price lists. I think that is the thing to do. I think it would be a good idea for the smiths to get together in every neighborhood and arrange a list of prices for all kinds of smith work. As to the "jackleg" and "price cutter," spoken of by A. S. Primmer, they are here to stay and are generally poor workmen. It is not reasonable to think that a man who can do first-class work will work for second-class pay. It is not what you charge, it is the quality of the work and the way you treat your customers that brings trade. Do the work to please, and your customers will not be so apt to kick on the price. Here are some of my prices:

Four new shoes	$1.50
Four old shoes	.80
Sharpening plow	.25
Sharpening lister	.30
Sharpening subsoiler	.10
Sharpening four cultivator shovels	.40
Pointing four cultivator shovels	2.00
Pointing plow .... $.50 to	1.00
Setting tires, each	.50
Spokes, each	.15
Felloes, each	.20
Bolster, wood only	1.50
Welding sickle	.50
Welding sulky rake axles	1.00

There is lots of work that I haven't done yet, but I do everything that comes to me. I have a regular Tom Tardy shop, but believe in improving and I hope to with the aid of THE AMERICAN BLACKSMITH. I read all of the letters in it and would not think of being without the paper at all. Here is a list of tools that I am using at present: one Royal Western Chief blower, one Silver post drill, drill bits from 3/16 to 3/4, one set of screw plates from 1/8 to 5/16, one set of screw plates from 5/16 to 3/4, four taps and four dies, one 65-pound vise, one bench and vise for woodwork, a set of woodworking tools, one Peter Wright anvil, one Stoddard tire shrinker, hammers and tongs, and other anvil tools. By the way, tell Benton to bring on his recipes, I am quite interested in such things. MASION HUFF, Missouri.

A General Shop of Ohio.—With much interest do I read of the manners and circumstances in which some started the trade, so I thought I would tell my story, too. When I was quite young I was inclined to be working iron and steel, making chisels, drills, etc., from old files. At the age of 15 or 16, a smith wanted me to learn the trade, but my parents did not consent. By this time I had made a small blower and had also made a pattern and had an anvil cast which weighed 40 pounds. I would watch the smith work then go home and try the same thing. I finally did pretty good work, but I was discouraged and gave up going into the shop. After I was married I bought a piece of ground and I worked on the farm, but in this I did not prosper, so I told my wife I was going into the shop. I went to see one of the best smiths I knew and asked if he wanted help. He said, "Vel, yas. Can you make a hook out mit de fire." I replied that I could and hired out to him for 50 cents a day. He was a very good smith and I learned very fast. Whenever I did a good job, he would say, "By golly, Henry, you beat all the other blacksmiths in town; you make a good blacksmith some day." I used to think he was flattering me, but today I do many jobs that others say cannot be done. It was in the old German's shop that I first saw THE AMERICAN BLACKSMITH, and I began to read it.

My first experience for myself was in 1902 with a partner. In one year I sold my interest to him and worked by the week for six months. After some misfortune, I came to this place with $78 worth of stock and tools, rented a house and shop for a period of five years, and now have about $500 in stock and tools. I have a gasoline engine that runs a rip saw, a drill press, an emery wheel, a tenoning machine, a grindstone, etc. I also have an attachment for the drill for bolting tires that I can turn the nuts on, then clip the ends off of one set of tires in 15 minutes. I have also a number of other homemade tools, some of which THE AMERICAN BLACKSMITH should have credit for. I also have a rack for my hammers that keeps them within reach all the time and swings halfway around the anvil. I find it pays to keep tools in their place, and THE AMERICAN BLACKSMITH is a stimulant to that kind of practice; besides, it tells lots of kinks that help to make a mechanic perfect. We certainly have a good paper and we ought to feel that it is "Ours." The articles on shoeing alone are excellent. I am making special study of anatomy of the foot and limbs, and I think every horseshoer should do the same thing. Let us strive to lift the standard of our craft higher.

I will give some of my prices: New shoes 40 cents; old shoes, 20 cents; buggy tires, new, per set $4.00; old ones set, $1.60 per set; 4-inch wagon tires set $3.00; wagon tongue complete $3.00; pole only $1.75; buggy rims, per set $5.00; 4-inch wagon tires and rims, per set, with one-half inch tire $20 or 5/8-inch tire $22; time work 40 cents per hour. I tried to get a picture of my shop, but failed, but I send one of a new wagon just finished with my twin girls sitting on it. H. NOTESTINE, Ohio.

Several Questions Answered.—I have several question I would be pleased to have you answer through your valuable paper:—

(a) Which will stretch the most per foot in length, a 1-inch or a 2-inch square bar of iron both having the same amount of heat? I claim both will stretch the same.

(b) Which would be longer, the front or hind axle of a wagon using 3-foot and 4-foot 6-inch wheels, the wheels to have the proper distance and both to track the same? I claim both axles should be the same length. A former smith I had differed with me, so I made a draft of wheels and axles for him. He said draft was all right but it would not work as he tried it with wheels and axles.

(c) What is the proper place for a box in a wheel, i. e., would it make any difference if we put the box an inch or two inches in further, providing the front hub-band were made deeper or the hub made larger? In other words, is there

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NORTH DAKOTA GENERAL SHOPS RUN BY BROTHER F. W. TURNER, WHO IS ANOTHER BELIEVER IN POWER a right place and a wrong place for the box? We usually set the box in the hub the thickness of axle collar, regardless of the length of the box unless the box is so short for the hub that we could not reach the nut with the wrench. In that case, we would set the box in deeper at the back. NIEL O'GORMEN, Missouri.

In Reply.—Referring to the first question, on the stretching of one-inch and two-inch square bars of iron, both having the same amount of heat, would say that both bars will stretch equally, as the stretching depends upon the length of the bar and not on its section in this case.

(b) In reply to the question on the length of front and hind axle of a wagon, using three-foot and four-foot-six-inch, would say that the axle for both front and back wheels should be the same length, provided the spokes are vertical and the hubs the same length.

(c) In reply to the query as to the proper position for the wheel box, would say that the box is usually set in the hub so that the collar of the axle will be flush or nearly so with the hub of the wheel. Cases, of course, may arise when this practice is impossible, but the wagon worker will do well to follow the above practice. E. J. M., New York.

A Talk on Prices and Price Cutting.—Being a reader of your valuable paper and also an American blacksmith myself, I want to say some things to others through "Our Paper." In the first place, we hear a great deal about prices, higher prices and cutting prices, scab shops and scab workmen.

Now, my shop is in a country town 11 miles from any union or association, and my business is general blacksmithing. I also do horseshoeing, and have for 40 years. I charge 20 cents for setting and 40 cents for new shoes; 50 cents to 75 cents for handmade shoes and from 60 cents to $1.00 for bar shoes. I do all kinds of repairing and am called as good a general blacksmith as there is in this part of Michigan. For my labor I charge about 50 cents per hour, and charge for the stock in repair work, and then I am sometimes called a scab, because I don't belong to the union.

I know of men who have raised the price on shoeing, and then gave back change to do work for the old price to hold a customer. I know men who will carry customers on their books from 90 days to six months, and then discount the bill to make it the old price. I don't want any customers if I have to get them that way. Boys, don't make a beggar's business of your trade. You cannot expect to get any more for your work than you charge for it, so charge what is right. If others want to work for nothing rather than to let you have the job for what it is worth, let them have it. The last day that I shod horses at 15 and 30, my day's work would have brought me $2.60 more if I had charged 20 and 40. That would help out at the week's end quite a good deal. A few years ago horses sold here for from $15 to $75, and we got 15 and 30 cents for shoeing. Wheat sold for 48 to 60 cents per bushel, corn and oats 25 cents, hay $5.00 to $7.00 per ton, butter 10 to 18 cents, eggs 7 to 14 cents, and all other stuff in proportion, and you could hire a good man for $1.50 per day. Now horses cost from $75 to $175, wheat 90 cents to $1.00, oats 50 cents, corn 75 cents, hay $9.00 to $12.00, butter 24 to 27 cents, eggs 20 to 22 cents and live hogs sell for more than dressed pork did before, and if you hire a good man you pay $2.50 to $3.00 per day. Stock is also higher, as well as rent and taxes, and still some smiths work for the same old price. How inconsistent! Take your share of the prosperity with the rest, for it won't be long before you will have to lay down your hammer and quit, and then who will care for your family? You owe it to your family, as well as yourself, to charge a reasonable price. Your customers will honor your name after you are gone if you leave enough to care for those that were dependent on you through life, and your family will think better of you as well. Go to the shop where men are working under price and talk with them and try to get them to do the right thing. Don't cuss them, for no man was ever converted by cussing him. Above all things, use your customers well and have them do the same by you. Don't follow the path to the "cider barrel"; better follow the one to the savings bank. We all have our failings and faults, so don't shift yours. AN OLD ONE, Michigan.

A GOOD-LOOKING PENNSYLVANIA SHOEING SHOP RUN BY MR. THOMAS N. ROGERS

A Kick and the Other Side.—I have been a reader of THE AMERICAN BLACKSMITH for a number of years, but as the years roll around I see that it is getting poorer in the way of horseshoeing and jobbing. If you will look over the October number you will see that there are 24 pages of reading matter, and of that number there are about ten pages devoted to gas and gasoline engines. The October number should have been called the American Gasoline Engine instead of THE AMERICAN BLACKSMITH. We are not all engine-struck and do not all want one, either; so a page or two would be enough, according to my way of thinking.

Speaking on gasoline engines, I would also like to refer to Thornton's letters and to Benton's talks; really these two are not worth printing. We pay our money for a horseshoer's journal and would like one. Give us some sensible talk the same as E. W. Perrin writes. You may not think this a bouquet, but nevertheless it is the truth. Hoping you will publish this in your November number, I remain,

Your Subscriber.

The Other Side.—We are very glad indeed to have our friend write us in this way. We would far rather have a reader tell us just what he thinks of the paper than to keep quiet about it and not say a word. We are thus able to explain our side of the matter.

In the first place, our friend mentions that "Our Journal" is "getting poorer in the way of horseshoeing and jobbing." And as an example he cites the October issue, which was a special gas engine and power number. Now, as a matter of fact, the October number contained some four or more pages of matter on horseshoeing, to say nothing of the jobbing and general smithing. Our friend, in speaking of the special gas engine issue, loses sight of the special shoeing issues that have appeared. He says nothing about the practical worth of the shoeing articles—for which, as a matter of fact, we are paying prices that other journals refuse or cannot afford to pay. It is our policy to feature some branch of the craft in each issue in such manner that each volume of twelve numbers will as a whole be very well balanced.

Again our friend says "all smiths are not engine struck." We are quite aware of this fact, and that is the very reason for our issuing a special power number. A smith does not and cannot appreciate the advantages of power practically and sensibly applied until he has an engine right in his shop.

As to Thornton's letters and Benton's talks we will append extracts from letters recently received from some of "Our Folks." We assure our friend and every one of "Our Folks" that Thornton and Benton would not have been thrust upon them if they had not wanted them and enjoyed their talks.

Again we desire to thank our friend sincerely for his kick. It is very seldom that we receive a communication of this kind, but they are nevertheless just as welcome as those letters punctuated by flowery compliments.—THE EDITOR.

Like Thornton's Letters and Benton's Talks.—"Give my best wishes to Thornton and tell him his letters are just what we need."—AN AUSTRALIAN SMITH.

"Keep Benton coming with his recipes; we need his talks."—A WESTERN SMITH.

"Thornton's Letters are certainly interesting, and I always look to see what Benton has to say, first thing."—A YORK STATE SMITH.

EDITOR'S NOTE.—It may perhaps be well to open this matter for discussion in our columns. "Our Journal" is for "Our Folks," and if there is anything in these pages that is not to the liking of any member of "Our Family" we want to know it. Let us have your opinion on these matters, Mr. Reader—tell us what you think of the paper and its various departments. If we have been serving you with something you don't like, let us know. If you get what you want, let us know how you like it and what you like best.

VOLUME 7 NUMBER 3

THE AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

BUFFALO
N.Y. U.S.A.

DECEMBER, 1907

$1.00 A YEAR
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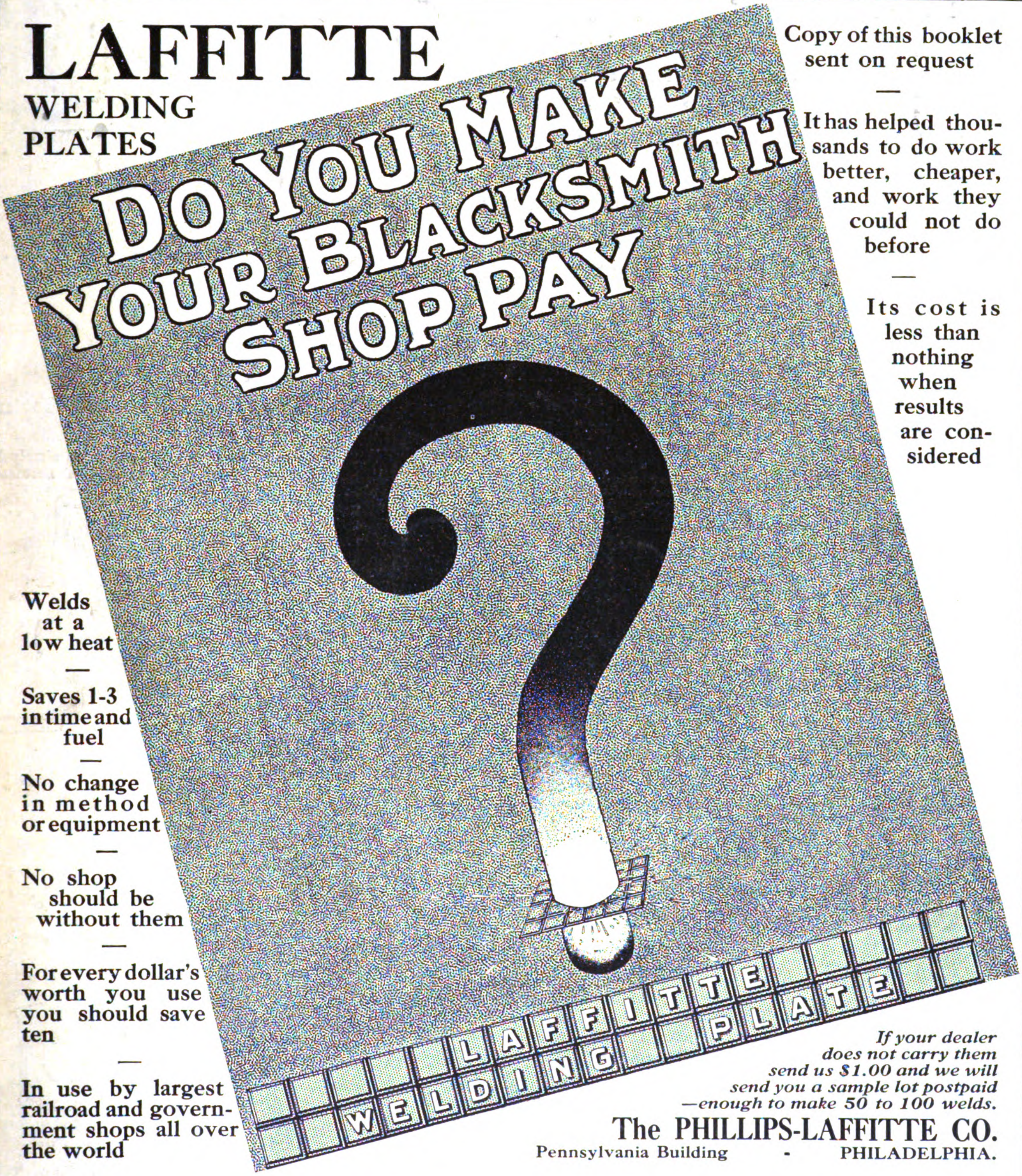
LAFFITTE
WELDING
PLATES



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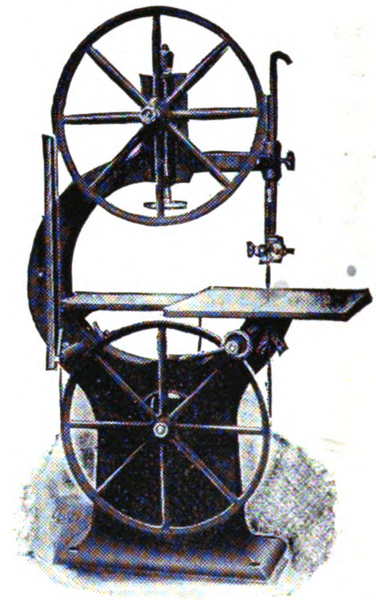

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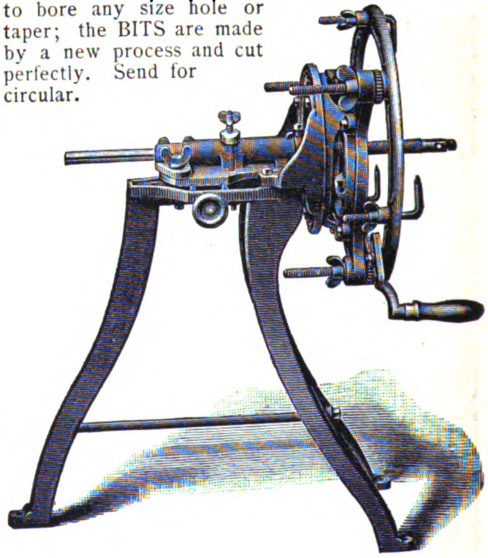

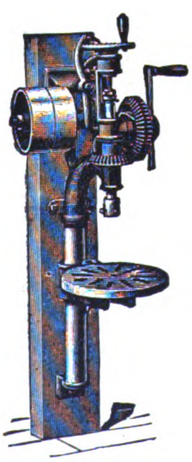

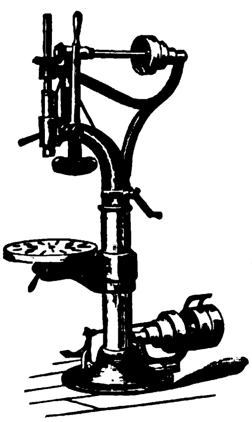

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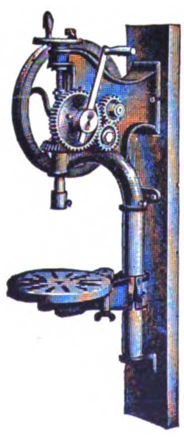

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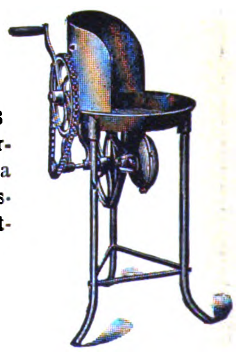

Fig. 901, with Shield.

"Intercourse and Progress always go hand in hand."—Buxton.

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Subscribers should notify us promptly of non-receipt of paper or change of address. In the latter case kindly give us both the old and the new address.

How is Your Herd?

Don't let your stock of pink buffalo stamps get so low that you are ever compelled to send out a letter to jobber, manufacturer, or brother smith without one. Our supply has recently been replenished, and we want every smith whose supply is low to ask for more. A postal will do. Remember the pink buffaloes are THE AMERICAN BLACKSMITH'S "big stick" and when you put a pink square on a letter to a jobber or manufacturer you receive the protection of "Our Big Stick."

Just Give Us a Chance.

In conducting a business of the size of THE AMERICAN BLACKSMITH, with its twenty-seven odd thousand readers, some mistakes are inevitable. Some errors in our service to subscribers can be laid at the door of the post office, and sometimes even subscribers, themselves, have been known to be at fault, through a lapse of memory, or an omission to notify us of change of addresses. We are free to admit, however, that we make mistakes ourselves, as we are only human, and must employ human-being clerks to help us run the business. But we do sincerely desire to make every mistake right. We would rather a hundred times over sacrifice our small margin of profit than to lose the friendship and good will of a subscriber, so that if you have any complaint to make, or if you think there has been any error in your subscription account, you will do us a favor by reporting it. You will find us, we think, pretty good fellows, who strive to do a little bit more than only what is right, but we cannot straighten out your complaint if you don't notify us what it is. If a man misses one or a dozen issues, though through no fault of ours, we would rather send him the missing numbers, if we have them, free of charge, in order to retain his friendship. Therefore, we say, always give us a chance to straighten out any complaint that you may have.

Contents, December, 1907.

For the Consideration of Our Folks.

We are desirous of continually increasing the usefulness and value of THE AMERICAN BLACKSMITH and with this end in view ask that every one of "Our Folks" write us a letter answering the following questions:

1.—Do you like our present method of featuring some branch of the craft each month—for instance, paying special attention to horseshoeing in one issue, then gas engines, then shops and shop layouts, and so on?

2.—Do you like the articles on gas engines and power?

3.—Are you interested in machine shop work? and would you like a series of articles on this work?

4.—What is your opinion of Benton's talks?

5.—Do you enjoy the "Heats, Sparks Welds" and the monthly poem?

6.—Do you like "Thornton's Letters"?

7.—Are you interested in the "Queries, Answers, Notes" department?

8.—Are you interested in ornamental iron work? and would a series of articles on this subject appeal to you?

9.—Would a series of articles on the repairing of guns, revolvers, typewriters, sewing-machines, lawn mowers, locks, and other small machines and novelties interest you?

10.—Would you be in interested in a series of articles on the smith's work on the largest turbine battleship about to be built?

We want every one of our readers to answer these questions candidly and to tell us just what he thinks. It will take but a few minutes to answer these queries and mail us your replies. Let us have your answers as early as possible.

Have You Ordered Your Calendars?

There are still a few calendars left for those who have not yet sent in their orders. But you'll need to speak quickly or you'll be disappointed. Our calendar for 1908 is by far the best we have yet published, and if you are looking for a good advertising medium you cannot do better than to get a supply of these beautiful art calendars bearing your business card.

ON THE ROAD TO THE VILLAGE SMITHY

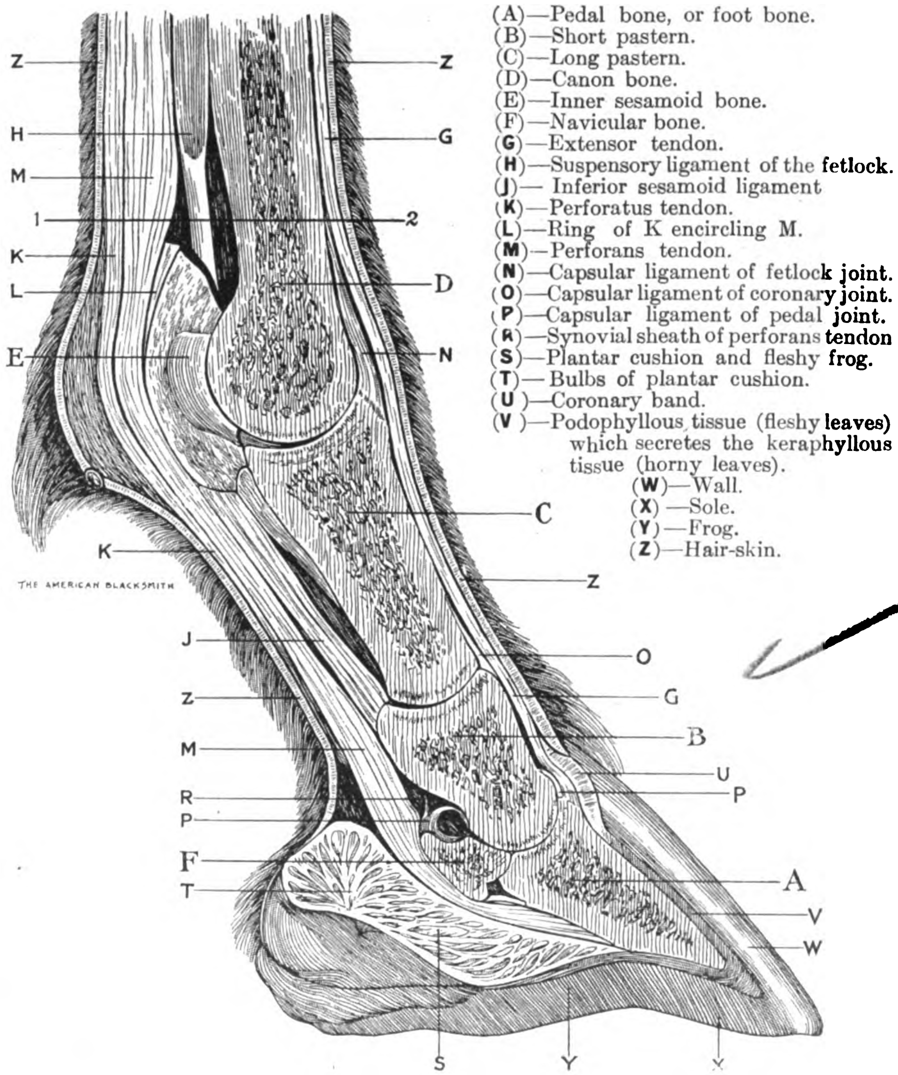
Anatomy of the Horse's Foot and Limb for the Horseshoer

W. O. JULIUS

AS THE HORSE is useful to man only because of his movements, the animal's foot and leg deserve the most careful attention, and the farrier or shoer should be thoroughly familiar with the anatomy of the animal's foot and leg. It is only by thoroughly familiarizing himself with these parts of the horse's anatomy that the farrier can intelligently shoe the horse in even the healthy state, and when the animal's feet or limbs are diseased or defective in form or action a proper knowledge of anatomy is still more imperative. It is a well-known fact that proper shoeing can not be accomplished by any prescribed rule or rules. No one system of shoeing will do for every case. Each horse, each foot must receive its particular treatment. Each case must be studdied—the cause, the effect, and the which, why, and wherefore carefully analyzed. The shoer must build his own opinion of each case upon his knowledge of anatomy of the foot and limb, and the application of that knowledge to the case in hand.

In Fig. 2 is shown the bony structure of the foot. The foot bone, or pedal bone, is shown at A. This bone is similar in form to the exterior appearance of the hoof. It is rough and has much the appearance of pumice stone on the wall surface. The short pastern at B is the second bone of the foot and lies between the os pedis, or pedal bone, and the long pastern. The long pastern at C is the third bone of the foot. It is situated between the short pastern and the canon bone, with which it is connected in such a manner as to present an angle of from one hundred and thirty to one hundred and forty degrees in the front foot and from one hundred and forty to one hundred and fifty in the hind foot. At the juncture of the long pastern and the canon bone are found the sesamoid bones D. These are two in number, one on each side of the back at the lower end of the canon bone E. The sesamoid bones are pyramidal in shape. Another bone of the foot, but not shown in this engraving, is the navicular bone. This bone is situated behind the os pedis, or pedal bone, in such a manner as to be accessory to the pedal bone and to increase the bearing surface presented to the short pastern. The position of this bone is shown at F in Fig. 1.

Having explained the bony structure of the foot, let us now consider the organs of motion and the protective covering. Let it be understood that while the organs of motion are the muscles, the shoer need concern himself only with the tendons of those muscles which flex and extend (work) the foot. These tendons are known either as extensors or flexors, the extensor tendons being found on the anterior face, or that side of the foot nearest the head, while the flexor tendons lie on the posterior or hind side of the foot. The large anterior extensor tendon of the toe is a very broad tendon attached to the pyramidal point of the pedal bone and running upward on the front of the foot. It is jointed by the suspensory ligament of the fetlocks, of which



SECTIONAL VIEW OF A FORE FOOT BISECTED THROUGH THE MIDDLE there are two branches, one passing on each side of the foot just below the sesamoid bones and joining the anterior extensor and broadening it considerably over the short pastern. Being on the front of the foot, it is to be easily seen how the muscles, to which these tendons are attached, pull the foot forward.

The flexor tendons of the foot are known as the perforatus tendon and the perforans tendon. The perforatus tendon, or superficial flexor, as its name implies, lies immediately beneath the skin, and covers the deep flexor, or the perforans tendon. At the sesamoid bones the perforatus tendon broadens and forms a tube through which the perforans, or deep tendon, passes. At about the center of the long pastern this tendon is divided into two branches, both of which attach partly to the long pastern and partly to the short pastern. Both of these bones are worked simultaneously by the tendon.

The perforans, or deep-seated tendon, is stronger than the perforatus tendon. It lies between the suspensory ligament of the fetlock and the perforatus. At the sesamoid bones it passes through the ring, previously spoken of, formed by the perforatus tendon, and then it broadens, passing between the two branches of the perforatus and gliding over the fibrous cartilage of the short pastern. It then passes over the navicular bone and finally ends on the inner and under surface of the os pedis, or pedal bone. This tendon, like the perforatus tendon, flexes the foot.

So that we may correctly understand the successive layers of structure, let us consider cutting through a horse's foot a few inches above the

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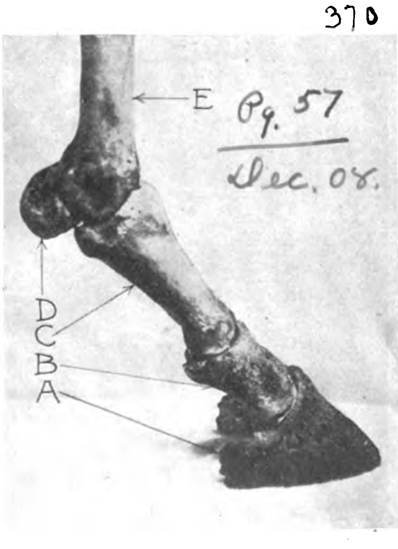

FIG. 2—SHOWING THE FOOT BONES IN THEIR PROPER POSITIONS

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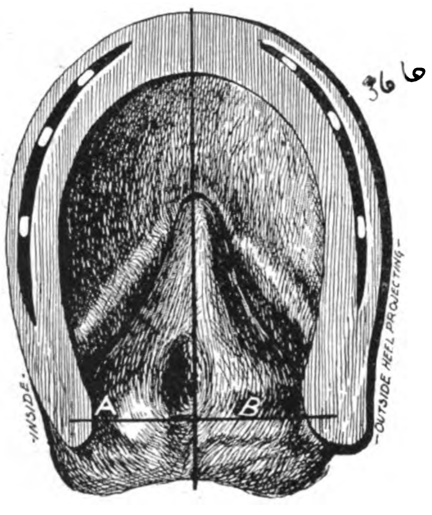


TO PROPERLY BALANCE THE FOOT, A AND B MUST BE EQUAL

fetlock at the line 1-2 in Fig. 1, We first encounter the skin, then the perforatus tendon, the perforans tendon, the suspensory ligament, the canon bone, the lateral extensor tendon, the anterior extensor tendon, and finally the skin on the front side of the limb.

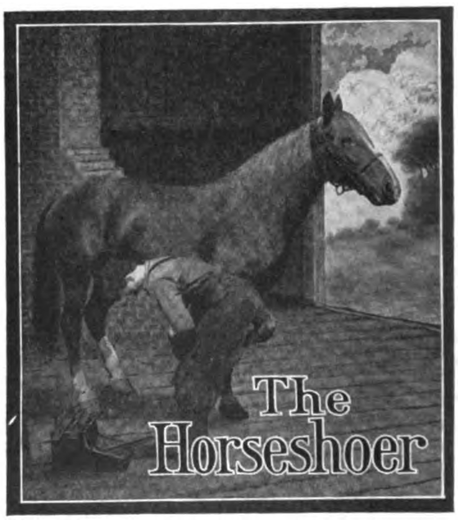
The tendons are liable to inflammation from injury of one kind or another, and as a result they thicken and shorten, thus pulling the foot out of its correct axis. To correctly determine the cause of the resulting abnormal foot axis the shoer must have a knowledge of the normal condition of the tendons, whereas the horseshoer without a knowledge of foot anatomy is very liable to follow a method of treatment which should really be avoided.

The softer tissues of the foot, such as the plantar cushion and the lateral cartilages, have already received attention in previous papers. We will, therefore, dwell on them but briefly. The lateral cartilages are attached to the wings, or branches, of the pedal bone and extend upward and backward above the coronet, where they can be felt with the fingers. The plantar cushion is similar in form to the horny frog, is composed of elastic, fibrous tissues, and lies between the horny frog and the perforans tendon.

As is well known by even those not intimately connected with the horseshoeing art, the blood vessels and nerves cover the foot proper as a network, the bottom of the foot as well as the walls being most thoroughly covered.

The next division of the foot to be considered is the protective organs. These are the skin and the horny wall, or hoof. Both have been very carefully explained as to function, form, and subdivisions in a previous paper on this subject.

In conclusion, we must impress upon ourselves the necessity of carefully analyzing the particular case of shoeing in hand before prescribing any method of treatment or shoeing. Don't simply apply your treatment because of a certain effect, but go back to the cause and look into the cause thoroughly. To say that any particular shoe or method of shoeing is a cure certain for any particular class of abnormal condition is as incorrect and just as reasonable as to say that cutting two inches off a piece of stock that is not the correct length will make it correct whether the stock was previously too long or too short. Yet some shoers prescribe this, that, or the other method as a certain remedy for the certain abnormal conditions. Each case requires its own method of shoeing or treatment, and to properly administer the proper treatment the shoer must know something of the anatomy of the horse's foot and limbs.



For defective hoofs make a compound of gutta-percha and gum ammoniacum, equal parts of each. The gutta-percha is cut into small pieces about the size of a sweet chestnut and placed with the gum in a tinned iron vessel and melted until thoroughly mixed. The substance has the color of chocolate, can be softened and molded into any form, and sticks to the hoof firmly. Too low a wall can be built up, lost portions of the hoof restored, and sand cracks closed to keep out the dirt. For dropped sole, to raise the bearing surface of the wall in seedy toe, and when the frog is atrophied, this substance is also useful. H. K., New York.

Shoeing for Corns.

E. E. HURRELL.

In reading over last month's journal, I notice a lengthy article on this subject which was written by a man who must be very much interested in the principles of shoeing. We need more of these men to come to the front and write what they know. We would be better able to correct each other's errors, and by weeding them out would soon be able to bring horseshoeing to a universal system.

What is a Corn?

The common definition of the word corn is "a hornlike excrescence on the foot." But we all know that there is no unnatural growth where the blood stains appear in the horse's foot. Here is where we make an egregrious mistake, by comparing it with the corn in the human foot and giving it practically the same treatment. There is no such a thing as a corn in the foot of a horse. But as we know these blood stains better by this name we will use it until we discover a better term. Hence, a corn is a rupture of the capillaries, which is caused not by undue pressure on the sole of the foot, but by undue pressure on the wall.

Causes.

Why is a corn, with few exceptions, located in the same place? Our friend says that the corn is caused by heel calks and the want of frog pressure. Then why is it that the corn is not

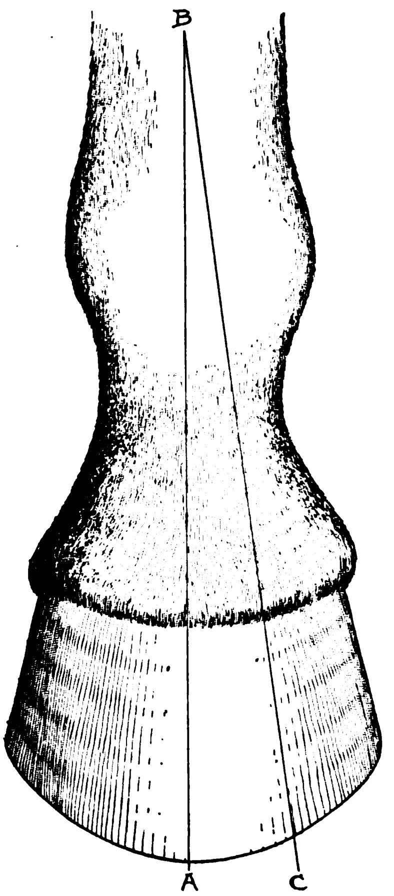


FIG. 1—SHOWING CORRECT AND INCORRECT LINES OF GRAVITY

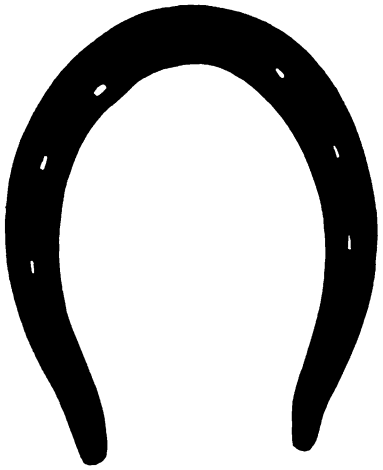


FIG. 2—THE TOE CALK RUNS WELL AROUND THE TOE AND A LONG CALK IS USED ON THE OUTSIDE HEEL.

found under the outside heel calk as often as the inside? Why is it that the corn is found under the bar shoe? This can be answered in a few words. It is because we shoe horses right and left. There is no distinction in the anatomy of the foot. Everything in a horse's foot is equal. Then shoeing closer on the inside gives the animal an uneven tread, causing a rupture of the capillaries on the side of the foot. Thence the blood runs down and settles at the lowest part of the foot, which is the heel.

The Cure.

As the corn is found in all horses of all capacities of work, the true and only cure is a benefit to every man of the craft. It is perfect equilibration. First, see that the shoe sets at even distance from the center of the frog. taking the crevice for the center. Secondly, see that the heels are of equal height from the coronet to the surface. If the coronet is twisted, which is almost generally the case, providing the animal has been allowed to travel unevenly for any length of time, lower the heel a trifle to allow it to come back to its natural position again. When you have done this, you have done your part towards curing a corn, and nature will do the rest. Always bear in mind that it is essential to have a perfect balance. And when you can successfully do this, you can cope with almost any ailment of the horse's foot.

Interfering.

Methods With Which I Have Had Good Success.

ALBERT F. LIBBY.

One of the hardest cases we have of interfering is where there is either a malformation of the knee or fetlock and pasterns such that the center of gravity comes on a line B-C, instead of on a line A-B through the center of the foot and on a line with the center of the frog. (See illustration.) It is impossible to have any rule for such cases, for the reason that nature sometimes forms an adhesion either of the check or suspensory ligaments. If we try to straighten the foot we lame the horse. In others, if there is no adhesion, the foot straightens readily. In nearly every case we find the inside drawn under, with a flaring outside to the foot. I shoe nearly opposite to what most shoers do. Commencing at the inside point of toe, I dress that down first whatever it will stand, and level the rest of the ground bearing of the foot from that point. I use a shoe like that shown in Fig. 2, running the toe calk well around on the outside toe with a long calk on the outside heel and a shorter one on the inside heel, if the foot will stand it; i. e., if there is but little adhesion of the parts. I have the outside calks the highest, perhaps one eighth of an inch. I have had very good success with this shoe.

For interfering behind, it depends largely on the pace that the horse is driven; i. e., if the horse is driven

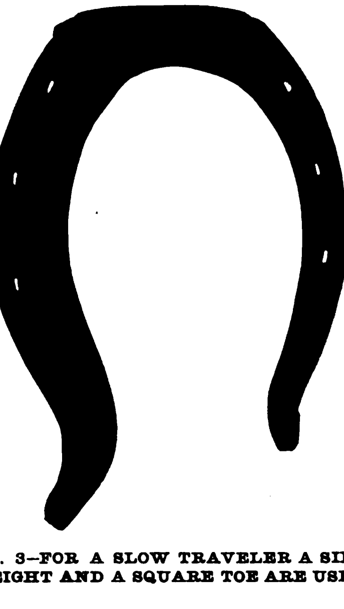


FIG. 3—FOR A SLOW TRAVELER A SIDE WEIGHT AND A SQUARE TOE ARE USED

seven or eight miles an hour he should be shod differently than if driven at twelve miles. At the slow pace I use a good stiff side weight with square toe, as shown in shoe No. 3, the weight of the shoe in proportion to the condition of the horse, with the outside of the foot slightly lower. If driven at a faster pace, say twelve miles, I shoe that same horse very much lighter, with the inside of the foot the lower. The reason is, that at the twelve-mile rate, he has a longer and more curved stride and strikes more on the outside of the foot. There are exceptions to all rules, and I do not say that I make all horses go clear that interfere, but I help the greater number of them.

The Horseshoe.

E. D. HARRIS.

The horseshoe as a support and protection to the foot is by no means ideal. It is, however, indispensable for horses working on pavements and hard roads, and it is, therefore, the duty of the farrier to make and attach such shoes as will most nearly meet the ideal as a support and protection.

The form or shape of a shoe should always be as nearly the shape or form of the foot as possible, except when the foot is out of normal shape or is diseased; and, inasmuch as front and hind feet and right and left are distinguishable, the same should be observed in the shoe. Some shoers, however, say that no difference need be observed for rights and lefts in horseshoes, but as long as a difference in feet is discernible, so, also, is a difference in shoes necessary. As to weight and thickness of the shoe, these should be such as to make the shoe wear about four weeks, though every fraction of weight taken off the feet is a saving in the strength and endurance of the horse. In fullering the shoe it is for this reason of advantage to make the groove or crease long. The crease or fuller also tends to roughen the ground surface of the shoe and thus prevent slipping on hard ground. The shoes illustrated are creased extra long, so as to make them as light as possible, yet not materially decreasing their wear. At Fig. 1 is shown a double half-bar shoe

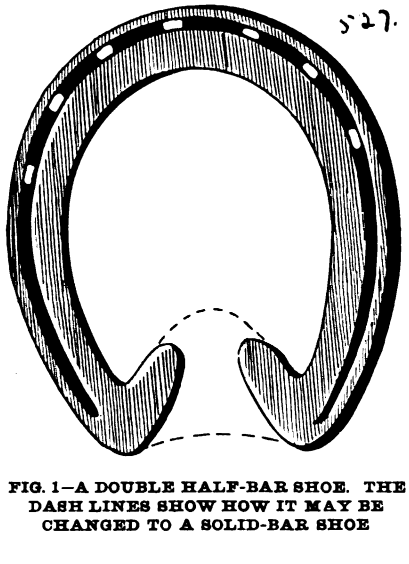


FIG. 1—A DOUBLE HALF-BAR SHOE. THE DASH LINES SHOW HOW IT MAY BE CHANGED TO A SOLID-BAR SHOE

which is very good for the cure of corns and contraction. The dotted lines show how a solid bar shoe may be formed. In both the double half-bar and also the solid-bar shoe the nail holes are best placed at the toe. This allows the quarters to expand easily. The office of the bar shoe is, of course, to give the frog pressure and to restore it to normal condition where through disuse it has become atrophied. The addition of a leather sole, with a packing of tar and oakum in the hoof before applying the bar shoe assists materially in bringing the hoof to normal condition.

Fig. 2 is shown as a well-formed front shoe. Note that the fuller, or crease, is carried back well toward the heels to give the shoe lightness. The shoe at Fig. 3 is weighted at the heels, and is for the purpose of shortening the stride in the fore feet. Note that

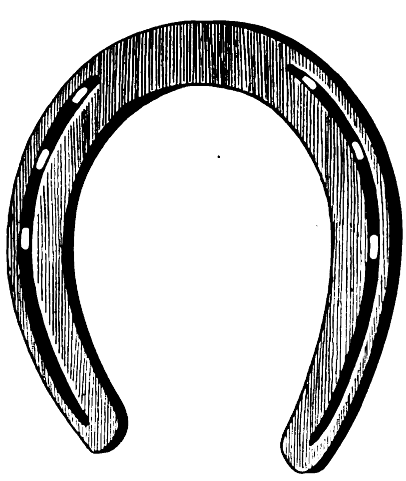


FIG. 2—A FRONT SHOE WITH THE FULLER, OR CREASE, BROUGHT BACK WELL TO THE HEELS TO LIGHTEN THE SHOE

the fuller in this case is only as long as is necessary for the accommodation of the nail holes, as all available weight is wanted at the heels.

The shoe at Fig. 4 is a toe-weight shoe to lengthen and quicken the stride. The crease in this case is, as shown, carried well toward the heels, so as to make them as light as possible. At Fig. 5 is shown a very good style of ice shoe. The toe and outer heel calks are at right angles, while the inner calk is slender and dull. This prevents the possibility of the horse cutting himself as with a sharp calk on the inside, and the outside heel calk being at right angles to the toe calk and longer than usual the animal is prevented from slipping sidewise.

In conclusion, let me say just a word or two about nailing. Nail as low as possible to insure a good hold. Don't pierce the wall above an inch and

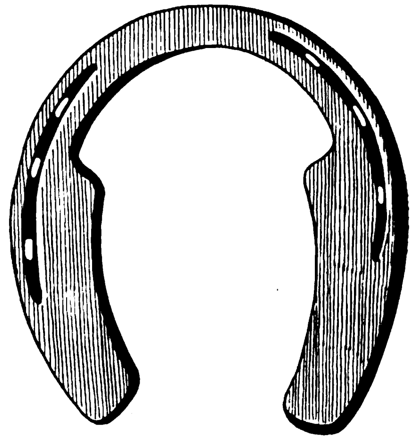


FIG. 3—A HEEL-WEIGHT SHOE FOR THE FRONT FEET. THE FULLER IS NO LONGER THAN ABSOLUTELY NECESSARY

three quarters above the shoe. A nail penetrating the white line and coming out low on the wall destroys the least possible amount of horn, has a wide, strong clinch, and has the strongest possible hold on the walls, because the clinch pulls more nearly at right angles to the grain of the wall. Finally let me echo that already worn-out phrase of caution—Don't let the rasp touch the hoof above the clinches.

Mule Shoeing, Corns, and a Hoof Ointment.

FRANZ WENKE.

I want to tell you of a little trick in mule shoeing which I have been using to advantage for some time. Very often I have found mules that overreach badly, and no matter how I shod them I could not stop it. At last I tried the following:

I shod the front feet without a toe calk but with a heavy shoe and ordinary heel calks. The hind shoes I made as light as possible, but put a good-sized toe calk on. I made the heel and toe calk the same height. On the front of the hind shoe and extending from one half to two thirds up the hoof, I welded a clip. I took a piece of bar iron $1\frac{1}{2}$ by $\frac{1}{4}$ inch or $\frac{5}{16}$. This heavy clip combined with the toe calk seemed to depress the toe of the hind foot and to make the mule step short with his hind feet.

In curing corns, I have found a good way to do is to pare the foot down to fit the shoe, leave the pressure off the corn entirely, by rasping the foot lower from the last nail hole, and extending back over the corn. Then on the inside, where the corn is, I flatten the shoe down to about half its thickness somewhat like the engraving. The last nail on that side of the corn I never drive. This, of course,

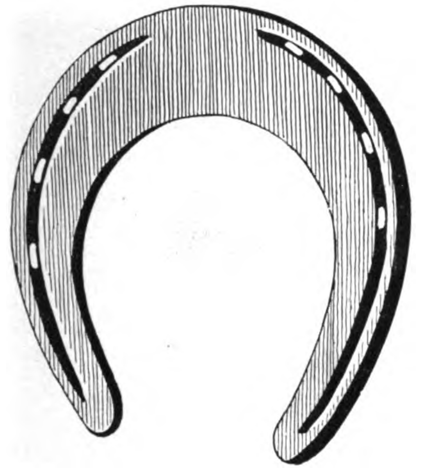


FIG. 4—A TOE-WEIGHT SHOE FOR LENGTHENING AND QUICKENING THE STRIDE

is only for ordinary corns and where there is a good, sound, and full frog. In severe cases, of course, I use a bar shoe. But still I take the pressure from the corn and thin my shoe down right above the corn. In this way, the place where the corn is will have no ground bearing.

I have got a little recipe which I will give for the benefit of such smiths as will try it. It is a hoof ointment. Take natural asphalt and boil it down with common beef tallow scraps. While still hot put in enough raw linseed or cottonseed oil to make a varnish, and stir until it is cold. It is put on with a common paintbrush. Now, after I shoe a horse and the feet are clean, I put this ointment on. It is better to wash the feet in cold water before applying it, I tried this on a troop of cavalry horses in Wyoming and after one year's use (about once in every forty-five days) I had the finest black and tough feet, hard as iron, but not a brittle one among the sixty-five horses. In 1894, when I came to Fort Leavenworth Kansas, the veterinary surgeon, was surprised at the nice feet my troop brought up there, in comparison with the other troops.

The Course in Farriery, or Horseshoeing, at Colorado Agricultural College.

Since the publication of the announcement regarding the establishment of a horseshoeing course at Colorado State Agricultural College several of "Our Folks" have requested further information, and we therefore publish an extract from the latest college bulletin.

"In the act of Congress appropriating funds for the establishment of Colleges of Agriculture and the Mechanic Arts in each state and territory, special reference was made to the Department of Mechanic Arts and the great need was pointed out of supplying some means of educating the various artisans and mechanics in their chosen callings. At the last regular meeting of the Colorado State Board of Agriculture it was decided to add to the already well-equipped department of mechanics a course in practical and scientific farriery, or horseshoeing. With the great development of the horse-breeding industry in the West there has grown a pressing demand for skilled farriers, or horseshoers. At present in Colorado it is almost impossible to find a skilled horseshoer who has sufficient definite knowledge of the anatomy of the horse's foot and the proper shoeing of it to adequately conserve the usefulness of the horse. When it is known that fully 60 per cent of the horses of America are laid on the shelf and their usefulness forever destroyed many years earlier than is necessary through the lack of proper care and protection of the foot by shoeing, it will be seen how necessary it is that some attention be given to this all-important branch of our College.

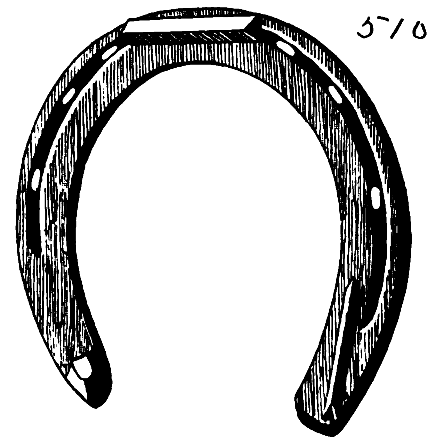


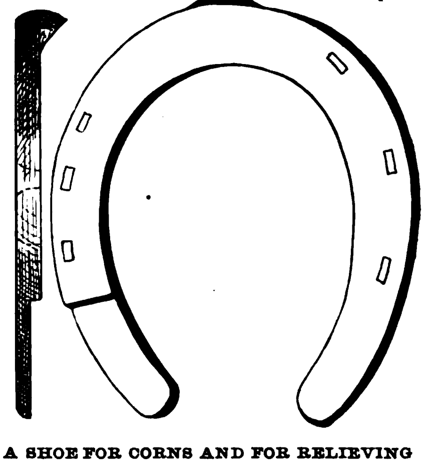
FIG. 5—AN ICE SHOE, THE TOE AND OUTSIDE HEEL CALKS BEING SHARP AND AT RIGHT ANGLES TO EACH OTHER

"A horse is shod for various reasons, chief of which are to protect the foot from excessive wear, to prevent injury and increase the usefulness of the animal by preventing slipping on hard frozen or too smooth pavements and roads, to rectify in part faulty conformation of the feet and legs, and to improve the action and general usefulness of the animal. The proper balancing and gaiting of driving or carriage horses has become a very important consideration, not only adding materially to their value on the market, but increasing to a marked degree their usefulness for the purpose intended. That a farrier may be competent to properly affix a suitable shoe to a horse's foot to accomplish the objects above mentioned it is absolutely essential that he have a specific and intimate knowledge of the anatomy and physiology of the foot and leg of the animal.

"Believing that there are many men in the West who are desirous of knowing how to shoe horses in the best possible manner and who wish to obtain the greatest success in their chosen calling there is being offered for the first time the coming winter a course in farriery, in which will be given a scientific and practical training extending over a period of five months of two years, which will thoroughly prepare men in this important work. The course will open November 4, 1907, and will continue for five months for the first year, closing on March 28, 1908, and for the same length of time the following year.

"The course, briefly outlined, will be somewhat as follows:

"A good practical knowledge of the smith's art will be required of all those who take up the special work of shoeing the horse's foot. For those who do not already possess this knowledge a preliminary course in forging is provided. Students will be trained in the regular forge room of the college in the elements of smithing. The care and management of the smith's fire will be taught first, as this is an important matter. Then a set of forgings will be made; these forgings are systematically arranged so that the student may be taught and advanced as rapidly as possible. They will begin with simple forgings in iron, bringing in drawing, upsetting, bending, and welding. Advancing gradually, the art of working steel follows the work in iron, and the student is



A SHOE FOR CORNS AND FOR RELIEVING THE PRESSURE AT THE HEELS taught to forge and temper steel, and make the various tools of his own trade. After reaching this stage in his training, the real business of horseshoeing, or farriery, is taken up. The student is now taught the anatomy and physiology of the horse; the foot especially is considered, the bones of the foot are studied, the articulation of the foot, the locomotory organs of the foot, the elastic parts of the foot, the blood vessels and nerves, and the protective organs of the foot are all carefully studied. The foot relation to the entire limb is considered. The standing position of the limbs, forms of feet viewed from in front, from behind, and in profile, lines of flight of hoofs in motion, forms of hoofs, growth of hoof, and wear of the hoof and shoe, physiological movements of the hoof. The skilled farrier now has the student in charge, and the actual shoeing of the horse is taken up, and examination of the horse is made preparatory to shoeing. The proper method of holding the feet of the horse is taught. The student is taught how

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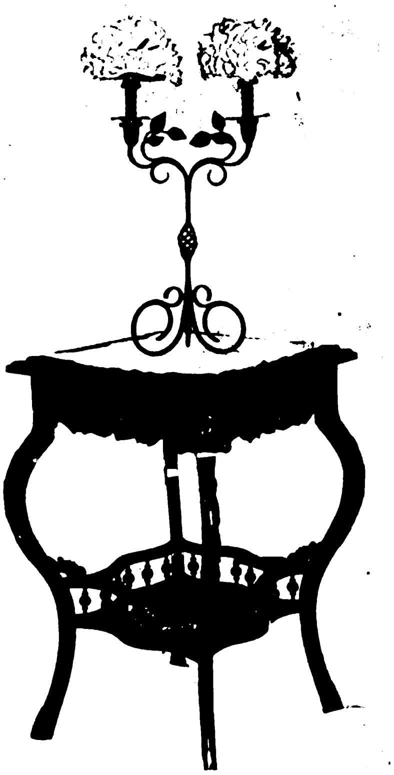

A DOUBLE CANDLESTICK OF BEAUTIFUL DESIGN

to properly remove the old shoes, and how to prepare the hoof for the new shoe, how to choose and make the new shoe, how to fit the new shoe, and how to nail it on.

"He is taught how to properly shoe horses that forge, or interfere, and how to gait and balance the horse. The care of shod and unshod hoofs is taught, also the use of oils and ointments.

"Applicants for admission should be at least 18 years of age and be possessed of a fair knowledge of reading, writing, and arithmetic. Arrangements will be made whereby persons having already had some training in farriery may receive credits on the passing of prescribed examinations.

"Students who complete the studies of the entire two years in this course in a satisfactory manner will be granted a certificate duly signed by the president of the college and the faculty of this particular department."

Several Pieces of Artistic Iron Work.

The several engravings show some ornamental work turned out by brother L. A. Wright, of Massachusetts. Mr. Wright says this is the result of working during his spare time.

The double candlestick is of very neat design and is pleasingly free from overornamentation. The general lines are good, and the piece is very well executed. The piano lamp is also very handsome and shows not only a regard for detail but for general appearance as well. The hall chair is another very pretty piece of ornamental work. The flower stand, or vase holder, is a very artistic small piece, and is of exceptionally pleasing design.

Altogether Mr. Wright's work is very artistic and shows a careful regard for artistic grouping. It is one thing to know how to forge and form details but another to group them so as to produce an artistic whole. This Mr. Wright has succeeded in doing.

Thornton's Letters.—14.

Being "Straight-from-the-shoulder" Talk from a Prosperous Self-made Smith to his Former Apprentice, now in Business

Dear Jim:

I'm mighty glad to hear that things are running so smooth and easy down your way. You'll find that credit department of the association saving many times its actual cost to the members. And then, too, it tends to hold the association together.

Yes, I knew Jack Miller had moved again. Will Burrows, the Emerson man, told me about it last week. Well, Jack is like lots of other chaps I know: they always think that the best locality is in the West or East or South or any

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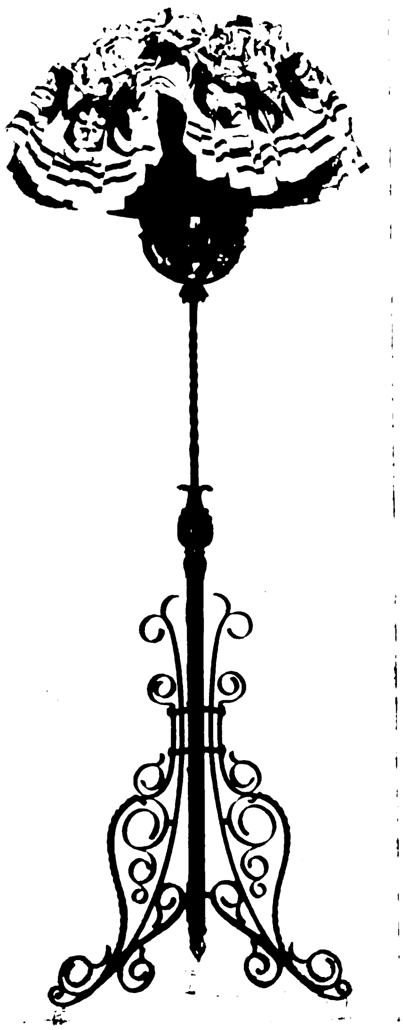

A HANDSOME PIANO LAMP OF WROUGHT IRON

place but their place. The roaming about some of these chaps do reminds me of old Rufus Jones, who did a little of everything. But Rufe had the moving-bug and was continually piling his stuff into or out of a covered rig. After a while his chickens kind of caught on and would lie down and cross their legs every time they saw a moving van. Of course, there's no earthly use in staying and sticking if there's no business in a town for you. But you'll usually find that these roving, gypsy-like chaps don't settle down long enough at one place to let the casters on the dining room table get cold.

Yes, it's well to know everybody in town if you go about it in the right way. Now, there was Bill Holden down our way who knew more people in the town than the constable or the postmistress did. Bill could bow and nod to most everybody and get a return nod too. But then Bill's job for years was to hold down one corner of the town and look at the people going by. Course he got to know them and they him, but when you asked any of his nodding acquaintances who he was they'd say, "Oh! he's the chap that stands on Beebe's corner." Now, don't let people know you simply as the man who goes to the post office every day at ten. But let them know that you are the best smith in town and that you are the best-natured man they ever saw. That's what you call advertising, and that's what you're looking for, not publicity as the advertising smart-Aleck says. The chap who breaks into the post office gets publicity, and more than he really wants. Advertising is the thing you want—good, old-fashioned, honest advertising that leaves a good taste in the buying mouth of the public.

I just mention the difference between publicity and advertising so you'll not be dazzled by some of the publicity hot air that crops out in the columns of your weekly paper occasionally. It's all right to know people and to try to know all you can, but what you want to be careful about is that they know you as they should know you. It's all well and good for some chaps to be known as the cheapest man in town or the fattest or thinnest or even the oldest inhabitant who hasn't done anything except grow old and has taken a sight of time to do that. And it's perhaps good to sidetrack onto one of these reputations—but don't get switched off onto any of them without making a good big try for some real business-bringing advertising. Be known as THE smith of the town rather than as the thinnest smith in town. Do you see the point?

Yours for advertising,

Thornton

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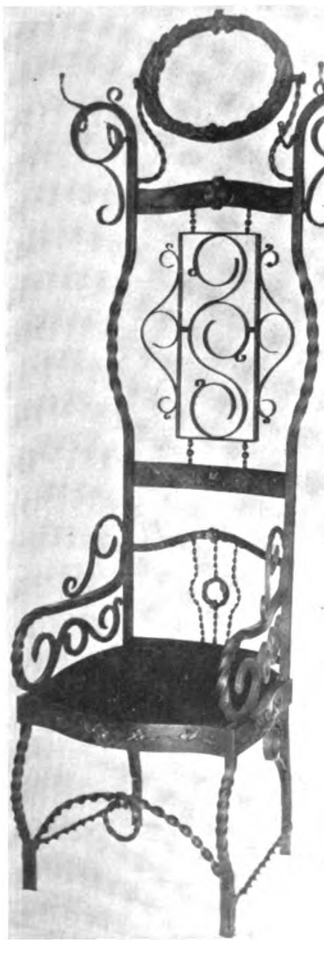

ANOTHER PRETTY PIECE OF ORNAMENTAL WORK

An Interesting Letter from Tasmania.

W. T. CRAMP.

While writing you, the thought occurred to me that you might like to hear something about this part of the globe. Tasmania is the apple-growing state of Australia, our climate being particularly suited to that industry. Perhaps you may have heard something about this; if not, I can assure you in time we are going to knock the Americans out in that line. Our apples are gaining a firm hold on the London market. We have sent some 14 shipments home this season, one of them carrying as much as 100 to 1,000 cases.

Now, something about ourselves. I have had 40 years experience in our line. I served my apprenticeship and worked with the same employer continuously for 27 years. Then with my late brother as partner, we started business for ourselves and after 15 years of hard work, we have just got the business into a stage of success. We employ 16 to 18 hands constantly and do a fair amount of work. A good deal of our material we import from your States, and, a few years back, put in a Henderson cold tire setter. Most of our work is done by hand labor, but in the near future we contemplate putting in some power machines. In all probability we shall run an oil engine. We have been exhibitors at our annual show, and for the last 13 years in succession we have carried off the prize for the best collection.

Ever since THE AMERICAN BLACKSMITH has come under my notice, I have been interested in reading some of the articles by different writers. In the April number there is one by Mr. P. M. Wade, who gives his opinion and experience regarding the draught of a high versus a low wheel. According to my way of thinking, the diagram shown upsets the pot, and if Mr. Wade will just place another square block on the other side of the diameter of the wheel he will at once

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A VASE HOLDER OF HAND-FORGED WORK

see that he has a corresponding overhang at the back which requires lifting and so counteracts the overhang of the front. I am not writing to disparage brother Wade. He has given his opinion, and I have given mine. As some other writer says, "In a multitude of counselors there is wisdom." Someone else may take it up and upset my pot. We are troubled here a great deal with this high and low wheel business, and as ours is a very hilly country, my advice to all is to keep the medium high wheel. Most of our vehicles are two-wheelers, and hilly roads place the high wheel at a disadvantage, as there is more weight to pull uphill and coming downhill the high wheel raises the weight so much above the level of the horse that it consequently makes harder work for the horse to hold back, because it has a tendency to run over the horse. There may be less friction on the axle in the case of the high wheel, as the wheel in traveling would not revolve so fast. That might lead one to think the draught was less than it would be in the low wheel. Let us have a thorough discussion of this question. It is only by taking up all sides of the matter that we can arrive at anything like a solution.

Catalogues Quoting Net Prices.

W. J. AUGEMEER

The smiths and wagonmakers receive catalogues from blacksmiths' supply houses quoting net prices. This I think is a mistake. Why don't we get catalogues quoting the retail price, same as the storekeepers and other merchants? When the merchant shows his customer a catalogue and tells him the price of the articles the customer does not know what the merchant pays nor does he know what profit he requires. But with the blacksmith it is different. When the customer asks to be shown a catalogue he also sees the price, which is net. Of course, the customer thinks the smith receives the same catalogue as the merchant, and naturally suspects the smith when the latter tells him that the prices are net.

You may say, "Don't show the catalogue to the customer." But when he wants to see the picture of the article before he buys and you want to sell him, what can you do? I think this is something we blacksmiths and wagonmakers had best look into and to get the supply houses to revise their method of pricing in the catalogues.

A Set of Artistic Hand Hammers.

EZRA DE WEES.

The accompanying engraving shows a set of hand hammers which may be interesting to brother smiths. The designs on the heads are inlaid with copper. They are all forged and finished by hand. I am very much interested in ornamental work and believe that this branch of the craft is constantly growing in favor. I cannot see why more smiths don't take up this most interesting branch of the craft.

Thermit and Its Use in Welding.

S. UREN.

The first frame welded with thermit in the Southern Pacific shop was in April, 1905; weight of engine, 18,400 lbs. The frame was broken at the root of the pedestal, where the main driving axle is located. The welded frame is in service today and shows no sign of defect.

To prepare the surfaces of the broken section, the ends of the frame were corrugated by drilling holes through the frame. A jackscrew was placed between the jaws of the frame for the purpose of opening the fracture $\frac{1}{16}$ of an inch. After the weld had been completed, the frame was too short; consequently it should have been spread $\frac{1}{8}$ of an inch. In every case the broken section should be reënforced with a band of thermit extending about three inches each side of the fracture and being about $\frac{3}{4}$ of an inch thick.

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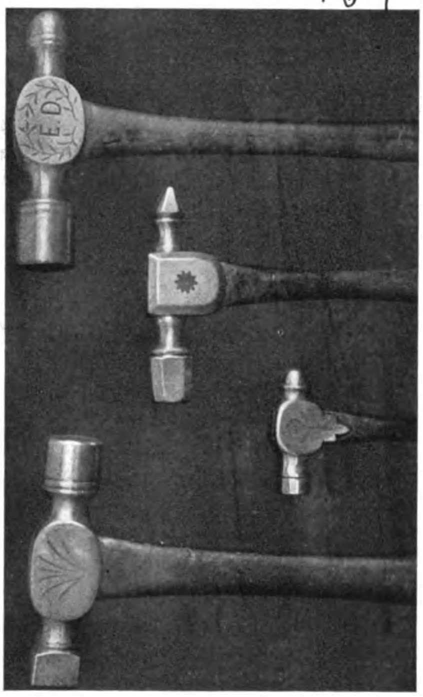


FOUR HAND-FORGED HAMMERS OF SPECIAL DESIGN

The method of making the mold to receive the molten thermit is explained in the directions for use. The shape of the mold must be changed to meet the conditions. Three or four different shapes will meet all the conditions required for repairing frames. The mold is usually made in halves and bolted together on the frame, and care should be taken that the mold is a perfect fit around the portion to be welded. To produce the contour desired in the inside of the mold make a pattern of wood similar to the shape. The reënforced portion of the frame is desired after being completed. The mold being bolted to the frame, the ends of the frame should be brought to a red heat by passing a gasoline burner through the pouring hole. The crucible of thermit is now placed over the pouring hole and ignited. In a few seconds the work is completed.

As soon as the molten thermit begins to congeal, release the jackscrew slowly, so that the spring of the frame will compress the heated thermit and equalize the shrinkage that must take place by the cooling of the metal.

From the writer's point of view, this is the best method of repairing a frame on the engine. Many frames have been repaired by this method in the Southern Pacific shops, with a small percentage of failure.

I do not wish to be understood that this method is as good as the blacksmith method—forge, steam hammer, and anvil. However, in emergency cases, when an engine comes in with a broken frame, by the thermit method the frame can be repaired and go into service the next day and oftentimes will serve the purpose until the engine comes in for general repairs. I should advise that when engines come in for general repairs, the frames be closely examined, and if defects are found bring the frame to the blacksmith shop and have it put in perfect order by the blacksmith.

A Few Short, Pithy Points for Gas Engine Owners and the Prospective Owner.

CARL E. JOHNSON.

After you have purchased an engine remember that you have not bought a machine which will solve the perpetual motion problem. A gas engine will stand a great big pile of abuse, but bear in mind that it cannot deliver its best service unless the operator gives it at least some kind of attention. Be sure that the engine is properly oiled at all times. Never fail to have the cooling water turned on while the engine is in operation. The cylinder should not be too hot or too cold. About 180 degrees is the right temperature. Be sure that the vent hole in the gasoline tank is always open. It is usually found in the filling cap. If anything goes wrong with the engine do not pull it apart. The trouble, nine cases out of ten, can be easily remedied by going over the engine carefully and systematically. If the engine fails to run, do not get excited, but go at things with a cool head and hand. See if the sparker is in proper condition. Examine the gasoline supply and be sure that it is right. See if you are attempting to run the engine without fuel. Examine the valves to see that they are not stuck and that they work easily and quickly. Give the fly wheel a turn over to see if the compression is right.

It seems almost unnecessary to warn the gas engineer against smoking in the engine room. The open-flame lamp should also be kept as far away from the gasoline tank as possible. If it is desired to examine the cylinder of the engine, care should be exercised so that when the flaming candle or match is put into the interior of the cylinder to examine it, the face is held away from the opening. There may possibly be an unexploded charge in the cylinder. Do not use steam engine oil to lubricate a gas engine. Be careful in selecting the oil used to lubricate all bearings. The manufacturer of a gas engine is usually the best authority on what oil is best for his particular engine. Consult the manufacturer when in doubt.

Comparative Value of Alcohol and Gasoline for Power, as Tested at Iowa State College.

The results of these tests showed that: (1) To compete with gasoline at twenty cents per gallon for use in gasoline engines, 94 per cent alcohol must be sold for from thirteen to seventeen cents per gallon and 90 per cent alcohol from eleven to fifteen cents per gallon. (2) None of the engines could be started readily with alcohol, although a few could be started more readily and with less difficulty than others. (3) After having once been started with gasoline and warmed up, the carburetors as designed for gasoline vaporized the alcohol successfully, except in one instance. (4) No doubt the gasoline carburetor can be readily changed to permit the use of alcohol as well as gasoline in the same engine. (5) Experimental work does not include tests of the specially designed alcohol engine, which should show better economy in the use of alcohol. (6) Gasoline cannot be used readily in a specially designed alcohol engine using high compression, on account of preignition. (7) The odor of the exhaust of an engine when using alcohol is not so unpleasant as when using gasoline. (8) Alcohol is much more pleasant to handle. (9) There is much less danger from fire when using alcohol for fuel than when using gasoline, owing to the fact that acohol does not vaporize as readily as gasoline and its flame may be extinguished with water.

Tests were made with three different makes of gasoline engines having ordinary compression pressures, each of which is in general use throughout Iowa. These tests were not so exhaustive as might have been desired from several standpoints, but a further continuation of the tests was not deemed advisable, because the Section was unable to secure an engine designed specially for alcohol. And it was further found practically impossible to properly alter the design of any of the larger gasoline engines found in the laboratory, for the most advantageous use of alcohol.

But the work was carried far enough to show that alcohol probably would not come into successful competition with gasoline in the production of power when the cost of alcohol per gallon is greater than that of gasoline, even in the specially designed engine. Conditions under which alcohol will be able to compete with gasoline will come about slowly, and by the time such conditions exist the Section expects to have secured enough experimental data upon which to base another more definite and technical bulletin.

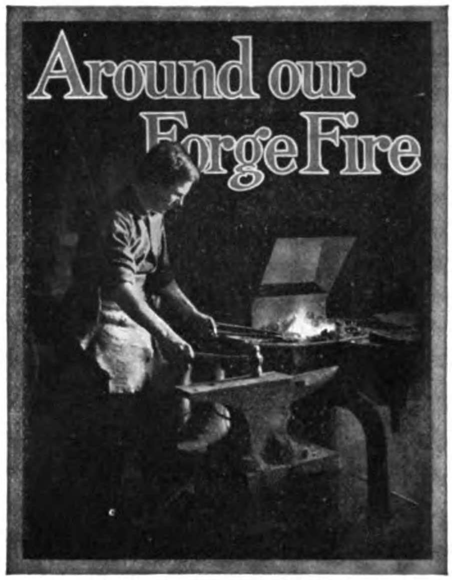
The main series of tests were made upon Engine No. 1, an eight-horsepower, four-cycle, water-cooled horizontal engine using a make-and-break igniter. A complete thermal efficiency test was not made. The temperature of the jacket water was taken merely to determine the condition under which the engine was working, but the amount used was not determined.

The brake horsepower was determined by means of a Prony brake and a speed indicator, and the indicated horsepower by the number of explosions and the area of the indicator cards.

Engine No. 2 was similar to No. 1 except that it was of the vertical type and rated at three horsepower.

Engine No. 3 was a two-horsepower, two-cycle, water-cooled horizontal engine using a jump-spark ignition.

Engine No.	Kind of Fuel	Indicated Horse-power.	Brake Horse-power.	Gallons per Brake Horsepower Hour.	Cost per Horsepower hour at 20c. per Gallon.	Compression Pressure.
1	Gasoline	11.6	8.6	.142	.0284	51
1	Alcohol	11.6	8.6	.214	.0428	51
1	Gasoline	7.4	5	.18	.036	51
1	Alcohol	7.6	5.1	.241	.0482	51
2	Gasoline		3.27	.167	.0334	60
2	Alcohol		3.25	.226	.0452	60
3	Gasoline		2	.211	.0422	62
3	Alcohol		2	.284	.0568	62



"You're just the man I want to see," exclaimed the Editor as Benton pushed open the door of "The Shop."

"Here I am," said the newcomer; "take a good look while you're about it."

"This is not a joking matter," returned the Editor. "Have a chair and make yourself comfortable; I want to talk to you and will be ready in a minute."

The Editor returned to the proof he had been reading when his visitor entered and after sending it to the printery turned to Benton.

"What do you know about belting?" questioned he. "Here's a reader wants to know how to remedy the raveling of a rubber belt. The belt was originally seven inches wide but already one inch has wasted."

"I don't know an awful lot about rubber belting," replied Benton, "but I should think that if his pulleys had a swelled center and the belt traveled free from any side guides he shouldn't have any trouble." Then continuing he said, "Suppose we have a rubber belt running on flat-faced pulleys instead of swelled-face pulleys. The sides or edges of the belt are pulled and stretched equally with the center, while the edges cannot give or stretch as readily. This may be one cause of the raveling, or if the belt runs through guides it is also very likely to ravel. If, however, the belt is run on swelled-face pulleys the center of the belt is stretched slightly more than the edges, and of course the edges are not so likely to tear or break."

"Your reasoning seems to be O. K.," said the Editor, "and perhaps you have hit upon our reader's trouble. At any rate I hope he'll let us hear from him whether you've hit the nail on the head or not."

Barrows happened in at this time with a "What did you say would keep my water jacket from freezing?" thrown at Benton.

"Chloride of lime," replied the man of recipes. "If you want to save your engine, better get it in soon. Won't be a very long while before you'll find ice in the slack tub."

Song of the Forge.

ANONYMOUS.

Clang, clang! the massive anvils ring;
Clang, clang! a hundred hammers swing;
Like the thunder-rattle of a tropic sky,
The mighty blows still multiply—
Clang, clang!
Say, brothers of the dusky brow,
What are your strong arms forging now?

Clang, clang! we forge the coulter now—
The coulter of the kindly plough.
Sweet Mary, mother, bless our toil!
May its broad furrow still unbind
To genial rains, to sun and wind,
The most benignant soil!

Clang, clang! Again, my mates, what glows
Beneath the hammer's potent blows?

Clink, clank!—we forge the giant chain,
Which bears the gallant vessel's strain
'Mid stormy winds and adverse tides;
Secured by this, the good ship braves
The rocky roadstead and the waves
Which thunder on her sides.

Hurrah! Cling, clang! once more, what glows,
Dark brothers of the forge, beneath
The iron tempest of your blows,
The furnace's red breath?

Clang, clang! a burning torrent, clear
And brilliant, of bright sparks, is poured,
Around and up in the dusky air,
As our hammers forge the sword.

The Sword!—the name of dread; yet when
Upon the freeman's thigh 'tis bound,
While for his altar and his hearth,
While for a land that gave him birth,
The war-drums roll, the trumpets sound,—
How sacred is it then!

Not much left of nineteen seven.

Christmas turkey ordered yet?

A tidy smith usually signifies a tidy shop.

No man can boss others till he can boss himself.

Advertising is a bee whose honey is better and more business.

Remember to write it 1908 after the thirty-first of this month.

A good man to let go is the one who is always watching the boss.

Shorter and shorter grow the days. Does the work decrease with them?

Be sincere, and win the truest respect of those whose respect is worth having.

The wood worker is known by his chips, but the smith is known by his tongs.

When there's more than one way to do a thing, the easiest way is often the best.

And again do we wish every one of "Our Folks" a bright and happy Christmas.

The general rule is to regard four feet eight inches the standard track for carriages.

A customer who pays without being dunned is like a day of sunshine after a week of rain.

All work and no play makes Jack a dull boy. All play and no work adds three letters to his name, Jack.

Be known rather as a charger of stiff prices and a doer of good work than have the name of "Cheap John."

Somebody will get left. Last year many orders for our fifty lots of calendars came too late. Get your order in now.

Are you a storehouse—taking and holding but never giving, or do you take and give of sunshine as opportunities present?

A trust may control other grease, but elbow grease will always pay a dividend to both large and small producers.

Hunt out the orders. He who waits usually finds that the other fellow has caught them before they got as far as his shop.

Hello! Got a phone in your shop? Pretty good sign of progressiveness. Some of the boys are using typewriters. Keep up the good work.

Side lines of many kinds we have heard about, but airship repairing is yet to be added to the list. Any of "Our Folks" doing this work?

Tom wrote out his winter's order for calk steel on the day the first snow and ice came. He didn't send it in, however, because it turned warm the next day.

Proper care will keep tools good and save buying new ones. But get new ones when the old ones are worn out or antiquated. Old, out-of-date tools are profit-eaters.

The best medicine in the world is cheerfulness—and the easiest to take. It means business to the business man. No one wants to trade with a gloom distributor.

Like a man, the older a debt gets the harder it is to do anything with. Go after them while they're young. And, by the way, now's a good time to look after your collections.

Run over the accounts at regular intervals if you don't want them to overrun. Otherwise before you know it some will be so far behind that they can't catch up—and then you'll be behind.

What are you doing for the future of the craft? Are you getting young men interested in the good old trade? Are you raising the standard of the craft? Is the craft better off for your being in it?

Where would you be if obliged to find out everything for yourself? And so when you hit on a good way of doing something, pass the news along to the other boys, as you in turn have learned from them.

Any steps taken in your locality for raising prices? The cost of supplies steadily advances, and smiths should certainly get more for their labors. Get in touch with the Secretary today and let him show you how to get what you deserve.

Owls like the dark, but human beings, the same as plants, shrivel in the gloom. Clean, well-lighted quarters are necessary to the accomplishment of best work these dull days. Get all the light and sunshine you can into the shop.

Let your brother smiths know what you are doing by sending in a photograph of your shop, your work, your equipment. And don't forget that occasional items on how you do this or that job are always welcome.

Look alive there to appearances. No good business man can afford to use poor-looking stationery. The plan announced in the advertising pages may interest you. It points a way how you can be sure of neat letterheads and other printed forms.

If you haven't done so get to it immediately. You'll save time and be able to turn out more work. And more work done at a time when there is more work to do is like making hay when the sun shines. Again we say, have tools sharpened and everything in readiness for the winter's rush.

Sharpen your pencil and figure out just how much more you might have if you had raised your prices a few cents on each job at the beginning of November. Figure it now and see if it's not worth while to get what you deserve. Begin December and see how much easier the domestic cart will run.

While all shoers know how to rasp a horse's foot, far too few know how to file the catalogues they receive. Have a place for these books of trade and keep them so you can put your hand right on the information you want when you want it. Don't rasp under the clinches, but be sure to file your catalogues.

Building up your own reputation by running down your competitors' seems never to work out. It's the chap who cracks his own whip, drives his own horse, and tends strictly to his own rig who gets there first. Banging each others' hubs and taking off wheels usually results in a third party winning in a walk.

"Man is a tool-using animal. He can use the tools, devise the tools; with these, granite mountains melt into light dust before him; he kneads iron as if it were soft paste; seas are his smooth pathway, winds and fire his unwearying steeds. Nowhere do we find him without tools; without tools he is nothing, with tools he is all."—*Thomas Carlyle.*

Too good to keep, think many of "Our Folks," and they send in their little items and helps regularly. Some, however, seem to believe in the doctrine of "too good to give." Just broaden out and give—don't be continually looking for valuable information without doing your share. You think, perhaps, that your item is of no use—send it in anyway and let your brothers judge.

We struck a man the other day who, one of the know-it-all kind, loudly proclaimed that while a craft paper was all right for beginners, he, for one, could learn nothing from them, and wouldn't waste his time, and so forth and so on. Come to find out, he had worked at three trades and given them each up. Couldn't make a decent living at any, so he said. There's a moral to this.

A hopeless case indeed is Tom Tardy. The ignorant man who wants to learn is respected. But Tom, while ignorant, is too stubborn to admit it. He has plodded along for years in the same old rut of antiquated methods, and declares, "What was good enough for father is good enough for me." He hasn't yet waked to the fact that white-haired methods won't do for brown-haired people.

A good cement for fastening the leather covering to the face of an iron pulley or for fastening leather to iron when required: Take one part glue dissolved in strong cider vinegar and add one ounce of Venice turpentine. Allow this mixture to boil very slowly over a moderate fire for about ten or eleven hours. Now clean or scrape the iron and leather surfaces perfectly clean. Then apply the mixture, while warm, to the iron surface, put the leather on and press firmly into place, allowing the cement to dry for a few hours.

American Association of Blacksmiths and Horseshoers.

Even to far-away New Zealand has the Association movement spread. Word has just been received that an organization of horseshoers in Nelson District has been accomplished and a price list agreed upon. I want every reader of this column to look over the list of prices which these New Zealand shoers are charging and want you to get busy in your county if you can not boast of an organization.

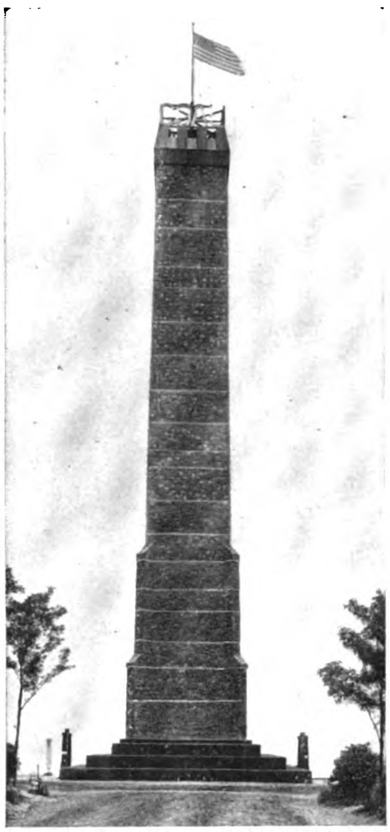
	Sh.	Pence.	
Hacks and carriage horses, per set	6	0	($1.45)
Half-draught horses, per set	6	6	(1.60)
Heavy draught horses, per set	7	0	(1.75)
Heavy draught, heels and toes, per set	10	0	(2.40)
Stallions from Sept. 1 to Jan. 1, per set	10	0	(2.40)
Trotting shoes per set	10	0	(2.40)
Racing plates, per set	10	0	(2.40)
Removes, per set	4	0	(.95)
Old shoes, draughts, per set	4	0	(.95)

Hard steel and steeling shoes, 6d. ($.12) per pair extra.

Young horses, first shoeing, 1s. ($.25) extra.

Establishments close on Saturdays at 1 p. m.

New Zealand smiths, however, are not the only ones who are organizing and agreeing upon the prices they deserve. Horseshoers in all parts of our own great country are organizing and agreeing upon a common price list. Dixon County, Tennessee; Polk County, Wisconsin; Buffalo County, Wisconsin, and the blacksmiths of Houston County, Minnesota, are some of the organizations lately reported. Everywhere smiths are beginning to realize the necessity of better prices for their work. Prices have steadily advanced until profits through selling prices of even a year ago are well-nigh impossible. You, Mr. Reader, cannot even attempt to absorb these advances. Just let me quote a few of the reasons stated by the various organizations recently reported. "The advance in prices of material and the high scale of wages demanded by journeymen are the reasons for the organization in this county." "The prices we are forced to pay for material, as well as the prices of all necessities with which we must provide our families, have so advanced that we are unable to make a respectable living working at the old rates." "Realizing that we are unable to make both ends meet, we have come to the conclusion that an organization is a necessity. We have been doing work at prices that were beneficial only to the other fellow, and, with the increased cost of material, labor, and freight rates, an advance is absolutely necessary to a fair profit."

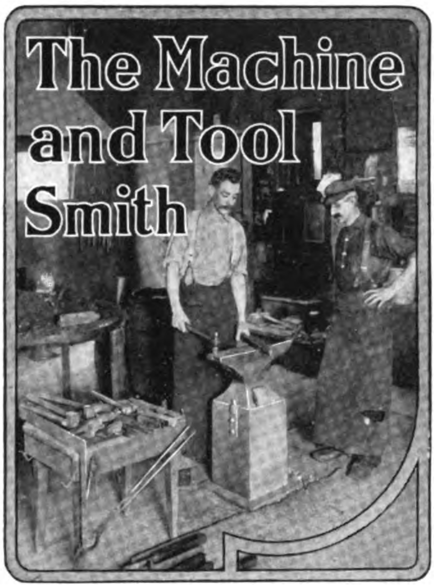


THE WEST VIRGINIA COAL COLUMN AT JAMESTOWN EXPOSITION

The Minnesota smiths have agreed upon prices as follows: New shoes, 40 cents each; setting shoes, 20 cents each; steel plugging, five cents extra for each shoe; Neverslip shoes, 55 cents each; refilling and setting shoes, 40 cents each; sharpening plows, 25 to 35 cents; new 14-inch lay, $3.25; new 16-inch lay, $3.50. The blacksmiths of Polk County, Wisconsin, have raised the price of horseshoeing from 20 and 40 cents to 25 and 50 cents, other work being advanced in proportion. The smiths of Buffalo County, Wisconsin, though but recently organized, have every smith in the county on their membership list, and an advanced schedule of prices has been agreed upon.

We have already referred to the excellent work being done in Bell County, Texas, and in the State of Iowa. These associations are adding to their membership at every meeting. Does this not make you feel anxious to get the organization ball rolling in your county? The Eastern Nebraska Association have decided to take in the whole State. Who knows but that a small organization started in your town or county may in time include every smith in your State? But sitting calmly in the shop and blowing smoke pictures of what can be done will never result in anything lasting or substantial. Get right out and call on the smiths in your county. Ask your neighbors what they think of the need for better prices. Get them to work with you. Agree upon a meeting place and get things under way NOW. This is just the time of year when a small advance will show up big in the month's receipts. It's not at all necessary to work for nothing in order to get business, and if you have been cutting and chopping prices with your fellow craftsmen, or if the steady advance in the costs has absorbed your profits, get into the association spirit now. My easy plans for the formation of branch associations are simple, and when you understand that the American Association is always ready to assist you in any possible way in getting the smiths solidly organized, you will wonder why you haven't before taken up this opportunity to help yourself.

A raise in prices, while important, is by no means the only advantage to be gained through organization. An association naturally promotes a better feeling among the smiths. It shows that nothing at all is to be gained by price cutting and trade fighting. It shows them how to protect themselves from the dead beat and unreliable customers. It affords them at reasonable cost a collection department which, making a specialty of one class of accounts, is more likely to be successful than the professional collector. But page after page could be filled, detailing the advantages of an association. The best way to get a full idea of what can be done is to get an association under way and install such reforms as are necessary in your locality. Address me at P. O. Box 974, Buffalo, N. Y., today, and, start a movement in your county without delay. Don't let another day pass without making some effort for better prices, harmony, and organization. THE SECRETARY.



Formers for Rapid Bending and Shaping.

E. A. SPALDING.

The usual way when a number of duplicate pieces are to be bent is to take a piece of iron or soft steel of suitable size, and bend it to the required shape and then form the pieces to that. This is the method in use in most shops, and also in our shop when there are only a few pieces to be bent and where it would not pay to make a more expensive former.

Illustration No. 1 shows a former with movable jaws operated by a hand lever, which will be found to be indispensable in a shop where there is a lot of bending to be done and still not enough to support a power machine, such as a bulldozer or a forging machine. I designed this former in the first place to bend shipper rods, as shown in Fig. 2, top piece. They are made of $\frac{3}{4}$-inch round iron with a $2\frac{1}{2}$-inch offset. By the old method, a smith with helper would bend 25 pieces per hour if he was a hustler. With this former he will bend 200 per hour. It worked so well on this piece that I tried other shapes and now have fifty sets of jaws for as many different shapes. Some require both jaws of the former, some only one jaw. The bottom block or form is bolted onto the plate or bed of the former. One of the features of this former is that it binds on the center; i. e., the jaws and bottom block are built up so that it brings the work above the pin on which the jaws hinge, thus allowing you to work on the center. This is an advantage in that you get all the power possible, and in that as soon as power is applied to the lever it binds the piece to be bent and does not allow it to move, so that when the gauge is once set any number of pieces can be bent and all be alike.

Fig. 2 shows some of the different shapes produced on this former. One man will bend from 2,000 to 3,500 pieces per day, according to size and shape. We have in connection with the former a furnace to do the heating. The former as shown in Fig. 1 is turned around and tilted to get a better view of it. Its place is lying flat on table on which it is shown.

The Making of a Mast-Band for a Battleship.

C. H. RICHARDSON.

The accompanying photograph of the cap-band, also showing the trestle-trees, was taken just before the steel spar was set in its position as main-mast on the new United States cruiser *Salem* now under construction at the Fore River Works.

The strange feature of this band is the simplicity of its construction, especially when the type of vessel

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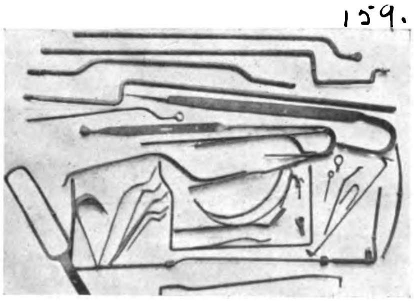

FIG. 2—SOME OF THE BENT SHAPES TURNED OUT BY THIS FORMER

it is to be used on is considered. As a rule, beauty in design, as well as durability, are carried to the extreme in all government work. The mast-band illustrated does not require the finest work to accomplish, and there is not a difficult step in its whole construction. The material used for this forging was six by two-inch Norway iron. The center posts are made of soft steel, the side straps are also of Norway iron; but $\frac{1}{8}$ of an inch is added to their thickness, making it $\frac{5}{8}$ of an inch instead of $\frac{1}{2}$ of an inch.

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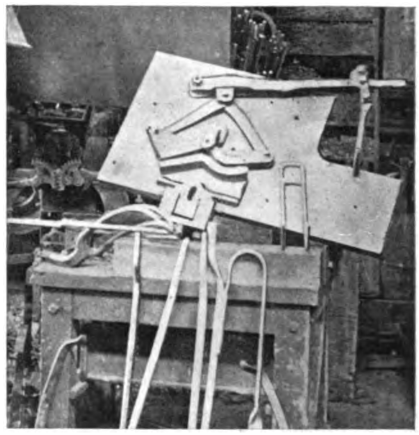


FIG. 1—A FORMER WITH MOVABLE JAWS FOR RAPID BENDING AND SHAPING

The plain band is forged first. The object for doing this is to give the spar fitters time enough to fit the ring in place and center it so that when the cap band is completed it will draw the topmast into line with the lower spar. The hinge band is made next, and the center is then forged and fitted into place. This dividing bar controls the accuracy of the whole cap-band, i. e., if the spar is not in line, the only place any help can be given it is at the mast head. This dividing bar can be set to the new centers very easily. The side straps are then made and riveted into place. The two eye pads are for housing the topmast, which is raised into its place by blocks attached to these eyes.

A word as to getting the length of the hinge band so the joints will be even when the band is in place. The topmast that is to pass through this band is 12 inches in diameter. To this distance is added one half inch to make up for the leather lining on this band. This leather is to protect the topmast (this spar is wood) from chafing. The size of the ring is now $12\frac{1}{2}$ inches in diameter. The circumference was found in the usual way by multiplying the diameter by $3\frac{1}{7}$. The example as it stands is then 13, the thickness of the block, multiplied by $3\frac{1}{7}$, which is $40\frac{6}{7}$ inches or $40\frac{7}{8}$ inches. This being the circumference of the band, it is now divided, and to each half is added stock enough to make the hinge and lock eyes. As a rule, the size of the pin in a hinge-band is

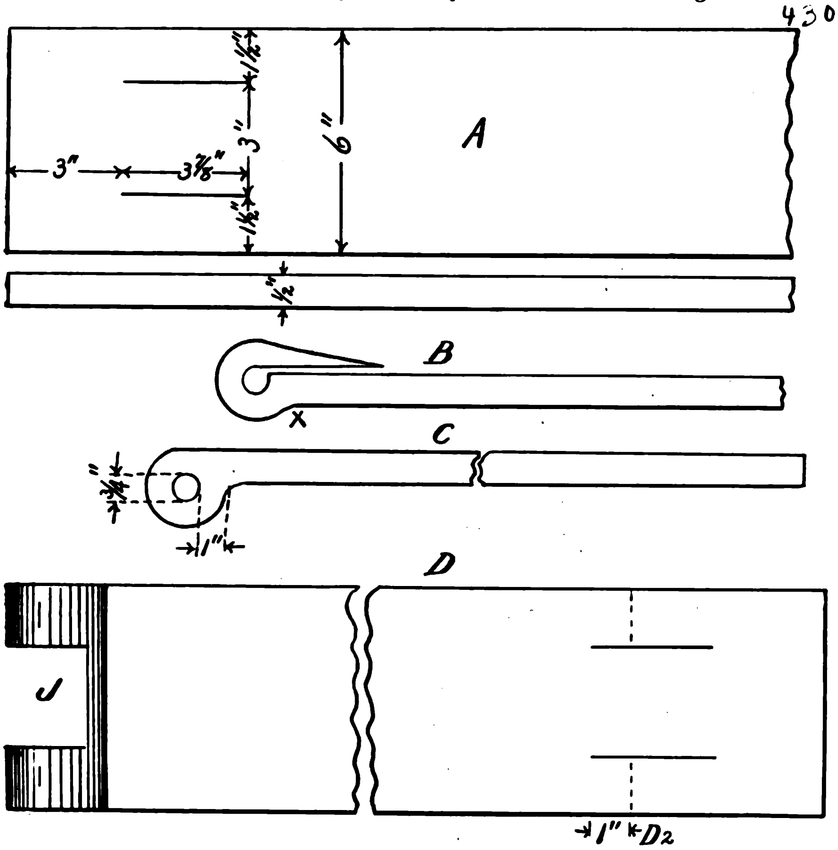
¼ inch longer than the thickness of material used. The pins used in this band are ¾ of an inch in diameter. The circumference of these pins would be ¾ and ½, which is 1¼ inches, and 1¼ inches multiplied by 3 is 3. 92 or 3⅞ inches. Twice this amount is added to each half of the circumference of the band and to each of these amounts is added twice the width of the stock. This allowance is for the lap welds. Combining the different lengths we have 20⅞ and 7¾ and 6, which is 34⅝ inches, total length of one half before welding the eyes.

The bar of stock should now be laid off as shown at A, three inches being allowed for the lap. It will be noticed here that the hinge is equally proportioned, i. e., the center is the width of the two sides. These dimensions are marked with a fine cold chisel, and when the stock is heated a thin hot chisel is driven through the metal from the inside of the band to be. The object of this inside cut is to insure a perfect edge for the jaw of the hinge. The cutter should not be driven through the material any farther than it is required to cut the outside fiber of the metal. It will be noticed that when the scarf is formed and the eye is bent as shown at B, the groove made by the chisel will spread wide enough for the required guide of the jaw. The eye should be worked as close to the eye pin as possible before the weld is made, as B will show. All arrangements being made for the weld, the heat should now be taken. A common fire brick laid on the top side of the weld will insure a perfect heat. With a fuller in hand lift the forging clear of the fire, and, using the fuller as a hand-hammer, hit the scarf along the thin hot edge, turn the work over, and drive the fuller in the neck of the eye as at X. The heat is finished at the steam hammer. As a rule, a wash heat is taken over the whole end, the scarfs are all worked in and the eye swaged and peened out. The center is cut out next and the champers formed on the half of the bar as shown at D. This half of the bar being completed, the next step is to lay the bar for the opposite end. The only point that seems to puzzle one for a time is getting the length right from center to center of the eyes. The rule that has more absolute success in the yard is shown at C and D2, i. e., the finished eye is measured through the thickest part (just at the fillet) and the amount is deducted from the half of the circumference of the ring. In the present example the eye is one inch through the fillet, one half of the circumference is then 20⅞ inches less one inch, or 19⅞ inches, one half of the circumference before welding the second lap. Now, lay on the length and mark the bar, as previously explained. If care is taken not to leave more than

428.

THE CAP BAND AS IT APPEARED ON THE MAST

430.



THE VARIOUS STEPS IN THE MAKING OF THE MAST-BAND

the stock mentioned for the lap and also to draw the scarf as thin as possible, no trouble will be found in getting the length of the hinge band. The opposite half is forged in the same manner as the jaw half, the sides are then cut out, and the joints are heated (a finished pin is inserted when the hinge is hot) and worked into shape.

Casehardening: Material and Methods Used, and Results.*

GEORGE MASSAR.

For casehardening we use this mixture in the following proportions: 100 lbs. prussiate of potash, 50 lbs. bichromate of potash, one barrel of common salt. Pulverize potash and mix with salt. We have used the carbonate of boneblack, but did not get the results that we do with potash. The potash can be used the second time without adding any new to it with very good results. We use our spring furnace, which is double-decked, for heating, as it is especially designed for that purpose.

The men who do the setting and tempering of springs look after the casehardening box. This furnace is heated with soft coal. We have four different sizes of cast-iron boxes having cast-iron lids. The pieces to be casehardened are packed in one of those boxes of a size suitable to the pieces. Pack the box carefully with the article to be hardened, so as to allow enough potash when dissolved to cover the work to be hardened, lute the edges of lid with fire clay to make box as airtight as possible, and allow box to remain in furnace from eight to ten hours according to sizes of articles you wish to harden. The thickness of shell of casehardening depends on the sizes of the pieces and the time they are

*Read before the I. R. R M B. A. convention at Montreal.

allowed to remain in the furnace. Our size of cooling tub is six feet six inches long, 26 inches deep, and 28 inches wide, with 1¼-inch inlet pipe at bottom of tub and overflow at top. We cool with clear water.

We have a screen the size of the tub on the inside; the frame made of 1¾ by 1¾ by ¼-inch angle iron with heavy wire netting as used in front end of smoke box. It sets about four inches above bottom of tub so as to allow the cold water to flow freely around the pieces to be hardened. Have a bail at each end of the screen so it can be raised out of the water.

As to points of carbon that our casehardening contains, I have no means of finding out. I am no chemist and can only tell by putting in test pieces. If they come out clean and white from the cooling bath it will stand the test; if they show spots the man in charge neglected his duty in not keeping furnace at uniform heat.

As chairman of the committee I wrote each member asking their views on the subject and received three replies.

VIEW OF GILBERT STREET AT THE JAMESTOWN EXPOSITION

Method of W. J. King.

I have been casehardening for the last six years with bonedust in the raw state. The bonedust is crushed into pieces about the size of rice, which I find to be equal to any casehardening process that can be obtained, and less expensive.

It takes about 12 hours to caseharden pieces as large as links, and it is sufficient for any use on railroads. Smaller pieces I do not keep in the fire quite so long. I use wood to burn the casehardening box with, on account of its keeping an even temperature, which, you know, is very essential in casehardening, and as it does not burn holes in the box, it has added value.

I have several methods of casehardening, but I find raw bonedust the easiest and best material to use. I seldom have to caseharden over after the engine has run her mileage. I often caseharden as deep as ⅛ inch, which is sufficient for any purpose, for when that is gone the link motion needs repairing. The one thing I am careful about is to see that the box is well lined with clay to exclude air. I put a small piece of iron in the box and do not look at it until the box is taken from the fire.

How J. J. Ryan Treats It.

In regard to the subject of casehardening, we use a cast-iron box ¾ inch thick with lid put on with bolts, and fire clay between lid and box, which makes a very neat fit. We use carbonated boneblack and salt to pack the material in, keeping each piece separated from the other. We also put clay on all bolts with threads so that the clay will cover the thread point. Put the box in furnace heated with wood blocks or oil, so as to bring box to lemon color, no hotter than about 1,350 degrees. Make special effort to keep it at that heat for 12 or 14 hours, which is very hard to accomplish; for when you put a man at night watching the furnace he is liable to forget and let the heat go down, or get it too hot, which has a tendency to make material short and brittle, and would not have the life it otherwise would if box was kept at same heat all the time.

The bath should be a good-sized trough fitted up with water flowing in from the bottom and flowing out from the top, so as to keep the water cool. All links and quadrants should be let down in bath with iron hooks and held edgewise in water so as not to spring them. Test pieces one inch round and ¾ by three inches flat when put in the box show, when left in 12 or 14 hours,

THE AUDITORIUM AND THE PALACES OF EDUCATION AT THE JAMESTOWN EXPOSITION

$\frac{3}{32}$ inch deep, which for all locomotive work gives good results.

R. A. Mould's Method.

There are several things to look upon as to what we call results. First, hardness; second, the condition of material after the process of heating and cooling has taken place. I am not one who looks upon great depth of hardness as the best result. I think we should be governed by the requirements of work desired hardened. If a hardness of $\frac{1}{16}$ inch is sufficient to fill the requirements, then this should be our aim as to length of time our work is burned. How is this obtained? First, by proper furnace to obtain most regular heat while being burned; second, the material used for the work, of which there are many kinds—ground bone, bone and leather, and many formulas used by many, all claiming the best results.

As to my own experience, the best results in heating are obtained from an oil furnace under fed with vent on the floor line of box, which gives the flame a complete circle of box and can be regulated to the degree of heat desired. For the length of time required to do a batch of casehardening you should be governed by the class of work you desire casehardened. On the Union Pacific we caseharden only links, pins, bushings, and such parts belonging to the motion work of a locomotive. With our furnace and the material used it requires about seven hours to obtain sufficient amount of hardness for a complete set of links, pins, etc. I consider the condition of the work after being casehardened. I have seen some pieces hardened to a depth of $\frac{3}{16}$-inch or more, the material being crystalline throughout the entire piece of work, making it dangerous to be applied on a locomotive. The center of all parts of casehardening should be soft and fibrous, so in case of accident it would bend and not snap off brittle like glass.

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THE WARPATH AT THE JAMESTOWN EXPOSITION

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ENTRANCE TO THE COURT OF MINES AND METALLURGY

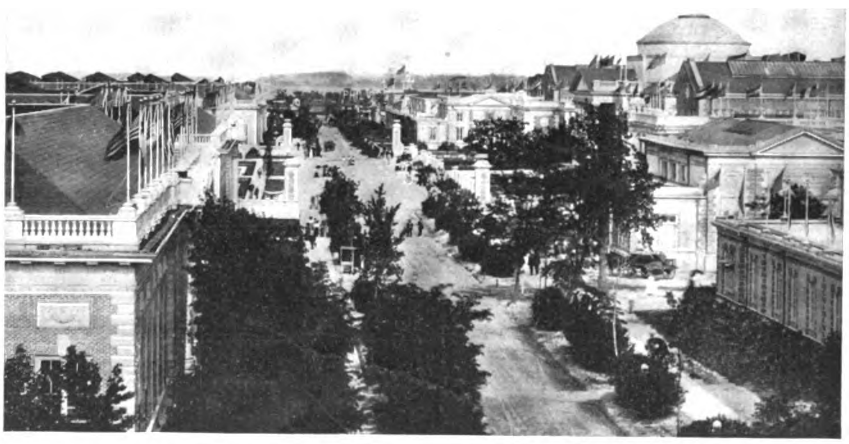
Repairing Flues and Welding Them.

GEORGE LINDSAY.

We weld all our flues with oil as fuel and an air hammer for power, and we use steel flues and steel safe ends.

As to the method of welding, I believe, more especially for steel, that hammer blows are better than the roller welder, although my personal experience with the roller is limited. As to welding steel to steel, all blacksmiths of experience know that high carbon steel would be treacherous to weld for some purposes, but for the material used in flues it is so low in carbon that it is easily welded and will bear a very high heat for steel. Of course, we also know that iron will weld better to steel than steel to steel. Some may ask, "Why?" Let us reason it this way: The melting point of steel is about 2500° Fahr. The melting point of wrought iron is somewhat over 2800° Fahr. If iron is at proper heat to weld it is hotter than the melting point of steel, and the result is that when united the iron brings the steel to fusion, which is necessary for a perfect weld. With steel to steel, it is a plastic or cement union, as, for instance, in a flue, it is so thin that fusion without proper working will make the metal short and crumbly.

But I wish to prove that it is practical and profitable to use steel flues if they are not mistreated, as we have universal success. I called the attention of our foreman boilermaker to this and inquired of him if he had any trouble with steel welds or with defective beading of steel flues caused by overheating. He informed me that in three years only one flue had given trouble in service at the weld, and for the beads falling off he informs me that when the engines come in for general repairs that the beads are as good as when they went out, and but for mud they did not need to come out after 12 to 14 months' service and a mileage of from 40,000 to 75,000 miles.



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VIEW OF POCAHONTAS STREET AT THE JAMESTOWN EXPOSITION

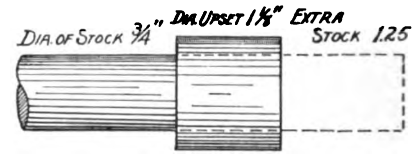
Now, I don't care whether they are shrunk, braced, screwed on, or welded; they seem to give the service without trouble. What more is required? Some may say, "Safety." I am not aware that we have ever had an accident from this cause either.

Now, at this point I wish to state that some put on only four inches for safe end, bringing the welding heat so close to the end without working the metal, which doubtless has a tendency to make the metal brittle. We use 6-inch safe ends, and while the end is hot enough to be swedged in the same heat as it is welded, it is not injured by overheat, neither is the metal brittle where the so-called shrink-fit is. In order to separate, you will have to hammer the flue square to separate them, and then not split the metal. By having a properly constructed furnace there is no need to overheat to get good results.

I noticed in one large shop the convention visited in a body, that they used a closed furnace. I don't care whether the ends were iron or steel, the end of the piece was ruined by heat without work, because the end was as hot as where it was welded and hammered, which helped to close the metal at that point.

How John Conners Accomplishes It.

We have our cutting-off machine and scarfing machine near by where the flues are cleaned or rattled. We scarf the long flue with an inside bevel and the short safety end with an outside bevel about 5/8 of an inch long; then the flues are taken to the oil furnace, where they are welded; and we use pneumatic air hammer machine. We have a double furnace. We place one flue on one side of the furnace while the flue is heating on the other side to be welded. When it comes up to a welding heat we bump it up against an iron block on the back side of the furnace, and then when it comes to a welding heat it is placed



EXAMPLE SHOWING HOW TO USE THE TABLE

in the machine and welded. Two men will weld 300 flues in ten hours.

Arthur Stockall's Way.

I do not handle the flues in our blacksmith shop, but they are done by the boilermakers in their own shop. The method of doing this work is as follows:

The flues are brought to the shop on lorries direct from the boiler, and are at once placed on the tumbling barrel with a lot of iron and steel turning chips and are cleaned. They are then passed endwise into a rack just back of the man who welds them. This man first cuts off the safe end, cutting and scarfing them at one heat. He then cuts off the end of the old flue, scarfing and expanding the end at one heat. Then they are placed in the oil furnace to be welded. One flue is placed in one hole with the safe end on, and when a yellow heat is on it is driven into place by a gentle push against a block at the opposite side of furnace. It is then placed in the hole next the man who welds it. When a welding heat is produced it is placed under the rolling welding machine and welded. They are pushed in a rack by the side of a pneumatic cutting-off machine, which cuts them to the proper length. After this they are passed to a swedging air hammer, and the ends are swedged to a right size to fit copper ferrule, after which they are loaded on a lorrie and taken to the boiler that needs them.

I may say that our man can weld from 350 to 375 per day; or three men who do this work can clean, cut safe ends, cut off old flue end and weld them, cut them to proper lengths, and swedge the end down to fit the copper ferrule, from 125 to 150 per day.

Table Showing Length of Stock Required for Upsets of Various Lengths.

FRED. SEABERG.

The accompanying table shows the amount of stock in inches required to make upsets of various sizes and lengths. As an example of how to

		Length of Upsets					
		1"	2"	3"	4"	5"	6"
Dia. of Stock	Dia. of Upset	Extra Stock Required					
3/4"	7/8"	.36	.72	1.08	1.44	1.81	2.17
	1"	.78	1.56	2.33	3.11	3.89	4.67
	1 1/8"	1.25	2.50	3.75	5.00	6.25	7.50
7/8"	1"	.31	.61	.92	1.22	1.53	1.84
	1 1/8"	.65	1.31	1.96	2.61	3.27	3.92
	1 1/4"	1.04	2.08	3.12	4.16	5.20	6.25
1"	1 1/8"	.27	.53	.80	1.06	1.33	1.59
	1 1/4"	.56	1.13	1.69	2.25	2.81	3.38
	1 3/8"	.89	1.78	2.67	3.56	4.45	5.34
1 1/8"	1 1/4"	.23	.47	.70	.94	1.17	1.41
	1 3/8"	.49	.99	1.48	1.98	2.47	2.96
	1 1/2"	.78	1.56	2.33	3.11	3.89	4.67
1 1/4"	1 3/8"	.21	.42	.63	.84	1.05	1.26
	1 1/2"	.44	.88	1.32	1.76	2.20	2.64
	1 5/8"	.69	1.38	2.07	2.76	3.45	4.14
1 3/8"	1 1/2"	.19	.38	.57	.76	.95	1.14
	1 5/8"	.40	.79	1.19	1.59	1.98	2.38
	1 3/4"	.62	1.24	1.86	2.48	3.10	3.72
1 1/2"	1 5/8"	.17	.35	.52	.69	.87	1.04
	1 3/4"	.36	.72	1.08	1.44	1.81	2.17
	1 7/8"	.56	1.13	1.69	2.25	2.81	3.38
1 5/8"	1 3/4"	.16	.32	.48	.64	.80	.96
	1 7/8"	.33	.66	.99	1.33	1.66	1.99
	2"	.51	1.03	1.54	2.06	2.57	3.09
1 3/4"	1 7/8"	.15	.30	.44	.59	.74	.89
	2"	.31	.61	.92	1.22	1.53	1.84
	2 1/8"	.47	.95	1.42	1.90	2.37	2.85

TABLE SHOWING LENGTH OF STOCK REQUIRED TO FORM UPSETS OF VARIOUS LENGTHS use the table a piece of stock of three fourths of an inch in diameter is taken, on the end of which an upset of $1\frac{1}{8}$ inches in diameter and one inch long is required. The dotted lines show the amount of extra stock required, or $1\frac{1}{4}$ inches besides the length of the required upset, which is one inch. The reader must bear in mind to add the length of the upset to the extra stock required by the table.

Calculating Stock for Rings and Bands.

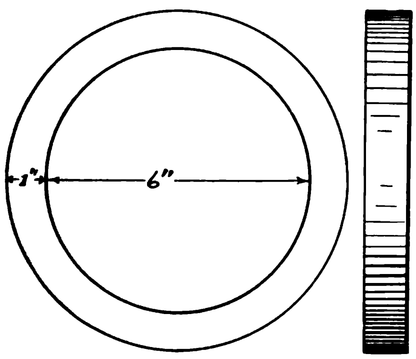
W. J. OTTO.

The calculation of stock for rings and bands and use of the formula of 3.1416, or $3\frac{1}{7}$, seems to give the general run of smiths more or less trouble. Perhaps it's the decimal, or it may be the fraction that is the stumbling-block. But, whatever the cause, smiths will find that an application of the same formula in a slightly different manner will work very much easier.

Let me first state the rule: Add the thickness of the material to the inside diameter of the required ring, multiply by 22 and divide by 7.

To explain this rule: if we divide 22 by 7 the result will be $3\frac{1}{7}$, so it can be readily seen that multiplying by 22 and dividing by 7 is equivalent to dividing by $3\frac{1}{7}$ or 3.1416.

Now, let us take as an example the ring illustrated in the engraving. It is required to forge a ring six inches in diameter from one-inch stock. To apply our rule we add the thickness of the stock, the allowance for welding, to the diameter. This gives us seven inches. Multiplying by 22 we get 154, and dividing by 7 gives us the figure 22, the amount in inches of stock required to forge a ring six inches in diameter from one-inch stock.



ANOTHER METHOD OF CALCULATING STOCK

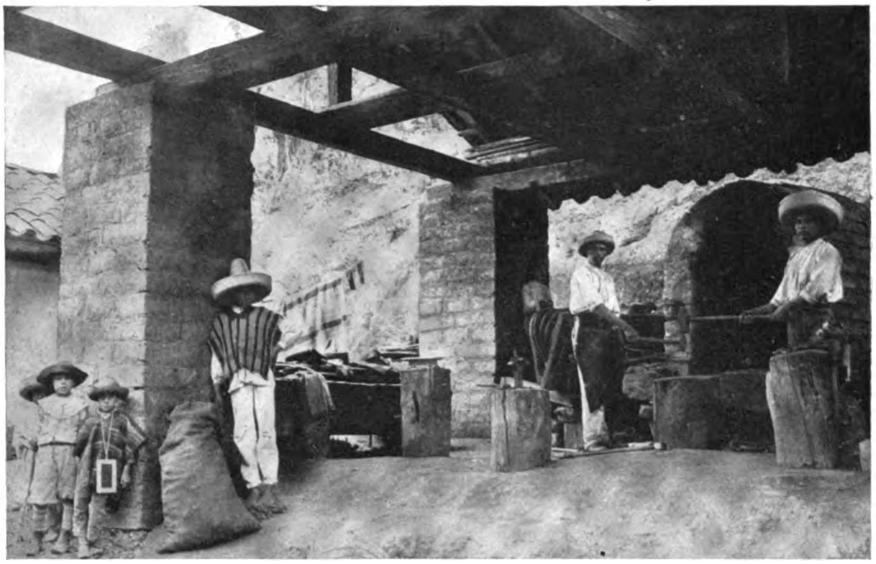
This includes allowance for welding. Of course, some smiths require more stock for welding than others. And should once the thickness of the stock be insufficient for the weld, the smith should change the rule to suit himself.

In this particular instance the rule of multiplying by $3\frac{1}{7}$ can be applied very easily. For instance, we add once the thickness of the stock to the diameter and get 7 inches, which, multiplied by $3\frac{1}{7}$, gives us 22 inches.

The Repairing of Old Frogs.

S. J. UREN.

In all railroad shops the repairing of old frogs is quite a factor. The method adopted in many of the shops is to scrape the frog if the point is badly worn. If the frog point is in fairly good condition, and the wing rails are badly worn, wing rails from other frogs that are not worn are substituted, or worn rails that have been taken out of the main-line track will answer for repairing old frogs, as the surface is sufficiently worn to correspond with the old point, so that when the frog is repaired the surface of the wing rail and point will be uniform. Another method; when the point is worn below the wing rail, bend the point up from the junction of the two rails forming the frog point sufficiently to be uniform with the wing rail, and place a wedge-shaped piece between the point and the plate to which the frog point is fastened. This method is applied to all patterns of frogs. If bolted frogs, the fillings should be made to conform to the changed position of the point. The pattern of new frogs has materially changed in the last 25 years. The old-fashioned sprung-rail frog is the frog now in use on the Southern Pacific, but in a modified form. The old spring-rail frog consisted of a frog point fastened to a plate, and two spring rails made from a thirty-foot rail firmly fastened at one end to the rail ties. The next pattern that came to the writer's notice was the single-spring rail frog. This consists of the point and one wing rail firmly fastened to a plate, and one long spring rail similar to the double long spring rail. The next pattern is what is known as the "clamp frog." This frog was produced by bending each member to the angle required, and then fastening them together



A MODEL MEXICAN SMITH SHOP, WITH ITS ANVILS OF RAILROAD RAIL, ITS PRIMITIVE BELLOWS, AND ITS VISE FROM "THE STATES"

with clamps sufficiently long to permit of wedges being driven in on each side of the frog members, thus firmly fastening the different members together. This frog has some merit, as in some cases the wedges can be released, and badly worn members replaced with little inconvenience. Much care should be taken in driving the wedges. Oftentimes the members become loose in service on the track. Men do not use sufficient judgment in tightening them, and often break the clamps. Taking everything into consideration, I do not consider this frog preferable to the old plate frog.

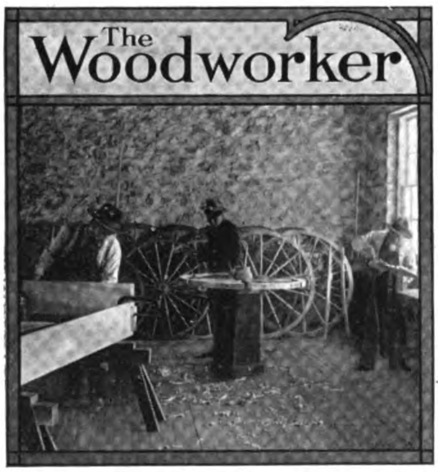
A Handy Chain Kink.

G. GRAVES.
New Zealand.

Here is a little thing that might be of use to the boys. I worked in a chain-fitting shop for some time, and when we put in a connecting link, the connecting link to be the same as the other links in the chain, we measured our stock as follows: We took a piece of iron slightly larger in diameter than the links in the chain and measured twice the length of one of the chain links on the outside and once the width of the link inside. We then bent the stock as cut, without upsetting, but scarfing with the ball of the hammer and then close. Now reheat the stock and open until the end links of the chains can be put in, one on each side of the tongs as at X, and then weld the new link. This rule will always work just right when making connecting links for broken chains. No doubt many smiths find it difficult to put in a connecting link so that it will be the same size as the links in the old chain.

Advertising the Smithy.

Everyone who has seen our 1908 art calendar cannot praise it too highly. And it certainly is one of the best calendars of the season. If you haven't yet sent in your order for a small lot, better write today. Our supply is limited. Somebody will be disappointed.



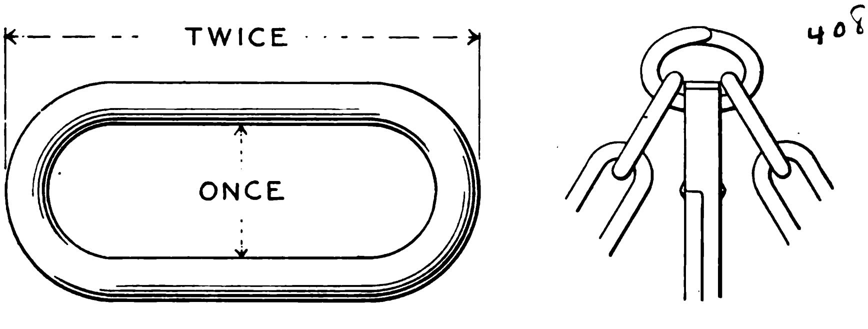
Tanging by hand.—I wonder how many woodworkers are still cutting tenons with the draw knife? If you are still at this, sometimes getting the tenon the right size, but more often cutting them too small, stop it and get a hollow auger. Make your tenons any size you want them and of the correct size every time you want them. It saves time, brothers, and time is money these days. H. B. T., New York.

For fixing wood in the lathe the wood turner will find the following simple formula of use: Melt together 4 parts of resin and 1 part of pitch and then add enough brick dust to make the melted mass hard when dropped on a stone. This will hold wood in the chuck while a tap with the hammer will remove it. Benzine or gasoline will remove all trace of the cement from the wood. A. L. Trescott, Ohio.

A Talk on Wheel Work.

W. C. P.

How tight should a tire be to comply with the wheelwright's demand? So tight that the spokes bend at the hub, that the tenons of spoke are crushed and strained? My experience has taught me of a vast difference in wood hubs and Warner flanges. The flange being metal and the spoke of wood, setting the tire very tight



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AN EASY FORMULA FOR FINDING THE AMOUNT OF STOCK FOR CHAIN LINKS

causes the flange to compress the spoke at the face and draw away at the back of the flange, and as a result the tire gets loose on wheel. At this point we do not need any argument about the condition of the wheel, as the wheel is the argument itself. But what about drawing this wheel into a soup-dish shape in resetting the tire? Is the blacksmith now before or behind the wheelwright? or did the blacksmith ruin the wheel setting the tire first time? I understand that the wheelwright does not say a half-inch dish when he says keep tire tight. My experience has taught me that the tenons of spokes must help the rim to bear the strain and that they must rest against the tire just tight enough to draw the wheel one-fourth of an inch.

In evidence of this fact in my experience I call attention to the Sarven wheel, the strongest wheel at the hub on the market today, and it will stand more abuse at hub than any other built. I frequently see Sarven wheels the spokes of which have been placed without cutting the rivets; I have also seen others in which the rivets have been so stretched as to be harmful and injurious to the wheel and hub; but worst of all is a spoke for a No. 8 or 8½ flange driven into a No. 7 flange. Now, boys, let us get inside of this wheel puzzle, get our heads together, and say what we know about the natural law or basis of the construction of the wheel.

Again, if the dish is the greatest factor in the wheel for strength, why do over-dished wheels always fail first in hub and rim? Again one wheel is ¾-inch dish, another ½-inch, a third ¼-inch, and the fourth one is straight, or, rather, back of dish a little. This wheel I get from Cleveland, Ohio, ready tired.

Now, Mr. Cleveland Man, please tell us the advantage of irregularly dished wheels. I stand for a uniform dish, and am able to prove that the irregular code is uncalled for and is a nuisance and objectionable. Now, if this irregular dishing has any good points overlooked by my shortsightedness, will some of the boys please be so kind as to look them up for me?

A Simple Tire Bolt Wrench.

B. F. TALLEY.

The accompanying engraving shows a very simply made tire bolt wrench. Any practical smith can make one very easily and will find it of much practical worth and a time and trouble saver.

Take a piece of ⅜-inch iron, upset one end of it and drive a square punch in it the size of a 5/16-inch nut. This simple device will save you buying a tire-bolting machine. The ⅜-inch stock should be about four feet long and welded onto an old brace that is past

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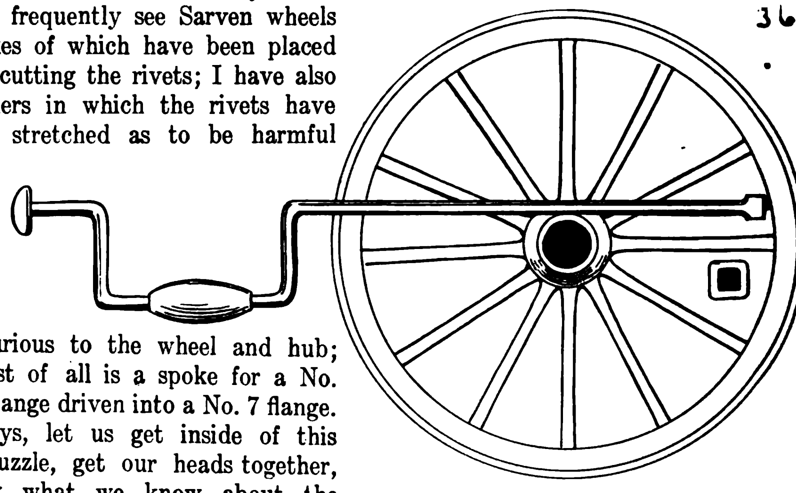


A SIMPLE TIRE BOLT WRENCH

its useful age as an ordinary brace. When applying your nut wrench run the iron across the wheel and let the stem rest against the hub when tightening a nut.

Queries Answers Notes

The following columns are intended for the convenience of all readers for discussions upon blacksmithing, horseshoeing, carriage building and allied topics. Questions, answers and comments are solicited and are always acceptable. Names omitted and addresses supplied upon request.

A Cut Foot.—I would like to have some craftsman tell me how to shoe a foot that has been cut by wire. The horse is lame on that foot. He has the right quarter of his left fore foot cut badly. Will some shoer explain? B. H. SUGG, Arkansas.

A Wheel Question.—I would like to ask some brother smith through the paper how to tighten the spokes in a staggered spoke wheel. Also if they can give me a recipe for retinning dishpans. Can someone help me? F. W. RICHEY, Illinois.

Wants to Build an Auto.—I wish to build an auto-buggy this winter. Will someone who has built one tell where I can get a motor engine for the auto? About a four-horsepower will do to put in a common buggy. A horseless carriage is what I want. F. C. STRACKE, Nebraska.

She Enjoys "Our Journal."—Mr. Staley is away and has been for about three months. I think I enjoy reading "Our Journal" fully as much as Mr. Staley does, if not more, having been interested in the business with him for the past 30 years. I feel sometimes that if it was really necessary, I could shoe a horse as well as he. Enclosed please find $1.00 to renew our subscription. MRS. C. F. STALEY, Michigan.

Our Journal in Canada.—Have been a subscriber to your valuable paper for less than one year, but already I look for it every month as a friend. I think I have learned more about horseshoeing since taking it than I did while serving my time. More than once I've had a very lame horse to shoe, and by following directions closely, have made a complete success. Long live THE AMERICAN BLACKSMITH. A friend in need is a friend indeed. GEO. LEASKE.

Each Copy Worth a Dollar.—I would not miss one copy of THE AMERICAN BLACKSMITH for the price of a year's subscription. That is how much I think of "Our Journal." I noticed in my September issue that some wanted to cut out one thing and some another. My best word is, shove all in that will do the craft any good, for we can't learn any too much about our trade and by reading these different articles is the only way we can learn. C. W. METCALF, Iowa.

Some Iowa Prices.—I will give you a few of my prices:

Pointing and sharpening plow	$ .90
Sharpening only	.45
One wagon tongue	2.50
One wagon axle	3.50
One wagon evener	.65
Setting four wagon tires	2.00
Setting four buggy tires, bolts extra	2.00
One new wagon reach	.80
One new wagon spoke	.25
One new piece felloe	.25

My other work is in proportion to the prices above. MAT LILLEG, Iowa.

A Busy Shop in Kansas.—We are busy here—three men and myself have all we can do, and there is more work coming. I treat my customers right, do good work, and charge accordingly. I have power and wouldn't do without it. I shall install a saw and jointer later. We do rubber tiring, rimming, etc. I put in a lawn mower sharpener in July, and it has more than paid for itself this fall. I like THE AMERICAN BLACKSMITH all O. K. and couldn't do without it. L. A. PIGUET, Kansas.

A Few Prices from Ohio.—

Four old shoes	$ .80
Four new shoes	1.60
Bar shoes, each	.75
Hand-turned shoes, each	.50
Four new shoes on stallion	2.00
Four shoes reset on stallion	1.50
Oxen shoes, each foot	.75
Sharpening plowshare	.30
To put nose on share	.50
Feather on share	.75
To set four buggy tires	1.75
To set one buggy tire	.50
2-inch light tires, no bolts, per set	1.00
3-inch tires, per set	2.00
3½-inch tires, per set	2.50
4-inch tires, per set	3.00
Neverslip shoes:	
Set four shoes, Nos. 1, 2, 3	2.00
Set four shoes, Nos. 4, 5	2.50
Set four shoes, Nos. 6 and 7	3.00
Reset four Neverslip shoes	.80
Reset calk four Neverslip shoes	.80

I don't do woodwork, and I don't ever want to be without THE AMERICAN BLACKSMITH. CHESTER GARY, Ohio.

Some Prices from Texas.—I have been reading THE AMERICAN BLACKSMITH for five years and think it a grand journal. I would not be without it now for a great deal. I have never seen an item from my section of the country, and perhaps some of our prices will be interesting:

Four new shoes	$ 1.00
Four old shoes	.70
Setting tires, each	.50
New tires	12.50
Wagon tongue	3.25
Wagon axle	3.25
Front and hind bolsters	2.25
Round hound	3.00
Tongue hound	2.50
Pointing 8-inch point	.50
Sharpening 8-inch point	.15

And other prices in proportion. My shop is 20 by 50 feet. The shop furniture consists of three forges, a House cold tire setter, a Little Giant cold shear and punch, a drill, a tire bender, and lots of small tools. A. A. TURNER, Texas.

The Benefits of Organizing.—We see there is a lot said in "Our Journal" about getting together and organizing. We organized here, starting with five members, and in ten months it has grown to a hundred. The traveling men have gone into it, and the heads of some of the hardware houses. I wish to say that one of the best day's work you can ever do, will be to lock the doors of your shop and go over to your brother smith and get acquainted with him, and not try to cut his throat when you meet him. In our town out here in Kansas there are four shops, and if one of the smiths is out of a job and his brother smith has a lot of work, he goes over and helps him out. It means also that we get better prices. When a customer comes to one of us and says that one of the others is shoeing for so and so we know better, for we have a perfect understanding and full confidence in each other. I advise my brother smiths to try this and see if it won't have the desired effect. S. J. PEMBERTON, Kansas.

A Power Shop of Illinois.—I have been a subscriber for almost four years and do not know what I would do without "Our Paper." I have a small shop and am crowded, but still get along. My shop consists of the following tools and machinery: A two-horsepower International Harvester Company Engine, a 16-inch rip saw, a double emery stand, a power drill, a screw cutting lathe, a large grindstone, and a scroll saw. In my spare time I am building a trip hammer. I also have a six-horsepower boiler in my shop, which I use to steam boards and am going to heat the shop with it this winter, as it takes but little fuel. I start my fire with cold water in the boiler and in 20 minutes I have 80 pounds of steam. This sounds rather "large" but it is so. I am going to put in a band saw in the spring, and a power blower. It only costs me 35 cents to run my engine ten hours and I would not crank a drill for that small sum, as you know how hard it is to drill ¾-inch holes for about five hours at a time. E. B. NEWELL, Illinois.

A Smith 55 Years—Cleaning Channels.—I have just passed my 55th birthday in the business. I started at my trade on my 15th birthday (1862) and I am still working and enjoy it very much. I tried from the beginning to do my best and am still learning. We have a large shop and machinery with good power, and that is what every shop wants, with good, sober help. Too much stress cannot be laid on the latter. Just a few words more to the craft in regard to cleaning the channels out for receiving new rubber tires. There is machinery made to do the work, but for those who don't feel like putting it in and don't have the money to give, I would say, put the wheel over the slack tub and turn it around a few times and see how quickly the dirt and soot will get loose. After you have done this, take a hammer and jar the wheel on the floor. I have a mortise which I use sometimes for letting the old-fashioned skeins in and I use this to finish with. It does the work nicely. I am going to put in a lathe to do auto work, and will let you know later how we make out. WILLIAM ANGLE, Pennsylvania.

Brazing Cast Iron.—I see Mr. James D. Ennis has asked for more information on brazing cast iron. We have found that the clamp that will do for one piece will not do for another, but a dozen clamps will do almost all the work that there is to do in a shop. I find that the U-shaped clamp is the most useful. Sometimes a straight piece of iron will do with a piece of wire twisted tight to take up slack, but above all things have a clamp that will hold when it gets hot. Some clamps will hold while the piece is cold, but when the casting gets hot, it will let the casting loose and let smoke or soot get into the break and your job is spoiled. Then you have to go over your work again, clean it, and clamp it anew. I braze a piece of steel or wrought iron to a piece of cast and guarantee it to break some other place before it will break where I repaired it. All you have to do is to dress the ends to fit close together where the joint is to be made. Put on your Weldarine compound, clamp up, and you can make a fine job. I would like to ask neighbor Ennis if he is using Weldarine to braze with; if so, follow to the letter instructions accompanying the set, and he will be all right. We had some trouble, but did not give it up, and now we are master. When we had any trouble, we studied the thing out, tried it over, and almost every time made a good job the second time. If in need of any more information, let us hear from you, telling your trouble.. S. J. Pemberton, Kansas.

A CORNER OF BROTHER SCHWARZ'S MINNESOTA SHOP

A Minnesota Shop.—The accompanying engraving shows a corner of our shop, which is 22 by 80 feet in size. We have just finished building this shop, and, of course, have been very busy in trying to attend to business too. We do a general smithing business and deal in farm machinery and implements. F. J. Schwarz, Minnesota.

An Open Letter to Horseshoers.—I want to say to those shoers who are not thoroughly acquainted with the anatomy of the horse's foot to take steps immediately to learn all they can about the foot. Get a book that treats on the anatomy of the horse's foot. You want to know every bone, nerve, and every artery and every ligament of the foot. By study only will you understand the anatomy of the horse's foot. Don't, like two thirds of our horseshoers today, know but very little about it. It is something every smith should understand before he is allowed to practice on his own account. And I want to say right here, if horseshoers were required to pass examination you would see far better prices for shoeing; for, as you know, it is the unskilled botch of a horseshoer that always cuts prices. There should be a law to stop him, for he is hurting the man who has spent all his life in the study and practice of his craft, a trade he holds dear. If he is a good one he hates to see some botch, who never learned a trade at all, cut prices. When we see a man trying to ruin prices which already are too small, why not have some way to stop or make him work under instructions until he becomes a skilled workman, then he won't want to cut prices. See the rest of the boys in the county and call a meeting of every smith in the county and talk this matter over. Appoint a committee of five to wait on the man who is running for assembly and tell him just what you want. He wants our vote to get his position and we want his vote, when he is there, in favor of an examination law to protect the poor horse from the unskilled smith. After your committee has waited on this man and he fully understands what you want, call another meeting and get every smith in your county to sign his name to a petition. Send the petition to your legislature and push the matter for all it is worth.

Now, brothers, the plans are all laid out for you, and I don't think there is a smith in any county in the United States but what will help the movement along if you only start it. We are sorely in need of some reform. For a trade that should stand at the head of all others we are indeed badly abused and downtrodden. So let us join hands all over the United States and in a short time the blacksmith will stand at the head of all trades, where he belongs. A Craft Worker, N. Y.

A Progressive Western Shop.—I will give you some idea of what I am doing down here in the Indian Territory. I have a floor space 27 by 60 to work on, and have put in a 12-horsepower I. H. C. gasoline engine for power, and it is a dandy. I have a drill, rip saw, emery wheel for general purposes, an emery to gum saws, and intend to put in a trip hammer next January. I also have a four-fire bellows, plenty of small shop tools, and a man saver. I mean a Hemphill shoeing rack. I have had 1800 pound horses in it and 600 pound horses in it, and it holds them all alike. I handle implements, and think every blacksmith ought to, for they know what will stand the test. I carry a small side line of shelf hardware, and can sell to my patrons at a saving price. My bolt rack will hold 5,000 bolts. I keep it well stocked so that I can furnish my patrons a bolt of any kind in a very short time. I buy my whole stock at wholesale prices; generally get 500 pounds of horseshoes, 50 pounds of toe calks, and 50 pounds of nails at a time. I do all kinds of work. I will give you some of my prices:

Shoeing, plain, new shoes		$1.00
Toed shoes		1.25
Old shoes reset (4 shoes)		.60
Wagon tongue		3.00
Tongue hounds, wood		2.00
Ironed		2.50
Hind hounds, each		1.00
Axles, each		3.00
Sand bolster		1.50
Hind bolster		3.00
New standard and bolster		3.00
Front bolster		3.00
Wagon box complete		18.00
Wagon reach	$ .75 to	1.00
Doubletrees		.75
Singletrees		.60
Neck yokes		.75
New tires, ⅝-inch, four wheels		10.00
Old tires reset, four wheels		2.00
Wheel spokes, each		.15
Felloes		.20
Buggy work, new axles, one-inch		8.00
Old axle set		1.00
Reaches	1.00 to	2.00
Tires set, four tires		3.00
Buggy poles		3.00
Single shaft		1.50
Two shafts		2.75
Crossbars		1.00
Singletrees		.50
Doubletrees		.75
Neck yokes		.50
Making plowshares, 12-inch		2.50
Making plowshares, 14-inch		3.00
Making plowshares, 16-inch		3.50
Pointing shares, each	.50 to	1.00
Sharpening shares	.50 to	3.00
Shovels sharpened, each		.10
Trimmed and Sharpened, each		.12½
Pointing shovels, each	.35 to	.50

All other work is in proportion to this. I think I shall raise the price on shoeing, wagon work, and plow work, if I go broke at it. I would like to know how many smiths there are in the Indian Territory who take The American Blacksmith. I would do my best to see all those that don't and persuade them to subscribe for it, as by that means we could establish a good living price. Let us hear from other Territory smiths. R. L., Indian Territory.

Missouri Prices.—What do you think about the price list question? We say print them right out in big bold type, so that "He who runs may read." We cannot expect to derive any benefit by keeping them secret, and great good is sure to reward our efforts if we keep them continually before the craft. How do you suppose the fellow takes it who is working away at the "old prices" when he reads the lists sent in by some of the boys. I expect it makes him feel that he wasn't getting all that was coming to him. Let's keep right at them and they are sure to come our way after awhile. In this section of the country (western Missouri) prices are advancing right along. The advanced prices of material have compelled us to raise on all wagon and buggy work, and the greater number have also raised on shoeing and other work. Not a few have quit the trade and gone to work at something else. One brother I might mention in particular. When the raise came in material, he tried to raise his prices, but some of his customers raised such a howl that he gave up in despair, locked up his shop, moved to Kansas City, and went to work on the street cars. They have been trying for two years to get a smith to take his place, but so far have been unable to do so. It is certain that when they do they will have to pay top price, for the day of the "cheap John" is fast drawing to a close. The following is a list of some of our prices, and we are expecting another raise of ten to fifteen per cent the first of the year.

4 new shoes, plain or toed	$1.50
4 shoes reset	.80
4 shoes reset and toed	1.00
Bar shoes, per pair	1.00
Rubber shoes and tips, per pair	1.85
Toe or side weights, machine-made shoes, per pair	1.00
Handmade shoes, each	1.00
Setting wagon tire, per set	2.00
New wagon tongue	2.50
New wagon axle, front	3.00
New wagon axle, hind	2.50
Coupling pole	1.00
Bolster, front or hind	1.50
Tongue hounds, each	.50
Tongue hound irons, each	.25
Hind hound, each	.75
Circle hounds	2.50
Three-piece hounds	3.00
Felloes, each	.25
Spokes, each	.20
Refilling set of four wheels, resetting tire	14.00
Cutting down set of four wheels, resetting tire	8.00
New rim on front wheel, tire set	2.00
New rim on hind wheel, tire set	2.50
Setting buggy tire	2.50
New buggy tongue	2.50
Buggy tongue circle	1.00
Welding tongue brace	.25
One new shaft	1.25
Crossbar for shafts	.75
Singletrees, each	.50
Doubletrees, each	.75
Welding shaft brace	.35
New end on shaft brace	.35
New bow socket	.50
Middle bow socket	.75
Repainting buggy	5.00 up
Resetting axle, one end	.50
Resetting axle, both ends	.75
New stubs, ⅞-inch	5.50
New stubs, 1-inch	6.00
New stubs, 1⅛-inch	6.50
New stubs, 1¼-inch	7.00
Welding spring	.50
Pointing plow	.75
Sharpening plow	.25
Sharpening and polishing plow	1.00
Sharpening and polishing lister	1.50
New 12-inch share	3.00
New 14-inch share	3.25
New 16-inch share	3.50
Pointing four cultivator shovels	2.00
Sharpening four cultivator shovels	.50
Polishing four cultivator shovels	.25
Sharpening rock drill, ⅞-inch bit, each end	.15
Sharpening rock drill, 1½-inch bit, each end	.20
Plugs, each	.12½
Sharpening disk harrows, per disk	.25
Sharpening rolling coulter	.50
Grinding ax	.25
Grinding sickle	.25
Welding sickle	.50
Welding new end on sickle	.75
Putting on sections, each	.05½
Putting on new guard plates	.06
New wooden pitman, old irons	.50
Welding iron pitman	.25

On all small repair work we "rub it in" pretty stiff, for everything we buy is high, and if we want to have anything left after paying expenses we have got to charge for what we do and keep things moving. To the boys I will say, send in your prices and let's see who is getting the best of it. If I find that others are doing a little better, I shall have to "tighten up" a little and keep the pace. P. V. BURGESS, Missouri.

Rules of the Nelson Farriers' Industrial Union of Employers (New Zealand).

1. NAME.

The name shall be the Nelson Farriers' Industrial Union of Employers.

2. INTERPRETATION.

"Union" means the Nelson Farriers' Union. "Committee" means the committee of management of the said Union. "Representative" means representative for the time being, appointed by the said Union for any special duty in connection with these rules. "Year" means a calendar year.

3. MEMBERSHIP.

The Union shall comprise all Master Horseshoers in the Nelson district. Any person starting business as a Farrier in the district, the Standing Committee to wait on him re joining the Union. New members must be proposed and seconded by two members of the Union.

4. OBJECTS.

The objects of the Union are:—

(1) To secure to the Union all the advantages of unanimity of action.

(2) To protect the interests of the Master Horseshoers in their dealings with their workmen or with labor organisations.

(3) To arrange for mediation or arbitration in trade disputes, by means of Boards of Conciliation, and other matters that may appear feasible.

(4) To take such means of defence as shall be considered most expedient against unjust or arbitrary demands of the workmen or of labor organisations.

(5) To take such steps as may from time to time be deemed expedient or necessary to protect the interests of the Union.

(6) To watch the interests of the trade with the object of promoting and encouraging the horse-shoeing trade generally.

5. ORGANIZATION

The Union shall recognize the obligation of supporting in every way any member who may in the judgment of the Union through lock-out, strike, or labor dispute, be placed in circumstances making such assistance necessary.

6. DISPUTES.

Disputes arising from any cause whatever between any member of the Union and his workmen or any labor organisation shall be dealt with by the Committee of the Union, but should the Committee be of the opinion that the dispute cannot be settled by it in accordance with these rules, or by by-laws, regulations, or orders that may be made hereunder, such Committee shall before taking any action submit the particulars of the dispute to a general meeting of the Union.

7. REGISTERED OFFICES.

The office of the Union shall be at the place of business of R. Watson, Trafalgar-street, Nelson, or at such other place as the Union shall from time to time appoint. The Secretary shall give the Registrar of Industrial Unions due notice of every change in the situation of the office.

8. MEETINGS.

The meetings of the Union shall be convened by the Secretary by notice given to members, or by advertisement published in a Nelson newspaper at least three (3) clear days before the meeting. In the case of a special meeting, such notice shall specify the nature of the business to be transacted. At all meetings of the Union the quorum shall be one-third of the total membership. All questions at any meeting shall be decided by a majority of the members present and voting thereon.

Except where otherwise provided by these rules, voting shall be open, unless any two members demand a ballot. A special meeting of the Union shall be held whenever the Committee thinks fit, or any six members of the Union, by notice in writing to the Secretary, so request. Such notice shall specify the nature of the business to be transacted. The annual general meeting shall be held in the first week in May, the day and hour of meeting to be fixed by the Committee.

At all meetings of the Union the President shall preside, and shall have a deliberative vote, and, in the event of equality of voting, a casting vote.

In the absence of the President, the Vice-president shall act as President, and while so acting shall have all the powers of the President; and in the absence of both, the meeting may vote any qualified member of the Union into the chair, and such member shall have all the powers of the President.

9. COMMITTEE OF MANAGEMENT.

The Union shall elect from its own members a Committee consisting of the President, Vice-president, and four other members, with power to add to the number, all of whom shall retire at the yearly meeting, and shall be eligible for re-election. Four shall form a quorum. Subject to the control of the Union in general or special meetings, the Committee shall have the management and superintendence of the affairs of the Union. The Committee shall take every means to secure the observance of these rules, by-laws, regulations, and orders of the Union, to further the objects of the Union, and protect the funds for whose rightful administration in accordance with these rules they shall be responsible. The Secretary shall be a member of all Committees ex officio.

10. REMOVAL OF OFFICERS.

Any member of the Committee or any officer of the Union may be removed from office by vote of the majority present at any meeting of the Union expressly called for the purpose of considering such removal. Such vote shall be taken by ballot, and 14 days' notice in writing of the intention to move the removal of the member shall be given by the Secretary to all members of the Union.

11. SECRETARY.

The Secretary shall be elected at the general meeting in May. He shall obey all orders and be under the control of the Committee. He shall receive such salary as the Union may from time to time determine. The Secretary shall keep the books (under the supervision of the Committee) and accounts of the Union, and a register of the full names and addresses of the members. He shall also act as Treasurer, and shall receive and collect all subscriptions and other moneys, and pay same into the bank to the credit of the Trustees as hereinafter provided. The Secretary may be suspended by the President of the Union, and subsequently removed by a majority of the members present at a meeting specially called to consider such removal. In the event of a vacancy in the office of the Secretary, any other person may be appointed by the Committee as Secretary pro tem., but all appointments before becoming permanent shall be confirmed at a meeting of the Union. He shall prepare the list of officers and members in January of each year and forward same to the Registrar of Industrial Unions.

12. MEMBERSHIP.

Upon the admission of any person as a member of the Union he shall sign a declaration agreeing to be bound by the rules, by-laws, regulations, and orders of the Union.

13. SUBSCRIPTIONS.

Each member of the Union shall pay an annual subscription of 10s. [$2.45] and an entrace fee of 2s. 6d. [$.60]. All funds, the property of the Union, shall be lodged to the credit of the Trustees in the General Post-office Savings Bank, or any other bank the Committee may from time to time direct, and all sums authorised by the Committee to be paid shall be drawn on the said account by the Trustee and countersigned by the Secretary or one member of the Committee.

14. TRUSTEES.

Two Trustees shall be elected annually, who shall have control of the property of the Union, and who shall invest the funds not required for immediate use in such manner as the Union may direct.

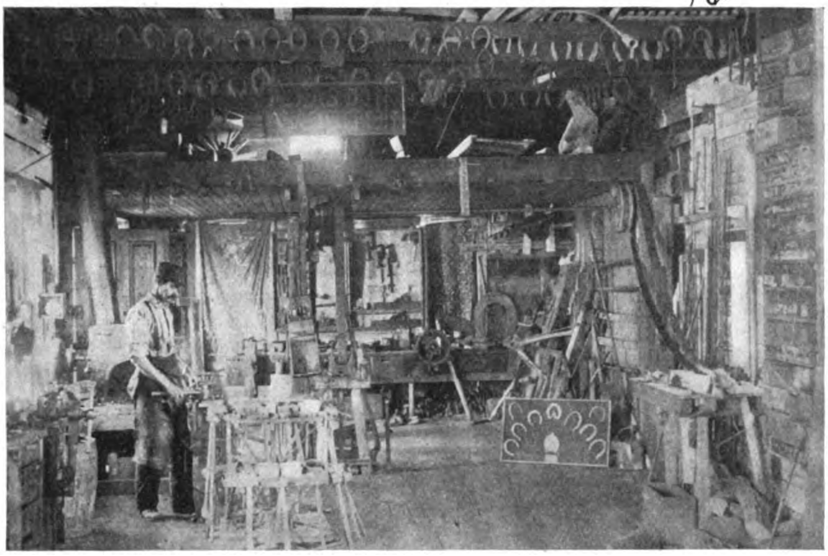
15. CUSTODY OF SEAL.

The seal of the Union shall be in the Custody of the Secretary, but shall not be affixed to any instrument except pursuant to a resolution of the Committee or the Union. It shall be affixed to all official communications to the Registrar. The affixture of the seal shall be attested under the hands of the President and Secretary, and one other member of the Committee. The seal may from time to time be altered or renewed as the Committee thinks fit.

16. REPRESENTATION BEFORE A BOARD OF CONCILIATION OR COURT OF ARBITRATION.

For the purposes of the "Industrial Conciliation and Arbitration Act, 1905," the Union may be represented before the Board or the Court by such person as is appointed in that behalf by the Committee, and the vote of the Union shall be given under the seal of the Union.

16.



ANOTHER PICTURE OF HENRY NOTESTINE'S OHIO SHOP

17. INDUSTRIAL AGREEMENTS.

No industrial agreement shall be made except under the seal of the Union, and pursuant to a resolution of the Union at a general or special meeting.

18. CASUAL VACANCIES.

In the event of any casual vacancy on the Committee or in any office occurring by reason of death, resignation, or otherwise, then, except where otherwise provided for by these rules, such vacancy may be filled by the appointment of a member of the Committee, but the member so appointed shall hold office until the next general meeting.

19. NON-PAYMENT OF SUBSCRIPTIONS.

Any member failing to pay his subscription within one month after written notice of the subscription being due has been given by the Secretary, shall be disqualified from taking part or voting at any meeting of the Union. Subscriptions in arrears and all other moneys owing to the Union may be sued for and recovered in the name of the Union by the Secreatry or any other officer appointed in that behalf by the Committee.

20. PURGING THE ROLL.

The roll shall be purged by striking off the name of any member who is in arrears of dues for 12 months, but this shall not free such discharged person from arrears due.

21. RETIRING FROM MEMBERSHIP.

No member shall discontinue his membership without giving to the Secretary at least three months' previous notice in writing of his intention so to do, nor until he has paid all fees and other dues, whereupon such member shall cease to be a member of the Union.

22. FINANCIAL YEAR.

The financial year shall terminate upon a day in the first week in May, in each year, to be fixed by the Committee.

23. BY-LAWS.

The Union may from time to time make by-laws, regulations, and orders not repugnant to these rules or the "Industrial Conciliation and Arbitration Act, 1905," and its amendments, for the regulation of the affairs of the Union or members. At any meeting of the Union any by-laws, regulations, or orders may be repealed, rescinded, varied, or altered.

24. ALTERATION OF RULES.

Any new rule, or alterations of, or additions to a rule, shall be made by a vote of a majority of members present at a special meeting called for that purpose, provided, however, one calendar month's notice in writing of the intention to repeal, rescind, vary, or alter any existing rule, or to make new rules, shall be first given to the Secretary, who shall at once advise the members of the proposed alterations or additions. Any amendments, alterations, or additions to the rules shall be submitted to the Registrar of Industrial Unions for his approval.

25. AUDITOR.

The books and accounts of the Union shall be audited and reported upon half-yearly by an Auditor, to be elected by the Union. He shall be eligible for reelection. He shall sign the half-yearly statement and the balance-sheet, if correct, or report his reason for refusing. He must not be an officer of the Union, and he shall receive such fee as the members may from time to time fix.

26. INSPECTION OF BOOKS.

Any person having an interest in the funds of the Union may inspect the books and names of the members at the office of the Secretary at all reasonable times upon giving twenty-four hours' notice of his wish so to do.

27. PENALTY FOR REDUCING PRICE OF SHOEING.

Any member known to reduce the schedule price of shoeing to be under the penalty of twenty pounds (£20) [$97.34] and all members to sign a promissory note to that effect.

28. DISSOLUTION.

Should three-fourths of the members wish to dissolve the Union, testified to by their signing some instrument, signifying their consent to such dissolution, or should the number of the members of the Union fall below ten, after payments of all debts then due, they shall divide or reserve the funds in such a manner and for such purposes as they may think fit, and thereupon the Union shall be dissolved and notice thereof given to the Registrar.

THOS. M. WIMSETT, President.
R. WATSON, Secretary.

VOLUME 7 NUMBER 4

THE AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

BUFFALO
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JANUARY, 1908

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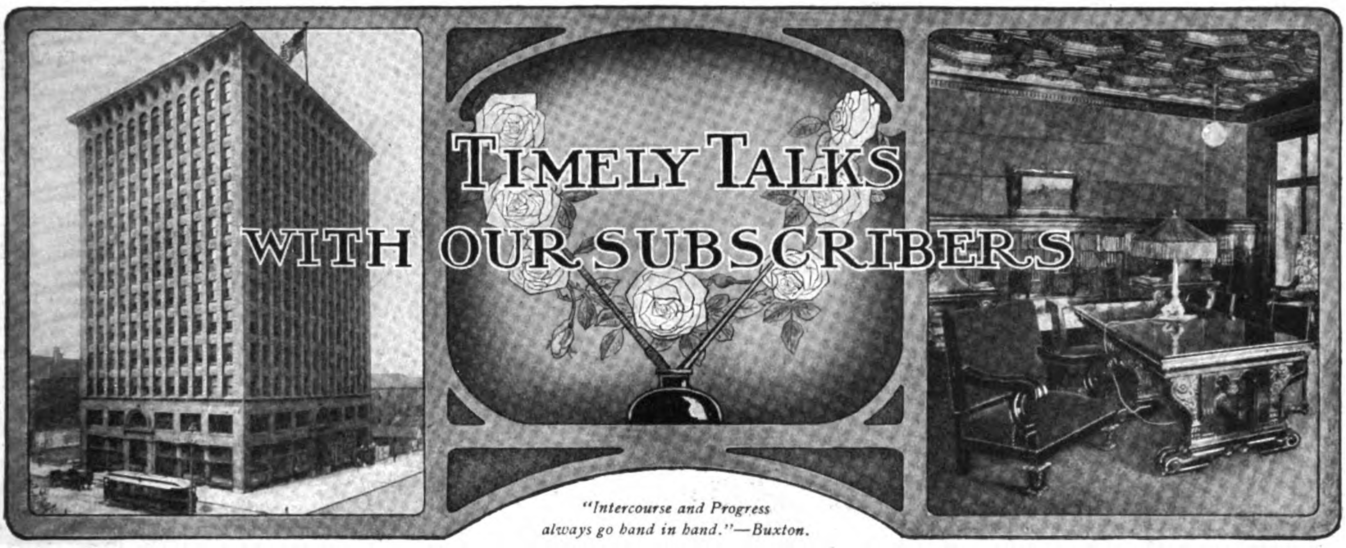

"Intercourse and Progress always go hand in hand."—Buxton.

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To the Strangers.

This issue will go to some craftsmen who have never before seen THE AMERICAN BLACKSMITH, and therefore a word about "Our Journal" is very much in order. Every number of the paper contains not less than 24 pages of solid, practical reading matter, and this is therefore a fair sample of the journal. The writers for our pages are authorities on their respective subjects. Trade puffs, stale clippings, and matter of like character are strictly prohibited in the columns of "Our Journal." And the program for the coming year promises to be better than ever. As Mr. R. D. Patterson of Arkansas says: "The paper is worth more to the craft than you have language to tell."

Are You in Need?

Do you want a new shop, a helper, a partner, a new boss, machinery, or do you wish to sell? Then the following letter will interest you: "In the September issue of THE AMERICAN BLACKSMITH I noticed A. W. Shaffer's advertisement for a blacksmith and horseshoer. I corresponded with Mr. Shaffer on the subject, and at present I am working for him. I feel that I am in debt to THE AMERICAN BLACKSMITH, and thank it many times for its assistance in getting this position for me." Our "Wanted and For Sale" columns are read and used by "Our Folks." If you want to buy, sell, trade, or exchange, you'll find a small AMERICAN BLACKSMITH want ad a profitable investment.

A New Department.

The spring of this year promises more work in the automobile line than ever before for the general smith, and to enable "Our Folks" to take care of this class of work we are going to devote a department to automobile work and repairing. The articles in this new department will be written by men who know, and we can promise interesting as well as practical papers. We already have several features under way for this new link in our chain of satisfactory service for subscribers, and if you want an automobile of your own we hope to tell you how to build one. Watch for the automobile and be able to do auto work when it comes in.

Contents, January, 1908.

A Big Stick That Protects.

A recent letter from a Tennessee smith reads: "I am out of pink stamps. Please send me a new supply, for they are a great help in my business." The little pink squares are doing their work and are real protectors that protect. Lots and lots of "Our Folks" consider them almost as necessary to their business as their hammer and anvil. Don't fail to place a pink buffalo on every letter you write to jobber, manufacturer, or brother craftsman. When your stock is low send for more. Don't wait until your entire herd has stampeded. A letter just received from a Michigan subscriber shows the actual protective value of these stamps: "Please send me a supply of 50 pink stamps. I find them a fine thing to use on my orders to jobbers, for if the order does not bear a stamp they won't fill it. This prevents farmers from getting supplies in my name." This protective feature alone, of Our Big Stick Protection Stamps, is worth something to you, Mr. Reader, so use the little pink squares freely.

Payment in Advance.

From some of the letters recently received, we are afraid that there is a slight misunderstanding on the part of a few of our readers regarding our terms of payment for subscriptions. One subscriber, for instance, wrote in recently saying, "When I order a load of coal I do not pay for it until I get it, so I don't see why you ask me to pay for my subscription in advance for the year before I receive any of the papers."

First and foremost, we want to say that this is not a question of trusting, but of bookkeeping. As far as credit is concerned, we would trust every blacksmith in the world for payment, as we do not believe the world contains a fairer, squarer class of business men than the blacksmiths are. The reason, however, we ask for payment in advance is simply a matter of bookkeeping. If we had to open accounts with 30,000 subscribers, the amount being one dollar per year, we simply could not make the price of the paper one dollar. We can afford to sell the paper for a dollar a year only because by charging in advance we thus eliminate the expense of bookkeeping and collecting, which would be an enormous item in a business like ours.

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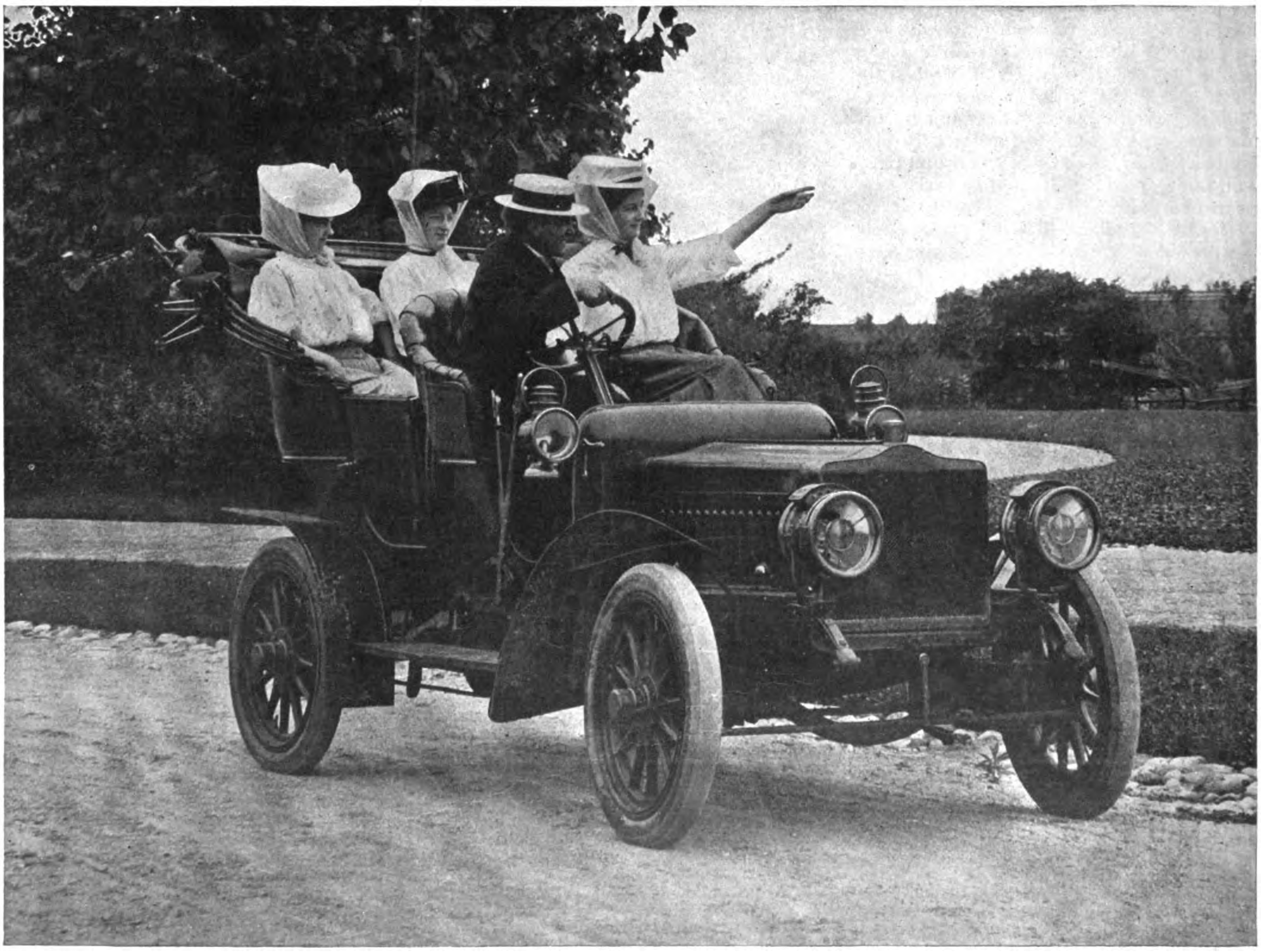

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THE OLD AND THE NEW

How to Build a Light Laundry Wagon

NELS PETERSON

A CLOSE study of the details shows that this wagon is quite a simple affair. It can be put up in any shop that is equipped for building wagons, as all the outlines are straight, with the exception of the top. There are no concave or convex panels, hence all pillars and posts are cut straight and easily joined together. At the same time, when it is painted well and finished off with a neat design of lettering, it will be found to present a very stylish appearance, which is a very essential part from an advertising point of view. By the way, these are not the only features to be taken into consideration. Being handmade and to order, it is expected to have some lasting qualities, and herein lies the only hope the custom shop has for competing with the factory-made vehicle. The custom shop must produce a job that will in competition outwear the factory job or it must go out of business.

By an examination of Figs. 1, 2, 3, and 7, a good idea of the general appearance may be had of the job when finished, while Figs. 5, 6, 8, and 9 show to better advantage the details in the construction of the various parts of the body. The body, as indicated in Figs. 5 and 6, is 7 feet 6½ inches long, measuring at the sills, and 3 feet 4½ inches wide, outside measurements. The footpiece is set at an angle of 30

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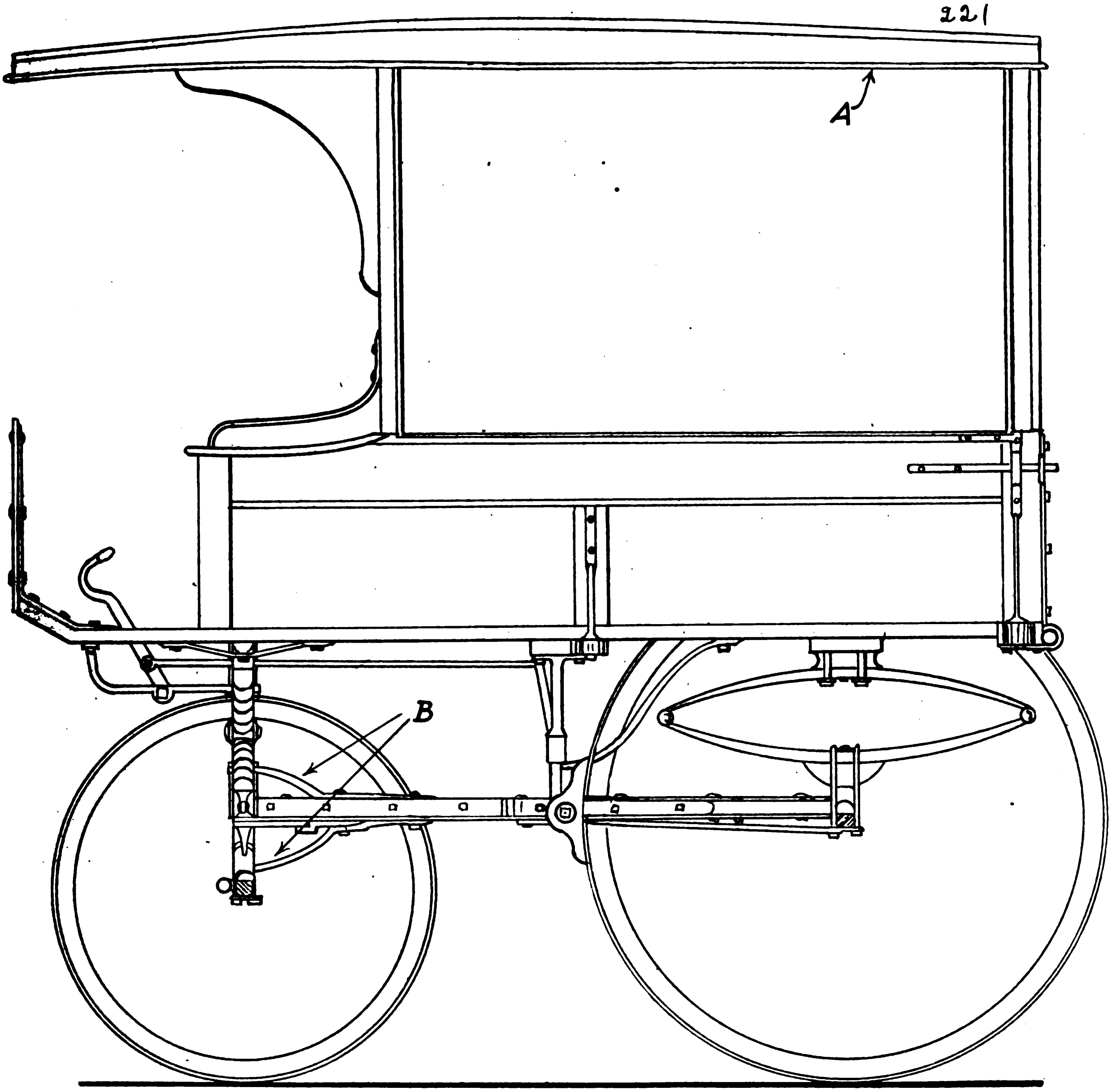

FIG. 1—A SIDE VIEW OF THE LIGHT LAUNDRY WAGON SHOWS THAT ALL OUTLINES ARE STRAIGHT

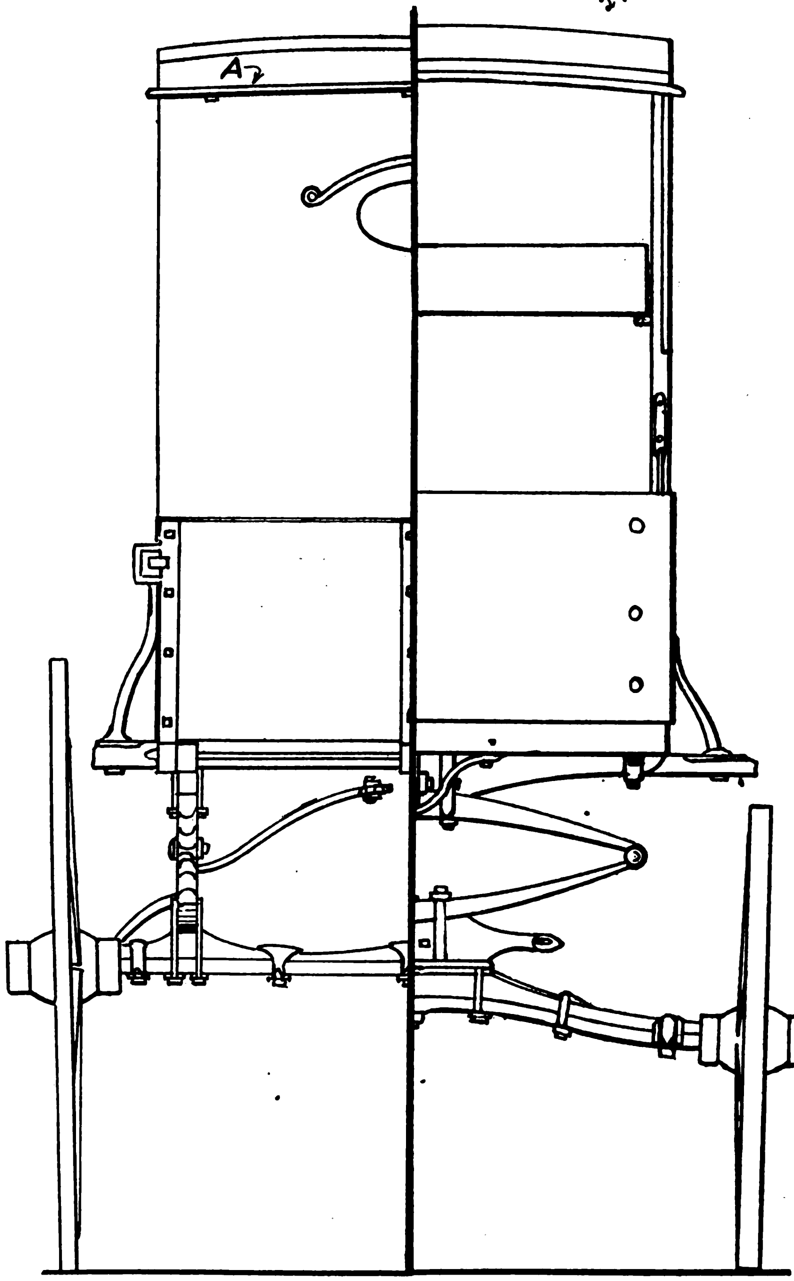

FIG. 3—SHOWING HALF BACK ELEVATION OF LAUNDRY WAGON

FIG. 2—SHOWING HALF FRONT ELEVATION OF LAUNDRY WAGON

degrees across the front of the footboard, as shown at A, Fig. 5. The sills are made of material 3½ inches by 1½ inches with a crossbar at rear end 2½ by 3 inches, as indicated by dimension figures. The pillars extending from the sills to the top are 1⅞ by 1⅜ inches for front and back, and 1⅜ by 1⅜ inches for the two in the middle, and measure four feet four inches from sills to the lower edge of top rail. Light 2 by ½-inch rails are then run lengthways on the inside, which serve to brace the top. The rail B, Fig. 5, is somewhat heavier than the others, and is grooved so that a box for carrying light bundles can be slid in and out easily. In order to provide access to this box from the rear, an end-gate is made to swing out from the top, extending down until it meets the lower end-gate as shown in Fig. 5 at C. The ribs across the top are one inch by one inch in thickness and curved up slightly in the center to prevent water from stopping on the top, the ends being notched into the top rail as shown at D, Fig. 5. Over these and running lengthways slats are fastened which complete the framework. The canvas is drawn over the edge of the top and fastened down with molding, as shown at A, Figs. 1 and 3. A heavy canvas is also stretched over the sides of the top and finished off with molding over the edges, forming large panels with plenty of space for lettering.

The running gear on this wagon is of a style which, in my opinion, is one of the most substantial for a three-spring gear that could be put up, and it is very important to have it built so that there can be no give to it of any consequence, as there is considerable strain on the gear when going down a hill with the brakes set tight, as shown in the engraving. The reach, which is 1¼ inches by 1¾ inches at the head-block, tapering to 1½ inches by 1¼ inches at the rear axle, has a perch plate 1¼ inches by ⅜ inches extending full length under the reach and forming a clip yoke under the rear axle, through which a strap is run and bent over the axle cap. It should extend far enough on top of the reach to take two bolts as shown. Two hounds and side-stays run from the reach to the rear axle and are securely fastened with slips, making it solid enough to withstand any ordinary strain to which the wagon may be put. The total length of the gear is four feet and ten inches, with a 1¼-inch axle and seven-inch spindle. The front spring is 1¾ inches, 36 inches long, seven leaves, and the rear springs 1¼ inches, 34 inches long, with four leaves. The wheels are 36 inches and 48 inches high, with a 1⅜-inch thread and a 1⅜ spoke.

A 12-inch malleable plate with ends extending out over the front axle cap far enough to take a clip is used. The front axle is braced from the kingbolt to the reach as usual, and this, being reinforced by a brace from the spring to the reach, as shown at B, Fig. 1, makes it quite solid at this point.

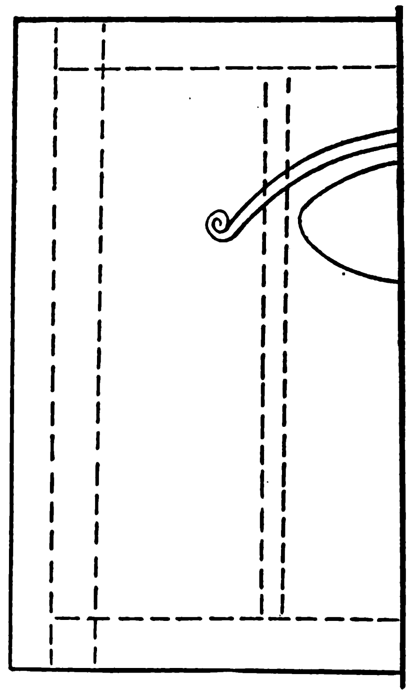

FIG. 4—SHOWING HALF OF THE UPPER END GATE

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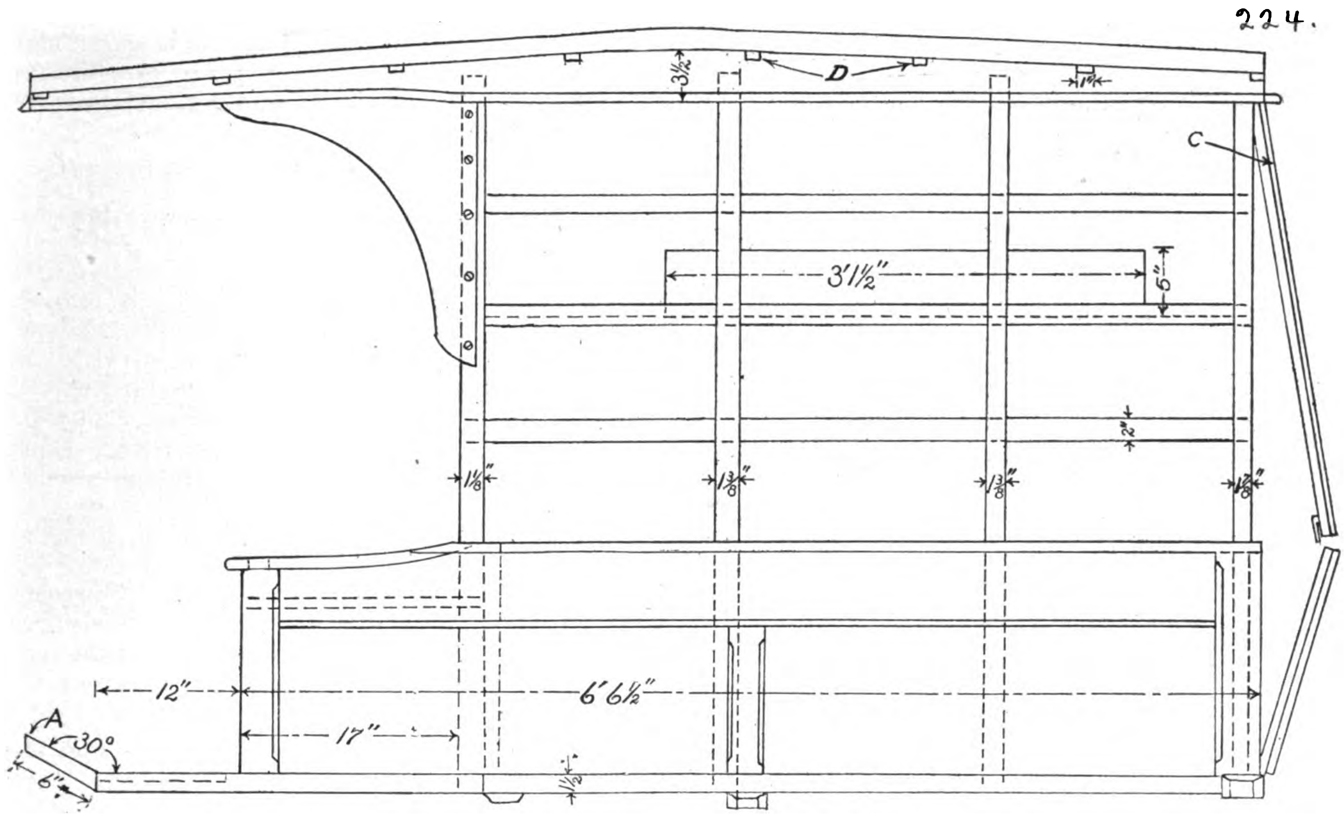

FIG. 5—SHOWING PRINCIPAL DIMENSIONS OF BODY FRAMING FOR LIGHT LAUNDRY WAGON

The painting is, of course, a matter of taste, but a wine color ground with black trimmings for the body and yellow gear with appropriate striping makes a good combination. Also a blue body and yellow gear makes a good appearance.

The Science of Building Good Wheels.

L. VAN DORIN.

If there is any one part of a wagon requiring more skill and attention than another, it is surely the wheel. In the first place, the stock must be bone-dry, otherwise it is impossible to make a good wheel. We consider rock elm the best material for hubs and for heavy wheels, second growth of white oak for spokes, and sawed short felloes of forest growth white oak.

Building a wheel properly requires very exact work; hence we prefer machine-made wheels to handmade. The spoke tenons must be properly made to fit mortise in hub, and spokes can be driven too tight as well as too loose. Too much side draft is liable to split the hub, while too much edgewise chokes and kills the grain of the wood in the spoke tenons. I am in favor of driving in glue.

In putting on the felloes I don't believe in the old theory of leaving them high at the joints and open on the outer side. They should be made a true circle and joint fit all the way through. Nor do I believe in leaving any opening in the rim to be closed up in setting the tire. It used

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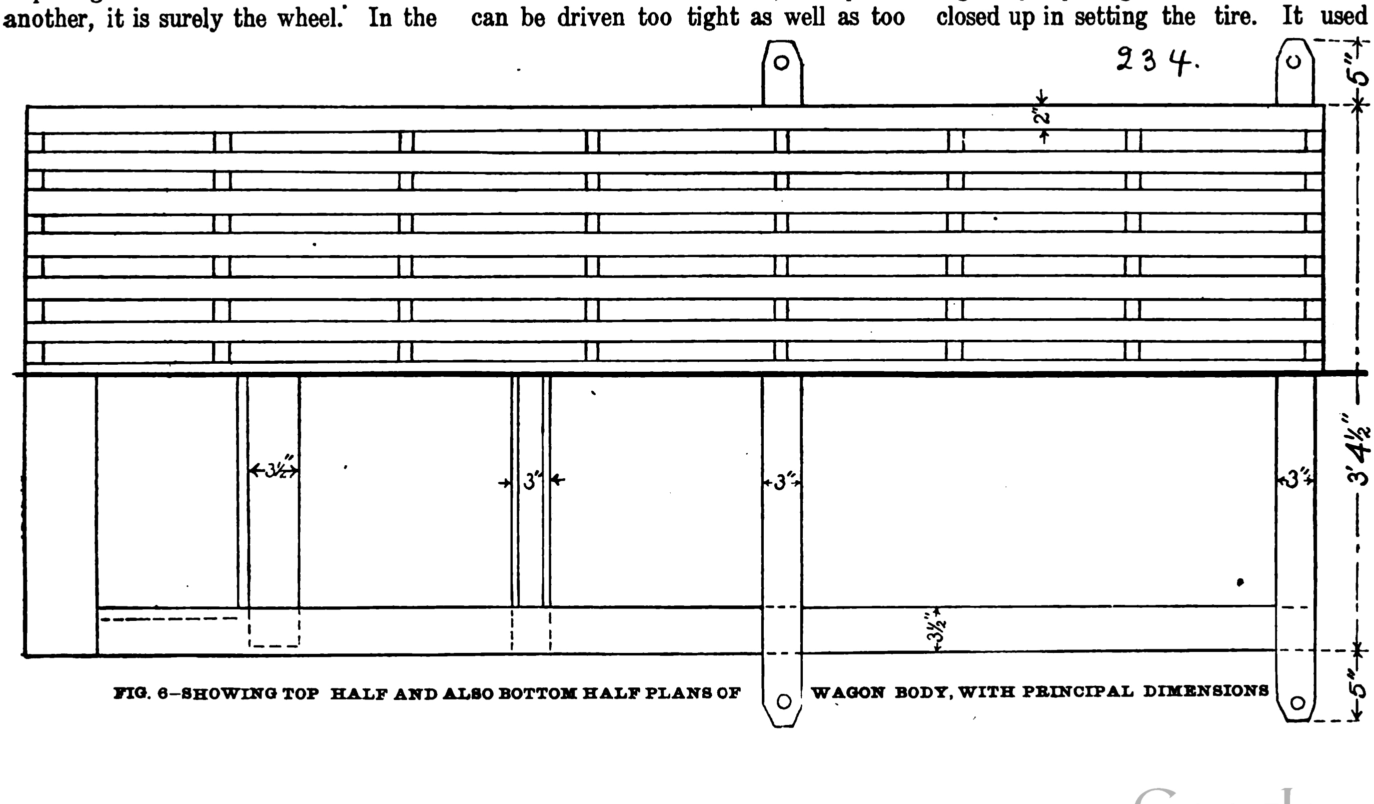

FIG. 6—SHOWING TOP HALF AND ALSO BOTTOM HALF PLANS OF WAGON BODY, WITH PRINCIPAL DIMENSIONS

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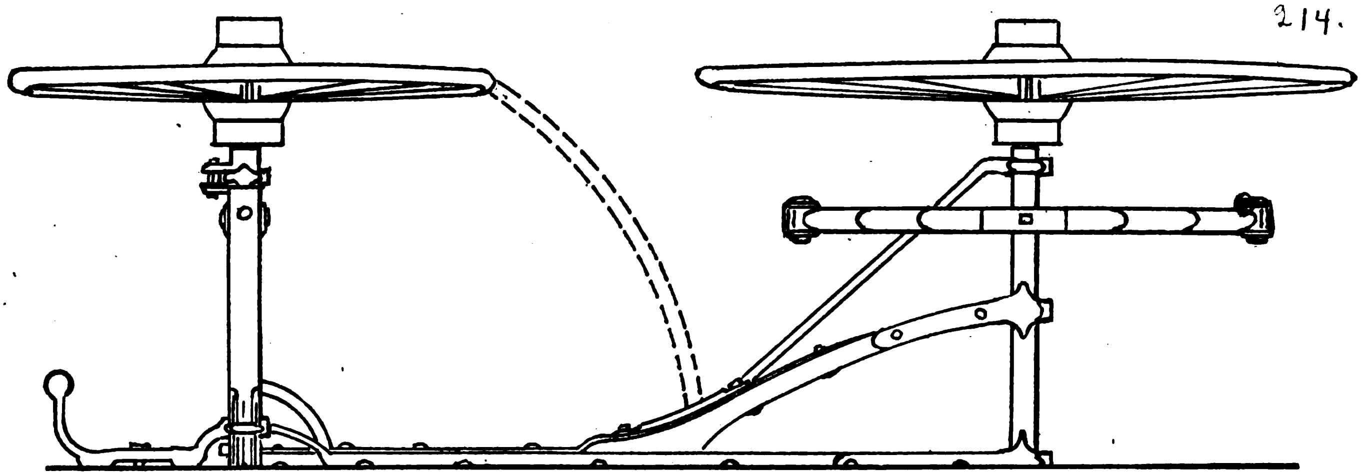


FIG. 7—SHOWING HALF-PLAN VIEW OF THE RUNNING GEAR FOR THE LAUNDRY WAGON

to be the proper thing, but it don't go now to make a good wheel.

Yes, I've been cussed for dishing too many wheels before I got wise and got to putting leather in the joints before setting the tire. Blacksmiths are frequently blamed for dishing wheels, when perhaps the tire was not as tight as it should have been had the wheel been properly constructed. The same draft in tire would not have dished it.

I don't like a wheelwright who depends too much on the smith getting his wheels in shape. I say if you want a wheel to have dish build it that way and leave the rim long enough so the tire can be put on tight without increasing the dish.

Make your wheel as you want it, and as it should be, Mr. Wheelwright. In short, make it right and live up to your name. Don't lean on the smith and expect him to correct the faults of your making. If you do your part of the job right, the smith will need to do his portion right or be responsible for a poor wheel.

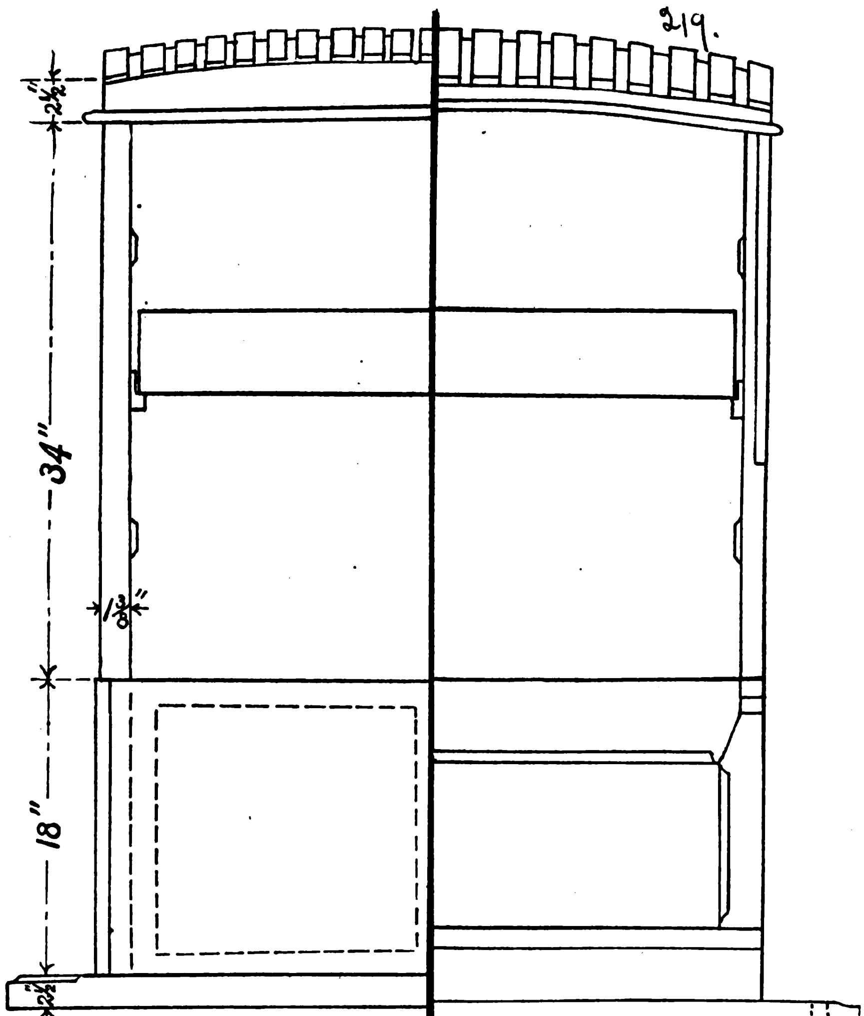


FIG. 8—HALF REAR VIEW OF WAGON BODY

FIG. 9—HALF FRONT VIEW OF WAGON BODY

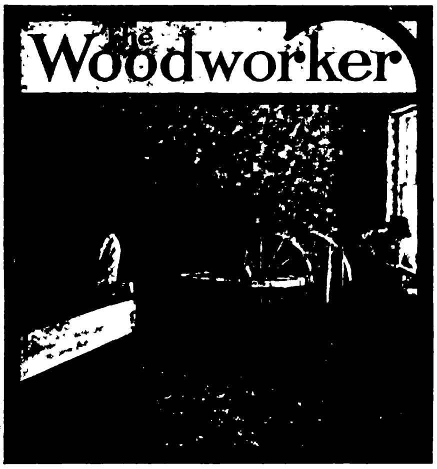
More on Axle Setting and the Wheel Problem.

W. H. QUNN

I desire to correct that part of my way of setting buggy axles as explained in November, which may be misunderstood. What I intended to convey was that buggy axles should be gathered so that the wheels will set narrow to the front from the back in proportion to the dish of the wheel. For instance, if the wheel has ¼ of an inch dish, then it should measure ¼ of an inch from center of axle to rim or tire, less than it would if square. Therefore, both wheels would make ½ of an inch narrower in front than back measurement; which we call the gather. The centrifugal forces of momentum are greater in the ratio of dish in wheel, therefore the gather should correspond as a centripetal or counteracting force.

I think there is more theory than practice in friend Daron's criticism of brother Koch's two blacksmiths.

The taper of an axle arm may be a factor in the bearings, but that "sliding friction" becomes the smallest of unknown quantities in practical analysis. As to the wheel proposition, I agree with Mr. A. Wade, who says a wheel fifty inches high runs easier than one forty inches high. Here is my reason for it: The spoke of a wheel is the lever of energy against obstructions to the rim. The angle of a low wheel from center being more acute than that of a higher wheel, the resistance to the draft is increased in like ratio. The marked difference in the angles of Mr. Daron's sketch shows up my idea to advantage. The solution of this problem in favor of the high wheel is still easier understood by taking two wheels of still greater differences in height.



When troubled with a wood screw that persists in working loose, try removing the screw and plugging the hole with cork, then replace the screw as before. This usually holds the screw. O. M. LAKE, Illinois.

Using a chisel seems to be such a simple operation that some may think this little item superfluous. Nevertheless, I saw a woodworker misusing a good chisel the other day, and a word or two on this point may assist some other chip-maker. And when I speak of chisels I mean the firmer, or paring chisel. When using the paring chisel place the flat or back of the chisel against the work. Don't attempt to use it with the bevel edge presented to the work. And in pushing the tool, attempt to make a shearing cut instead of a straight pushing cut. In other words, push the chisel sideways as well as forward, cutting as with a knife. F. W. F., New York.

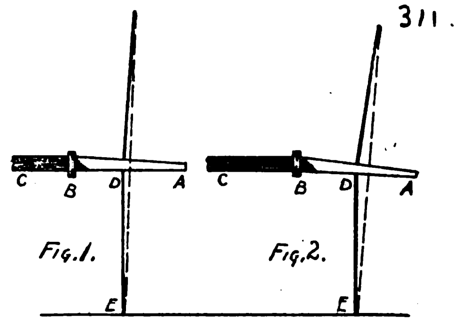
An Interesting Talk for the Wheelwright.

J. W. DARON.

In the November number brother Gunn says that he would like to hear from other craftsmen besides himself on axle setting. I gave a few of my ideas on the gather of wheels in the same number; and now I shall try to give a few on vertical axle setting. The first item is: Whenever the taper of the spindle coincides with the dish of the wheel, then the former should be set in such a position that the latter will stand on a plumb spoke. This is the rule, and it simply means that the spokes all around stand at a right angle to the surface of the spindle. Fig. 1 shows just how the spokes stand in relation to the spindle, and whenever they vary from this the wheel cannot run on a plumb spoke and run free and easy. The bottom of the spindle is then not horizontal nor is it at a right angle to the plumb spoke. But some claim the wheel must always stand on a plumb spoke, no matter whether it has more dish than needed or no dish at all.

Let us examine the diagrams and see what they prove to us. The first represents a spindle six inches long and $\frac{1}{2}$ of an inch taper and a wheel four feet high and $\frac{1}{2}$ of an inch dish. This makes both of the spokes and the taper of the spindle the same angle precisely from a straight line. Therefore, the wheel will run naturally on a plumb spoke and hug neither the collar nor the nut. It is seen that the bottom of the spindle AB is on a line with the bottom of the axle BC, as it should be, and, of course, at a right angle to the spoke DE. Now let us take the diagram Fig. 2, which represents a wheel with a one-inch dish and $\frac{1}{2}$ of an inch dish too much for the taper of the spindle; because this spindle has the same taper as Fig. 1. Now, it will be noticed that the point of the spindle A, Fig. 2, stands below the straight line BC, which is a necessity if we wish the spoke DE to stand plumb in the wheel as we see it is. But it is unnecessary to say that the wheel will hug the collar B with great force, as the diagram shows very plainly that it will.

Now, this question naturally arises: What is to be done in such a case? The answer is: Set the spindle so that the point will stand halfway up from where it is to a straight line, as the bottom of the axle BC, then the bottom of the wheel E will be thrown out to the proper place. This is the only way to remedy such cases, and this will do it, equalize the forces, and make the wheel, Fig. 2, run just about as easy as Fig. 1. Thus, it is incorrect to say that all wheels should stand or run on



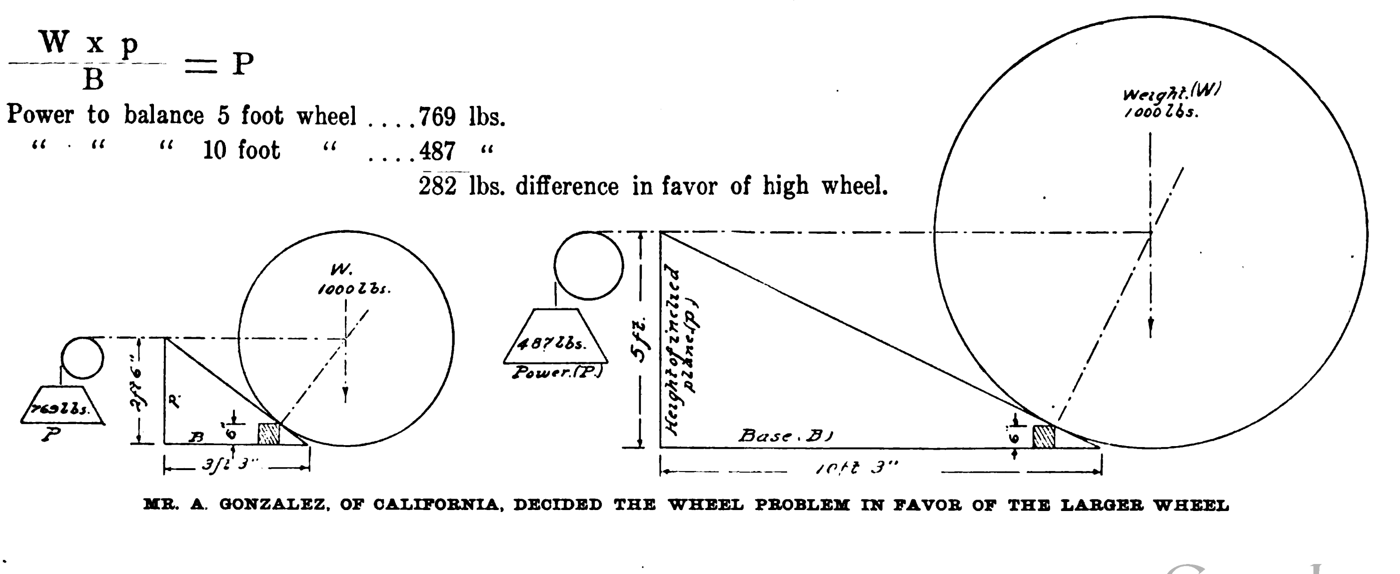
THE PLUMB SPOKE PROBLEM AND EASY RUNNING WHEELS PUZZLE THE WHEELWRIGHT

a plumb spoke. The only time they should, as I stated in the beginning of this article, is when the dish of the wheel coincides with the taper of the spindle.

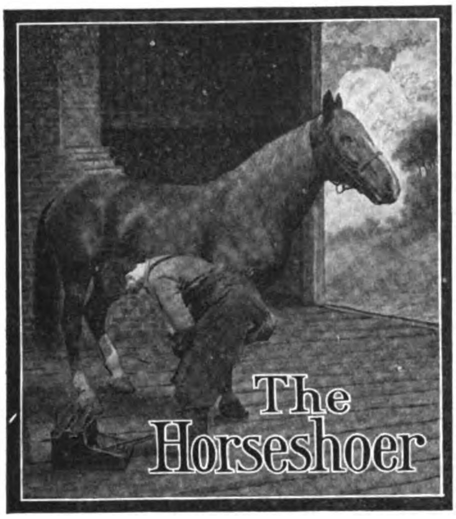
There are other important points I should like to mention, but cannot, as it would intrude too much upon the rights of others. I am like brother Gunn; I should like to hear from other craftsmen on the subject. For it is only by exchanging ideas and views on the different branches of the trade that we can learn and add to our knowledge of the craft. The man who is so nearsighted as to keep everything to himself is not very likely to keep up with the times. He is not liable to absorb much of anything that is new, who does not feel free to give of

$$\frac{W \times p}{B} = P$$

Power to balance 5 foot wheel ....769 lbs.
" " " 10 foot " ....487 "
282 lbs. difference in favor of high wheel.



MR. A. GONZALEZ, OF CALIFORNIA, DECIDED THE WHEEL PROBLEM IN FAVOR OF THE LARGER WHEEL his own store of knowledge. So let us be liberal in giving our ideas, in telling our opinions. Pay the other fellow with hints of your own.



For contracted feet try beveling the hoof surface of the shoe at the heels, making the inside of each heel from 1/8 to 3/16 of an inch higher than the outside. The heels then rest on a shoe which tends to spread the walls continually. This usually effects a cure. P. H. ZINCK, Delaware.

Why not use a little knife for cutting the little burr raised by the nail when driven out through the wall? This will prevent the bad practice of rasping a groove under the clinches and will make a much better-looking job. We use little curved cutters in our shop and find them better, quicker, and more satisfactory all around than the old practice of rasping the wall. Try it, Mr. Horseshoer. W. H. DOWNING, Ohio.

A Short Talk on Interfering.

C. G. ROUTH.

In the article written by Van Dorin, the kind of horse he intends to stop interfering behind, I suppose, is like the following: one that toes out and is just a little crooked in the legs. Now, suppose that this same horse toes out in front, brother, do you intend to apply the same remedy? Now, when a horse comes into my shop with his legs all cut by interfering and I am asked to stop it, the first thing I look for is the cause. Suppose the horse toes reasonably straight ahead. I take the foot and make it perfectly level, then by using the compasses, I leave just as much hoof on the inside of the frog as there is on the outside and especially at the point of the frog. Then pull the foot forward and round it ready for the shoe. Then fit the shoe. If with calks, be sure and make them level, also have the shoe full all around. This will not do with all horses that interfere, but will stop a case like the one I have described. There are hardly any two horses alike, consequently what will cure one horse will make the other interfere; so if brother L. Van Dorin has a remedy that will stop them all, he ought to be called a scientific horseshoer. As to playing to the gallery, as he says, common sense is all that is necessary. In my next letter I will tell what I know about toe weights and funny shoes. I almost forgot to say that cross-firing, overreaching, and so on can be helped by the driver to some extent.

The Bar Shoe and Its More Frequent Use.

E. D. HARRIS.

If the bar shoe is successful (and it is) in restoring the atrophied frog to its original state, why not use it always on feet that are inclined toward shrinking at the heels and frog? As frog pressure is necessary to the health of the foot, a bar shoe is most desirable. If the shoe is such as to allow plenty of natural pressure on the frog, there is, of course, no reason for using the bar shoe. But when the foot is so shod as to be lifted high off the ground, artificial means of getting pressure on the frog must be used.

When it has been decided to use a bar shoe on a foot that has been receiving little or no frog pressure, apply the pressure gradually at each shoeing until full pressure is obtained. Otherwise, the frog being tender, you will very likely make the foot worse than it would have been with no pressure at all.

The bar shoe will by no means cure all foot ills, but a common-sense use of it will minimize foot troubles. Sore heels and inflammation and undue pressure at the heels can be relieved by using the bar shoe in a sensible manner. Corns are sometimes cured by a use of the bar shoe, and I would recommend its use most strongly where high calks are used, or where the horse's foot is raised off the ground.

A Typical Case of Forging.

E. W. PERRIN.

First of all, let us ask the question, What is forging? When a horse strikes the toe of the front shoe with the toe of the hind one, thereby making a "click-clack" noise while trotting, he is said to forge. Therefore, forging is a defect of gait, unpleasant to hear and dangerous to both horse and driver, because it occasionally causes a horse to stumble and fall.

Causes.

Forging is usually the result of defective conformation of body or limb or both. For instance, horses that stand higher at the croup than at the withers (see Fig. 1), horses with long legs and short bodies, horses with long legs behind and short ones in front, and horses that stand under in front and behind—that is to say, with their legs too far under the body. Then again, apart from defective conformation, pain in the front feet or legs, by delaying the "pick-up" in front, may cause forging; abnormal growth of hoof in front or too heavy shoes; sometimes stringhalt is a cause; careless riding or driving and indifferent shoeing are also factors in this phase of interfering.

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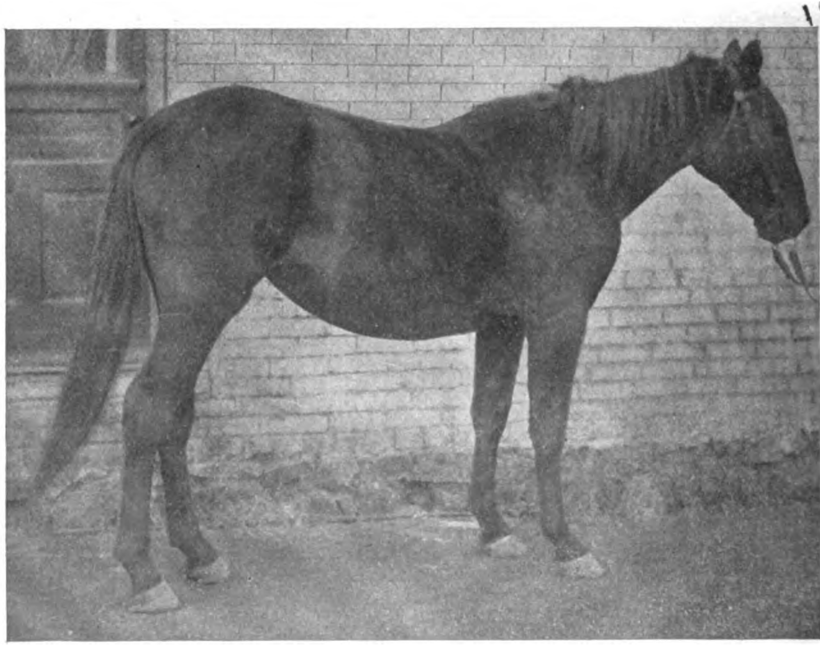

FIG. 1—HORSES THAT STAND HIGHER AT THE CROUP THAN AT THE WITHERS ARE LIABLE TO FORGE

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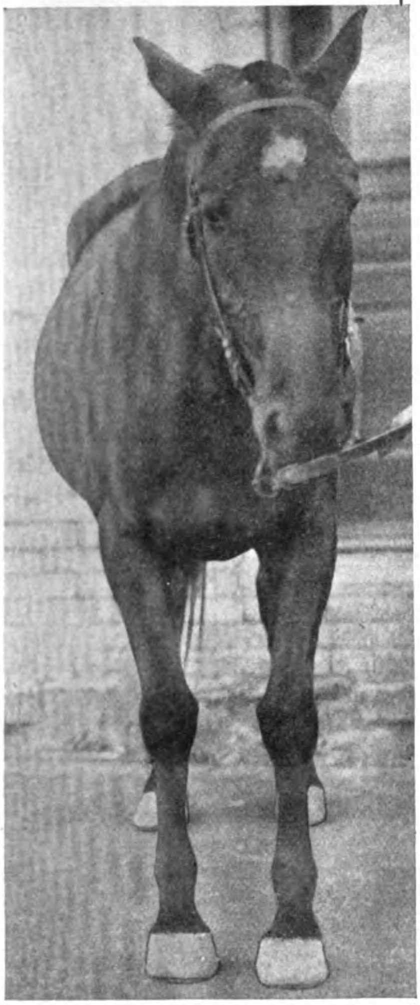

FIG. 2—THE MARE'S FRONT LEGS ARE CONSIDERABLY SHORTER THAN HER HIND ONES

You will notice that some colts will forge only when allowed to slop along at a careless jog, but will go clear if made to step up to the bit.

Each part of the reciprocating engine must move in perfect unison with every other part in order to have perfect motion. In like manner, in order to have perfect locomotion in the horse each limb must move in perfect time with its fellows or the whole locomotory apparatus is out of order. If the "pick-up" in front is delayed but a half a second, it is out of time with the hind foot on the same side, which results in a collision, the toe of the hind shoe striking the toe of the front (see Fig. 3).

The Cure.

The cure lies in our ability to impede the action behind or accelerate it in front. The animal which forms the subject of this article is a good, stout, serviceable mare (see Figs. 1 and 2) and a good line trotter, but you will observe from her picture that her front legs are short in comparison with her hind ones. If you will follow with your eye the joints in the brickwork which forms the background of the picture you will observe that the withers are about one brick lower than the croup. This, then, is the main cause of the trouble. I had tried lengthening the toes behind and shortening them in front (a plan effective in some cases), without success. I soon found that in this case a heel calk behind made a marked improvement. I then found that frog pressure in front helped considerably, while additional weight behind and very light shoes in front effected such a marked improvement that she forged only when going at a careless jog. However, this mare's feet are somewhat flat in front, so that the thin, light shoes let the sole of her foot too close to the rough ground over which she has to travel, with the result that her feet became tender from sole bruises. To obviate this I now shoe her with the very light bar shoe with rolled toe shown in Fig. 5, and a good thick leather sole. The hind feet I shoe with outside weight and heel calks as in Fig. 6. Thus shod, the mare goes perfectly clear. But as the front shoes wear out quickly, with a view to make them last longer I tried a heavier shoe, with the result that the forging recurred. The additional weight evidently delayed the "pick-up," thus proving how much depends on the weight of shoes in a difficult case.

Cross-Firing and Faulty Action.

A. F. LIBBEY.

Cross-firing is cutting the quarter of the front foot with the opposite hind one. The stride of the foot is shorter by a number of inches than its mate. Measuring the tracks with a tape line you allow one ounce extra weight per inch in either shoe or apply to the outside of foot for every inch the short striding foot is lacking in its stride.

A slight weight applied to the front foot is sometimes beneficial, but this shoe does not always prove a remedy. Some horses will not stand a bracing-shoe. I have seen horses shod with just a common light shoe, straightened at inside point of toe, with the crease closed back as far as third nailhole and set well under the foot, go clear where the shoe in Fig. 2 had failed.

Faulty action is sometimes caused by the diseased condition of the foot or from accident. We find the toe of one or both hind feet shortened so that the laminæ are sensitive and the speed impaired. In such cases a cap-toed shoe is beneficial. As it is a difficult shoe to make, I will, for the benefit of the young shoer, describe the process of making. Take a shoe of the shape and weight you wish and twice the width; now center-punch, leaving about two inches in the middle for cap; then draw out the ends to the width you wish your shoe and take your creaser and crease the cap, not running the creaser over halfway through. Now hammer the cap out thin and turn at right angles with shoe shape; see that the shape is perfectly true both ways; and then bend the shape slowly in the toe, keeping the face side of the shoe level. Now turn the quarters and punch (see Fig. 2). This is a hard shoe to toe, but one can make a scoop toe-grab on shoe by plating inside the web of the toe if you wish.

Thornton's Letters.—15.

Being "Straight-from-the-shoulder" Talk from a Prosperous Self-made Smith to his Former Apprentice, now in Business.

Dear Jim:

No, son, don't make excuses to me, and especially to your customers. If you haven't got the goods, you can't sell 'em. And if you don't know how to do a certain job, why, you simply can't do it. But don't let such a thing

FIG. 3—POSITION OF A HORSE'S FEET IN THE ACT OF FORGING

happen, old man. Know how to do the job a week before it comes through the shop door. You won't have any trouble doing it then. Sometimes the man who knows little makes a better show than the real man of ability—

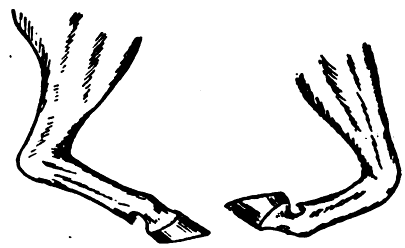

FIG. 4—THE POSITION OF A HORSE'S FEET WHEN PASSING CLEAR

it's just a case of having the goods in the show-window. I think your trouble is having the goods but not showing them. Just tackle the hard jobs in a common-sense way, and you're pretty sure to succeed.

Yes, Jim, I certainly recommend getting into town affairs. If, as you say,

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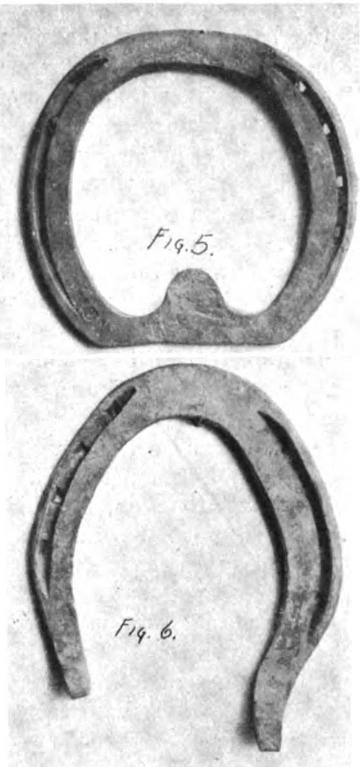
town things are not run right and you know they're not run right, don't be afraid to stand up and say so. Of course, there's no use in slashing around like a would-be reformer. But then, again, there's lots of chaps who stand around and holler "Sick 'em," but not many who'll pitch in. Now, I want you to pitch in and stop hollering. If you want to make the most of your opportunities you want to get into things in your town. Be identified with the boosting committee or some other body, and work hard for the town. Course there's no use in working so hard for the town that you neglect your business, or, what's more important, your home.

And right here I want to say that Fanny can smooth out many a business wrinkle for you if you'll talk things over with her. This talk about locking up your business in the shop when you go home is all rot. I wouldn't give two cents for the man who doesn't tell his life-partner about his business successes or failures. You owe it to her to let her know how things are going.

I am glad to know that you are getting along better with the help. It's just as I thought; you tried to keep your men by doing the work they should do. And that will never keep the right kind of men in your shop or anybody else's shop. Another thing you want to avoid and that is something I saw the other day. I went out to call on Jack Pressman, who has that big shop out on the north side, and found him out in the wagon shop putting things to rights. Now, Jack has two boys to do that work, but still he wasted at least an hour getting things into ship shape. When I called his attention to the matter he said he never thought about it, as he always jumped into any work that was to be done. Now, that is a good way to feel, but when you have two boys to do cleaning up and you can be pretty sure that one of them is loafing somewhere, you had best stir up the boys a bit.



A LIGHT BAR SHOE WITH A ROLLED TOE FOR THE FRONT FEET, AND AN OUTSIDE WEIGHT WITH HEEL CALKS BEHIND

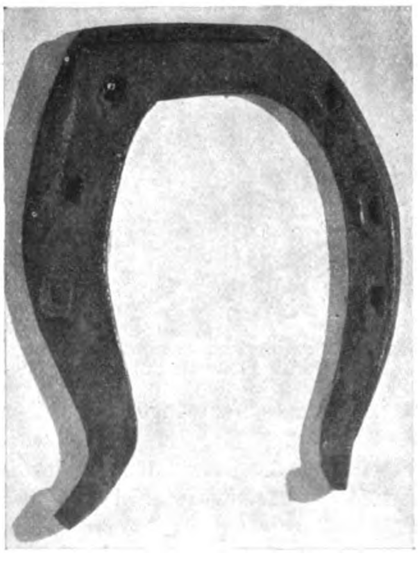


FIG. 1—A SIDE AND TOE WEIGHT SHOE FOR CROSS-FIRING AND FAULTY ACTION

Another little matter I want to speak about now is the temptation to give orders on long datings. You carry several side lines, but I don't want you to be tempted into loading up on any one of them. I know it's pretty hard at times to refuse to give a nice, smooth-talking salesman an order. And especially when he says that he'll not send it in before a month or more. But don't order unless you absolutely need the goods. Buy only what you think you can sell, and not what the salesman thinks you can sell.

I touch on these points only because I want you to steer clear of them. I know that you haven't stubbed your toe yet, but it is the stubbing that I want to prevent.

In closing, I want to wish you a very Happy New Year, and I hope that the coming year will find you making at least as good progress as you have in the past, if not better. We simply must keep going ahead if we are to be classed as live ones.

Yours for progress,

Thornton

Thermit and Its Use for Welding.

GEORGE W. KELLY.

The results of the use of this process for repairs to engine frames, driving-wheel centers, and connecting rods since August 17th, 1906, are as follows:

Eleven steel sections, or 22 welds, the same as those shown at last year's meeting. These sections are finished and ready to apply to the engine as soon as they come into the shop. The advantages are, the old section can be removed and the new one applied without the removal of the part of the frame remaining. We are now rebuilding a class of engine that has the forward pedestal and front end combined, made of steel and welded to wrought iron frame with thermit, doing away with the front and splice, thus making a continuous frame. There are sixteen welds in service made on various parts of engine frames since August 17th, 1906, and also twenty-seven welds on driving wheels.

We make the mold on driving-wheel centers and spokes and allow it to remain; burn the pattern out for the band, drying the mold through the riser opening with the frame heater, saving much time and running no chance of the thermit getting away through a parted mold. To get good results from this work it is very important that proper allowance be made for

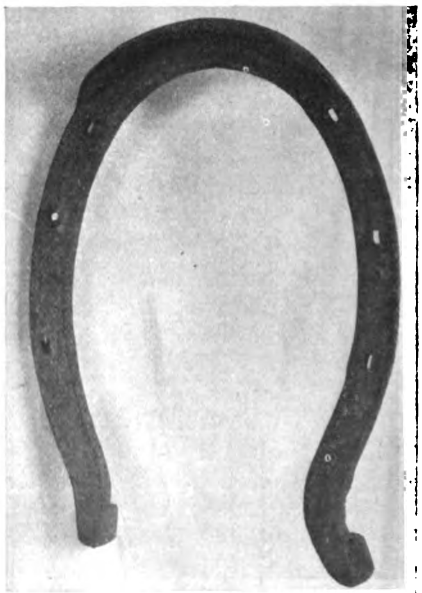


FIG. 2—THIS IS USUALLY A HARD SHOE TO FORGE—THE TOE BEING CONCAVE

the shrinkage; this also applies to locomotive frame work.

There are seven connecting rods in service, five of them being middle connecting rods, one of the jaws of each welded close up to the junction of the opening jaw.

After experimenting with the use of thermit for this class of work we found that after the reinforced collar was machined off and the rod finished to standard size, it was impossible to see, by the use of a glass, where the weld was made.

These rods are in service, and one of the engines has since passed through the shop, and after careful inspection the rod was found in perfect condition. The method of doing this class of work is as follows:

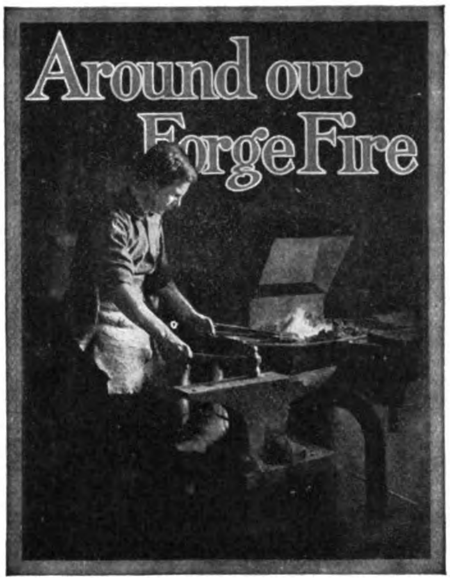
The broken part is drilled two inches from the broken line. The mold is made over the break, using a piece of soft steel to take the place of the broken piece. To hold the new piece in line a clamp is used, and as soon as the thermit has entered the mold we use this clamp to draw the new piece together from $\frac{1}{2}$ to $\frac{5}{8}$ of an inch, when the thermit is in liquid form, thus making a perfect weld, doing away with all tendencies due to air cavities. After the welds are machined they are taken to the smith shop and heated to a red heat and looked over carefully. This is a simple method, and often puts an engine back into service in a very short time.

All of the above welds have been made by heating the work through the riser opening to a red heat. Since we have used this method we have had no failures.

In conclusion will say that after coming into very close touch with this process of welding and making over 134 welds during the past two and a half years, I am convinced by the actual results obtained that it is a great advantage to use thermit, which melts at such a heat that when properly applied it will fuse the material with which it comes in touch.

REPORT FROM MR. C. E. TALADA.

As a member of your committee to investigate the merits of thermit welding process, I submit my report. Owing to the splendid facilities of our shops, we are able to remove and repair engine frames very quickly. The thermit process is not employed here. I have seen a number of specimens of welding on other roads employing this process for quick repairs. It seemed to be very satisfactory. As to the tested strength of welded pieces I cannot make a statement.



"Say, Benton, old man, have you had any experience in brazing?" asked the Editor, as the man with the recipe habit came in for a chat. "I am very anxious to get some good practical information on the subject of brazing for 'Our Folks,' and if you can help me I wish you would."

"Well, I've dabbled around a little and brazed one or two things in my time, but I'm not what you'd call an expert." And Benton removed his big coat, dropped into his accustomed seat, filled his pipe, tilted his feet up on a desk, and prepared for a quiz on brazing.

"I'm not looking for expert opinions now," said the Editor; "What I want is good, straight, practical information that will enable 'Our Folks' to do brazing in their shops." Then, continuing, he asked, "What have you found as the best means of holding your work while heating it?"

"In the first place, it is simply impossible to get one clamp or two clamps or even a half dozen clamps to hold all the brazing work that is likely to come into the shop," returned Benton. "Where I got my brazing experience we had several clamps, but we made special clamps about as often as we used the regular holders. The best scheme I ever came across was a stunt used by a chap down in Pittsburg. This fellow had a lot of brazing to do and made good money at it. He used a table, the top of which was a casting with square holes all over it running from the top side through to the bottom. This casting was about four inches thick. When he had a job of brazing he laid it out or set it up on this perforated plate, and with pins driven into the square holes he held the piece to be brazed perfectly solid. He used gasoline for fuel and fed it into the brazing torch under pressure from a tank. He also used fire bricks around the joint to be brazed to hold the heat around the point to be heated."

"Well, that is something new to me," returned the Editor. "It appears to me that a brazing table on that order should find a ready sale if placed on the market."

"I think it would," assented the other. "I'm rather surprised that some one hasn't before thought of this simple method of holding work and turned out an improved brazing table."

"What methods and fluxes did you use, Benton, when you did brazing?"

"Well, we used several methods in our brazing. One thing I don't believe can be emphasized too strongly, and that is, to thoroughly clean the edges of the parts to be joined. No brazing at all can be done if the adjoining parts of the work are greasy or dirty. One method we used was to thoroughly clean the ends of the parts to be brazed, and then coat both ends with oxide of copper. This decarbonizes the cast iron and gives the spelter a chance to honeycomb the metal. The pieces were then firmly clamped in just exactly the position they were to be when repaired and heated in a muffle furnace. A brazing torch can also be used, or even a coal forge. If the regular coal forge is used, either charcoal or coke should be used for fuel."

"Did you cool your work in water, or did you allow it to cool in the furnace?" questioned the Editor.

"We allowed it to cool in the furnace, for I believe that is the proper method. We also cleaned the work before allowing it to cool, as it is almost impossible to scrape off the little nibs of borax after once thoroughly cold." Then, continuing, Benton said, "Another method we used, and one which I found simpler and better than the other one, was to make a compound of boric acid twelve parts, subcarbonate of iron three parts, and chlorate of potash, pulverized, four parts. The pieces to be brazed were then clamped and heated to the proper heat. Then some of the compound was mixed with spelter and applied to the joint with a lily, or rough iron spoon. This made a perfect brazed joint."

"Did you find it best to heat your work first and then apply the flux and brass? or is it just as well to have flux and spelter in the joint before heating?" asked the Editor.

"I think it best to heat the work first and then apply flux and spelter," replied Benton. "I am inclined to believe that the spelter and flux are burned long before a brazing heat is secured if the flux and brass is added when the work is cold."

"On complicated pieces did you use anything to protect the good parts of the work from the heat?"

"We used clay to protect the good parts from the heat," returned Benton. "Clay was also applied to any polished parts which may be damaged by the heat. And in some cases, especially where small pieces were to be brazed, we used stiff clay to hold the work; sufficient of the metal being imbedded in the clay to hold the work firmly and the parts only to be heated being exposed."

"The compound that you used with spelter—was it ready mixed with the spelter? or did you mix it as you needed it?"

"I mixed up a quantity of the compound, and kept it in a fruit jar tightly sealed. When I used it I mixed in the spelter as needed. And another point is that good spelter only should be used. There are cheap spelters on the market, but the best obtainable should be used in every case where a good job is wanted."

"What do you think puzzles the average smith when attempting to braze cast iron?" asked the Editor.

"Experience, I think, is all that's needed."

The noon whistle then interrupted their talk, and Benton and the Editor went out to lunch.

Reflections of a Worthy Helper.

JOHN DONNELLY.

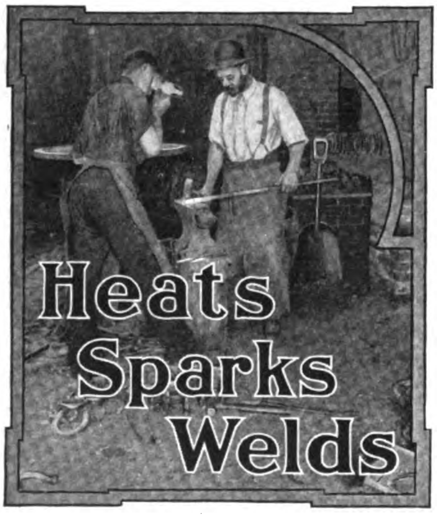
There was a time when none possessed a fairer form than I,
But now I'm looked upon with scorn by every passer-by.
Perfectly proportioned, I had beauty, grace, and power,
When into bondage I was sold—oh! how I curse the hour.

My master placed me on my bed, quite nude, and strongly chained;
Upon my unprotected face most cruel blows he rained.
Against this I protested long, and in stentorian tones,
But the wretched man still beat me, and heeded not my moans.

For months I tried, with some success, to loose my galling chains,
When partly free, my master soundly beat me for my pains,
Put iron bands around my waist, and nailed them to my bed,
And seared my face with irons, which he had heated red.

For ten long years he kept me bound, and beat me every day,
And often other men looked on without a word to say.
I'm free at last, but useless, and for the scrap pile bound—
A blacksmith's worn-out anvil, worth half a cent a pound.

Written expressly for THE AMERICAN BLACKSMITH.



The best time is a little before time.

Don't allow the second letter of rest become a "u."

Not much use in turning a leaf 'less you keep it turned.

A customer once fooled won't give you a second chance.

Do your backbone qualities or your wishbone tendencies weigh the most?

We want you to tell us how we can make this periodical more valuable to you.

'Tis well worth the effort, and then, too, people like to come into a clean shop.

Like a child's Christmas without a Christmas tree is the craftsman without a good craft journal.

Another station has been reached on the road of time. Are you well equipped for the next journey?

The man with money but no brains is like the first spring poem—he's dumped into the wastebasket.

Many a man has got into trouble by signing his name to papers without reading them. Read before you sign.

A winner—an up-to-date smith with up-to-date tools in an up-to-date shop, with an up-to-date craft paper always handy.

Business is business, but the blacksmith business is more than business. It's business, knowing how, and then some.

How's business in your parts? A generous use of advertising grease will make the wheels of business run more smoothly.

Give your neighbor a good start on the road to a better and happier new year by getting him to subscribe to Our Journal.

Tell the man you hire just what you expect of him. Then if he doesn't measure up, let him know it, and after several trials let him go.

The chains used for mooring the gigantic "Lusitania" are made of square links, and are said to be four feet in length and to weigh 400 pounds each.

Lumber may be high, but it's not so expensive as doctoring up a bad cold or something worse which may result from working in a wet, draughty shop.

The road to hell, they say, is paved with good resolutions. Better to make one good resolution at New Year's and keep it, than to make a dozen and not keep any.

Save the old shingles when you renew the shop roof. They are fine for starting the fire. Will the shingles on your shop serve better as kindling than they do as roofing?

When you think of cutting prices put yourself in your neighbor's place. It takes a big man to see all sides of this question, but you will find that it will hurt both of you.

When satisfaction sets in, progress stops. It's the man who is dissatisfied with things as they are who improves them, invents new ways, contributes to progress, and advances civilization.

The widest tunnel in the world will be the Rhone-Marseilles tunnel. It will contain a canal wide enough for two barges to pass, and a track on either side for an electric railroad.

"Of course, 'The rolling stone gathers no moss,'" said Thornton, "It usually travels the road of least resistance—downhill. Seems to me it would get some of the long green if it went up."

"More associations are being formed this season than ever before," says the Secretary. Is your county one of those being organized? If not, you'd better get busy now and reap the benefits with the others.

Eminent scientists tell us that the emotions of anger, worry, fear, and despair affect our physical well-being like so much poison Happy is the man who has absolute mastery over himself. It can be cultivated.

There's a nasty hole in Tom's shoeing floor and hardly a week passes but some horse gets his foot caught in it. Wouldn't take friend Tardy five minutes to fix it, but he'll wait as usual till something serious happens.

An anvil, the largest in the world, and used in the Woolwich Arsenal, England, is said to weigh 60 tons, while its block weighs 103 tons. Altogether 600 tons of metal were used in the anvil, the block, and the foundation work.

Three worth-while presents for a single dollar bill; a year's subscription for a friend; six months' subscription for yourself; a new subscriber for us. Can you distribute New Year's cheer to better advantage? Act now on this suggestion.

"The only lady smith in the State," boasts Vincent, Iowa. "The lady is blacksmith Phifer's wife, and is his very efficient assistant." "Blacksmith Phifer" is Brother L. E. Phifer, whose interesting items on craftwork are familiar to "Our Folks."

Tools in place and repair, a supply of calks ready, plenty of coal, stove up and roaring—Thornton's. Tools scattered, no calk steel in sight, only a sprinkle of coal on hand, and the stove just where it tumbled two months ago—Tom Tardy's.

It has stood over six years and means more today than ever. Read the Honest Dealings paragraph in this and every issue. It insures a fair and square deal for "Our Folks" and the Pink Squares go with it. Just say "More pink buffaloes" when your supply is low.

A concrete shaft 115 feet high has been built by an electric company in Pennsylvania. The shaft is eight feet two inches square at its base, and tapers to one foot square at its top. It is hollow for a distance of 84 feet from the ground, the walls being one foot thick.

Moving an 8,000-ton opera house is no small feat. Yet this is what was accomplished in Brooklyn, N. Y., recently. The structure moved is of brick and stone, and about six stories in height. Some 1,600 lifting screws were used to raise the structure, while 25 powerful hand-worked turnscrews were used to push the building along.

Within the next few weeks there will be in operation between the railroad and great borax mines in Death Valley, southern California, a cable locomotive that will do away entirely with the famous "20-mule team," of which so much has been written and so many pictures published. The unique feature of the new enterprise is the method of applying the power. In the center of a railless road forty miles long will be laid a strong steel wire cable, 1¼ inch in diameter. Instead of the cable drawing the four-ton locomotive, it remains stationary, and the locomotive, clutching hold of it, draws itself along. Beneath the locomotive are two sprocket wheels upon which runs an endless chain made up of links, each one of which grips the cable in turn. Sixteen links take hold at once. The locomotive thus fairly pulls itself over the ground, and so great is its power that grades of fifty per cent can be traversed. The engine of the locomotive is similar to that of an automobile, and can develop 200 horsepower. The new method of hauling out borax to a point where the regular railroad connection may be reached is a great improvement over the present mule power which has been used for so many years, and because of the death-dealing climatic condition of the valley it is the only feasible plan.

American Association of Blacksmiths and Horseshoers.

The Secretary of the Iowa State Association has sent in copy of their agreed price list. I am publishing it in this column and I want you to look it over carefully. Could your prices not stand a raise of a few cents all along the line? You are certainly not getting all you should or all you want to get. It is the business of the American Association of Blacksmiths and Horseshoers to encourage a better feeling among craftsmen throughout the world and to assist them in getting better prices and such protection as they need. If the craftsmen in your county are continually fighting each other and cutting prices, let me hear from you today. My easy plans for forming county branch associations will enable you to get the prices you deserve and will enable you to promote a better feeling of fellowship among your brother craftsmen.

Iowa State Blacksmith Association.
PRICE LIST OF HORSESHOEING.

	Each
New shoes	$ .50
Resetting	.25
Steel plugged shoes	.60
Leather pads with packing, extra	.25
Rubber cushion pads	1.25
Stallion shoes, new or old	1.00
Bar shoes	.75
Side and toe weight	.75
Trotting horse, hand-turned	.75
New Neverslip shoes, No. 4 and smaller	.65
New Neverslip shoes, No. 5 and larger	.75
Resetting Neverslip shoes	.20
Neverslip calks	.05
Paring horse's foot	.05
Shoeing bronchos and fractious horses, extra	1.00

Vicious and unruly horses shod at owner's risk. New shoes brought with horses, no allowance. J. A. HAMILTON, Secretary.

This season is thus far way ahead of any previous one in the number of requests for plans and the number of associations actually formed. Smiths everywhere are beginning to realize as never before that they must get better prices if they are to expect a profit. The prices of supplies and living have advanced considerably since a year ago, and patrons of smith shops are certainly unreasonable to expect that the blacksmiths can absorb these advances.

Organization is the order of the day. Workers in all lines are realizing this, and we find unions, organizations, and associations of all kinds on every side. It is certainly up to the smiths to get together. And the price problem is not the only one which only an association can conquer. Don't hesitate another minute, Mr. Reader, to forward a request for my easy plans. When you realize that the American Association is always willing to assist you in getting the smiths of your locality solidly organized, you will see that it is like refusing to help yourself by not sending for my plans.

Let every one of us consider himself a committee of one to further the interests of the smithing craft. You, Mr. Reader, do your part by asking for my plans, giving me an opportunity to carry out my part of the contract. Shall I receive your request by the next mail? Address me at P. O. Box 974, Buffalo, N. Y. A penny postal will do, and it will pay you to lay the paper aside for a minute to write your request.

THE SECRETARY.

The Modern Smith.

That the smithing craft is gradually but surely getting back into its rightful place in the world's trades is very plain even to the unobserving. People are beginning to realize that the trade cannot be successfully followed by every "Tom, Dick, and Harry," no matter what their training. The day has passed when a man with a railroad rail for an anvil, a pile of stones for a forge, and a training worse than his equipment, can successfully pursue the trade. The modern age insists upon some degree of skill and knowledge in the modern smith. And the knight of the anvil is "delivering the goods," as the boys say.

In looking closely at the smithing craft one cannot help but see the improvements that have taken place in the past few years. Better shops, better tools, and better conditions all around. The gas engine and electric motor are carrying the heavy loads; more labor-saving machines are being installed every day, and, by no means least, the craft are organizing for protection. The modern smith shop is not the same as the one of years ago. Modern tools and machinery have made it clean, bright, and healthy.

But don't let us rest in our efforts to bring the craft to a still higher plane. Let us boost every chance we get. Don't let the remarks of the knocker go unchallenged. A Boosters' League can still do good work in raising the standard of the craft. Be a booster.

Promising Work and Keeping the Promise.

When the farmer brings in his plow, or the teamster his wheel, or the grocer his horse, each wants his work done immediately. They can't wait a week. They can't afford to wait. What steps have you taken to return their work when they want it? Do you promise work for a certain time and then "fall down" on your promise? You cannot afford that. You cannot afford to spend your time at an old hand drill or a bellows and disappoint your customers. You cannot afford in this day of progress to continue along the old roads. You must take the lightning express if you want to keep pace with your fellows.

A man cannot measure up to his full capacity without proper tools to work with. A man cannot turn things out on time unless he has the equipment to do it with. Improved machinery and labor-saving tools will enable you to do better work in less time and more work in a given time. And more work and better work mean more profits—the reason for your being in business.

The Course in Blacksmithing at North Dakota Agricultural College.

H. CHISHOLM.

The equipment of the forge shop at the North Dakota Agricultural College consists of forty down-draft forges, with accompanying anvils, hammers, tongs, hardies, and fire tools. The shop is also equipped with a sufficient number of heading tools, punches, and chisels. In addition to the standard tongs at each forge there is a large assortment of special tongs used for demonstration work.

The course of training is adapted to the needs of the students attending the college, and is necessarily different from that of other sections of the country. The State of North Dakota being largely agricultural, most of the students expect to follow farm life, and are anxious to fit themselves for doing the necessary repairs on farm machinery and farm utensils. A special short course is arranged for this class of students, most of them taking two winter terms. Students taking the regular mechanical course are given more advanced work, and many of them can do very creditable work upon graduation. Several have started in the blacksmith business after taking two terms. The aim of the college course is not specially to train students for following blacksmithing as a business, but rather to enable them to do necessary farm blacksmithing. Conditions in large sections of the State make this almost a necessity. Large numbers of the farmers are located very remote

66.

THE BUILDINGS AT NORTH DAKOTA AGRICULTURAL COLLEGE ARE OF MODERN ARCHITECTURE

from repair shops, making the expense of traveling back and forth and the loss of time out of all proportion to the cost of the work itself. Also the farming

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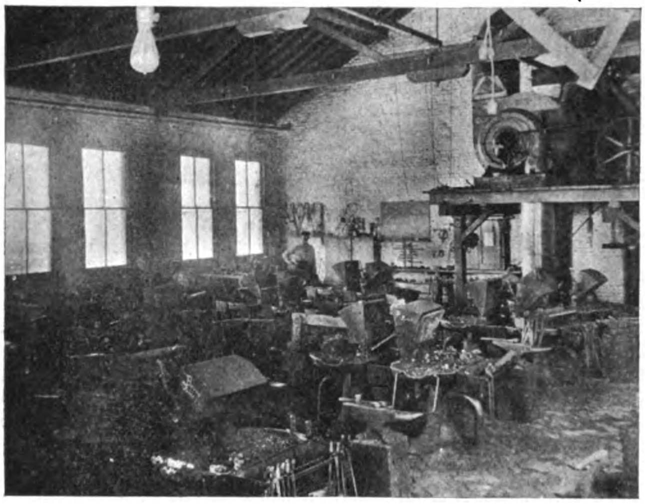

THE EQUIPMENT OF THE FORGE ROOM IS UP TO DATE IN EVERY RESPECT

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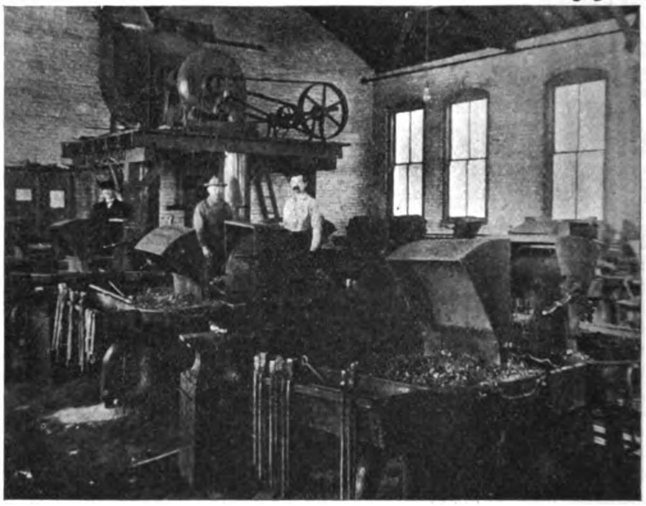


THERE IS NO EXCUSE FOR A SMOKE AND SOOT LADEN ATMOSPHERE IN THE MODERN FORGE SHOP

throughout the State is done so largely by machinery that a repair shop on the farm, where a little blacksmithing and machine work can be done, is a necessity.

The plan followed at this institution is one seemingly best fitted to existing conditions. Most of the students have had no experience at the forge, and while they are energetic and not afraid of soiling their hands, yet they have a very limited idea of accuracy, system, or proportion. They have the very common idea that muscle and energy, the ability to do a large amount of hard work with as little use of gray matter as possible, is what is needed at the forge. The wise instructor will proceed to disabuse their minds of this idea at once, and it is remarkable how quickly order and system can be made to succeed the chaos of the first class period.

Here the students are first taught to build and maintain the forge fire. The importance of this item is kept before the student throughout the entire term, the instructor insisting that more blacksmiths make an indifferent success at their calling from inability to properly maintain a forge fire than from any other cause.

The first exercise is necessarily of the simplest kind—hammering a piece of iron square. As soon as the student becomes reasonably familiar with the fire, tongs, and hammer, he is required to draw a piece of iron to a definite size and length. These exercises are followed by upsetting, bending, welding, etc. The line of exercises is much the same as that adopted by other institutions of this kind—hook and staple, rings, bands, clevises, chains with hooks and swivel, rivets, bolts, eyebolts, wrenches, tongs (flat and round), and enough work in steel to enable them to make simple tools.

To the engineering students more instruction in steel working is given. Also they are made thoroughly familiar with the different kinds of steel, its uses and treatment, together with casehardening and annealing by the slow and quick processes.

Beginners work altogether from models, which are conveniently placed, but which they are not allowed to take to the forge. The exercises are so arranged that each succeeding one presents a new problem in forging. A strict working out of the required exercises is insisted upon before the making of things designed by the student is allowed. Fancy work of all kinds is discouraged, and in its place the foun-

12.

INTERIOR OF A NORTH DAKOTA GENERAL SHOP

dation principles of the craft are emphasized.

Supplementing the laboratory work, blackboard illustrated lectures are given by the instructor from time to time as required, the "question box" being a feature of these lectures.

An Ornamental Fence and Gate Built by an Australian.

A. GREED.
Australia.

71

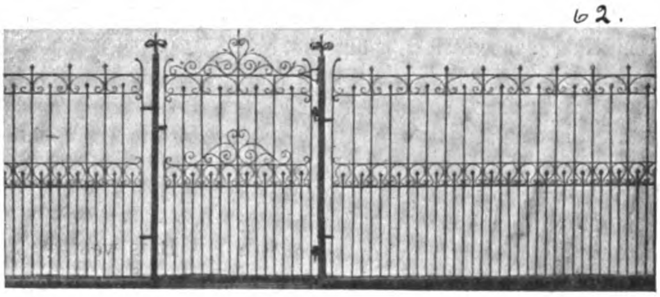
COMPARISON OF THIS VIEW WITH THE ONE SHOWING THE WOODEN FENCE SHOWS THE IMPROVED APPEARANCE OF THE GROUNDS

The February number of "Our Journal" I found especially interesting, for I had been looking for a nice design for a garden gate. The design in that number was just what I wanted, and I set to work and made a fence for my own house. I am a blacksmith by trade and made the whole thing single-handed. I have just got it fixed and enclose you a picture of the fence itself and of the house with the picket fence and with the iron one, showing the difference the iron fence makes in the appearance of the house. I might add that the fence has been the talk of the town and is very generally admired. I think that you will admit that I have considerably improved upon the original design. The addition of the little tips on the top scrollwork of the gate and the scrollwork in the center and the substitution of the wrought-iron scrollwork on top of posts instead of cast ones as in your design, and the fence being made in panels, all, I think, adds materially to the appearance.

64.

THE OLD WOOD FENCE AND GATE

62.



THE IRON FENCE AND GATE

For the foundation of the fence I found that dressed stone work would cost five or six shillings ($1.25 or $1.50), per foot, which would make a serious item in 60 feet, but by using a cast-off rail from the railroad, I made a good foundation and an iron finish more in keeping with the work.

The upright bars are made of $\frac{7}{16}$-inch round. The end bars of panels and gate are of $1\frac{1}{4}$ by $\frac{7}{16}$-inch round-edged tire steel. The top bar and lower middle bar are of $1\frac{1}{4}$ by $\frac{3}{8}$-inch, the other two bars of $1\frac{1}{4}$ by $\frac{1}{4}$-inch. The scrolls on fence are $\frac{3}{4}$ by $\frac{1}{8}$ inch. The main scrolls on gate are of $\frac{7}{8}$ by $\frac{3}{16}$ inch. The posts are of $1\frac{1}{2}$-inch water pipes, and scrolls on top of posts are $\frac{3}{4}$ by $\frac{3}{16}$ inch.

I use a gas engine for power in my shop, but as it is not running all day I took the opportunity to do the drilling when it was working. The holes are drilled in iron railing about $\frac{3}{4}$ of an inch deep. I drilled them a scant $\frac{7}{16}$ of an inch, and made a tool to drive the $\frac{7}{16}$-inch bars in from the top, which made a splendid sound job. I might add that the fence only cost me about £8 ($38.94), apart from my own labor. The latter I rather enjoyed during the cold winter mornings. I might also add that though I have a punching machine I drilled all the holes, as it made a neater finish. To keep the middle bars from dropping in the center, I drove a chisel under them and raised a burr. On the left-hand side of the picture of the house I have a large double gate, and I propose next winter to make an iron one to match the rest. I have also enclosed photo of my business place. I must add that business has been very brisk in Australia these past few years.

Bulbs for Andirons.

T. G. GOOGERTY.

Bulbs for andirons may be made by using $\frac{1}{2}$ or $\frac{5}{16}$-inch round or square stock. In using square stock the rods should be twisted before they are welded into place, making the work more pleasing, but requiring a little more skill to shape. In working up bulbs for andirons they may be welded at the top of shaft, making the whole one piece when finished, or the bulb may be gotten out as shown in Fig. 1, with the shank at the bottom threaded. They are fastened to the shaft by drilling a hole in the top and tapping it so as to screw the bulb into place. The beauty of this kind of a

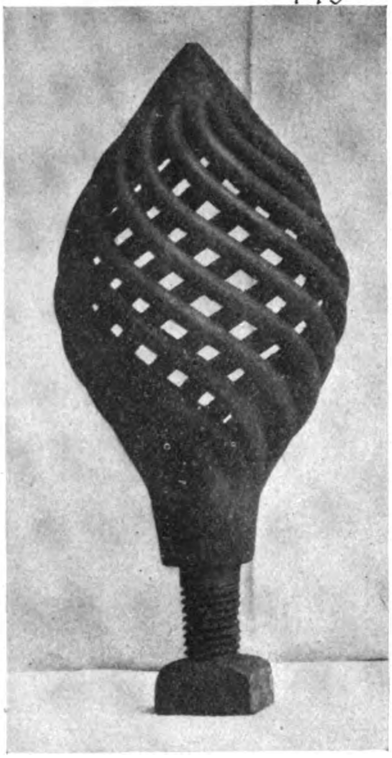
83.

AN AUSTRALIAN READER'S CARRIAGE WORKS AND SHOEING FORGE bulb depends on how gracefully it is formed. The rods should be uniform in sweep and distance apart, without any kinks in them.

To construct this bulb there should be 13 soft steel rods ½ inch round and cut 7½ inches long. It is very necessary to use soft steel, as iron will not stand the strain in forming the bulb. After the rods are cut, forge a piece to be welded in the top and bottom of bulb. These pieces may be inch-round iron swaged on one end, see A, Fig. 2. Now, the thirteen pieces of ½-inch rods are laid around these three pieces and bound tight with a strong piece of wire which will keep the rods in place in the form of a cylinder or tube. The top piece is then inserted, as at B, and it is ready to be welded. To make this weld the pieces should be held with a pair of tongs with jaws that will fit tight around the rods, placing a ring on the end of handles, binding the whole firmly.

The part to be welded is placed in a clean fire, one that has a good bank of coal on each side, with plenty of well-burned coke under and over the piece. It is then heated slowly on the end until it is red. The blast is then shut off, and some flux, such as welding compound or borax, is put on the ends of the rods. The blast is again put on slowly, and the piece is turned over once in a while so as not to burn the rods at bottom. If the lug at end has a tendency to fall out of the rods it is held in place with a poker which has an inch of its end bent at right angles. The welding heat is raised by gradually giving it a little more blast, and when

493.



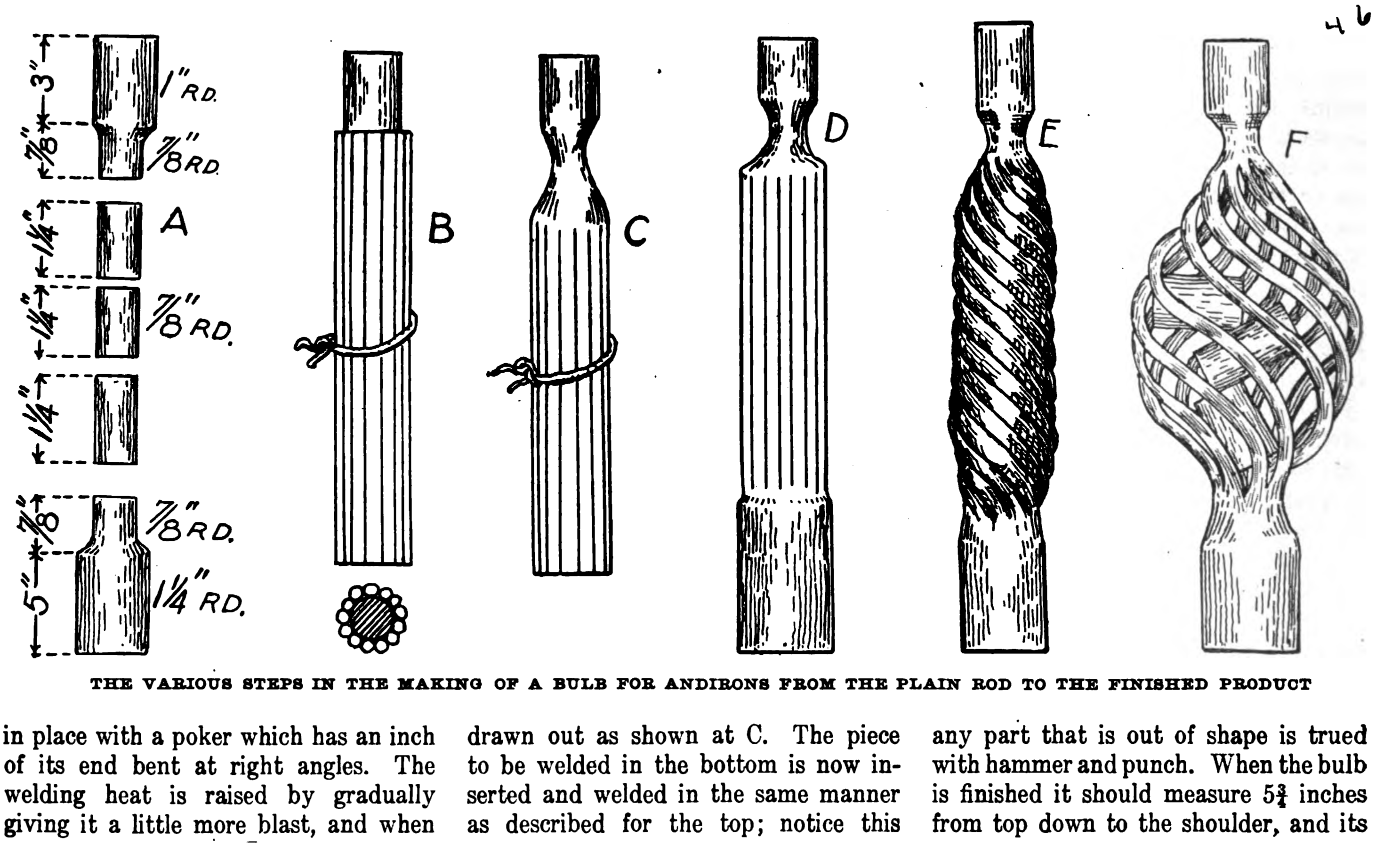
THE FINISHED BULB READY FOR ATTACHING

it is right, if the ends of rods and lugs do not stick enough to hold while taking it from the fire to the anvil, the poker with the little bend at end is used to hold lug in place until the work is on the anvil.

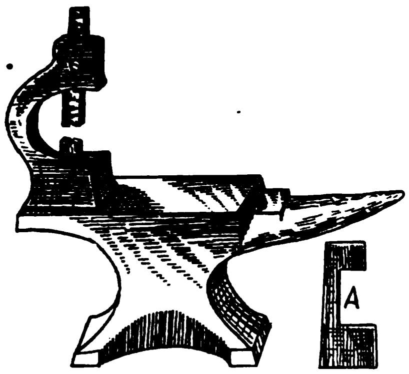
It is welded by hammering near the end of the rods, at the same time it is drawn out as shown at C. The piece to be welded in the bottom is now inserted and welded in the same manner as described for the top; notice this piece welded in place at D. The entire piece is now heated uniformly to about a yellow heat; one end is caught in a vise, and with a monkey wrench on the other end it is twisted to the right as much as the rods will stand without danger of breaking them at the weld. The piece may have to be heated more than once in order to twist it enough. A little light tapping with a hammer on the end while twisting will also help it, see E in Fig. 2. The entire piece is again heated to a uniform heat and twisted in the opposite direction, tapping on the end lightly with a hammer. This twisting will force the rods out in a bulb shape as at F.

The three pieces of round iron inside of the rods, keeping them in shape while welding and twisting, will now drop out if two of the rods are spread a little. The lug at the top is drawn out a little more at the point, and the rods are trued by heating first the top half of bulb, catching the knob at end in vise in a vertical position, with a long slim punch to reach into bulb and tapping the rods out on the other side where needed, each rod is driven out with this punch and a hammer until the bulb is uniform in shape. The bulb is turned over and trued in the same manner, and the bottom shank is swaged to a ⅝-inch rod. A thread is cut on the shank, the knob at top is cut off, and the end is pointed by grinding it on an emery wheel. The bulb is now annealed, and any part that is out of shape is trued with hammer and punch. When the bulb is finished it should measure 5¾ inches from top down to the shoulder, and its

462.



THE VARIOUS STEPS IN THE MAKING OF A BULB FOR ANDIRONS FROM THE PLAIN ROD TO THE FINISHED PRODUCT diameter through the wide part 3¼ inches, and it ought to look like the



A HANDY ANVIL TOOL FOR LIGHT DIE WORK

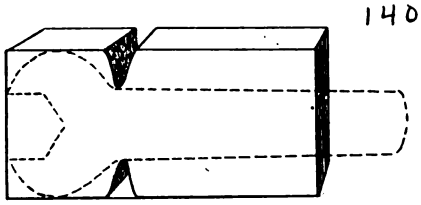
finished bulb shown in Fig. 1, and as shown on the andirons.

How to Make a Machine Wrench.

J. H. DEAL, JR.

The accompanying engraving shows a machine wrench and the stock required to forge it. The wrench is for

140.



HOW TO MAKE A MACHINE WRENCH

use on a nut ⅞ of an inch across. Take ½-inch stock and make the handle four inches long and taper it from one inch to ⅞ of an inch at the end. The thickness of the handle to taper from ½ of an inch to ⅜ of an inch. The stock should be 3¼ inches long, two inches wide, and ½ inch thick. The engraving shows how to forge the wrench from the stock.

A Simple and Easily Made Tap Wrench.

D. FOSTER HALL.

The engraving shows a tap wrench which is easily made and is a very handy tool to have in the shop. If one has a lathe it can be centered and handles turned up, or they can be forged in shape. It can be made out of any good tool steel of any size or length. The number of holes and their sizes may also be made to suit. Anyone will understand after looking at the engraving just how it ought to be made.

A Blacksmith's Compass for Hot Work.

STEVEN STRAKA.

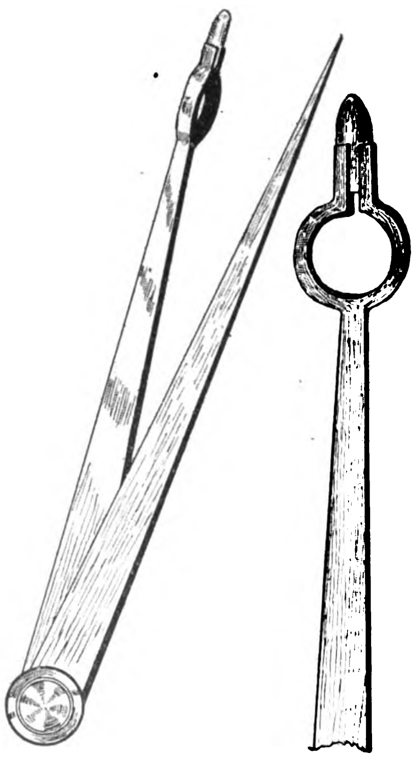
The accompanying engraving shows a simple but very practical and easily made blacksmith's dividers and com pass. The legs are 14 inches long and are of flat stock ½ inch thick, the legs being 1¼ inches wide at joint and tapering to a point on one leg and to a socket on the other leg. The socket on the one leg should have just sufficient spring so as to hold a piece of soapstone. The opening in the socket is one inch in diameter. The rivet holding the legs should be sufficiently tight to hold the legs firmly and yet not too tight so the legs move with difficulty.

A Handy Anvil Tool for Light Die Work.

D. FOSTER HALL.

The accompanying engraving shows a handy little tool for blacksmiths' use, which can be of use for various purposes. It is a tool which can be made by any good blacksmith. I made one out of cast iron, but a forging is better, as the casting is liable to crack from the jar after a while. Different kinds of dies can be used on this tool. A set of swages from $\frac{3}{16}$ to ½ inch for swaging any kind of work, also a set of cutters for cutting round iron. Dies of special design can be made and used in this tool.

To make it, take a piece of 2½-inch square steel and forge solid as shown at A and bend into shape. After forging, center both ends and drill a 1½-inch hole from top end and another



A BLACKSMITH'S COMPASS FOR HOT WORK

1½-inch hole into the base. Then finish with a one-inch drill. This leaves ¼ inch all around for shoulder for lower die to set on. Now forge a square piece to fit hardy hole in anvil; on the other

A SIMPLE AND EASILY MADE TAP WRENCH

end of the piece make a driving fit for hole in base of forging. Put in a set screw to hold it firmly in place and also one for lower die. The top die wants a set screw to keep it from turning around and a slot milled into it so it can slide up and down. Make dies of good tool steel and shape the end to suit.

If **chilled cast iron** is to be drilled, heat the iron red hot and place a piece of brimstone at the point to be drilled. When the casting cools the iron may be drilled with ease as usual. L. H. Fox, Ohio.

To **caseharden cast iron,** heat the piece to a good red, and after sprinkling with the following mixture, plunge the piece into a hardening bath: Equal parts, by weight, of yellow prussiate of potash, sal ammoniac, and saltpeter. O. A. BROWN, Illinois.

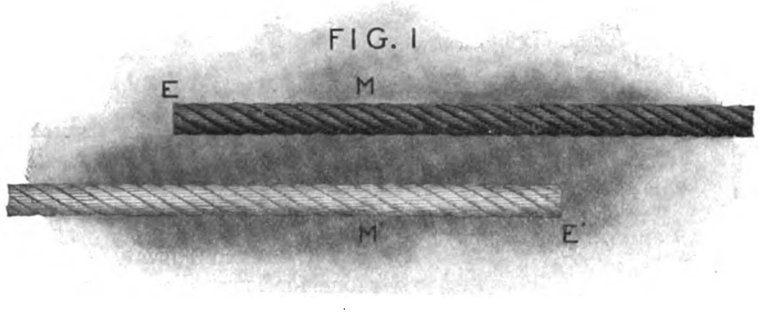
To **anneal self-hardening steel,** heat the piece to a medium red and hold the heat for three or four hours according to the size of the piece. Then bury the piece in a large box of fresh green pine sawdust. If seasoned wood dust is used, it is very liable to burn. Be sure to pack the piece well and airtight. C. B. EVANS, Michigan.

Best Fuel for Use in the Blacksmith Shop.

J. G. JORDAN.

Foreman Blacksmith T. & N. O. Shops.

From my experience of a good many years I have found oil to be the best fuel for furnace work, if the furnace is so constructed that the oil will not come into contact with the iron that you are heating, as there is more fixed carbon in oil than in coal. We make all our driving axles in oil furnaces, and some of these finish up 11 inches in diameter, and we have never had but one break, and that was due to getting too high a heat.

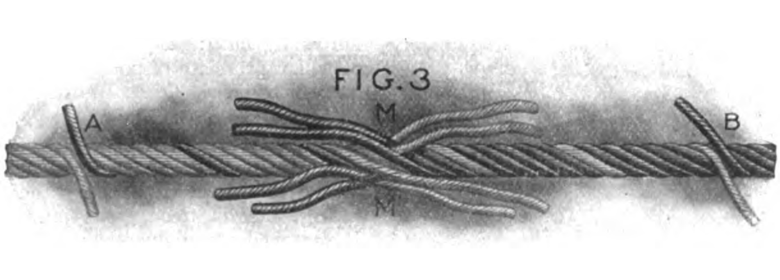


THE ROPE IS CUT TO PROPER LENGTH, AND MARKED

Oil for fuel can only be used in furnaces, or in boxes constructed similar to a furnace, to confine the blaze. With oil for fuel you can weld locomotive frames and straighten most any iron on a car or engine without removing it. This is a great saving.

I do not know of any place where coal has been superseded by oil in forges for blacksmithing. Coal is the mainstay in a blacksmith shop, and will remain so until somebody invents something to keep the heat from spreading on the forge so you can do all classes of work on a forge with an oil burner.

Good coal is the best fuel for blacksmith forge fires, and bad coal is no fuel at all. Now, how to get good coal is a question. Every shipment of coal that I have received of late is out of a different mine. Some is bad, some worse, and some you cannot use at all.

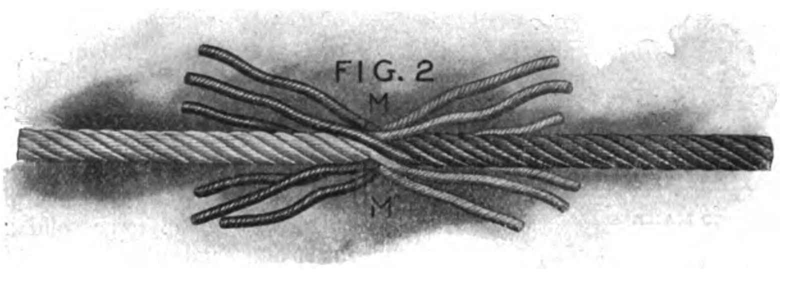


ONE STRAND AT A TIME IS UNLAID AND REPLACED BY ONE FROM THE OPPOSITE END

At times you can get very good coal, but you can never tell beforehand what class of coal you will receive in the next shipment.

A few months ago we received several carloads of so-called "blacksmith coal," with which we had much trouble. The first trouble was with frames. We could not weld them. Then, all the smiths complained that they could not weld iron with it, much less steel. This coal would not make any coke at all. As we could not use it for any purpose whatever, I had our chemist analyze it, to see why welds could not be made with it. The following is the analysis:

Moisture	5.70%
Volatile and combustible Matter	18.21%
Fixed Carbon	43.80%
Ash	27.89%
Sulphur	4.40%



THEN THE STRANDS ARE UNLAID AND INTERLOCKED

You will readily see that it contained entirely too large an amount of sulphur and ash, and not sufficient fixed carbon to make coal fit to use in a blacksmith fire.

The way our blacksmiths do here when we receive bad coal is to keep a memorandum of particular work done, with the date of repairs, and number of engine or order that the work was charged to, and under that write, "Repaired with bad coal," so we cannot hold them responsible for a bad weld.

I agree with Mr. John Buckley in his able address last year, recommending a specification for purchasing agents to follow, and I will add, too, that I believe it would be well for foremen to see their superintendents and master mechanics, and ask them to take the matter up with the purchasing agent and have him buy blacksmith coal according to specifications given:

Sulphur	1.00%
Fixed Carbon not less than	70.00%
Moisture not more than	1.20%
Ash not more than	7.00%

We get our coal mostly from Tennessee or Alabama, as those are the nearest coal fields to Texas that produce coal fit to use for blacksmithing. You cannot get Cumberland or Blossburg coal out here, as the haul is too great.

As we cannot advertise any particular company's coal, even if it is the best coal, we cannot do better than to purchase coal by specification, and make it come up in quality or reject it.

That is the only plan I can see to get good coal. The best coal you can buy is the cheapest in the long run, regardless of cost.

How to Splice Wire Rope.

The tools required are a small marline spike, nipping cutters, and either clamps or a small hemp rope sling with which to wrap around and untwist the rope. If a bench vise is accessible it will be found very convenient for holding the rope.

In splicing rope, a certain length is used up in making the splice. An allowance of not less than 16 feet for ½-inch rope, and proportionately longer for larger sizes, must be added to the length of an endless rope, in ordering.

Having measured carefully the length the rope should be after splicing and marked the points M and M′, Fig. 1, unlay the strands from each end E and E′ to M and M′, and cut off the hemp center at M and M′, and then:

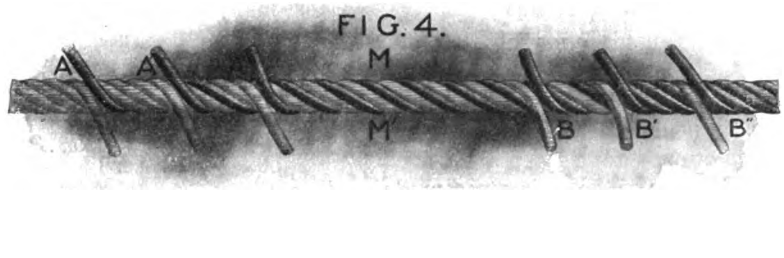
First. Interlock the six unlaid strands of each end alternately and draw them together so that the points M and M′ meet, as shown in Fig. 2.

Second. Unlay a strand from one end, and, following the unlay closely, lay into the seam or groove it opens the strand opposite it belonging to the other end of the rope, until within a length equal to three or four times the length of one lay of the rope, and cut the other strand to about the same length from the point of meeting, as shown at A, Fig. 3.

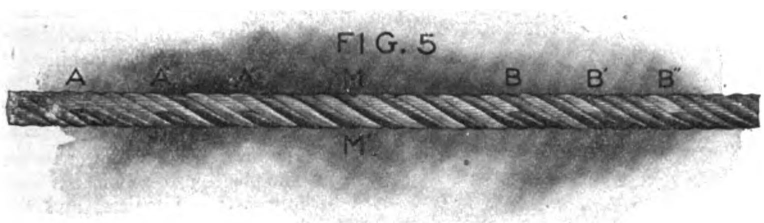
Third. Unlay the adjacent strand in the opposite direction and following the unlay closely, lay in its place the corresponding opposite strand, cutting the ends as described before at B, Fig. 3.

The four strands are now laid in place terminating at A and B, with the eight remaining at MM′, as shown in Fig. 3. It will be well after laying each pair of strands to tie them temporarily at the points A and B. Pursue the same course with the remaining four pairs of opposite strands, stopping each pair about eight or ten turns of the rope short of the preceding pair, and cutting the ends as before. All the strands are now laid in their proper places with their respective ends passing each other, as shown in Fig. 4. All methods of rope splicing are identical up to this point; their variety consists in the method of securing the ends. One good way is as follows:

Clamp the rope either in a vise at a point to the left of A, Fig. 4, and by a hand clamp applied near A, open up the rope by untwisting sufficiently to cut the hemp core at A, and, seizing it with the nippers, let your assistant draw it out slowly, you following it closely, crowding the strand in its place until it is all laid in. Cut the hemp core where the strand ends and push the end back into its place. Remove the clamps and let the rope close together around it. Draw out the hemp core in the opposite direction and lay the other strand in the center of the rope in the same manner. Repeat the operation at the five remaining points and hammer the rope lightly at the points where the ends pass each other at AA, BB, etc., with small wooden mallets, and the splice is complete, as shown in Fig. 5. If a clamp and vise are not obtainable, two rope slings and short wooden levers may be used to untwist and open up the rope.



AFTER ALL STRANDS HAVE BEEN INTERLACED THEY ARE CUT



THE FINISHED SPLICE SHOWS ONE CONTINUOUS PIECE OF ROPE

A rope spliced as above will be nearly as strong as the original rope, and smooth everywhere. After running a few days, the splice, if well made, cannot be pointed out except by the close examination of an expert.

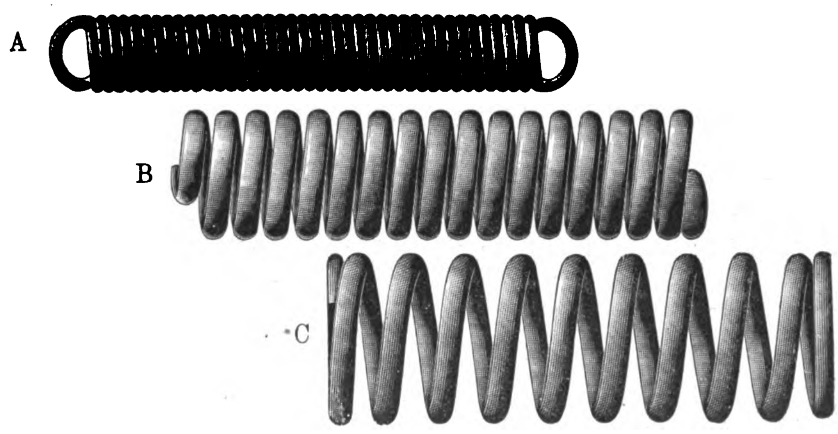
We are indebted to The American Steel and Wire Company for this description and the illustrations of how to splice wire rope.

The Design of Spiral or Helical Springs.

F. E. WHITTLESEY.

As the blacksmith often has to use springs, a few suggestions regarding their design may be of use. All springs may be divided into three great classes —extension, which pull out; compression, which push together; and torsion, which twist. The material used is steel, brass, and phosphor-bronze. Springs must be so made that they will do the work required without being strained beyond their elastic limit. In fact, springs for safety valves, gas engines, or any work where special security is desirable, should be so designed as to keep the strains far below the elastic limit.

Steel springs should always be used, excepting that brass or phosphor-bronze springs may be necessary in wet places, as in pumps, to prevent rusting. Furthermore round material should always be used, as it makes a better and cheaper spring than flat or square material.



THE SPRINGS SHOWN ILLUSTRATE (A) THE EXTENSION, (B) THE TORSION, AND (C) THE COMPRESSION TYPES

In outlining the principles of extension and compression spring construction we will use the following formulas:

Formula No. 1: $f = \dfrac{D^2}{50d}$

Formula No. 2: $f = \dfrac{PD^3}{1{,}575{,}000d^4}$

Formula No. 3: $P = \dfrac{31{,}400d^3}{D}$

The letters used represent the following:

f = the extension or compression of one coil in inches, or, in other words, the deflection of one coil in inches.

D = diameter of the spring measured from center to center of the wires, called the pitch diameter.

d = the size of steel in inches.

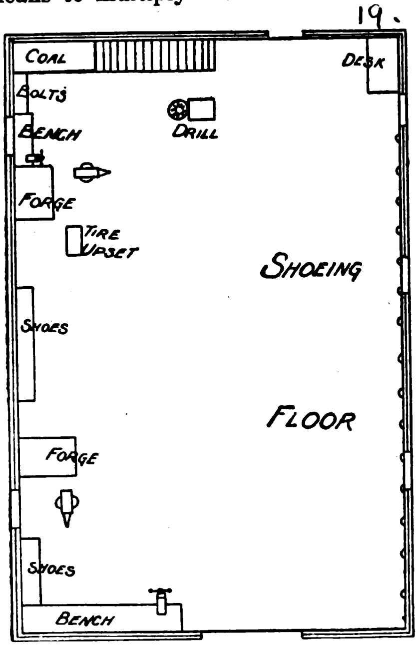
P = power exerted by the spring.

These formulas apply only to compression springs and to round steel extension springs with no initial tension. Initial tension in extension springs is the ability to hold weights up to a certain amount without the coils separating.

Now, the man who has never studied algebra need not think himself unable to handle these formulas, as they are very simple and easily applied and we will explain their use fully. The man who still remembers the tussle he had with $x^2+2xy+y^2$ can consider himself fortunate, and he is invited to omit the following paragraph.

The sign D^2 simply means to multiply the diameter of spring by itself, while D^4 means to multiply the diameter of the

19.



FLOOR PLAN OF A PENNSYLVANIA SHOEING SHOP

wire by itself four times. In solving the formulas the figures above the line are to be multiplied together; the figures below the line multiplied together, and the first product divided by the second.

Example: How much can a compression spring hold if of two inches pitch diameter and made of ¼-inch wire? For this we use formula No. 3.

$$P = \frac{31{,}400 \times \frac{1}{4} \times \frac{1}{4} \times \frac{1}{4}}{2} = \frac{490\frac{5}{8}}{2} = 245\tfrac{5}{16} \text{ lbs.}$$

How many coils will there be in this spring when 10¼ inches long? Use formula No. 1 to find the space allowable between each coil.

$$f = \frac{2 \times 2}{50 \times \frac{1}{4}} = \frac{4}{12\frac{1}{2}} \text{ or } \frac{8}{25} \text{ or } .32 \text{ inches.}$$

As ¼ inch is the size of the wire, or .25 inches, therefore the pitch of the spring is .32 + .25, or .57 inches, which is the space occupied by each coil.

On compression springs one coil is usually squared and ground on each end of the spring to give a flat bearing surface; therefore deduct twice the size of the wire from the total length to find the acting length: $10\frac{1}{4} - \frac{1}{2} = 9\frac{3}{4}$ inches acting length. $9\frac{3}{4} \div .57 = 17$ acting coils in the spring. The total number of coils will be 17 plus the two coils squared on the ends, or 19.

To find the distance the spring will compress with any weight less than 245 lbs., which we found is the weight it will hold when compressed just together, we use formula No. 2. We will figure the weight at 150 pounds.

$$f = \frac{150 \times 2 \times 2 \times 2}{1{,}575{,}000 \times \frac{1}{4} \times \frac{1}{4} \times \frac{1}{4} \times \frac{1}{4}} = \frac{1200}{6152}, \text{ or about}$$

$\frac{15}{77}$ inches per coil. Our spring has 15 acting coils, therefore the compression of the spring with 150 pounds will be $15 \times \frac{15}{77}$, or nearly 3 inches.

To find the weight a spring will hold at a given deflection per coil, use formula No. 2 transposed thus:

$$P = \frac{1{,}575{,}000d^4f}{D^3}$$

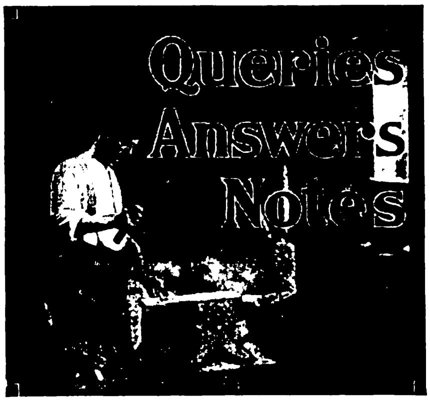
Example: How much will a compression spring of the following dimensions hold when compressed two inches: 1½ inches pitch diameter, 6 inches long, ⅛-inch wire, 10 acting coils? 2 inches compression for 10 coils is ⅕ inch per coil.

$$P = \frac{1{,}575{,}000 \times \frac{1}{8} \times \frac{1}{8} \times \frac{1}{8} \times \frac{1}{8} \times \frac{1}{5}}{1\frac{1}{2} \times 1\frac{1}{2} \times 1\frac{1}{2}} = \frac{76.9+}{\frac{3}{8}}$$

or nearly 22.8 pounds.

These formulas are based on a fiber stress of 80,000 pounds per square inch. When it is necessary the spring maker can produce springs to stand 100,000 pounds per square inch or even more, in which the coils will be proportionately farther apart, but it is better to avoid these high stresses. Springs for gas engines, safety valves, etc., should be made with 10 to 20 per cent more coils in the same length, than is obtained by the above formulas. This greatly lessens their liability to breakage, the springs supporting proportionately less weight at the same deflection.

Brass and phosphor-bronze springs will stand fully as much deflection as steel springs, but will sustain only ½ to ¾ of the weight at the same deflection.



The following columns are intended for the convenience of all readers for discussions upon blacksmithing, horseshoeing, carriage building and allied topics. Questions, answers and comments are solicited and are always acceptable. Names omitted and addresses supplied upon request.

Wants to Build a Sand Belt Machine.—I would like some brother to tell me how to make a sand belt machine. I would also like a chisel mortiser. Can some brother help me? J. B. Myers, Indiana.

On the Setting of Hub Boxings.—I noticed that Mr. Neil O'Gorman was inquiring about the position of a box in a wagon hub. As I follow that business, and make it a specialty, I will give him my rule. It is not at all times possible to do this, but where there is sufficient room in the hub, my rule is to equally divide the box on the spokes of the wheel, or in other words, have the spokes in the hub set directly over the middle of the box. It will make a great deal of difference in the rimming of the wagon wheel. C. F. Rhodes, Arkansas.

Another Reply to the November Kick.—I have just read in the November number, the article "A Kick, and the Other Side," signed by "Your Subscriber." I would like to say that I have taken your paper since the first number, and I consider it a rare thing if I do not get the price of a year's subscription from a single number. I think it is growing steadily better. Perhaps "Your Subscriber" is like some of the smiths in this town. They know it all, without any trade paper. I suppose I am "engine struck" as I am very much interested in gasoline engines and intend to install one in the spring, and am very much interested in the article on power. And I say, give us Thornton's Letters and Benton's recipes, the more the better. I am also very much interested in articles on shoeing, as I want to learn all I can about that branch of the trade. Am sending sketch of floor plan of my shop. It is a two-story building with wood shop on second floor. Work has been very good this season. A Pennsylvania Smith.

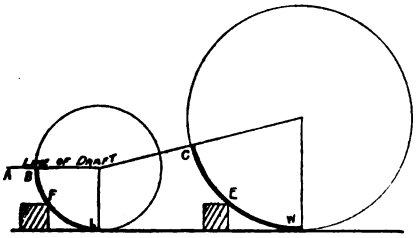
How to True an Emery Stone.—I would like to know what to use to true up the face of an emery stone. Can someone enlighten me? Luke Blabey, Canada.

In Reply.—Emery wheel dressers may be had at the supply houses. They are of the circular type and are held against the edge of the wheel. The edges of the circular cutters are pointed like saw teeth, and they reduce the emery by hacking out the grains. The emery wheel must be revolved slowly at a speed of about 80 to 100 feet per minute, and the cutting must be light. The cutting must be from the edges toward the center to prevent the edges of the wheel from breaking away. B. L. K., New York.

How to Recut Old Shoeing Rasps.—Some one will say, "That won't pay." That is what I said, but just to try it I took an old rasp, annealed one end, took a three-cornered file, and went over it, bringing it up to a nice sharp point, and, after re-tempering it, to my surprise it would do nicer and smoother work than a new one and last just as long.

In reply to several inquiries as to welding broad, heavy tires: I use Laffitte Welding Plate, which gives very satisfactory results. I get it from Cray Brothers, Cleveland, Ohio. R. R. WOLFORD, Ohio.

And Yet Another Solution.—I notice that "The Wheel Problem" seems to afford some controversy. I think the matter is very clearly and easily understood if looked at in this way: The accompanying sketch represents that part of the gearing of a wagon which we deal with in this problem. The pull of a team, approximately, acts along the line of draft as represented by line ABC. Now consider that part of the rims of the wheels BFL and CEW, represented by the heavy lines, as levers, and the obstacles to be run over as the fulcrums. Again, the power acting on one arm of the lever, the pull of the team is acting in the direction of the line of draft ABC. The force acting on the end of the other arm is that part of the weight of the load, which acts vertically downward through the hub, directly on the part of the rim at L and W. Now, looking at the front wheel, one sees, since the arms BF and FL are equal, the power to pull wheel over the obstacle must be equal to the weight on the wheel. Looking at the back wheel, one sees that the arm CE is greater than the arm EW, hence the power required to draw the wheel over that obstacle is less than the weight on that wheel. So much for theory, now for practice. For work about a ranch (and this is the dry belt, where the roads, although sometimes steep, are hard and smooth), I prefer low-down



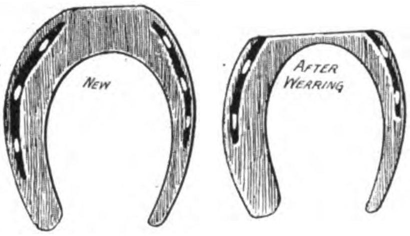
AND YET ANOTHER SOLUTION TO THE WHEEL PROBLEM

trucks, as they make the work in loading and unloading so much lighter, and this is a great consideration. But for a man doing a great deal of hauling on roads, I would advise the larger wheels, at any rate if the roads are at all bad or stony. Yet if the roads were perfectly smooth, I fail to see what advantage, as regards light running, one type of wagon has over the other, excepting that in the wheel of the low-down type there is less material, and hence, gear for gear, the low-wheeled wagon should be somewhat lighter in construction, thus benefiting the horses.

Perhaps it would not be out of place here to record the well-known fact that the reason for the front wheels being smaller is that by so being, they will enable the tongue of the wagon to swing around more, permitting wagon to be turned in a smaller space. L. S. GEORGE, British Columbia.

Can You Name It?—I have a six-foot engine lathe of which I do not know the name. It has a rod and screw feed, uses round belt on rod feed pulleys which have three grooves. It has a four-step pulley on lathe, and countershaft, and uses a two-inch belt. It uses a heavy weight to steady the carriage and rest, and takes in 42 inches between centers and swings 15 inches. It has a crank screw to raise tool on slide rest. Maybe some AMERICAN BLACKSMITH reader can give the name of this lathe and where made, as I need some repairs for it. This lathe is said to have been used in the Government Arsenal at Watertown, N. Y. Would also like to see a design and description of a homemade bolt cutter with a crank so that you could use a chuck out of a hand stock. ED. LANDER, Kansas.

Wants to Stop the Dragging.—I have received all the copies of THE AMERICAN BLACKSMITH, and am well satisfied with

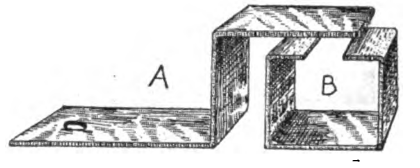


THE ANIMAL DRAGS BOTH HIND FEET

them. I would like to have some subscriber give me some idea as to how to shoe a horse that drags his hind feet along the road. In four weeks he cuts the toe of the shoe right through. I shod him with a piece of old rasp placed upon the front of the foot, but still he cuts them out, and wears nearly all the horn down to the quick. T. W. FOWLER, New Zealand.

A Word of Thanks.—I wish to express my thanks abundantly to W. A. Short for his explanation of the measurements of a wood axle. He could not have explained it more thoroughly if I had been talking with him and asking him questions about it. I have put in hundreds of them, but I always went by the old axle, as he says, to get the length, except to get my pitch and gather. Now, if I can help Mr. Short, or any other brother, with any point or subject I would be more than pleased to do so. I have been a reader of THE AMERICAN BLACKSMITH for over six years, and I find it the best journal in the field. It is worth treble what we pay for it, and any man who finds fault with "Our Journal"—well, I'll feel sorry for him when he reaches the judgment gate. C. W. METCALF, Iowa.

The Secrets of the Forge Fire.—There are many smiths who know how to build a fire, but here is the problem: Do they know how to use it? or do they know the secrets of the fire after it's built? I have read many articles like Mr. R. T. Woodson's. He writes good common sense, but he doesn't give the secrets of the fire. He says not to use fresh coal. The first reason, there is no heat in it, and the second reason is that it is not fit to weld with. To ex-



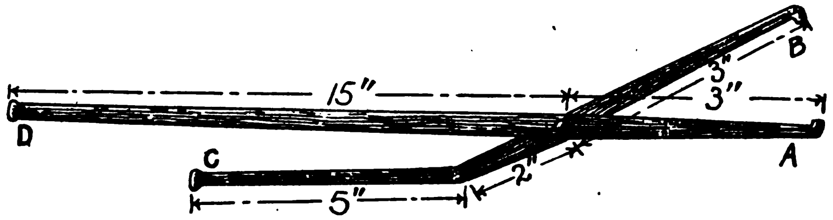
A WRENCH FOR HOLDING HARROW TEETH

plain this, let the reader take an iron and place it in a fresh fire and heat it to just a red heat and notice the condition it is in. Then heat a piece in a coke fire and compare the two pieces. You will notice that the one heated in the fresh fire will have a scale of sulphur on it, while the other is free from any sulphur. Another point is that you should turn on the blast lightly before placing your work in the fire. And here is the point where we get so many slipshod welds, you will place your iron in the fire and then poke away at it before you turn on the blast. I just want to start the ball and let the other fellow pick it up and throw it over to first base. Who will do it? C. W. METCALF, Iowa.

A Wrench to Hold Harrow Teeth.—To hold harrow teeth in channel bar harrow, I made a wrench as follows: I took a half-leaf of buggy spring, punched a square hole in the thick end large enough to slip up on the tooth two or two and a half inches, then bent it as shown at A. I then formed a U, as at B, a little deeper than the channel bar is wide, with the opening at top about one sixteenth of an inch wider than the thickness of the bar. I riveted this with two rivets on top of the short end of the angle, slipped the U over the channel bar, gave a quarter turn down, slipped wrench onto tooth, and it holds it nicely. Try it, brother. LUKE BLABEY, Canada.

A Good Example to Follow.—I got my paper this evening, and, as always, I started at the cover and read through to the back. Well, I got along till I struck the calendar ad, and I concluded that I wanted some, so I stopped right there and wrote for some. I went back to my paper, and on the first page you remarked you would like the names of all the blacksmiths and shoers I knew, so I quit again and wrote a list of them. Then back to my paper again, and I strike a man that I would like to shake with, that John M. Pfeiffer and his one-man association. More power to him. Just let him stick to it, and he will find out he will come out all right. I raised prices July first, and, of course, some of my customers made a holler, but I found out that the majority care more for a good job than the extra five or ten cents. Some of my customers went to my competitor, and some to other towns with their horses, as I made the biggest raise along that line. But they all came back, and don't say a word now about prices. I use good shoes and good nails, and as I followed shoeing alone for ten years it was quite a revelation to them to find out the difference between a poor job and a good one. I have also been doing a little missionary work on the side, and have got the two shops in the next town to raise, as they found out that all my horses didn't come there when the price went up, so they came to the conclusion to try it November first. Well, I guess I have said enough on the subject, but it makes me feel good to think that my asserting my independence should be the cause of making some more of the boys sit up and take notice. J. S. CORNWALL, JR., Iowa.

How to Weld Wide Tires.—I see much in "Our Journal" in regard to the way some brother smiths weld broad tires. Some weld one side and turn and weld the other side, and some say to put bricks above the tire. Now, brother smiths, let me tell you how I weld broad tires. First, I scarf both ends, and then bend nice and round; after that I put them in the fire and do not use any nail or rivet to hold the tire, as I suppose some do, but simply heat to a nice white heat, and then bring the tire out on the anvil and have my helper give the first stroke. Then I follow with hand hammer and get a weld that cannot be beat. In most cases, I find the tire right when through welding. I then put them back in the bender and true up at weld. Then they are ready for the wheels. I refer to four-inch tires, and in no case have I had any trouble. I think when I read the Journal sometimes that the boys haven't had much experience with all kinds of work. Now, boys, spruce up, and don't take a back seat, but work to the front, and after you grow older in the work you will understand better how to talk about such things. and say I was right in giving you such advice. That is what I tell my boys, and I have two to help me. I have two fires in my shop, and good ones at that. No pumps as we had when I learned my trade. Those days are gone, and I am running a general shop for all kinds of work. Horseshoeing is the work I like best and I have my share, if not more, and I don't take a back seat in shoeing. I shall have worked at my trade for 33 years in April, 1908. This comes from an everyday smith. One question, and then I'll stop: Where does a buggy wheel run faster, at the top or bottom? I will give my answer next time I write. Long live "Our Journal!" JESSE CORNELIUS, Pennsylvania.



A HANDY TIRE PULLER EASILY MADE

A Handy Tire Puller.—I submit a device that I use to pull on tires when I set them. I think anyone will understand the working of it. The lever is made of ⅞-inch round iron and is tapered square from the rivet hole. It offsets ½ inch to the right side, about ⅞ inch from the short end, so it will come directly in line with the dog. The dog is made of ⅞ by ½ inch, the long part being rounded as the smith wants it. The end of the lever A is placed against the face of the rim; the dog B is hooked over the tire with the end of the short lever C resting on the floor, with the left hand on the long lever D the tire is quickly and easily put in place. P. M. W., New Hampshire.

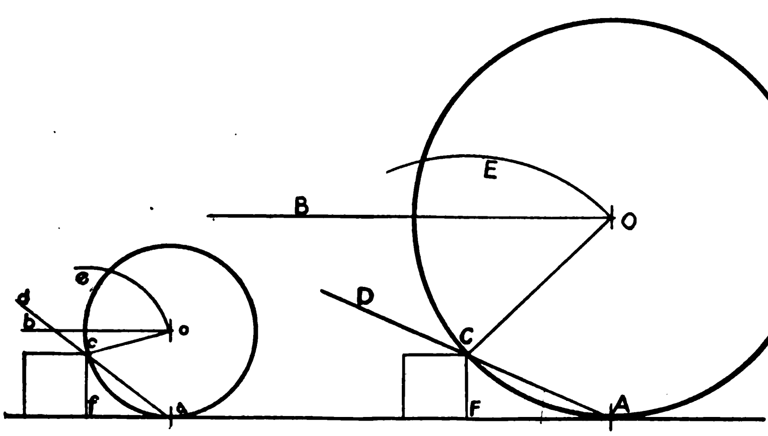
A Californian's Ideas on the Wheel Problem.—I have heard this high and low-wheel problem discussed many times, and have read many publications in regard to it, but find no explanation that appeals very strongly to my version of the problem or its usefulness. There are technical points in the question, and the solutions as given by brothers Wade, Daron, and Primmer which might be proven otherwise, but they are all mostly right as to their respective understandings of the question, and I have wondered why such wise brothers have not given my solution. It seems that brother Daron is thinking only of the wheels, and not of the loads the axles carry. He forms his conclusions from them, when in reality their difference in weight is a very small factor when compared to the ton or more which the axles are to carry. Here is the question as I think it is intended: Which will require the greater amount of power to draw from town to town over rough and indifferent roads—a loaded wagon with high wheels or a loaded wagon with low wheels, it being conceded that the wagons are of equal strength and carry the same weight of load?

First, you will all concede that it is easier to roll a full cider barrel than to lift it. Second, the steeper the incline up which you try to roll a barrel the greater the amount of energy required to move it a given distance. Third, the more nearly you pull or push in the direction in which an object must be moved the less will be the amount of energy required to move it.

Refer now to my illustration, in which I show a greater difference in the size of wheels than does brother Daron, so that the difference in draft can be more readily seen. The loads carried by the two wheels have to travel in the direction of the curves *oe* and OE; thus you see that the smaller the wheel the steeper will be the incline. The lines *ad* and AD show the average inclines, and I would like every brother to look at these inclines and decide for himself, after reading our first deduction on the cider barrel, if large or small wheels have less draft when both carry equal loads.

Every wheel carrying much load will sink into the earth to a certain extent. The larger wheel, having more tire surface, will pull easier than the small wheel, even if they both sink an equal depth into the earth. If you would have your wheels last longer, put your load lower. Below the axle is better than above it, as traveling over rough or indifferent roads causes end-thrusts of the axle. These thrusts are caught by the lower wheel, which has the greater part of the load to bear at the time of the thrust. Another great saving the big wheels make in power is when traveling over gravel or over blocks that are near together. As in the illustration you will readily see that the larger wheel will not hang so low to the ground as the smaller wheel.

Here in California there is a great deal of logging with high wheels from 10 to 16 feet in diameter, and everyone familiar with the ease with which two horses can transport a log 60 inches in diameter and 24 feet long, which would require six horses to draw on a wagon with wheels 42 inches high, is inclined to have a very poor opinion of our eastern brothers who think there is no advantage in high wheels. Experience tells. R. L. SWANSON, California.



A CALIFORNIAN'S IDEA ON THE WHEEL PROBLEM

A Letter and Price List from Kentucky.—Being a reader of THE AMERICAN BLACKSMITH, and reading how so many began the good old trade, I thought I would tell my story. My father was a farmer and also a very good blacksmith, so he kept a few tools to do his own work with. He never did like to work for the public, so every chance I got I was in the shop making some little thing, and as I got so I could do very good work, he made me do all the repair work and the shoeing of the horses. I stayed with him till I was nearly 21 years of age. Then I asked him one day if he would loan me his old tools awhile if I could rent the old shop at an adjoining town, for I wanted to run a shop. He consented, so I went to see about the shop. The owner said I could have the shop for a dollar a month. I rented it and moved in the next day—didn't have a dollar in the world. I shod one horse the first day, and the second day there came in a set of buggy wheels to cut down and run, and from that day to this I have had all the work I could do, and I have been at it six years. The second year I bought an old Tom Tardy shop and six acres of land around it, and I got that paid for. Then I wanted a new shop. I built a good frame shop, 20 by 30 feet, and last spring I built another room onto it, 18 by 20. I now have plenty of room and a good set of tools, and everything paid for. I have got over $600 worth of stock and tools, and do a general blacksmithing and woodwork business. I have no power in my shop, but hope to have in the future. I give below a few of the prices I get here in old Kentucky:

4 new shoes, plain	$1.00
4 new shoes, steel toed	1.40
Side weights, each	.40
Resetting old shoes, each	.15
To fill hind wheel	$3.50
Front wheel	3.00
Felloes, each	.20
Spokes	.15
Tongue	2.50
Hounds, front	2.50
Hounds, hind	2.00
Resetting tires up to 2 inches, each	.50
Resetting tires over 2 inches	.75
Buggy rims, per set	6.00
Tires, reset per 4	2.00
Shafts per set, complete	4.00
Single shaft	1.50
Crosspiece	.75
Singletree	.50
Bow sockets	.50

And all other work in proportion, with job work at 50 cents per hour. I love THE AMERICAN BLACKSMITH paper, and can hardly wait for it to get here. I think it the best journal on blacksmithing I ever saw. I notice in the November number some subscriber is kicking about the paper. I don't see how it could be any better. He says he is opposed to Thornton's letters and Benton's talks. Now, all the objections I have to them is, Thornton just don't write his letters long enough, and let Mr. Benton come on with some more of his good recipes. T. E. TINSLEY, Kentucky.

A Power Shop of York State.—Last spring we purchased a four-horsepower Fairbanks-Morse gasoline engine with which we are very much pleased. We run a 12-inch rip saw and a drill, and will put in more machines later. The ripsaw is a great helper to us on our woodwork and also in cutting off fingers. I very carelessly sawed off my index finger on my left hand and also cut my palm.

We keep one man most of the time. We have no other shop to buck against now, but at one time there were two other shops doing business here. We do all kinds of work in wood and iron and also do shoeing. Other prices run as follows:

New shoes, each	$.30 to $.35
Resetting	.15
New bolsters	2.00
New bolster stakes	.40
Wagon spokes, each from	.15 to .25
Setting 4 buggy tires	1.50
Setting 2-inch tires	2.00
Setting 3-inch tires	3.00

Other prices are about the same proportionately. W. H. MOSS, New York.

A Letter From a Scotch Brother.—I value "Our Journal" very much and find in it many things of interest to the craftsman. I hope you will always be successful. I eagerly look forward to the coming of THE AMERICAN BLACKSMITH every month. I am sending you herewith a picture of my shops. Opposite you will observe the "auld kirk" (old church), which dates back to the year 1418, long before the reformation here. JAMES THORN, Scotland.

A GENERAL POWER SHOP OF YORK STATE

What Smiths Are Getting for Their Work in Various States.

Alabama.

Horseshoeing, 4 new shoes	$1.00
Setting buggy tires, per set	2.00
Buggy spokes, per pair	.10
Wagon axle	1.50
1 set of buggy axles	4.50
New set of buggy tires	4.00
Setting dray tires, 4 by ¾	4.00
New buggy shafts, per set	2.25
New wagon pole	2.00
New buggy pole	3.50
New rimming buggy wheels, per set	5.00
Painting buggies	6.00
Soldering bandsaws	.25
Tempering planer bits	.15

Alaska.

Horseshoeing, new shoes	$5.00
Horseshoeing, bar shoes, each	2.50
Resetting	$3.00

Arkansas.

Shoes toed	$1.20
Plain	1.00
Plow sharpening	1.00
Wheel filled	$3.50 to 5.00
Wagon tongue	2.00
Wagon axle	2.50 to 3.00
Wagon singletrees	.75
Doubletrees with thill	1.25
Doubletrees without thill	.75
Neck yokes	.75

California.

4 new shoes	$2.00
4 old shoes	1.50
Setting tires, each	1.00
New tires from	$12.50 to 15.00
Stubbing buggy axles	10.00 to 12.50
Pointing and sharpening plows	1.00 to 1.25

Rimming buggy wheels, each	$2.00
New spoke	$.25 to .50
Tongues	5.00 to 7.50
New shafts, old iron	5.00

Florida.

Shoeing, per set of 4 plain	$1.50
Fill 3-inch wheel rims and spokes	3.50
Fill 2-inch wheel rims and spokes	2.75
Shrinking 2-inch tires and under	.50
Shrinking buggy tires	.75
Shrinking 3-inch tires	.75
Wagon shafts complete with singletree	3.75

Illinois.

New shoes, per set	$2.00
Resetting, per set	1.00
Setting buggy tires	2.50
Setting wagon tires	2.00
Pointing cultivator shovels	2.00
Sharpening cultivator shovels	.40
Pointing and sharpening share	1.00
One new axle	3.25
Setting buggy axle	1.00
Wagon tongue	2.50
Bolsters	1.50

Indiana.

Four new pressed shoes	$1.25 to $1.50
Four hand-turned shoes	2.00
Four tires set	2.00
Four buggy tires set	1.50
Four new wagon tires, 3 in. by ½ in.	10.00
Four new buggy tires	4.00
Wagon axle	3.00
Wagon tongue, only	2.00
Plow shoes ground, each	.15
Steel lay shape	.20
Road scraper blades sharpened	2.50

AN "AULD KIRK," DATING BACK TO 1418, IS OPPOSITE THIS SCOTCH SMITHY

Indian Territory.

New 16-inch crucible plowshares	$3.25
Pointing from 12 to 16 inch	$.65 to .75
Sharpening shares	.15 to .25
Setting wagon tires	2.00
Setting buggy tires	3.00
Horseshoeing, plain	1.00
Horseshoeing, toed	1.25

New spokes in wagon, each........$ .20
New wagon axles, front, $4.00; hind.. 3.50
Buggy tongues 3.25
New buggy rims.................... 1.25
Four new wagon skeins put on, $3\frac{1}{2}$-inch 8.00
New wagon box with side boards, complete..........................14.00
Lower box, all new, painted.........10.00
Setting a spring buggy axle......... 1.00

Iowa.

Horseshoeing, plain, each...........$ .50
Horseshoeing, racing plates, each.... .75
New wagon wheel, average.......... 5.00
Wagon wheel spoked................ 3.00
Wagon wheel rimmed............... 2.00
Wagon hounds, per pair............ 3.00
Wagon axle, hickory............... 3.00
Wagon hind bolster................ 2.00
Wagon stakes for bolster, each...... .25
Buggy wheel, D grade, $\frac{3}{4}$ and $\frac{7}{8}$....... 3.50
Buggy body, piano, with seat........10.00
Buggy shaft...................... 1.25
Plows sharpened, 6 and 7........... .10
Larger plows sharpened. ....$.15 to .30
Credit prices 25 per cent higher.

Kansas.

Pointing 4 broad shovels............$1.50
Pointing 6 small shovels............ 1.75
Pointing 2 plows.................. .65
Sharpening plows.......... $.15 to .20
Making lays, 16-inch.............. 3.00
Making lays, 14-inch.............. 2.75
Making lays, 12-inch.............. 2.50
Setting tires...................... 1.50
Putting in spokes.................. .15
Putting in felloes.................. .20

Maine.

Four new shoes...........$1.25 to $2.00
Bar shoes, plain, per pair........... 1.00
Bar shoes, calked, per pair.......... 1.25
Hand turned, per set .....$1.50 and 2.00
Resetting 4 shoes ....75 to 1.00
Feet dressed with leather tar and oakum ....35 to .50
Rubber pads...................... 2.00
Neverslip......................... 2.00

Massachusetts.

New shoes, light...................$1.25
New shoes, heavy.................. 1.50
Toe and set........................ .80
Reset .... .60
Buggy tires reset.................. 2.00
Wagon tires, according to heft, from ....$2.00 to 4.00
Setting axles, light................ .75
Mending shaft irons................ .50
Putting on new light tires........... 4.50
New stubs, light.................. 6.00
Spokes, singly.................... .25
Spokes, more than one.............. .20
New buggy shafts.................. 1.50
New buggy shafts without leather.. ....$1.75 to 2.00
Reach or coupling pole...... 1.50 to 1.75

Michigan.

Four new shoes, hand made.........$2.00
Four new shoes, machine made...... 1.40
Four shoes set..................... .60
Four new Neverslip shoes........... 2.50
Wagon tongues, new............... 1.50
Tire setting, buggy................ 2.00
Tire setting, wagon, 3 in. to $3\frac{1}{2}$in. ... 2.50
Tire setting, $1\frac{1}{2}$ to 2................ 2.00

Minnesota.

Four toed shoes...................$1.40
Side weight shoes, per pair.......... .75
Plates, per pair................... 1.00
Plow sharpening, 2-horse, 12-inch .... .15
Plow shares, 2-horse, 12-inch 3.00
Plow moldboards, 12-inch........... 3.50
Drill points...................... 2.00
Sharpening disk plows.............. 1.50
Wagon tires, $\frac{5}{8}$ by $1\frac{1}{2}$.............. 8.00
Resetting, 60 cents each; per set..... 2.00
Wagon axles, front $2.50; back...... 2.25
Sharpening road grader............ 2.50
Pointing cultivator shovels.......... 1.50
Resetting tires, 60 cents each; per set. 2.40
New pole......................... 2.25

Mississippi.

Shoeing, four new shoes............$1.50
Resetting, four old shoes........... 1.00
Shoeing in stocks.................. 2.50
Buggy and wagon spokes....$ .15 to .25
Rims .... 1.00 to 3.00
Wagon tongues, each....... 1.50 to 2.50
Hounds, per pair .... 3.00 to 4.50

A COPPER BOX WITH BYZANTINE ORNAMENT BY MR. THOMAS GOOGERTY, INSTRUCTOR AT ILLINOIS STATE REFORMATORY

Bolsters.................. 1.00 to 4.00
Setting buggy tires................ 2.50
Wagon tires, per set........ 2.00 to 4.00
Sharpening one-horse plows, each.... .10
Pointing one-horse plows, each...... .25

Missouri.

Four new shoes...................$1.50
Four old shoes.................... .80
Sharpening plow................... .25
Sharpening lister.................. .30
Sharpening subsoiler............... .10
Sharpening four cultivator shovels... .40
Pointing four cultivator shovels...... 2.00
Pointing plow.............$.50 to 1.00
Setting tires, each................. .50
Spokes, each...................... .15
Felloes, each...................... .20
Bolster, wood only................ 1.50
Welding sickle..................... .50
Welding sulky rake axles........... 1.00

Nebraska.

Setting new shoes, each.............$ .40
Setting old shoes, each............ .25
New plow lays, crucible............ 3.50
Point lister....................... 1.00
Point plow....................... 1.15
Point shovels..................... 2.00
New shovels...................... 4.00
New tongue, complete.............. 5.50
Buggy tongue, old circle and irons.... 3.00
New wagon axle, hind.............. 3.50
Bolsters 2.00
Cutting down wagon wheels, per set..10.00
Tire setting, per set............... 2.00

New Hampshire.

Four shoes..............$1.00 and $1.25
One pair bar shoes................ 1.00
Setting 4 new tires................ 5.00
Resetting........................ 1.50
On lumber wagons for resetting, from $2.00 to 4.00

New Jersey.

Four new iron shoes.......$1.25 to $1.50
Four new steel shoes............... 1.50
Four new hand-turned shoes........ 2.00
Two new bar shoes........ 1.00 to 1.25
Four new Neverslip shoes........... 2.50
Four reset shoes.................. .40
Four old reset shoes, calked......... .60
Four old reset shoes, sharpened...... .60
Neverslip calks.................... .05
Leather pads.............. .35 to .50
Resetting buggy tires.............. 1.90
Resetting wagon tires...... 2.00 to 2.50

New Mexico.

Four new shoes, plain..............$1.50
Four shoes, toed.................. 2.00
Four shoes, reset..................$ 1.00
Setting 4 tires, 3 inch, per set........ 4.00
Setting tires, 3 inch, each........... 1.50
Setting 4 tires, 4 inch, each.......... 2.00
Setting buggy tires, per set.......... 4.00
Four new buggy tires, $\frac{5}{16}$ by $1\frac{1}{4}$......10.00
$1\frac{1}{4}$ axle stubs, per set of 4............10.00
$1\frac{1}{2}$ Axle stubs, per set of 4............12.00
Spokes and felloes, each............ .30
Axles, 3 by 4..................... 4.50
Axles, larger..................... 5.00
Wagon tongue put in............... 4.50
Tongue hounds, each............... 1.50
Hind Hounds, each................ 1.75

These prices are a little higher than any which I have seen published in "Our Journal," but we have to pay so much more for material, and living is very high, and blacksmith's wages are from $3.50 to $4.00 per day. And at that it's very hard to get help. Our competitor's prices are lower than ours, but we have all we can do. I don't think a few cents difference in price makes very much difference to people who want good work.

New York.

New shoes, 1 to 5, each.....$ .25 to $ .35
Bar shoes, per pair, 1 to 5... 1.00 to 1.50
New light tires, per set............ 4.00
Setting light tires, per set........... 1.60
Heavy tires up to $2\frac{1}{2}$ inches......... 2.00

Ohio.

New shoes........................$1.50
Resetting .... .80
Bar shoes, each................... .75
New plow lay..................... 3.50
New lister lay..................... 3.50
Pointing plow..................... .75
Wagon tongues.................... 2.50
Buggy tongues.................... 2.50
Box, handmade 12.00

Oklahoma.

Horseshoeing............. $1.25 to $2.00
Tire setting, per wheel .... .50
Plow work, sweeps, each..... .10 to .25
Plow work, breaking, each... .15 to .35
Pointing breaking plows..... .50 to .75
Sharpening listers .... .25 to .30
Welding circles............. .75 to 1.00

Pennsylvania.

Horseshoeing, per set of four, 0 to 4..$1.00
Horseshoeing, per set of four, 5 to 7.. 1.25
Setting four buggy tires............ 1.60
Removing four shoes.............. .50
Four buggy rims.................. 4.00
Four buggy tires.................. 4.00
Buggy spokes..................... .15
Horse cart shafts, per pair.......... 4.00
Two and four-horse wagon poles or tongues......................... 3.50
Neverslip, per set of four............ 2.00

Tennessee.

Four-inch tongue..................$3.00
Reach pole....................... 2.00
Refilling wheel.................... 9.00
Respoking wheel.................. 2.50
Wagon axle, per inch.............. 1.00
Body of a buggy..................10.00
Shafts, each.............$1.25 to 1.50
Crossbar......................... .75
Painting buggy...................10.00
Plain horseshoeing......... 1.00 to 1.25
Toed horseshoeing................ 1.50
To put in rack.................... 2.00
Shovel plows, complete............ 3.50
Two-horse harrow................. 7.50

Texas.

New shoes........................$1.50
Resetting......................... 1.00
Buggy tires set................... 2.75
Wagon tires set, hot or cold......... 2.50
Buggy stubs, per set, 1 in........... 8.00
Wheel filled.............$4.50 to 5.00
Wagon tongues.................... 3.50
Plow sharpening............. .25 to .45
Pointing.................... .75 to 1.00

(To be continued.)

VOLUME 7

NUMBER 5

THE AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

BUFFALO
N.Y. U.S.A.

FEBRUARY, 1908

$1.00 A YEAR
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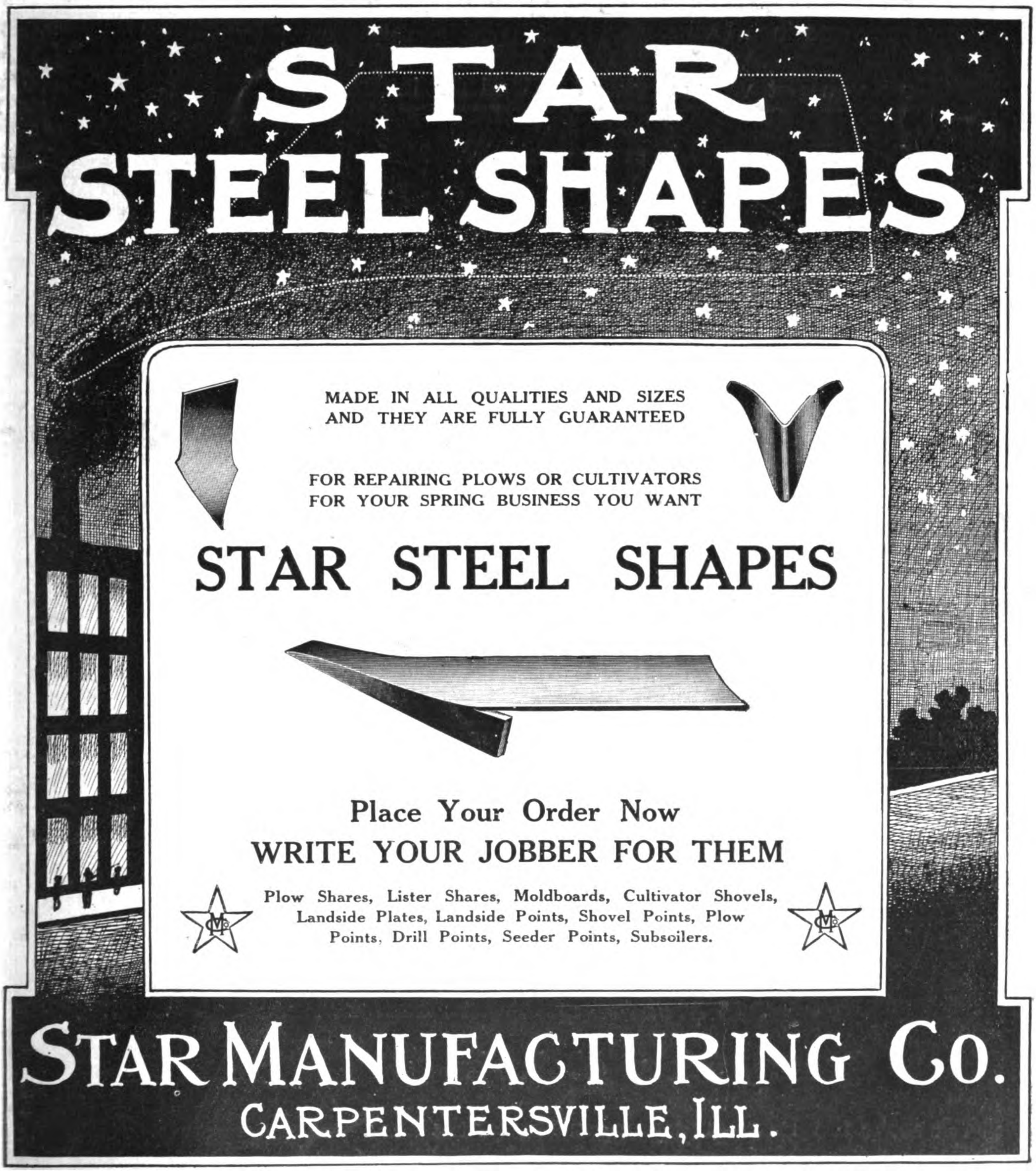
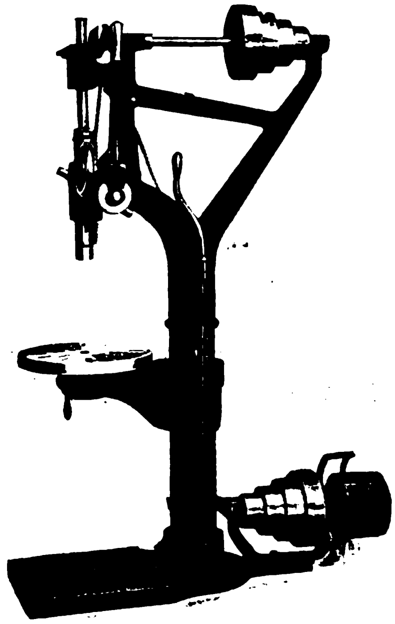


New Power DRILLS



"Power Drills" is the name of a beautiful booklet, now ready, illustrating and describing our new line of 20-inch Drills.

Have you got your copy yet? Send for it.

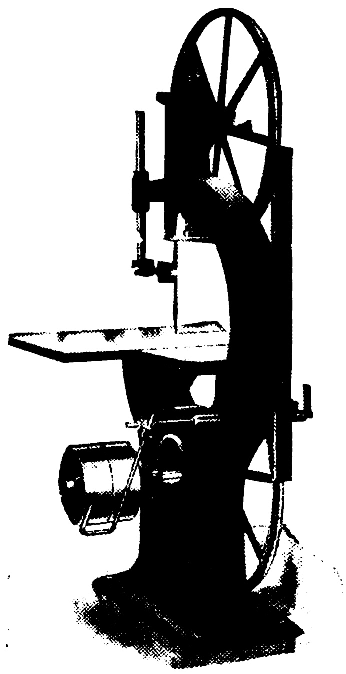
The Drills are new in every particular. Made with either round or square base and in four styles as follows:

Lever Feed Only

Combined Lever and Wheel Feed
AS ILLUSTRATED

Power Feed and Automatic Stop

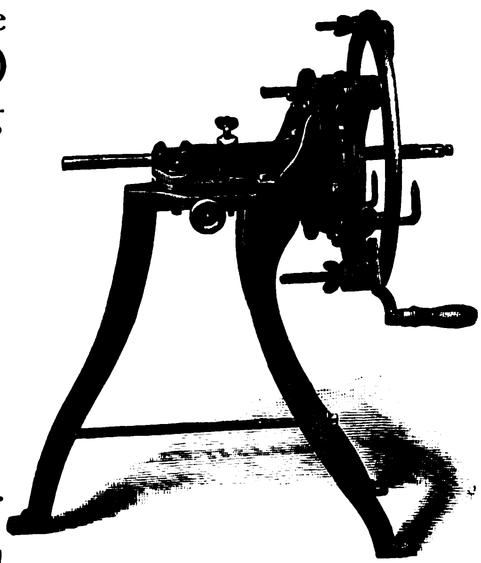
Power Feed with Back Gears and Automatic Stop



Send for our New Loose-Leaf Machinery Catalog

It illustrates and describes several sizes each of Post and Bench Drills, Portable Forges, Hub Boring and Spoke Tenon Machines. It explains in detail four sizes of the most conveniently operated Band Saws on the market. It describes the newest Hub Boring Machines. (See cut herewith.)

You can save money by seeing this catalog before you buy.



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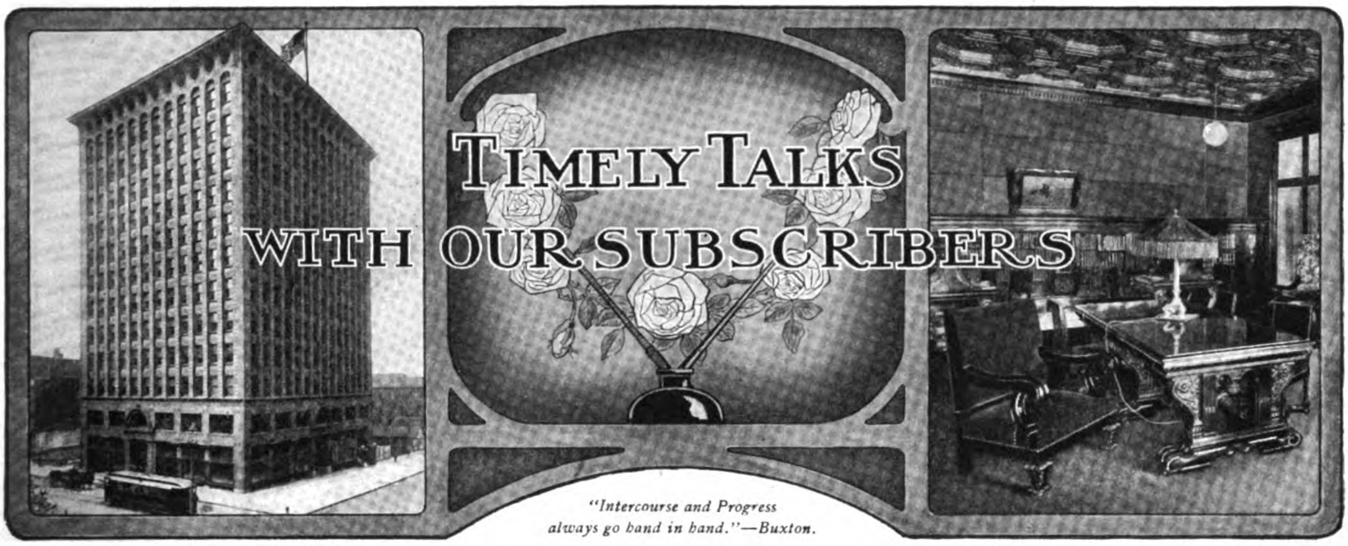

"Intercourse and Progress always go hand in hand."—Buxton.

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That Fifty Thousand.

Have you forgotten about our quest for the fifty thousand? Are you spreading some good talk about "Our Journal?" Are you taking advantage of every opportunity to "tell your neighbor"? Well, don't let up—keep at it continually, everlastingly. Hand your neighbor a copy of the paper and get him as a steady reader of "Our Journal." Make him one of "Our Folks." And we make it worth your while, too. Lots of "Our Folks" are taking advantage of that six-months offer and getting their own paper free. If you need sample copies, a postal request will bring them. Then you can call on your neighbor smiths and bring him twenty-four pages of good cheer. But don't come away without his order for membership in "THE AMERICAN BLACKSMITH Family of Our Folks."

The Boosters' League.

Why not? Just an informal body of staunch, whole-hearted smiths, pledged to challenge the knockers' remarks and to boost. No initiation fee, no membership fee, nothing but your word to BOOST every chance you get. Will you join, brothers? The object of the league is to raise the standard of the craft, to place the smith on a higher plane in the commercial world, to encourage young men to come into and stick to the trade, to further the interests of the trade in every possible way. Join the Boosters and pass the good word along.

The Art of Asking Questions.

A question fully explained is half answered, and readers desiring information will assist us greatly if they will bear this in mind. State your case fully. Tell all you possibly can in your question. It is often necessary to guess at a questioner's meaning, and it is, of course, doubtful whether or not the reply gives the information desired. We are often compelled to write for more information regarding the case in question, and when the information sought by the questioner is desired for immediate use, much valuable time is lost. A full, concise explanation will save much time and trouble for both the questioned and the questioner, and we hope that all readers will bear this in mind when requesting information.

Contents, February, 1908.

"Our Folks" as Contributors.

A number of our readers feel it their duty to contribute regularly to our columns. They freely discuss and talk on the subjects continually being brought up, and seem to feel it part of their duty to the betterment of the craft. It is needless to say that they are getting a maximum of returns and value from "Our Journal." It is needless to say that they are, without doubt, heart and soul in the craft. It is not especially to these men that this talk is directed, but to those of "Our Folks" who have read and enjoyed the articles month after month, and have profited by the information, yet have never been represented in these columns by either a letter or article of any kind. To these readers we wish to say that our columns are always open for the discussion of up-to-date craft subjects. We always welcome articles on any subject connected with the smithing craft. And we want every reader to feel that it is part of his duty to the craft to write an occasional item for publication. If only for the purpose of telling about your shop equipment, let the editor hear from you. If you employ any special machines, let us hear about them. If you have any shop-made machines in use, explain their making. If you use any out-of-the-ordinary kinks and methods, let your brother smiths know about them. Your brother craftsmen are just as glad to hear from you as you are to hear from them. So be free to write for "Our Journal" whenever you can. The best way to do a thing is to do it now.

What a Doctor Says.

The doctor's mare continued to travel lame despite the fact that the shoer had attempted several times to correct the fault. The man of medicine couldn't do without the animal, so determined to take the case into his own hands. The first thing he did was to send for a year's subscription to THE AMERICAN BLACKSMITH. He read and studied the articles on horseshoeing and anatomy, and in a short time, by putting into practice the ideas and by using the knowledge gained, he had his mare going as well as ever. This is no fairy tale, but an actual happening. Read the doctor's own letter on page 117.

"AND THE HUSHED QUIET OF THE SNOW-FILLED AIR
TELLS US THAT DAME NATURE SLEEPETH THERE"

Concrete and the Modern Smith Shop

A. B. HILTON

560

FOR smith shop construction, concrete is in many ways an ideal material. It is fireproof, and frame construction is not to be compared with it in durability. For use as a foundation material for gas engines, emery stands, and other smith shop tools whose foundations are not subjected to great concussion strains, it is very well suited. And those smiths who contemplate building shops now or in the near future will do well to consider concrete as a constructive material.

Cement concrete is the product resulting from an intimate mixture of cement mortar with an aggregate of crushed stone, gravel or similar material. When proportioning the ingredients for a concrete mixture, it is more accurate to measure the cement by weight, unless the unit used is the barrel or sack. The reason for this is because, when taken from the original package and measured in bulk, there is a chance of error due to the amount of shaking the cement receives.

For general use the following proportions are recommended:

For very strong and impervious work, one part cement, two parts sand, four parts aggregate.

For ordinary work requiring moderate strength, one part cement, two and one half parts sand, five parts aggregate.

For work where strength is of minor importance, one part cement, three parts sand, six parts aggregate.

In the event of aggregate (gravel, crushed stone, or other coarse material) containing sand or other fine stuff which has not been screened out, allowance should be made in proportioning the mortar, as it is easily understandable that the fine material contained in the coarse stuff and added to the mixture is exactly the same as adding the fine matter separately as so much sand.

The mixing of concrete should be done thoroughly, first in the mortar and then with the coarse material. A common method of measuring the ingredients is to use a bottomless box, first measuring your sand and depositing on top of that the required amount of cement. These two are then mixed dry with hoe or shovel until the entire mass is of one uniform color. A ring is now formed of the mixture, and into the center is poured nearly all of the water required for the batch. The dry material is now gradually worked from the side to the center until all of the water is taken up. The mass is now quickly turned and thoroughly mixed with shovels, at the same time sprinkling and wetting until the required consistency is attained. The mortar is now spread out, and the coarser material, whatever it may be, is added, after being previously measured and well wetted. The mixing is done by turning the mass with shovels until it is thoroughly uniform.

The comparatively dry mixture, from which the water can be brought to the surface only by vigorous tamping, is probably the strongest, but for the sake of economy, and to insure a dense concrete, a moderately soft mixture is recommended for ordinary purposes.

In the coloring of cement work the best results are obtained by the use of mineral pigments. The coloring matter, in proportions depending upon the desired shade, should be thoroughly mixed with the dry cement before making the mortar. By preparing small specimens of the mortar, and noting the color after drying, the proper proportions may be determined. The following pigments, or coloring powders, are used for coloring cement:

For gray or black use lamp black.
For yellow or buff use yellow ochre.
For brown use umber.
For red use Venetian red.
For blue use ultramarine.

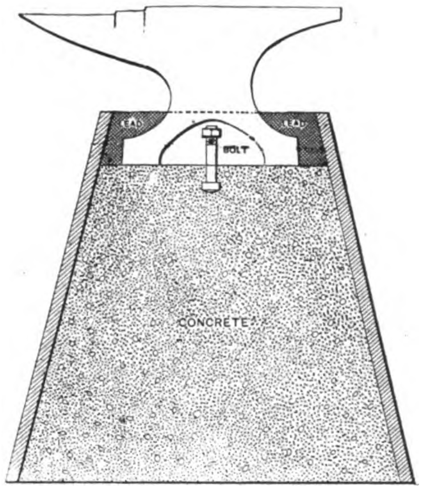
The depositing of concrete should be in layers of from four to eight inches and thoroughly tamped before it begins to harden. It should not be dumped into the mold from a height greater than four feet unless it is again mixed before tamping.

No doubt there are not a few readers who will recognize cement as an excellent material for the cooling slab in front of the anvil and forge. In this connection I would say, however, that cement is too unyielding, hard, and cold for use behind the anvil or where the smith is likely to stand for long periods. But for places where hot iron is dropped or where hot ashes are likely to scatter it is excellent. At these places the cement floor is constructed in the same way as for sidewalks and driveways; that is, subfoundation of cinders well tamped, then a foundation of concrete mixed to about the proportions of one part cement, three parts sand, and six parts of stone or gravel under one inch in size. On top of this is deposited the dressing of cement mortar in the proportions of one part cement to two parts sharp sand.

For the construction of concrete building blocks, the regulation cement block machines are recommended. It is possible, however, to build your own hollow block mold for the making of plain blocks for use in foundations for machines, gas engines, and the like.

CEMENT CONSTRUCTION IS ESPECIALLY SUITABLE FOR SMITH SHOPS

Select good white pine free from knots and sap, and take a good, sound piece for the base B of the mold, about 14 by 24 inches in size. This



A CONCRETE ANVIL BLOCK

The tapering cast-iron box is filled to within two inches of its top with concrete. On each side of the anvil is imbedded a bolt and nut. The space above the concrete is now filled with molten lead and thus holds the anvil rigidly in place, also deadening its sound to a marked degree.

board should be strongly cleated. The sides of the mold are made as shown, the ends being strongly cleated, and the inside of the ends carrying a board as at CC, so as to form a depression in the ends of the blocks. The sides and ends of the mold are hinged to the base B, so as to be easily let down or put into place when the mold is in use. At D is shown the tamper, which is easily made by taking a small square piece of half-inch stock and jump-welding a piece of round stock onto it. The bottom board at E is made to fit inside the mold. Several of these boards should be made so as to allow the blocks to cure before disturbing them. The blocks at F are used as cores to make the finished block hollow. A small projection or pin in the bottom of each of these cores fits into a hole in the bottom board. The board G is used as a guide when removing the cores.

In operation the mold box is set up as shown, the clamps being put in place and lightly wedged. The bottom board is put in position and the cores put in their places. Now, using a one to three mixture, proceed to fill the mold by alternate filling and tamping. When entirely filled place the board G on top of the block and withdraw the cores F. Now remove the clamps HH, and drop the side and end boards. The block is then lifted out on the bottom board and allowed to remain on it until cured, which requires from twenty to thirty days.

The use of hollow block construction introduces a saving over brick or stone, and the cost of laying concrete blocks is less than brickwork. A wall of good concrete blocks is stronger than a brick wall of equal thickness, and as a fire-resisting material for smith shops is unexcelled.

Best Fuel for Use in the Blacksmith Shop.

Mr. Lawrence Hoffman's Report.

The best coal for the blacksmith is Blossburg coal. It comes from Pennsylvania. The price of the coal is a little high, but it is the cheapest in the long run. A fire of this will last five hours with very little cleaning; it makes good coke and clean heats and causes very little waste to your iron.

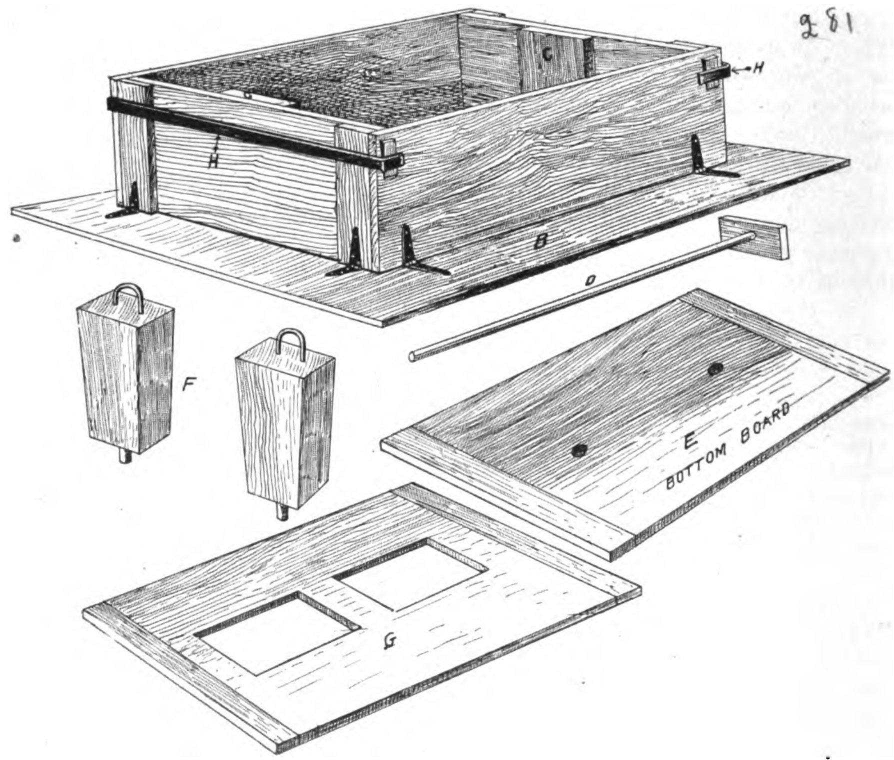
The coal the company furnishes for me is the Tennessee coal, but it is very poor. We have to clean out the fires about every two heats, and then there is always a delay in getting the next heat. The coke is too soft and too light for heavy work. For bad coal, have hard coke and break it up very fine and use it for coke and you can get very good heats. For the tool-dresser fire, I think gas is the best. It is cleaner than oil, and you can regulate the heat so much nicer. I use fuel oil for welding flues.

Mr. James T. McSweney's Report.

The coal used by this company in the blacksmith shop is shipped from Frostburg, Md., near Piedmont, W. Va., and is considered the best quality of coal that can be obtained for use in forges. I have never seen any other grade of coal that would give equal satisfaction, and as we have had experience with no other grade, cannot say much on the subject. Once or twice we have been out of this coal for a day or two on account of delayed shipments, and in using the ordinary coal find a great deal of sulphur in it, which makes it very bad for welding. The Piedmont coal gives off very little ash, and we have no difficulty in keeping a clean fire. We have no specifications for ordering smith coal, neither am I in a position to give you an analysis of the coal we use, as we have no testing bureau at this point.

In our heating furnaces we use fuel oil for making bolts and car forgings on the bulldozer. This is a nice clean fuel, no ashes accumulating nor any cleaning required, and heats very quickly, and it is all up to the operator to get the work out.

The question as to the most desirable forge for use in the smith shop is one very hard to decide. We have the square forge with four different kinds of tuyère irons, four with the old water tuyère irons and one with a box tuyère.



YOU CAN BUILD A HOLLOW BLOCK MOLD FOR MAKING PLAIN CONCRETE BLOCKS

How to Lay Out a Wooden Axle.

S. F. MILLER.

First of all, I get the bottom and front of the axle perfectly straight, then I turn it upside down, draw a line through the center from end to end with straightedge, and cut the length. I always go according to the old axle for getting the length. Now, I draw a line up and down on both ends 1/16 of an inch to the front of center of line for 3 by 9 skein, and 1/8 of an inch for 3¼ by 10 skein. Now, I set compass at half the dimension of inside hollow part of skein, set the compass on up and down line on the end 1/16 of an inch up from bottom for 3 by 9 skein, and 1/8 of an inch for 3¼ by 10 skein, and draw circle. Then fit skein to that and you will have an easy-running wagon.

To clean the water pipes in the circulating system of automobiles, use a strong hot solution of sal soda or potash. Fill the tank with the solution, run the engine for a few minutes to allow the solution to do its work, then draw off, and refill with pure water. Now run the engine again until the water becomes hot and then draw off. The cause of this clogging is the vegetable matter in the water used, which deposits a thick slime on the inside of the circulation system of the engine. A. N., Illinois.

Rattan as a material for automobile bodies, while occasionally seen, is now being used almost entirely by one manufacturer. The claims in its favor are that it weighs one third less than wood construction, and is dust and water proof. The rattan is rubber lined, and the upholstery may easily be removed for cleaning. M. O. B., New York.

To run an auto on gas sounds rather "fishy," but that is just exactly what was done in a test recently in Canada. A steel tank was placed in the auto and filled with natural gas, and without altering the machinery, the machine made a run at a speed of about nine miles an hour.

The Automobile Department.

The automobile field has grown and broadened in its few actual years of real existence until this season of 1908 bids fair to outrival any previous year. The low-priced car or buggy is an actual fact, and 1908 will see many newv ehicles in this class. The touring car and commercial vehicle have reached a stage where further improvement seems almost impossible, while all vehicles in the self-propelled class generally have reached a standard that may be described as safe, sane, and sensible.

Naturally, with this activity in the motor vehicle field, the blacksmith and kindred craftsmen will be called upon to repair and fix more horseless vehicles than ever before. And to enable "Our Folks" to cope with the small repairs as well as the more difficult and complicated ones, we have established this new department. Its aim will be to give the reader such information as will enable him to go about the repairing of a motor vehicle intelligently. To give such information as, supplemented by the smith's natural mechanical skill, will enable him to repair, rebuild, adjust, and, if necessary, build, motor-propelled vehicles.

Incidentally, in connection with this new branch of smith work, the craftsman will be able to install a line of supplies which, on account of his contact with the automobile traveling public, he will be able to sell readily and at a good profit. The opportunities connected with this new branch of vehicle work are limited only by the smith's ability, and when once entered upon this work, extra profit opportunities will appear on all sides.

An Automobile Scissors Grinder.

The city of Los Angeles, California, says an exchange, boasts of a citizen who bought an automobile and rigged it up with grinding wheels to be run by the engine. The grinder's regular customers include butcher shops and restaurants which he serves in the morning, while the afternoons are devoted to the residence section of the city. The time formerly spent in walking from place to place is now profitably employed in actual money-earning work. His expense for gasoline is about twenty-five cents per day.

A Few Pointers for the Would-Be Automobile Repairer.

A. J. B.

In the repairing of automobile parts, as well as other things, it is necessary to know what work the part performs, and, in many cases, the conditions under which this work is performed. For instance, it would be impracticable to repair a part subject to intense heat, by soldering it. Nor would it be advisable to repair a part which is constantly subjected to great strains, in any but a most thorough manner. It is therefore necessary to have some knowledge of the conditions under which the part to be repaired operates. And to gain this knowledge the best method is naturally to examine all the cars possible, to learn at first hand all you can about motor car construction generally, and the more popular makes in particular.

TWO KINDS OF HORSELESS VEHICLES FOUND IN NORTHERN MAINE

When a disabled car is brought to the shop, don't be afraid to inquire into the details of the breakdown. When a customer comes with a wagon to be fixed, he tells you what he wants done. If the autoist doesn't tell you what his trouble is, ask him. You cannot reasonably be expected to look the car over and repair it without knowing anything regarding the symptoms of the difficulty or the causes leading up to the breakdown.

If some detail of the machine or motor is unfamiliar to you, don't hesitate to ask for an explanation of that detail. It is not expected that you be familiar with every detail of every car on the road. And no smith need feel that he is showing culpable ignorance by asking for information from the autoist. On the contrary, the repairer displays common sense and a willingness to go at things right.

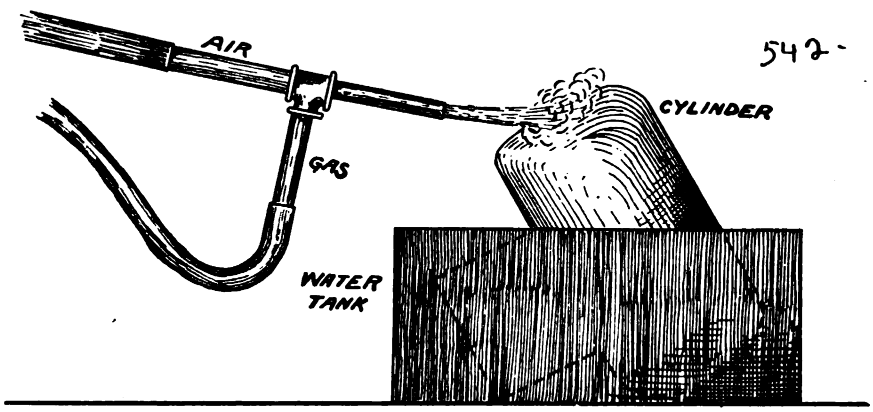
Automobile Repairing and the General Blacksmith.

J. F. SALLOWS *

The general blacksmith, if he wants to keep in the race for his share of business, has to equip his shop with such tools and appliances as are necessary to take care of the new line of work, that of automobile repairing. The automobile offers a fine line of repair work for the general smith who is up to date. This, of course, applies to the smith in the small towns and to the country shops; in the cities and larger towns there is usually a garage that takes care of all auto repairs in a way with which the general smith cannot compete. But an auto owner, like many other people, will go a few miles farther if he is going to get better satisfaction. Hence, it behooves the smith to prepare for this class of work. He should have some kind of power, either steam, electricity, or a gasoline engine. Then he should have a pit to run the auto over. This will do away with his rolling around on his back while doing a small repair job. The pit should be about twenty feet long, three feet wide, and four feet deep, and when not being used for auto work should be covered with cross planks and the space used for horseshoeing or any other line of work. The writer will each month explain as plainly as possible through the columns of THE AMERICAN BLACKSMITH how every smith can perform his part in repairing automobiles.

We will first consider the smith who is so fortunate as to have a shop equipped with gas, compressed air, and such like. All of these are essential to an up-to-date repair shop. But the smith who has not those appliances can at a slight disadvantage take care of all repairs as well as his more fortunate neighbor.

Brazing is the most important feature in automobile repairing, and there are such parts to be brazed that cannot be successfully done in an ordinary forge. Take, for instance, a cylinder that has a slight crack just large enough to render it useless. The owner has to send perhaps hundreds of miles for a new cylinder, and before his job is done it may cost him $50; while if the smith is equipped for the work, he can do the job for $5.00 and make a good profit. The engraving shows a splendid method for brazing a cylinder. Have a water tank large enough to cover all but the part to be brazed. This protects the bore and prevents warping; any good cast-iron brazing compound can be used. In the next issue the writer will explain more fully the methods of brazing all kinds of metals, and will also give an original formula for brazing cast iron which is being used in the plant where he is at the present time foreman.



A SIMPLE ARRANGEMENT FOR BRAZING THE CYLINDER OF AN AUTOMOBILE ENGINE

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CUBA WITH ITS EXCELLENT ROADS IS AN AUTOMOBILISTS' PARADISE

*EDITOR'S NOTE.—Mr. J. F. Sallows began his blacksmithing education with a five-year apprenticeship at general smith work, but owing to an accident received while shoeing a horse he was unable to follow general smithing, and became a tool smith with the Canadian Pacific Railroad. Since then he has been employed by the Snyder-Hughes Company, of Cleveland, Ohio; Baldwin, Tuthill & Bolton, of Grand Rapids, Michigan; and the Olds Motor Works at Lansing, Michigan. Mr. Sallows is now with the Reo Motor Car Company, as foreman of the forging, tempering, case-hardening, brazing, and riveting departments. He is the author of "The Blacksmith's Guide," and as associate editor of "The American Blacksmith" will write exclusively and regularly for these columns.

Some Motor Car Difficulties and Their Quick Repair.

BY HONK HONK.

When called upon to repair any part of the motor car in which you have had to remove the cylinders, be sure to see that the piston rings are in the right position before you replace the cylinders. These rings have a habit of turning and sliding round so that the slots are in line, this causing a loss of compression. If a piston ring breaks, a new one, of course, is required, but for a temporary repair asbestos string may be bound in the groove.

A disabled muffler, while not preventing the running of the car, results in a most disagreeable noise that can in the majority of cases be prevented. If the muffler is split or burst, a sheet of metal can be riveted on the outside and directly over the split. Or it can be covered with sheet asbestos and then bound with wire or held in place with flat bands.

If in overhauling a machine or in making repairs it is found that any of the balls in any of the bearings are

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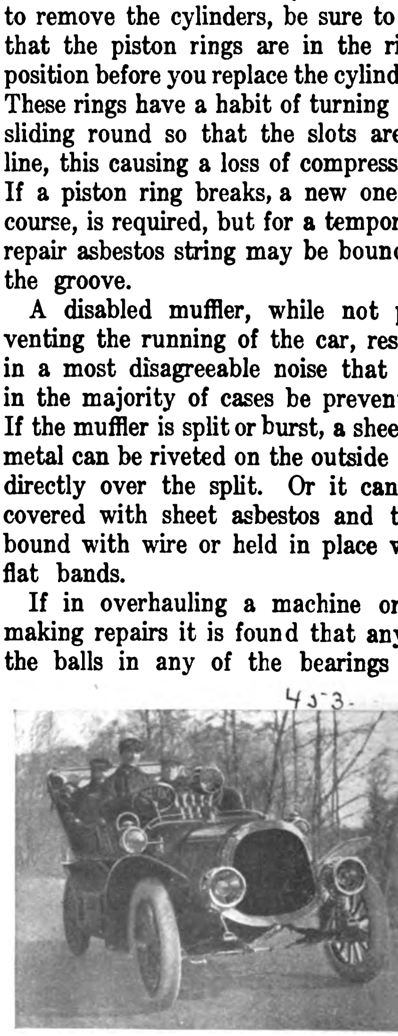

THE GENERAL SMITH SHOULD BE PREPARED TO CARE FOR THE TOURING CAR.

broken, remove the broken pieces immediately. It is better by far to have a ball less in the bearing than to run the risk of cutting the cones to uselessness. And in this connection let me caution against the use of kerosene in cleaning those bearings containing felt separators. The coal oil dries up the felt and affects the running of the bearing.

In conclusion let me give a few pointers on the cleaning of a mud-covered car preparatory to a general overhauling and replacing of the broken or worn parts. Use plenty of water—it will remove the dirt much quicker and with less damage than rubbing and sponging. An excellent article now on the market for the quick cleaning of all manner of things is the hollow brush from which the water issues behind the bristles. A good substitute, however, is a soft brush in one hand and the hose in the other, both stream and brush working on the same part at once. Treat all parts of the body, wheels, and frame in this manner and allow to dry. The engine, if to be thoroughly cleaned, should be gone over with a soft cloth saturated with kerosene, care being taken not to flood the bearings with this oil as it washes the lubricating oil out and causes the bearings to cut. In cleaning a machine all parts can be easily and quickly examined, and any repairs and adjustments made.

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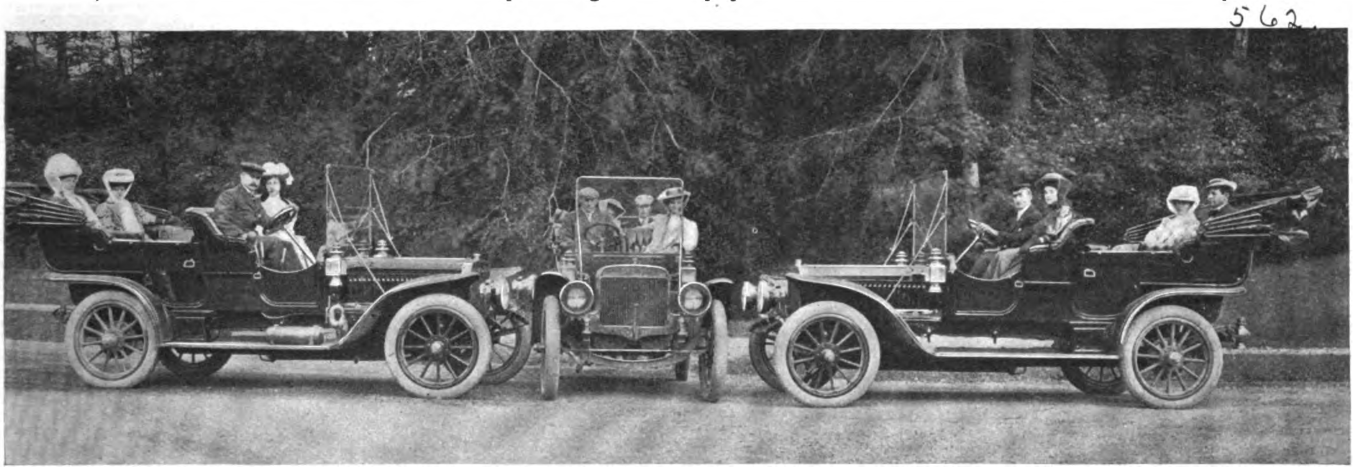

THREE VIEWS OF THE NEW 1908 MODEL WINTON SIX-CYLINDER TOURING CAR. THE WINTON FACTORIES WILL DURING 1908 MANUFACTURE SIX-CYLINDER CARS EXCLUSIVELY

Thornton's Letters.—16.

Being "Straight-from-the-shoulder" Talk from a Prosperous Self-made Smith to his Former Apprentice, now in Business.

Dear Jim:

Yes, it does seem rather queer to talk of taking an inventory of a blacksmith shop, but can you give me one good reason why it should not be taken? Is there any reason why an inventory should be taken of a store that will not apply to a shop? We have been taking inventory regularly every year at this shop, and you will find it a difficult matter to find anything about the place which is not in use or absolutely necessary for one thing or another.

Of course, if the boys lived strictly to the line of "everything in its place," you would have no difficulty in knowing just what you had in the line of stock, tools, and machines. But they get careless at times, especially during the rush hours, and some things will find their way to places where they were not at all meant to rest. It is not my desire to argue with you on this question, but I want you to get busy taking inventory just as soon as you can, and I want to predict now just what surprises will greet you.

You will find that your stock and equipment is worth much more than you supposed; that you have many tools, sizes of stock, and miscellaneous material that you did not suppose were in the shop. You will find that the boys have been putting things where they were never supposed to be placed. You will find that you have been carrying and devoting room to material that should be in the scrap heap. After you have taken inventory, go over the sheets with the boys and point out to them just where they can save money for the firm. You won't need a field glass to find these points, and it will require no great amount of imagination on the part of your help to see the point.

And I think you will find right now to be the best time for going through your shop. Things are not in a great rush now, and you can keep at least part of the boys employed at stock taking during the slack season. If you find any supplies in your side lines that have been in stock longer than they should have been, mark them down and get rid of them. I don't believe in carrying axle grease or anything else so long that it eats up the profits by way of storage.

Another thing I want to speak of right now, and one which I thought you would mention first, is the matter of repairing automobiles. There is no joke at all about it, Jim: when a mishap catches the motorist on the road, he involuntarily turns to the blacksmith's shop. And if the blacksmith is able to send him on his way, the smith can easily pocket a generous fee. I want you to get busy on this new branch of vehicle work. You always did have a knack of puttering around and fixing up things down here, and I do not think you will have any trouble in mastering this new problem.

In this connection, I would suggest your adding to your side lines along the automobilist's needs, and to put in a supply of gasoline right away. By way of advertising, I would recommend the placing of neat, well-painted signs on the roads leading to your place, and to let it be known generally that you will do automobile repairing.

Now, these are simply little suggestions. I want you to work out the details, but what I more especially desire is to have you get ahead of your competitors in this line. Get several good, practical books on motor car construction and be the real motor car repairer in your vicinity.

In your next, let me know how you progress with the above suggestions.

If you have any difficulty in working out the details, don't be afraid to let me hear from you.

Yours for success,

Thornton

The Course in Forge Work at the North Carolina College of Agricultural and Mechanical Arts.

CHARLES W. THOMAS, M. E.

The course in forge work is one of the branches included in the department of mechanical engineering and mechanic arts, while students in agriculture, textiles, civil and electrical engineering take the regular course. Yet it is the aim to introduce, where possible, special work in the branch of industry the student has chosen as his life's work, so that he can readily do any work that may be required of him on the farm or in the mill.

In the mechanical department, we have the regular four-year students who devote four hours per week in the freshman year and four hours in the first term of the sophomore year to the forge work. They may be students who have had some experience at the trade before entering college, or they may be schoolboys with no practical experience whatever. The class in mechanic arts generally are more mature.

FIG. 1—SOME WORK FORGED FROM STEEL CAR SPRINGS BY FIRST-YEAR STUDENTS

They attend college only two years; in the first they devote six hours per week, while in the second they can devote from six to twelve hours. This last year is so arranged as to put in optional subjects which can be omitted, and trade courses substituted to suit the desires of the student.

As is the case with almost all agricultural and mechanical colleges, the appropriations are not sufficient to allow of any elaborate extensions, except when new tools and work are built in the shops, which means that materials only have to be paid for, the labor being furnished by the students. This necessitates additional work by the instructor, or, perhaps, some additional designing by the professor in charge. But it is also good experience for the students as well. The repairing of a broken part means judgment as well as execution.

The forge shop is by no means a model shop. It is too small for the classes we have to handle. The forges are of old style, and we have no power hammer, yet we can boast of good hand tools. While I am an advocate of the best of everything for educational institutions, yet circumstances alter cases very often. The course as laid out takes up the care and maintenance of the fire, the use of the anvil and tools, and working first in iron and then in steel. Advanced students or those who have had previous experience naturally make greater progress, so that they are permitted to do special work which may be for their own use or for the college. Sometimes they are able to earn some money by turning out work and paying to the department the cost of materials used. All the shops in the department are en-

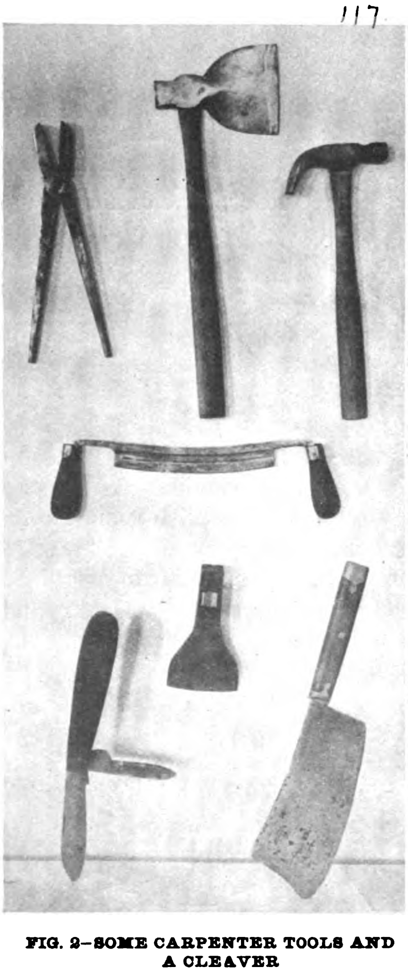

FIG. 2—SOME CARPENTER TOOLS AND A CLEAVER

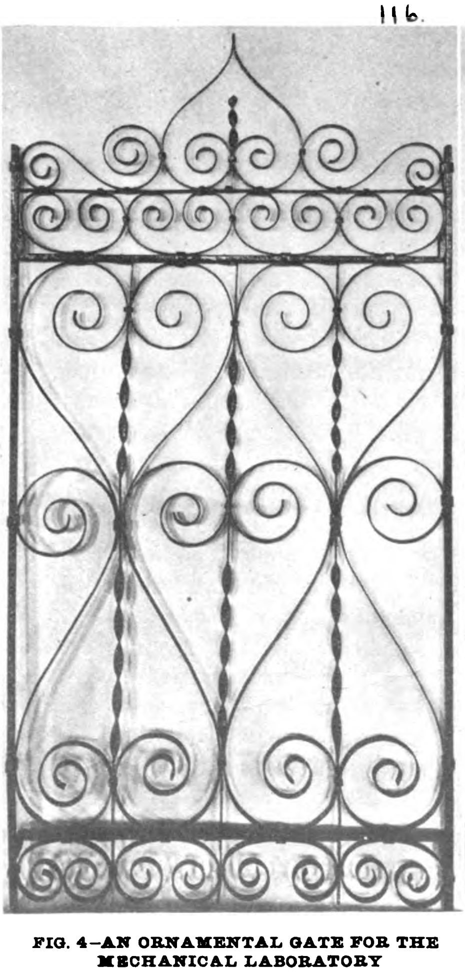

FIG. 4—AN ORNAMENTAL GATE FOR THE MECHANICAL LABORATORY

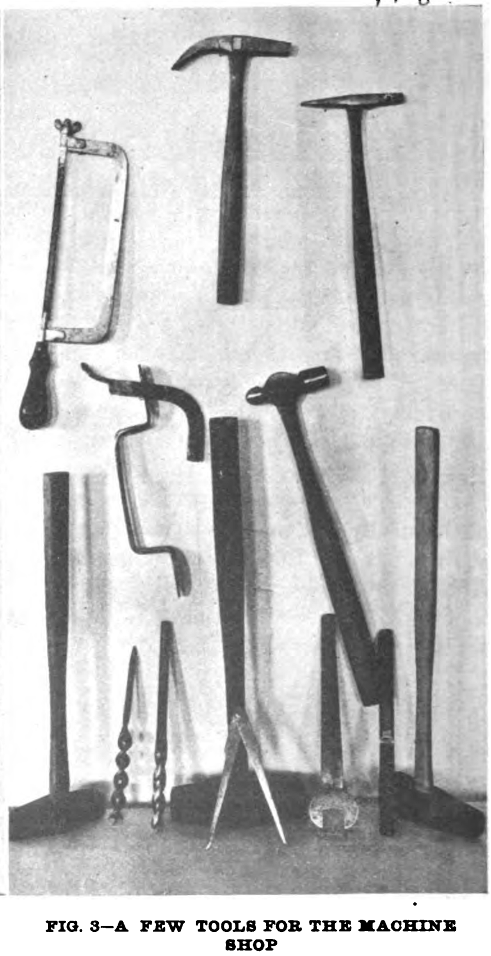

FIG. 3—A FEW TOOLS FOR THE MACHINE SHOP

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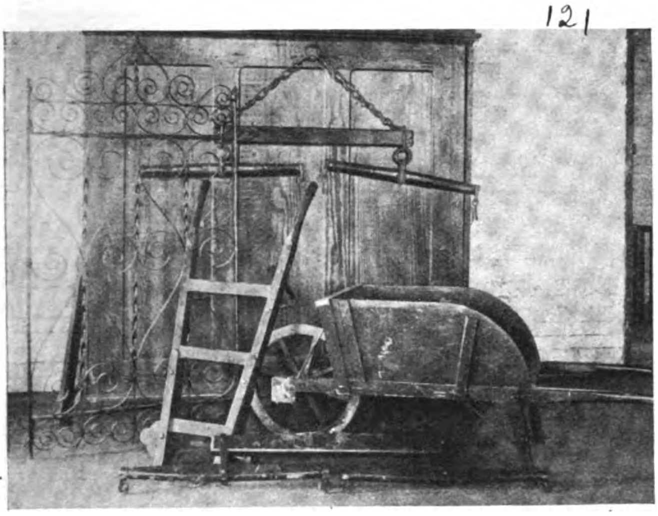

FIG. 5—THE WOOD WORKING AND THE FORGING CLASSES WORK TOGETHER IN MAKING WHEELBARROWS AND THE LIKE

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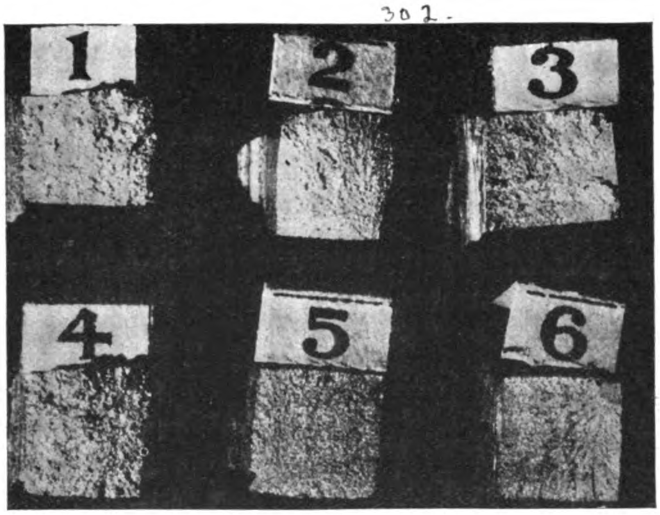

FIG. 7—SEVERAL SPECIMENS OF TOOL STEEL THAT WERE SUBJECTED TO DIFFERENT TREATMENT

couraged to do work that can be sold, so as to bring back at least the cost of materials. This has another phase as well: the exercise is simply one thing, while the building of a commercial object means, generally, assembling the parts, which requires thought and care. Notes and text-books are used as the course of exercises demands, it being found advantageous to combine study and work to produce the best results, while a written examination is the finish of each term's work.

When I first took charge of the department, I made it a special object to have the exercises and special work in all the shops to conform to practical proportions and not to result in misfits. Where it is possible the student is given an idea of the value of his labor based on market principles.

Fig. 1 of the engravings gives an idea of the work in the first year (nine months) of the forge shop. Considerable of this work was forged from steel car springs. It is noticed that students in the mechanical trades take more interest in the working up of hammers, plyers, calipers, etc., while those who have been brought up on the farm make pruning shears, butcher knives, cleavers, etc. Figs. 2 and 3 give a better idea of the work. The jackknife shown in Fig. 2, while unusually large in size, yet is complete in every detail and made from the rough by a student finishing his first year's work.

Our facilities being limited, we can devote only a little time to artistic or fancy work. The gate shown in Fig. 4 was made for use in the mechanical laboratory. Fig. 5 shows whiffletrees, wheelbarrow, and a hand truck made partly by the forge classes and partly by the woodworking classes. Fig. 6 shows a two-horse wagon, built from the rough timber and iron. The same materials were supplied that any blacksmith would purchase, and from them the wagon was worked up. Fig. 7 shows specimens of tool steel that have been subjected to different treatments: (1) Heated to a bright yellow heat; (2) to a cherry heat and hammered until cold; (3) to a cherry heat; (4) to a white heat; (5) burned and worked at cherry heat; (6) burned, then worked down with a borax heat.

A change of instructors necessitated the abandoning of this series of exercises for a year or so, but, when time permits, it is my intention to pursue a systematic course in tempering, not only of the ordinary steels, but of the high-speed steels as well, so as to give the students practical demonstrations of the necessity of being careful in the forging and tempering of tools. Horseshoeing was taken up last year with the agricultural students.

It will be noticed, in conclusion, that all of the exercises are of a complete and commercial nature. They are designed to give practical results at once, so as to fit the student to make himself useful as soon as he graduates. The

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FIG. 6—A TWO-HORSE FARM WAGON BUILT FROM THE ROUGH TIMBER AND IRON

student is taught the simpler operations in forging at first, and is then gradually taken by degrees through the more advanced stages of forging operations, always keeping in view the commercial and practical end of each step, the latter being more in demand by the commercial world.

Three Good Pointers for General Smiths.

JAMES GARRISON.

Here is a pointer to all brothers who use gasoline engines. A common complaint in winter is that the engine can't be easily started, especially when the thermometer says twenty degrees below. Judge your own engine in this little kink; I will illustrate according to our I. H. C. First, bear in mind that it takes three turns to start this way; that is, turn off compression and turn over twice, or, in other words, the first turn, opening the valve, the second, throwing the gasoline at the air, and then turn it and stop it there. Now, go away and leave it just in this condition for three minutes, until it has time to vaporize, and then come back to the engine and turn on your battery. The engine will go the first turn. All engines are treated in this way.

A word on shoeing will, no doubt, help. I have shod horses for eleven years, and can say, luckily, that I was never hurt by a horse. The secret is caution. Be kind and speak low to the horse. Don't keep his foot up more than is necessary. Go easy, don't lose your temper, and you can soon shoe any colt. Just learn to shoe a horse with patience, and you will never need a stick.

My way of shoeing interfering horses is to shoe them just as you would shoe yourself; that is, weight of shoe in proportion to the weight and size of the limbs. First see that he stands straight and that his limbs are not deformed. Then shoe with insides high for buggy and road horses, keeping shoes level and neat. Keep the inside same as the outside, unless he is a thin, narrow-framed horse; then make longer inside.

A Boring Bar for Hand Use.

L. R. SWARTZ.

The accompanying engraving shows in detail an emergency tool that I have found very handy where one has to bore pulleys or gear wheels that are too large to bore to center in the lathe or drill press, or for use on a repair job where proper machine facilities are not available. I made and used such a tool a short time ago. It did the work satisfactorily, and can be used on wood or metal.

The stock and dimensions may be altered to suit the work and circumstances. The following is what I used:

A is a $\frac{3}{4}$-inch rod of mild steel upset and pointed, and with $\frac{3}{4}$ U. S. standard thread. B is a $\frac{3}{4}$-inch pipe 10 inches long, upset and swaged at the ends so that the $\frac{3}{4}$ U. S. standard tap could cut a full thread. A collar was then shrunk on the lower end and the threads cut with a long shanked tap. C is a $\frac{3}{4}$-inch by 12-inch rod of mild steel, 9 inches of which is threaded to run up into the sleeve. This sleeve was tapped from the upper end so as to work in line with the bar as true as possible. D is a piece of $1\frac{1}{8}$-inch square mild steel, $2\frac{1}{2}$ feet long. E is an 11 by $1\frac{1}{16}$ inch piece drawn out on D. The $2\frac{1}{2}$-foot length of D does not include E. The mortise at F is $\frac{7}{16}$ by 1 inch cut square through the bar next to E. The upper end of F was dressed to a taper, so that the key would fit snug the whole way through, and hold the bit firmly. The shoulder formed at the junction of D and E is square, and the cutting edge of the bit should be even with this shoulder, or $\frac{1}{32}$ of an inch down on E, so that the tool may follow a $1\frac{1}{16}$-inch hole if necessary. G is a bit made of $\frac{5}{8}$ by $\frac{7}{16}$ inch tool steel. The set of the edge is shown at L. The curve on the face is to allow the edge to act the same as a twist drill edge. The key H is also of tool steel, untempered, and enters at the same side as the cutting edge. The plate I is of steel tire with a deep center punch mark to serve as a bearing for A in the center, and screw holes in each end by which it is fastened to a joist or beam overhead. The guide plate J, which is of 1 by 4-inch tire, has lines at right angles crossing at the center. A hole $1\frac{1}{16}$ inches is then made in the center and screw holes in the corners.

A $1\frac{1}{4}$ or $1\frac{1}{2}$-inch hole is now made in a piece of heavy plank, and J is bedded into the plank so that the guide E may pass through both. Fasten I overhead and place the plank with J on a couple of trestles. Then set the plank level both ways, and so that the center of J is plumb below the center mark in I. Now fasten the work on the plank with two or three hook bolts, like K, so that the bit will cut the desired hole in the center of pulley or gear wheel.

To put on the feed, hold the sleeve B while turning the bar. I used a 24-inch Trimo pipe wrench on my bar to cut a pulley from $2\frac{1}{4}$ inches to 3 inches. This gave the bit a $\frac{3}{8}$-inch hold on the metal. If there is a key way in the piece, put a spring or other moveable support under the point of E to keep the bar from falling when the bit is passing the key way.

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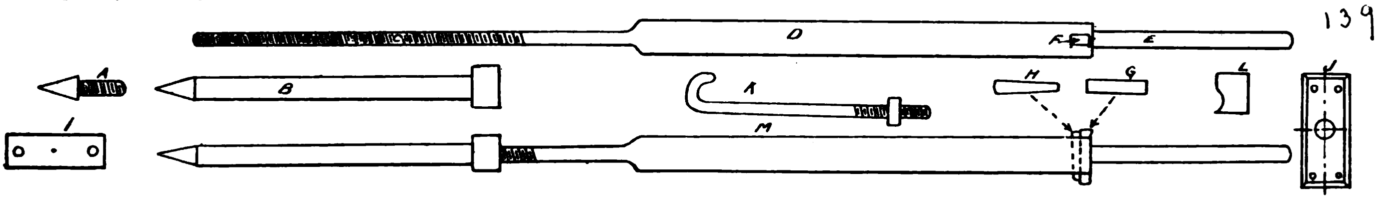

AN EMERGENCY TOOL FOR BORING PULLEYS OR GEAR WHEELS THAT ARE TOO LARGE TO PUT IN THE LATHE OR DRILL PRESS

The Proportional Dimensions of Standard Wrenches.

R. A. WEST.

Instructor in Forging, University of West Virginia.

The accompanying diagram and table show at a glance the proportional sizes

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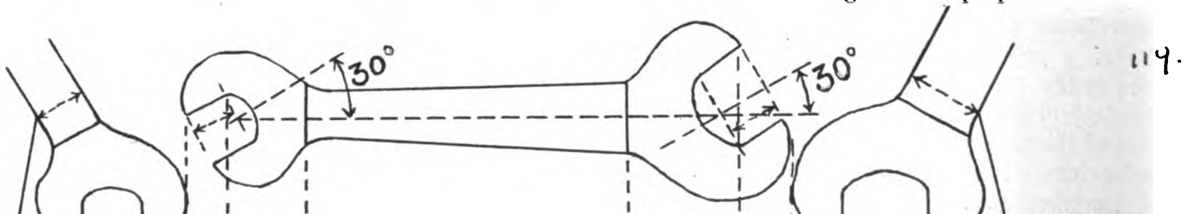


Dia. of Bolts	Thickness of Neck	Thickness of Wrench														Dia. of Bolts.
	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{5}{16}$		$\frac{3}{8}$	$\frac{3}{16}$	$\frac{3}{16}$	$\frac{1}{2}$	$2\frac{1}{2}''$	$\frac{5}{8}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{2}$		$\frac{3}{8}$	$\frac{1}{4}$
$\frac{3}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{2}$		$\frac{5}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{7}{8}$	$3''$	$1\frac{1}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{7}{8}$		$\frac{5}{8}$	$\frac{1}{2}$
$\frac{5}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{7}{16}$		$1\frac{1}{16}$	$\frac{5}{8}$	$\frac{5}{8}$	$1\frac{3}{8}$	$4''$	$1\frac{5}{8}$	$\frac{3}{4}$	$\frac{3}{4}$	$1\frac{1}{4}$		$1\frac{1}{8}$	$\frac{3}{4}$
$\frac{7}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{1}{4}$		$1\frac{7}{16}$	$\frac{13}{16}$	$\frac{13}{16}$	2	$5''$	$2\frac{1}{8}$	$\frac{15}{16}$	$\frac{15}{16}$	$1\frac{5}{8}$		$1\frac{3}{8}$	1
$1\frac{1}{8}$	$\frac{1}{2}$	$\frac{7}{8}$	$1\frac{5}{8}$		$1\frac{13}{16}$	1	$1\frac{1}{16}$	$2\frac{3}{8}$	$6\frac{1}{4}''$	$2\frac{5}{8}$	$1\frac{3}{16}$	$1\frac{1}{8}$	2		$1\frac{3}{4}$	$1\frac{1}{4}$
$1\frac{3}{8}$	$\frac{5}{8}$	$\frac{7}{8}$	$1\frac{7}{8}$		$2\frac{3}{16}$	$1\frac{1}{4}$	$1\frac{5}{16}$	$2\frac{7}{8}$	$7\frac{1}{2}''$	3	$1\frac{3}{8}$	$1\frac{1}{4}$	$2\frac{3}{8}$		2	$1\frac{1}{2}$
$1\frac{5}{8}$	$\frac{5}{8}$	1	$2\frac{1}{8}$		$2\frac{9}{16}$	$1\frac{5}{16}$	$1\frac{1}{2}$	$3\frac{1}{4}$	$8\frac{3}{4}''$	$3\frac{1}{2}$	$1\frac{5}{8}$	$1\frac{3}{8}$	$2\frac{3}{4}$		$2\frac{1}{4}$	$1\frac{3}{4}$
$1\frac{7}{8}$	$\frac{3}{4}$	$1\frac{1}{8}$	$2\frac{3}{8}$		3	$1\frac{9}{16}$	$1\frac{3}{4}$	$3\frac{3}{4}$	$10''$	4	$1\frac{13}{16}$	$1\frac{5}{8}$	$3\frac{1}{8}$		$2\frac{1}{2}$	2
$2\frac{1}{4}$	$\frac{3}{4}$	$1\frac{1}{4}$	$2\frac{3}{4}$		$3\frac{1}{2}$	$1\frac{13}{16}$	2	$4\frac{3}{8}$	$12\frac{1}{2}''$	$4\frac{7}{8}$	$2\frac{1}{4}$	2	$3\frac{7}{8}$		3	$2\frac{1}{2}$
$2\frac{3}{4}$	$\frac{7}{8}$	$1\frac{3}{8}$	$3\frac{1}{4}$		$4\frac{1}{4}$	$2\frac{1}{4}$	$2\frac{7}{16}$	$5\frac{3}{8}$	$15''$	6	$2\frac{5}{8}$	$2\frac{1}{2}$	$4\frac{5}{8}$		$3\frac{1}{2}$	3

TABLE SHOWING PROPORTIONAL DIMENSIONS OF STANDARD WRENCHES, BY WHICH, GIVEN ANY DIMENSION, OTHER MEASUREMENTS CAN BE MADE PROPORTIONATE of standard wrenches taking nuts from three eighths inch to four and five eighths inches in size. It seems hardly necessary to explain the use and workings of the table, as it can readily be seen that, given any dimension of the required wrench, the other dimensions can easily be made proportionate from the table.

Cash or Credit ?

The smith who can carry on his business on a strictly cash basis is the exception. Especially in rural districts, few smiths can refuse absolutely to give credit and make a success of their business. The average customer of the country smith cannot pay cash for his work, and, of course, the man desiring this trade must extend credit. There is no hard fast rule for the extension of credit. The smith must use his own judgment in giving credit. He must know when to say "yes" and when to say "no" in reply to the ever recurring credit question. He should know how much credit a debtor is worth. And when credit is extended for thirty days, he should insist upon payment at the end of that time and not allow the account to run for three or four months. The prompt collecting of your accounts will enable you to discount your bills, and bills discounted means profit before the goods are sold.

It is, of course, necessary when extending credit to put it on a business basis. Don't give a man anything he wants simply because he has promised to pay you for it next week or next payday. If he requests credit ask for references. And then don't let him bluff you, but look up his references and be guided accordingly. No business can hope to succeed with a loose system of credits. Make a rule to request payment at a specified time and let customers understand that the rule must be followed.

A General Shop of South Wales.

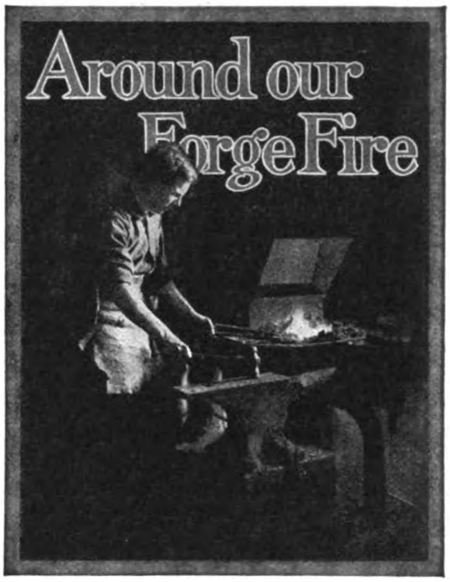
THOMAS MORGAN.

Great Britain.

My shop is not a very large one, but I believe it is the largest I have come across in this country. I have a fair equipment, and I believe in power. I have only had it in for one year. I have a Messrs. Fairbanks, Morse & Co. two-horsepower petrol engine, and it works well. I haven't spent a farthing for repairs on it yet. I also have one drilling machine, a grindstone, a punching and shearing machine which will punch ¾ inch holes through ¾ inch stock, and shear 4 inches by ¾ inch without a stop. I have two bellows worked by the engine. One is a double blast, and the other a pear shape. The little engine works the whole lot at same time. I have one upsetting and welding machine, a Porter bolt cutter, and one hoof trimmer of American make which I ordered through a Gloucester firm. It was the first to come to this country, and the firm now has the sole agency for the British Isles. That was due to their advertisement in your valuable paper. It is a great labor-saving tool.

My shop is lighted with acetylene gas. I have plenty of work for one apprentice and myself.

A GENERAL SHOP OPERATED BY POWER IN SOUTH WALES



"I say, Mr. Editor, what's all this talk about automobiles in 'Our Journal'?"

"Why, we've started an auto repair department," replied the Editor. "'Our Folks' will be called upon this year to repair more motor vehicles than ever before, and we're going to help them with this work. It means big money for the smith, and lots of them will have need of just the stuff we're going to give them."

"Who has charge of the department, if I may ask?"

"Mr. J. F. Sallows will have charge of it. Mr. Sallows is connected with one of the big automobile factories in the capacity of foreman, and is an expert on auto topics. He is also author of a recent book entitled, 'The Blacksmith's Guide.' He started his smithing career with a five-year apprenticeship at general blacksmithing, horseshoeing, and plow, carriage, and wagon work, but owing to an accident received while shoeing a horse he was unable to follow this field for a living. He then became a tool smith on the Canadian Pacific, and since has been employed in several shops as tool smith and expert in machine shop methods and requirements. As foreman he now has charge of the forging, tempering, case-hardening, brazing, and riveting departments."

"Do you think there is need for this new department? questioned Benton.

"Yes, there certainly is need of this new department," returned the Editor. "The problems confronting the repairer of automobiles are far different from those experienced in ordinary vehicle work. The materials met with are in many cases new to the average smith."

Morrow came in at this point, and said he was looking for Benton. "I am having trouble with some tools," said he. "They don't harden right, and in looking for the cause I find that the bath doesn't seem to touch the tool."

Benton was busily turning the leaves of his recipe book, but finally stopped and said, "Use muriatic acid in the water—about one third acid to two thirds water. I think you'll find that your steel will then harden all right."

"Thank you, Benton, perhaps I can now finish that job of lathe tools." And with a happy look as though a big load had been lifted from his shoulders, Morrow went out.

Taming a Wild Horse.

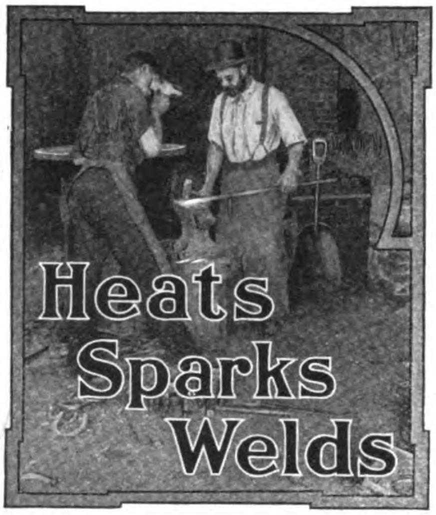
W. G. SIMMS.

Last night he trampled with a thousand steeds
The trembling desert. Now, he stands alone—
His speed half baffled theirs. His fellows lurk
Behind, on heavy sands, with weary limbs
That cannot reach him. From the highest hill
He gazes o'er the wild whose plains he spurned,
And his eye kindles, and his breast expands,
With an upheaving consciousness of might.
He stands an instant, then he breaks away,
As reveling in his freedom. What if art,
That strikes soul into marble, could but seize
That agony of action,—could impress
Its muscular fullness, with its wingèd haste,
Upon the resisting rock, while wonder stares,
And admiration worships? There,—away—
As, glorying in that mighty wilderness,
And conscious of the gazing skies o'erhead,
Quiver for flight his sleek and slender limbs,
Elastic, springing into headlong force—
While his smooth neck, curved loftily to arch,
Dignifies flight, and to his speed imparts
The majesty not else its attribute.
And, circling, now he sweeps the flowery plain,
As if 'twere his—imperious—gathering up
His limbs, unwearied by their sportive play,
Until he stands, an idol of the sight.

He stands and trembles! The warm life is gone
That gave him action. Wherefore is it thus?
His eye hath lost its luster, though it still
Sends forth a glance of consciousness and care,
To a deep agony of acuteness wrought,
And, straining at a point—a narrow point—
That rises, but a speck upon the verge
Of the horizon. Sure, the humblest life
Hath, in God's providence, some gracious guides,
That warn it of its foe. The danger there,
His instinct teaches, and with growing dread,
No more solicitous of graceful flight,
He bounds across the plain—he speeds away,
Into the tameless wilderness afar,
To 'scape his bondage. Yet, in vain his flight—
Vain his fleet limbs, his desperate aim, his leap
Through the close thicket, through the festering swamp,
And rushing waters. His proud neck must bend
Beneath a halter, and the iron parts
And tears his delicate mouth. The brave steed,
Late bounding in his freedom's consciousness,
The leader of the wild unreached of all,
Wears gaudy trappings, and becomes a slave.

He bears a master on his shrinking back,
He feels a rowel in his bleeding flanks,
And his arched neck, beneath the biting thong,
Burns, while he bounds away—all desperate—
Across the desert, mad with the vain hope
To shake his burden off. He writhes, he turns
On his oppressor. He would rend the foe,
Who, subtle, with less strength, had taken him thus,
At foul advantage—but he strives in vain.

A sudden pang—a newer form of pain,
Baffles and bears him on—he feels his fate,
And with a shriek of agony, which tells,
Loudly, the terrors of his new estate,
He makes the desert—his own desert—ring
With the wild clamors of his new-born grief.
One fruitless effort more—one desperate bound,
For the old freedom of his natural life,
And then he humbles to his cruel lot,
Submits, and finds his conqueror in man!



There are no free passes over the road to success.

A little smile often breaks up some mighty big clouds.

He generally gets, who hustles while the other fellow waits.

A head full of wisdom seldom swells, nor does it leak out at the mouth.

Don't look up the date on the insurance policy after the fire—do it before.

If you haven't business, advertise for it. If you have business, advertise it.

An inventory of last year's errors will prevent their recurrence during 1908.

He need never fear of his business making him hustle who is afraid to hustle for business.

Always welcome are good shop pictures. Send a picture of your shop to the Editor now.

"My happiness consists in doing tomorrow what I could have done today," says Tom Tardy.

The paint-covered defect in a vehicle lives forever as a lie, though it deceives but for the moment.

It doesn't necessarily follow, because one in a quarrel or argument is wrong, that the other is right.

'Tis not necessary to suspect everybody, but remember—all the bunco men are not at the county fair.

Going to care for the automobile? This is another good chance for adding materially to your profits.

Be sure you have followed directions to the very letter before you condemn—and even then better try again.

The poultry and eggs produced in the United States during 1907 were valued at four hundred million dollars.

None too early to prepare for spring. Tools in good order—new ones ordered—scrap and dirt out of the way?

Perhaps there isn't a newcomer in your neighborbhood—but if there was, would you have made a business call?

Why does a man, who would not stoop to dishonesty in his own home, draw the line at nothing when the boss orders it?

At the recent automobile show in Chicago one hundred and twenty manufacturers exhibited six hundred cars valued at two million dollars.

A small advance in prices now will mean big money in your pocket in the spring. None too early to agitate for this now. Ask the Secretary.

Of course,—'tis not expected that you agree with everything said in "Our Journal." But you tell your side of the question; don't remain silent.

"Hemming and hawing" about poor business will never better conditions. 'Tis the chap who advertises and hustles who first says, "Business is good."

Have you sent us a neighbor's new subscription? Then won't you do it now? Send us a dollar and a new name, and we'll advance your own time six months.

A good boss uses his brains more than his feet. But he doesn't necessarily wear his trousers through at the seat. He keeps brain, feet, and hands in good training.

Every business man has time to talk business. When you are the talker, say something and then stop. But when you are the listener, stop the talker when he has finished.

Who ever heard of a woman putting off the family washing to go visiting? Yet a man will put off cleaning up shop or a hundred and one other important jobs for a less provocation.

A horse that reclines to be shod is said to be the property of a Caldwell, New Jersey, milkman. The animal is said to lie down and raise its hoofs whenever brought to a smithy.

Forge the first link of a vigorous organization campaign in your county by asking the Secretary for his easy plans today. Start now so as to reap full benefits from the extra business activities in the spring.

A horse which was turned loose daily to go to a street watering trough failed to show up as usual the other day. A search being instituted, the animal was finally found at a blacksmith shop. Needed shoes, very likely.

"They prevent farmers from getting supplies in my name," writes a Michigan reader, when asking for pink stamps. The little pink buffaloes are certainly filling their place without rattling. Use them freely and ask for more.

You can no more expect to run your business on the money outstanding than to build a house on the foundation under your neighbor's residence. Keep at the heels of your debtors—a tight string on collections is a big step toward success.

If a shoestring peddler called on you just when you needed a shoestring, he would run a good chance of getting an order, wouldn't he? Ever think to try the same reasoning in your business? Keep your eyes and ears open to the wants of your customers.

Safety devices pay in the long run. The man who must keep one eye on his machine to keep from losing a finger or an arm, can not turn out as much or as good work as he who devotes his entire attention to the work, knowing that with reasonable care his fingers are safe.

'Tis the man, not his name, position, surroundings, or friends, that makes for true success. The same sun that hardens clay softens wax. It's the same heat in each case but a different material make-up. It's the man's make-up—the stuff he's made of—that makes his success.

Tom has fixed the hole in his shoeing floor. But he didn't get at it soon enough. Just the day before he fixed it, a mare caught her foot in it, threw herself, and broke her leg. Of course Tom couldn't understand why the driver didn't wait till the hole was repaired. And when asked about the other holes in the floor, Tom said, "Oh! I guess they'll do—don't seem as if it is necessary to keep patching things all the time."

Another Nebraska Meeting.

Secretary Chadwick of the Nebraska State Blacksmith and Wheelwright Association has received so many requests from all parts of the State to call another general meeting that the Executive Board have decided upon Fremont, Nebraska, as the next meeting place, on February 26th and 27th. A strong feature of the meeting will be the smith-shop tool and machinery exhibit, which is promised.

Every Nebraska State smith, whether a member of the State association or not, is requested to be present.

American Association of Blacksmiths and Horseshoers.

I take pleasure in presenting to you a brief report of the Nebraska Association which met at Lincoln recently. I regret that it is impossible for me to give you a full and detailed account of this meeting, but you can readily see that the gathering at Lincoln was a most enthusiastic and successful one. The seed of the Nebraska Association was planted the latter part of December, 1906, and from the first meeting of fifteen men, held at that time, the Association has grown to include the entire State of Nebraska. At the meeting recently held, representatives from all sections of the State were present, over two hundred shops being represented.

Meeting called to order with President J. W. McKay in the chair. Dr. Leonhardt, a prominent citizen, and a representative of the Lincoln City Council, welcomed the association to the city.

Election of officers coming next, the rules were suspended on motion, and by a rising vote Mr. J. W. McKay was unanimously elected president for the ensuing year.

Other officers elected are: Mr. W. M. Rosborough, vice-president; Mr. T. H. Chadwick, secretary, and Mr. C. W. Murphy, treasurer. On motion the Chair appointed as an executive committee, G. E. Loder, J. W. Edwards, and J. I. Depew.

The committee on resolutions reported as follows:

Resolved: That the blacksmiths of Nebraska are in need of legislation as follows: To protect the craft, and preserve it from becoming extinct on the following lines: viz., horseshoeing, vehicle repairing, and general blacksmithing. Also that his labor and materials be considered and protected as all other labor; viz., it shall constitute a prior lien upon all property he may work upon. We also recommend that all apprentices shall serve a term of not less than three years under a competent master workman, and that he must possess a certificate of his ability and time served. We also recommend, for the protection of the general public, the appointment of a State board to examine all persons as to their ability to shoe horses before being allowed to practice. We also recommend that the quarterly dues be placed at fifty cents per member, for the purpose of creating a legislative fund. Be it further resolved: That not less than nine hours shall constitute a day's work for a journeyman.

THE COMMITTEE.

By motion a vote of thanks was tendered the Lincoln Commercial Club for their courtesy and kindness in providing a suitable hall, and the freedom of their club rooms to this Association.

On motion it was decided to make THE AMERICAN BLACKSMITH the official paper of the Association.

It was decided by motion that a uniform price list be adopted throughout the State on horseshoeing and general wagon work, after hearing from each county.

Our attendance was good. Some of the larger towns, and even whole counties were in attendance in a body, and all worked in unison. Some localities sent delegates representing from ten to fifteen different shops, so that altogether there were about 225 shops represented at this our first annual meeting, which encourages us in the belief that we can in a short time perfect an organization which will be highly beneficial, not only to the blacksmiths, but also to the public at large.

Any blacksmith or wheelwright who did not, or was not able to, attend this State meeting, and wants to become a member of the Nebraska Blacksmith and Wheelwright Association, can do so by making application to the president or secretary of said Association; and upon paying membership fee and quarterly dues to said officers, a price card will be forwarded to the applicant. It was left in the hands of the executive committee to organize the State by counties, they being able to more thoroughly interest those who should belong to the Association and to more ably meet local conditions which govern in various sections of the State.

J. W. McKAY, President.
T. H. CHADWICK, Secretary,
Syracuse, Neb.

Now, craftsmen, won't you carefully read the proceedings of the Nebraska Association, and then get busy in your locality? An association started now will enable you to benefit very materially by way of increased profits during the coming spring rush, and it is none too early to prepare for the renewed business activities sure to be felt in all branches of trade this spring.

Let me have your request for my easy plans today. You know better than anyone else that the advance in costs requires you to get more for your material and work. And you will find the other boys in your county

Iowa State Blacksmiths' Association.

ALGONA, IOWA,................190 .

DEAR SIR:—The Collection Laws of Iowa enable the common laborer, the lumber dealer and other large firms, to enforce payment of any money that is due them, but the blacksmith thus far has no means by which he can enforce payment for his work and material. This makes it necessary for him to do business on a cash basis, or nearly so.

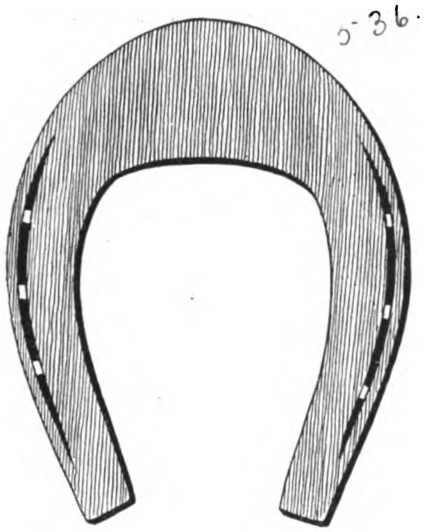
We are requested to publish your name in a book of reference for the benefit of our members. All of our members have agreed to extend no credit to those whose names are thus listed. There are about 3,000 blacksmiths in Iowa. Many of them are members of our association. Mr.................................of.......................Ia., informs us that you owe him................................Dollars. If this is correct please call as soon as possible and make some kind of a settlement with him.

He will then notify us, and your name never will be listed on his account.

We do not wish to injure you in any way or cast any reflections upon your credit. Our book is published without malice or ill feeling toward any one, but for the purpose of enabling our members to dispense credit favors only to those who are worthy of credit.

Yours very truly,
J. A. HAMILTON, Secretary.

FORM OF LETTER SENT TO REPORTED DEAD BEATS BY THE COLLECTION DEPARTMENT OF THE IOWA ASSOCIATION



A HEAVY TOE-WEIGHT SHOE WITH LIGHT HEELS IS USED FOR THE FRONT FEET

of the same mind. Shall I receive your request for association pointers by return mail? May I assist you to secure better prices for your work? Address me at P. O. Box 974, Buffalo, N. Y. But get busy now and prepare for spring.

THE SECRETARY.

An Echo of a Recent Meeting.

BY COMPETITOR

Of course, I was in favor of organization, and I was surely going to that meeting at Tupperville which the boys had decided to call. And while I knew that several of the boys had been to call on my competitor down the street, I was pretty certain that "Buzzard"—his real name is Bird,—as I nicknamed him, wouldn't go. He wasn't the kind that favors associations, and, anyway, hadn't I caught him in any number of lies? But whom should I see, the minute I stepped into the meeting place at Tupperville, but "Buzzard" talking to a group of smiths, some of whom I counted on being "my" friends.

Things went on fine at the meeting, 'most every shop in the four counties being represented, and everybody was very enthusiastic. And except for the presence of the "Buzzard," whom, it seemed, I was constantly meeting, I was having a good time.

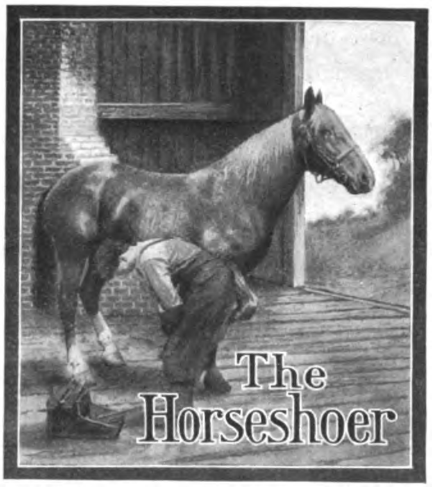
To cap the climax, I was appointed his assistant on one of the committees, and, of course, immediately after adjournment, he hustled over to me to arrange for a meeting of our committee. Well, my opinion of the man was raised considerably during that meeting, and in a little conversation before the meeting I found that he was a pretty good sort. But I couldn't forget those lies he told about me.

Convention business over, the boys started for their homes, and Bird—I didn't call him "Buzzard" any more—and I came home together. We had no sooner gotten into the smoker, and lighted our cigars—which he supplied—than he said, "Well, Mr. Carter"—he always addressed me very politely,—"I think you and I had better get acquainted. The two days at the convention have been very busy ones for both of us, and now I think we had best have a good talk."

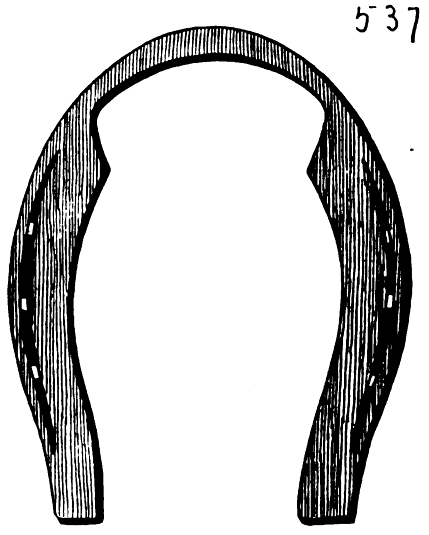
"That's very nice talk," said I. Then, remembering several of his recent doings, I added, "But it doesn't mix well with your practice of bidding under me every time a job goes the rounds in town. For instance, you gave old Timple a price of $3.75 for his repair job when you know it couldn't be done for less than $4.50."

"I never did any such thing," returned Bird. "He told me that you had quoted him a price of $3.75, but I didn't believe him and thinking to call his bluff I told him to go to you. He said the next day that you had taken the job at that price, but I didn't believe him." I didn't answer. The conversation was getting too warm for me, so I changed the subject.

Bird and I now have a very thorough understanding and when anyone says they can get work done cheaper at Bird's place, I simply tell them that I know better.



To Prevent a Horse from Forging.—I use a heavy toe-weight shoe, as in the engraving, on the front foot to make him reach farther. After I get front shoes on, measure from the coronet to the bottom part of shoe at toe. Then I make a heavy shoe, as in the engraving, for the hind foot, with a light toe and a heavy heel, say from about the middle of the shoe to the heel very heavy, and measure from coronet to bottom part of shoe, and put the hind shoe same distance from the coronet as front shoe.



THE HIND FEET ARE SHOD WITH A LIGHT-TOED AND HEAVY-HEELED SHOE

This will detain the horse in raising his feet so quickly, and consequently he won't throw his hind foot so far forward. You can stop most any horse from this habit with the kind of shoe I stated. I have stopped some awful bad forgers with this kind of shoe. J. B. WINDLE, Kansas.

A General Talk on Horseshoeing and Some of Its Evils.

C. CRAIG.

In the first place, I argue that horseshoeing is injurious to the horse's foot, no matter how scientifically it is applied, and that it is injurious under every circumstance. I am sure any practical horseshoer who has a knowledge of the anatomy and physiological movements of the foot and leg will agree with me too. Now, I suppose one of the most common and affecting evils which comes from shoeing is contraction; for you can scarcely pick up a shod hoof but which is more or less contracted. Some of it is hereditary, but if you will follow it back, and follow it closely, you will find the real cause of it to be shoeing. This trouble is very dangerous if not attended to, as it is liable to become chronic and the wings of the foot bone (os pedis) will soon become affected. If such a case is left to get along any old way, as is generally the case, the horse is left a cripple for life, and to suffer unknown pain on account of this evil practice.

Another evil which I might state is leaving the shoes on too long, to save a penny, and in the end lose a dollar. And then we have another very common evil which is mostly caused directly or indirectly from shoeing, and that is corns. Contraction will cause corns very often, for we often find them both together. Then there are many troubles and diseases common to the horse today, such as quarter and toe cracks, hollow wall, ossified cartilage, drop sole, crooked hoof, calk wounds (which sometimes cause a separation between the sensitive and insensitive laminæ), scalping, overreaching, stumbling, front and hind interfering, and all kinds of choppy-gaited movements. Now, if these were followed back we would find the real cause to be shoeing. For too many times we overlook the real trouble and blame it to something else. For instance, how could we think of a horse traveling free and clean with the interior structure of his feet bound tight with a hard dry hoof caused from shoeing and neglect, and the shoe serving as an iron band to hold it good and tight?

Now, let us take, for instance, a sound horse with a good, healthy foot, one that never was shod. The hoofs are round and plump, with well-developed frogs, and each part of the foot is performing its natural functions and all depending upon the well-being of each other for their health and proper nourishment. The sole and frog are bearing an equal amount of weight and the latter compelling the hoof to expand and contract at each footfall. The hoof, being flat on the ground, receives moisture enough to keep it soft and in a healthy condition. Now, in shoeing the hoof, the first step is to choose the size and weight of shoe, and, no matter what the weight of the shoe may be, we are putting an extra amount of weight on the muscles of the leg, causing more labor for them, which is contrary to nature. The next step is to prepare, fit, and drive the shoe, and the result is that all the weight which the whole hoof and frog were intended to carry is thrown upon the outer wall. Consequently, we hinder the sole and frog from performing their natural functions.

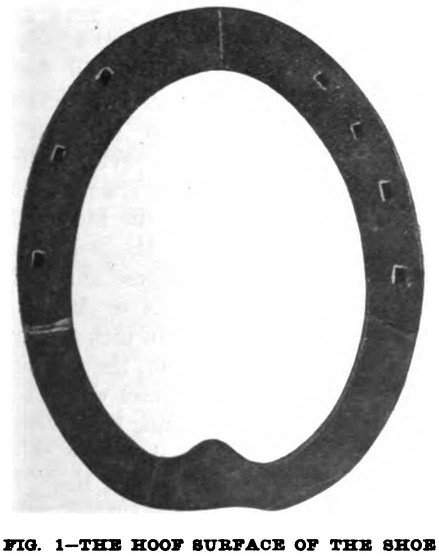


FIG. 1—THE HOOF SURFACE OF THE SHOE HAS THE BEARING RELIEVED AT THE LEFT HEEL

The frog was intended by nature to take an equal amount of weight along with the sole and wall, to expand the hoof, and to act as a cushion to prevent concussion

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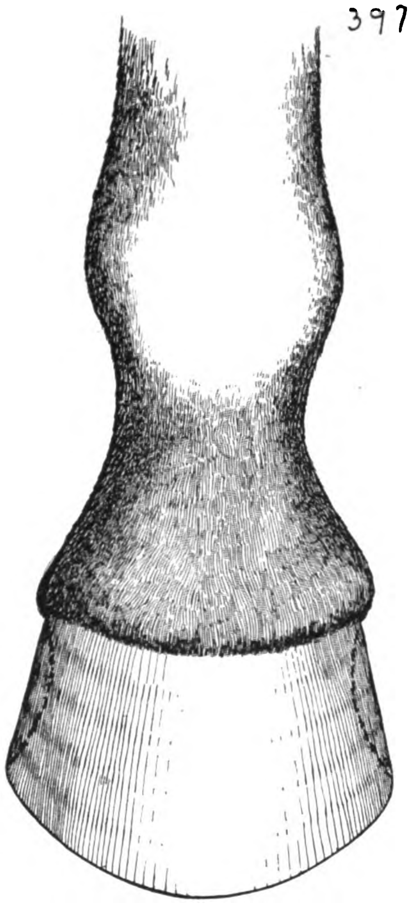


CONTRACTION DISTORTS THE FOOT AS SHOWN BY THE DASH LINES

upon the sensitive parts of the horse's foot. When the hoof is shod, these parts of the foot cannot do their duty, because they are hindered, for as soon as the shoe is placed on the hoof the frog is raised from the ground. In this position it cannot act as a cushion, neither can it expand the hoof any more nor perform its former functions, which kept it soft and pliable and gave the blood free circulation through it. It therefore begins at once to dry up, and soon becomes of no use at all to the foot. The blood which passed through it to the different parts of the foot—viz., the frog artery, which supplies the frog with blood; the velvety tissue of sole and frog; and back part of coronary band and bars—is shut off. This is one of the greatest evils which comes from shoeing.

If we take the foot of a horse and examine it closely we find a mass of nerves, ends of ligaments, and blood vessels. And the hoof when in a healthy condition exactly fits this mass of tissue within it. So it is easily seen that the least unequal amount of pressure on any of these nerves and blood vessels will hinder the circulation of the blood and the nutrition of the foot and cause pain. Hence, we are likely to find more or less fever in the foot, and this, if not attended to, will cause the whole hoof to become dry and hard and then general contraction. These results must follow the average kind of shoeing and all kinds of shoeing to a certain extent.

Quarter and Sand Cracks.

A. F. LIBBY.

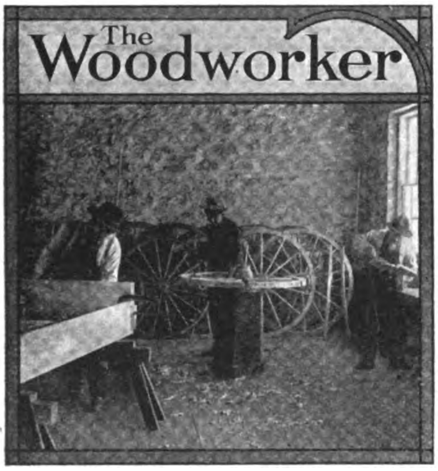
There are two causes for quarter and sand cracks; first, from an imperfect articulation of the pasterns causing the weight of the horse to be thrown on one quarter; second, the condition of the horse from overwork and want of food, or from being overfed and from the want of exercise, either of which will cause lack of horn deposit in the foot.

In the first case you find the coronary cushion driven up, with the lateral cartilage displaced. Take the compasses and measure the height of the heels. You will find that the side that is burst open is from three sixteenths to three eighths of an inch the highest. If three eighths of an inch higher, cut a notch in the foot in front of crack, cut down the heel, and have one quarter of an inch space between heel and bar shoe, see Fig. 1. As soon as that settles, remove shoe and cut down heels so they are of same height, leaving space between shoe and heel as before. As the quarter settles, the coronary cushion and lateral cartilage will return to their proper places. Then, and not till then, will the quarter grow down solid and healthy.

In the second case, I let the shoe

FIG. 2—THE RIGHT BRANCH OF THE SHOE IS THINNED FROM THE GROUND SURFACE SIDE

bear lightly on the foot at the heel, but take off the ground bearing. See Fig. 2. I cover this kind with a plaster composed of one pound of pitch and one ounce of beeswax applied when warm and held in place with strips of linen cloth. Some people use brass-plate with screws, but the above is better, for it keeps the shell in place and stimulates the growth of the foot.



A Practical Talk on Wheel Making.

J. W. DARON.

I notice W. C. P. gives a talk on wheel work in the December issue, and invites the ideas of others on the same subject. The first thing he wants to know, or question he asks, "How tight should a tire be to comply with the wheelwright's demand?" In the progress of his article, he asks other questions which have reference to about the same thing as that of the first. So in order to embrace about all he wishes to know, I shall submit the accompanying illustration.

First, in Fig. 1 we have a straight line AB through the center of the spokes that are at a right angle to a straight line running through the hub CD. Of course, these are in the position to give full diametrical strength, but not so for lateral strength. Now, compare Fig. 2 with Fig. 1. We find that Fig. 2 has less diametrical strength, and more lateral strength on account of the incline of the spokes to the point of the hub, which forms the dish as an arch against outside resistance. So in proportion as the dish is increased the diametrical strength is decreased, and the lateral strength is increased. Therefore, a wheel could be dished so much that it would be almost useless. I conclude from this way of comparing wheels that have dish and wheels that have no dish or are perfectly straight, in connection with my experience of wheel making, that a wheel properly dished, and to the right degree, will withstand greater lateral strains and shocks than a straight one, because it has more side strength, as we have shown in Fig. 2.

The next question that arises is, How shall a wheel be dished, i. e., with the tire, or made with the proper dish by the wheelwright, before the tire is put in? When we dish a wheel with the tire from one half inch to two inches more than it was made by the wheelwright, as seen in Fig. 3, we spring the spokes more or less, and break the connections of tenons and mortises, and to this same extent is the strength of the wheel destroyed. Thus, I think there is but one answer to this question, and that is, if the wheelwright understands his business he will make his wheel with the spokes on a right angle to the surface of the arm or skein on which it is intended to run. Then all that is needed is to put the tire on snugly; not for the purpose of drawing in more dish—because a little more will be drawn into it in spite of all that may be done to prevent it, which is right to draw up the joints—but more particularly for the purpose of holding the wheel solidly in the shape it was made. Most of the patent wheels, especially the Sarven, are made straight, and depend on the tire to draw in the dish. We see the results: either the wheel is ruined or the dish goes out.

I distinctly remember many years ago the Sarven wheels were made with the proper dish at the factory, from a half to three fourths of an inch; then when the tires were put on they stood the test. A wheel is a frame consisting of mortises, tenons, and joints, just like any other frame, and should not be drawn out of shape with irons, destroying its strength.

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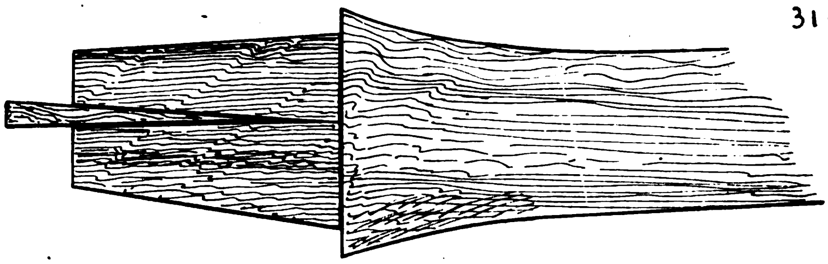
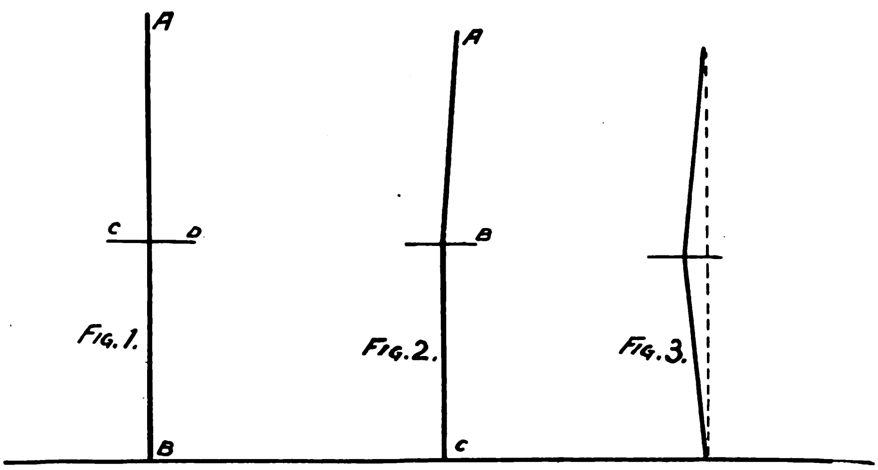


THE WEDGE WILL HIT THE BOX IN THE HUB AND SPREAD THE TENON TO FILL THE MORTISE



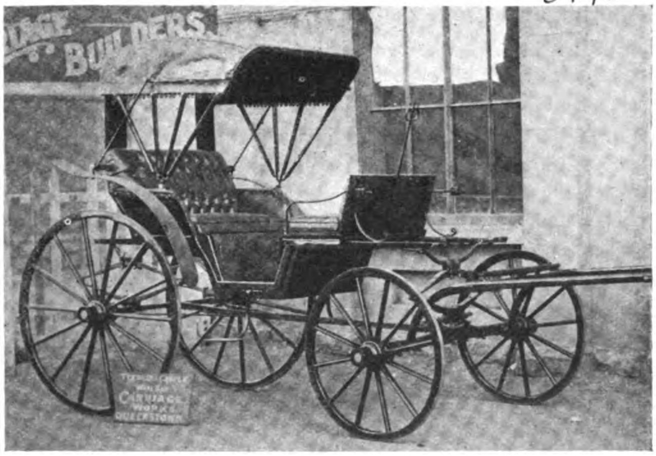
THE WHEELWRIGHT AND THE BLACKSMITH EACH HAVE A DISTINCT PART IN THE BUILDING OF A GOOD WHEEL

The Sarven Hub.

R. D. PATTERSON.

In looking over some of my back numbers of "Our Journal"—I have kept all of them for years—I read an article on setting tires on Sarven wheels, for back dish, etc. It made me feel like writing a few lines on the Sarven hub. I don't think there is enough attention paid to the hub. When your spokes are loose in the hub, and your dish is hard to control, in most all cases you will find that the wood in the old hub has become loose and will slip endways in the bands or flanges. If it will slip $\frac{1}{32}$ or $\frac{1}{16}$ of an inch, what have you got the strain on, the flanges or the rivets? If your wheel wants to back-dish, how are you going to prevent it? I will tell you how I handle this wheel. After removing my tire, I remove all the rivets, draw off my flanges, and if the spokes are too loose in the hub I pull them out and put a

A VERY NEAT-APPEARING HEARSE OF ARTISTIC DESIGN



A CARRIAGE OF UTILITY BUILT ALONG PLEASING LINES

short wedge in the end of the spoke across the narrow way, not up and down, so that when you glue the end of the spoke and drive it down, the wedge will hit the box in the hub and spread the end of the spoke to fill the mortise. When I have done this, I then warm my flanges and fill them with glue and put them on. I now take a ¾-inch bolt and draw it down in the hub as tight as I think the bolt will stand, rapping on the ends of the hub with a hammer. Then you are ready to rivet the bands. Put on your rim and tire, and I believe you have a good wheel. I have never heard of any complaint about my work done this way.

Two Examples of High-Grade Vehicle Construction in South Africa.

TREWEEK AND CARDEN.
Cape Colony.

The accompanying engravings show two examples of our work recently turned out. The hearse stands in front of our premises, and is rubber-tired. We are known here as the West End Carriage Works.

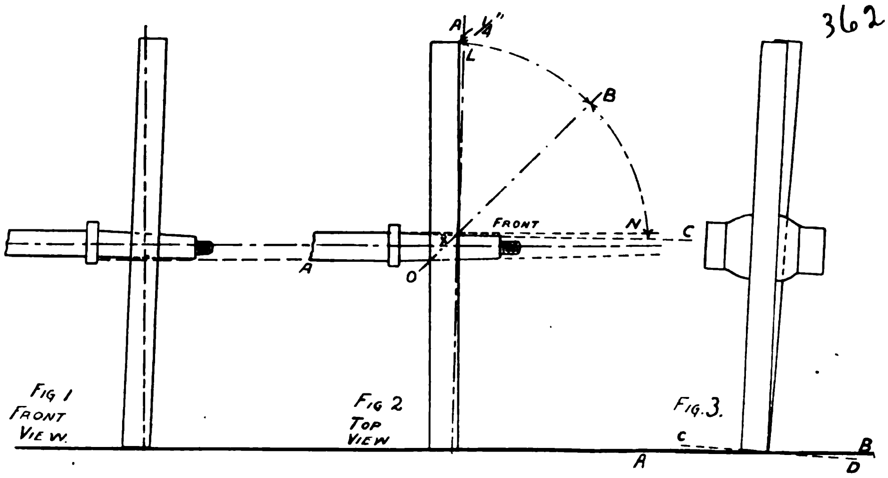
We greatly enjoy reading your paper, and Mr. Treweek, who has spent some years in the trade in America, understands the humor of Thornton's letters. We also think there is a lot to be said in favor of Tom Tardy, as he does not believe in too much hustle.

When Is an Axle Properly Set?

NELS PETERSEN.

The question of how to set axles properly for vehicles seems to have come up for discussion. I would like to ask the question, When is an axle properly set? Who can answer? The point aimed at is to avoid any unnecessary friction that will cause the vehicle to run heavy. Some men will argue that because the wheel leans out at the top when set to a plumb spoke it has a tendency to run away from the collar if the axle is not gathered. Then again the taper of the spindle is supposed to have the same effect on the wheel, and for that reason the axle must be gathered. This is probably true to some extent, just as much so as if the axle had no pitch, for the wheel would not stay on. However, the tendency of the wheel to run off when standing on a plumb spoke is not so great as supposed, but for sake of argument we will say that the taper of the spindle will cause the wheel to run to the nut. The amount of gather, then, to counteract this tendency would seem to depend on the amount of taper the axle has to each foot of length. Suppose a spindle 12 inches long has a taper of ½ of an inch, that is, it is line C, which is the front surface of the axle, out two feet, which is the distance from X to A on a four-foot wheel, the axle at this point would measure one inch less in diameter than at the collar, or a half inch less from center to one of its sides. Now, if the sliding friction produced by the tire against the ground equals the friction produced by the taper of the spindle, then it would seem that the proper way to gather an axle would be to divide the difference so that the distance from A to L and from N to C would be the same, which in this case would amount to ¼ of an inch. This would give one inch gather to a pair of four-foot wheels.

But there are other forces to be taken into consideration. An axle is set so that a wheel with ¾ of an inch dish is



AN AXLE IS SET PROPERLY WHEN ALL UNNECESSARY FRICTION IS AVOIDED

½ of an inch less in diameter at the point than at the collar. Lay it out on a piece of paper; any size wheel will produce the same effect, but for the sake of convenience take a four-foot wheel. From the center X Fig. 2, draw a line OB at 45 degrees to the center line through the axle. If we extend the standing on a plumb spoke, which it should have to get an even bearing on the bottom of the spindle. Draw a line through the center of the axle, and another line along the bottom side of the spindle but parallel to the center line. This latter line, if tangent to the point of the spindle, will be seen to fall some distance from the spindle at the collar. See Fig. 1 A. And, as the weight of the load is downward, it would seem that the angle which a line through the center of the spoke makes with the bottom of the spindle would cause the wheel to crowd the collar without gathering the axle. Another point: the weight of the load being down, the point of contact which the spindle makes with the boxing is on the bottom, and not on the front side, as can be seen on an axle that has been worn considerably; i. e., the wear has taken place on the bottom, not on the side. While the axle is new, at least there is not much chance for the wheels to flare out at the front.

Brother Gunn makes the remark that it is a great mistake to set axles to gauge. This simply proves that he never used a gauge. All up-to-date shops use automatic axle gauges for setting axles nowadays, and it is the only way an axle can be set properly, to say nothing of the amount of time and labor saved.

Suppose the wheel has half an inch dish and you want to set it on a plumb spoke, the gauge will tell you at a glance when the axle is set under half an inch. The same is true of the gather. Take a repair job, for instance, where you have put in new spindles or stubs: the wheels vary in dish; one may have half an inch, the other one and one half inches. How will you measure to get both exactly straight? You can't do it. If you set the axles so that the wheels will all be on a plumb spoke, a glance along the side of the wagon would make the wheels look distorted, like a rail fence. See illustration, Fig. 3.

Neither can you set an axle properly by turning the axle over and placing a straightedge on the wheels. No set of wheels are down to square tread when the axle is set properly, unless the tires are made cone-shaped, with the big end of the cone to the back of the wheel. But as all tires are made straight, the pitch of the axle will cause the tire to wear off to the front edge, the back being thicker, which must have been noticed by every one who has had any experience resetting tires. As shown in Fig. 3, the line AB represents the ground, another line CD drawn parallel with the tread of the wheel crosses the first line, and ought to convince anyone that an axle cannot be set so as to have a plumb spoke and the wheels down to a square tread.

How to Make a Lumberman's Peavey.

H. H. SMITH.

The accompanying engraving shows the style of peavey I have made for the last few years. The hook is made of black diamond tool steel and is $\frac{7}{8}$ by $\frac{1}{2}$ by 13 inches. Heat and upset about $1\frac{3}{4}$ inches, then bend the upset end and form a diamond or duck's bill. Then take a piece of sheet iron, and draw a 9-inch circle on it, and take $\frac{1}{4}$ of the circle and use it as the pattern. Now bend the hook until the inside of it fits the pattern. When bent the proper shape of the hook will be about two inches longer than the pattern as shown in the engraving at H. The clasp D to hold the hook is made of 1 by $\frac{1}{2}$-inch Norway iron. Leave the two lower corners full thickness, as shown by the black portions in the engraving at D. Draw the middle to the length it takes to go around the handle at C. Punch a hole in each end so the hook can be bolted on. Take one-inch band iron for the two end rings. Now put a pick in the end of the handle and a bight EE, and the job is complete.

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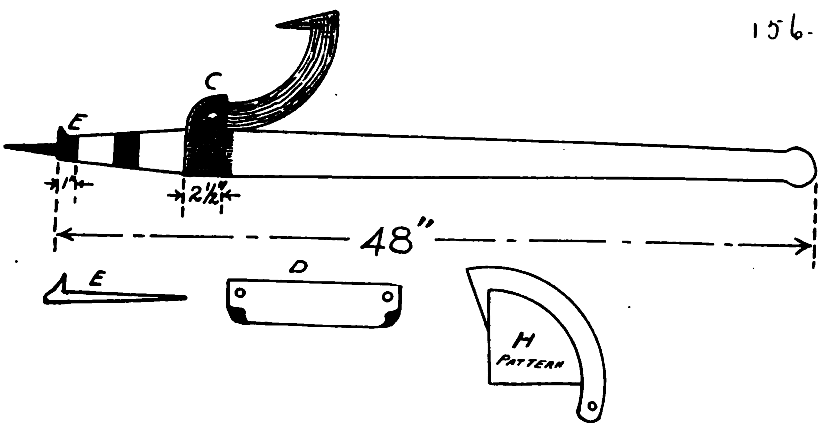
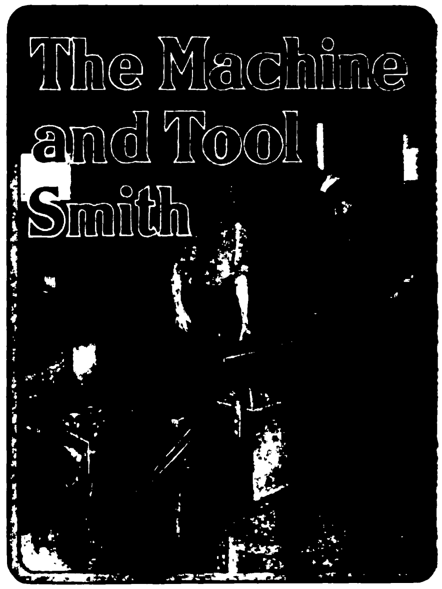


A LUMBERMAN'S PEAVEY, OR CANT HOOK, OF PRACTICAL DESIGN

Smiths having calls for lumber peaveys, or cant hooks, will find this a good style, and one very easily made. The right curve for the hook is easily ascertained by drawing a pattern as above described. One or two of these handy lumber tools may be made during spare time and easily sold if located in a timber section.



Treating High-Speed Tool Steel.

GARRETT CREEDON.

Foreman Smith, Boston & Albany Railroad Shops.

At these shops we have been using several grades of high-speed tool steel for the past four years, the first to come into use being the Midvale. This was closely followed by Novo, Mushet, and lastly by Rex A and Victor.

While it would be a very hard matter to make a comparison with regard to the best of these grades, I can say that we have had very good satisfaction with all of the different classes, although the different representatives of each kind always had a different method of treatment, which was very confusing to our tool dresser, so much so that we have laid all the different ways aside and have used the same treatment in all high-speed tool steel, our present method giving good results.

The machine shop has one man engaged exclusively in the care of machine tools and other tools. This man takes all tools necessary to be dressed to the tool dresser, who dresses them all and lays them on the floor to cool. He then makes a hollow fire, heating the nose of each tool to a white heat and giving it a sweat. Then he places the tool as quickly as possible under a high pressure of compressed air until tool is cooled down. Each tool is treated in a similar manner. They are then taken and ground on a dry emery wheel, after which they are fit for use.

The results obtained from the use of high-speed tool steel as compared with water steel could not be taken into comparison, inasmuch as high-speed tool steel is so far superior to water steel that it would be useless to endeavor to make any comparison with the results obtained.

All of the machines at these shops are working on the piecework system, and with water steel the piecework system would be practically useless.

With reference to the dressing of tools on piecework I would say: the blacksmith is responsible for every tool dressed, and it is necessary that each and every one be given personal attention, in view of the fact that there are no failures from these tools which could be attributed to negligence on the part of the blacksmith in not properly dressing them.

We have two valves on this pipe, one half-inch and one three-quarters-inch, which are used to blow the water out, and are then used to blow on the tool and also on the fire. We do not use compressed air to blow this fire only when the speed is shut down or in case of accident to machinery or fan gives out.

We use high-speed steel for flat drills and for special chucks made for each size steel, and have obtained very good satisfaction from the use of same. We do not use any carbon steel for cutting tools in our machine department with the exception of one or two used on brass work. The only other use which we have for this tool steel is for taps, dies, and punches for boiler work, and shear blades. We have on hand at this shop about two tons of

In conclusion, I wish to say that I most heartily recommend the use of high-speed steel in all railroad machine shops, and I would also recommend as little forging as possible on the tools by the blacksmith. The only treatment necessary for those tools is a small hot coke furnace for heating the nose of these tools for treatment.

The Boston & Albany shops employ about two hundred and fifty men, the blacksmith department consisting of thirty-three men.

The equipment of the blacksmith shop comprises two steam hammers, two shears, one $1\frac{1}{2}$-inch Bolt Heading Machine. On this last-named machine sufficient bolts are made "piecework" to supply the entire Boston & Albany road, which consists of three shops,

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TWO WROUGHT LAMPS OF ARTISTIC DESIGN FROM THE FORGE OF MR. THOMAS GOOGERTY, INSTRUCTOR IN FORGING AT THE ILLINOIS STATE REFORMATORY

We have a small iron stand about three feet high having a plate about twelve inches square on top with two common fire bricks placed on this plate so that the blacksmith can place the tool between these bricks when applying air to the tool. The air pipe is about twelve inches long over this plate, and is placed in such a manner that the blacksmith can swing the pipe to any angle. We have a drip on this air pipe which removes all moisture from the air before using.

good carbon steel made up into all kinds of tools, but at the present time this steel is lying out in our shop yard, and we would be glad to dispose of it for little or nothing.

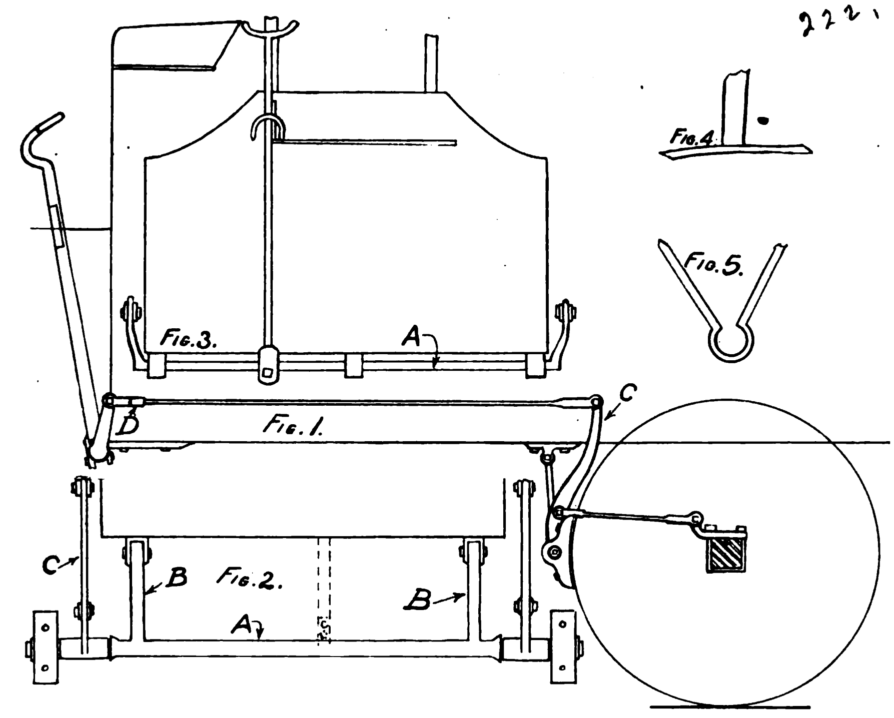
When we first started the installation of high-speed steel at these shops, instructions were issued by the general foreman to have all water steel taken to the blacksmith department. Upon the receipt of this material it was immediately consigned to the shop yard, and it is still at that point.

turning out on an average about thirty-five general repair engines per month and about four hundred freight cars. At these shops the general output is, on an average, about seventeen engines per month.

How to Make a Good Wagon Brake.

NELS PETERSEN.

Blacksmiths located in a hilly and rough country usually have plenty of experience in making and repairing



A WAGON BRAKE OF EXCELLENT DESIGN IS THE ONE KNOWN AS THE CALIFORNIA BRAKE

brakes for vehicles of various descriptions. There are brakes of many kinds, some good and some of little value, especially on heavy wagons. For instance, take a heavy truck wagon built to carry four or five tons and going down a steep incline. No team of horses could possibly hold the load, and sometimes it is difficult to hold it with a brake, especially if it is a poor one. About the best one I have come across is what is called a California brake.

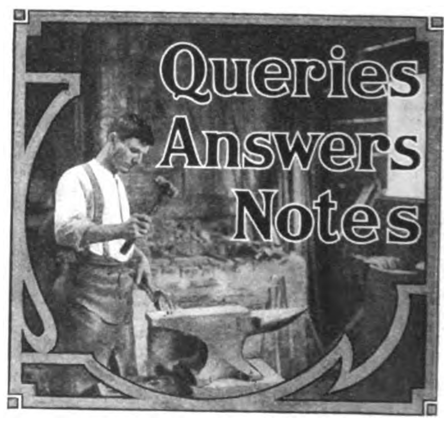
A study of the general lines of this brake will show that an immense leverage is procured. I have seen this brake locked so tight that the wheels stopped turning and dragged on the pavement. Of course, the parts must be made heavy enough to withstand the strain, and they must be in proportion to the size of the wagon. For instance, a wagon with a three-inch spoke and rim, as on a heavy dray, the brake beam A, Fig. 2, should be made of not less than 1$\frac{3}{8}$-inch to 1$\frac{1}{2}$-inch round stock. The brake hangers B are sometimes welded to the beam, the upper end being finished off with an eye like a shaft eye which fits into a shackle bolted to the sill of the body as shown. Sometimes the eye is made on both ends, the lower one being made large enough to fit over the beam and a collar welded on the beam to fit between the two hangers. In the latter case a spring is attached to the beam and run up to the bottom of the body as shown by the dotted lines, where it is held in place with a staple or some other arrangement to keep the beam from turning.

About the hardest pieces to make on the whole brake are the two brake levers shown at C, Figs. 1 and 2. An eye is forged on the lower end, and in order to prevent the lever from swinging sideways and hitting the body when the bearing becomes worn, the eye is usually made three inches or more long. To forge the eye, a piece of iron the width of the eye is used, the stem being jumped on and shaped as shown in Fig. 4. The ends are then scarfed, bent, and welded on a mandrel to fit the beam.

Another method is shown in Fig 5, where the iron is drawn to the thickness you wish to make the eye, then doubled over and welded. But this leaves the flat part of the lever the wrong way, and it must then be set off with the fuller and hammered down to the proper size. It does very well for lighter work.

The brake roller, as shown at A, Fig. 3, has a crank on each end and is made square where the foot lever is fastened, a crotch being forged on the lower end of the foot lever to fit the square and a bolt inserted through the crotch and under the roller. A notch is also cut in the lower side of the square where the bolt is put in to keep it from slipping sideways. Enough play must be allowed, however, to permit a little side motion of the foot lever so that the catch will stay in the ratchet when the brake is set tight. The brake rod, running from the crank on the roller to the rear lever, has a screw buckle on the front end as shown at D, Fig. 1, so that when the brake becomes worn or loose the rod can be shortened by simply removing the bolt and turning the screw buckle till the rod is the proper length.

A brake of this kind is a little more expensive than the common brake, but it will last a long time and it does the business. The parts that usually give out first are the bolts in the levers, which can be easily replaced. Sometimes the crotch on the foot lever becomes worn and loose, in which case it must be taken out, heated, and closed up. When the holes in the levers become worn, there is too much play, and a good remedy is to plug the hole, weld it down, and drill a new hole. Owing to the amount of leverage, a worn-out hole or bolt will give the foot lever so much throw that it cannot be set tight, in which case the brake is useless and dangerous.



The following columns are intended for the convenience of all readers for discussions upon blacksmithing, horseshoeing, carriage building and allied topics. Questions, answers and comments are solicited and are always acceptable. Names omitted and addresses supplied upon request.

Wants to Shoe a Pacer.—I would like to ask some brother smith a question on horseshoeing. I have a customer who has a pacing horse, but after shoeing, the animal trots. Will some brother tell me how to shoe him so he will continue to pace, and also kindly show cut of shoe?

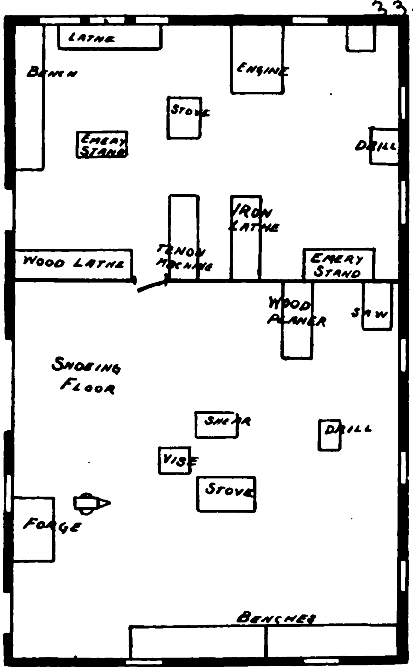
J. H. PASTORFIELD, North Carolina.

Wants Information on Forgings.—I would like to have some brother smith tell me how to make a shackle for a cutter, so a pole can be put on. I also want to know how to make a circle for a buggy, and how to calculate the amount of stock to use to make a half-circle for a wagon and have the circle come out three inches on the sandboard. And I would like to know how to make a brace for the hounds on a truck. THOMAS LONG, New York.

Several Questions.—We would feel greatly obliged to your readers if they will give us some idea of the cost of putting in oil engine power to work a band saw, planer, trip-hammer, emery wheel, sand belt, boring machine, spoke-tenoning machine, and a hub borer. We have a staff of 15 hands, and contemplate changing to oil engine power. I would also like some brother to tell us what lubricant to use on the bit of the boring machine to keep it cool—something inexpensive. T. & C., South Africa.

The Location of Forges.—I want to ask a couple of questions through your paper. I am thinking of building a new shop in the spring, and would like to know if there is any advantage in having the forges out in the shop, over having them by the wall. Would like to know the best way to grind a mower sickle. We grind them on the emery wheel, but we can't keep them from getting too hot, and after a few grindings they are a good deal softer than at first. And to grind them on a grindstone would be too slow to make anything at 25 cents per sickle. EDMUND SHUMAKER, Illinois.

A Letter from Cape Colony.—THE AMERICAN BLACKSMITH has reached me very regularly every month and please take it from an African blacksmith that it's first-class stuff. I have recommended it to all my friends. Wages for our craft here run from 10 to 12 shillings ($2.40 to $2.88) per day. For a house suitable for a man with a family of seven children you have to pay rental of five pounds ($24.33) per month. There are a great number of American-made vehicles on the roads here. What is wanted here when the good times set in is a real good man to drive American trade, one who has traveled through the country and knows the people and their needs. W. H. HUTCHINGS, South Africa.



THE GROUND FLOOR OF A WELL-EQUIPPED OHIO SHOP

A Word from a Physician.—I do not see how an up-to-date blacksmith could do without your journal. I am a practicing physician. My mare interfered in front, and I could not get a blacksmith to shoe her properly. She could not do regular work without doing injury to her right leg. I saw a copy of your journal, and became a subscriber for this purpose alone, and got my mare in two months where she would not interfere at all. Would not take anything for what I have learned from your publication. W. P. LEONARD, Georgia.

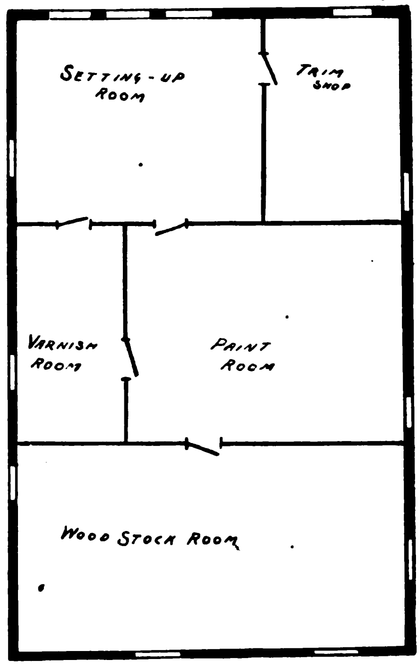
An Examination Law is Needed.—I have just been reading the question and answer columns treating on different affairs, but I failed to see one question discussed that bears on my mind strongly. That is about farmers and quacks putting on their own and other animal's shoes, and thereby taking trade away from a smith. And, more than this, they get the feet in such terrible shape, becoming contracted and every other thing. And to cap the climax, they work for half price, keeping customers out of the regular shops. They buy a cobbler outfit, and seem to think that they can do everything when the only thing they can do is to make trouble. What do others say? H. C. HEITHECKER, Indiana.

On Wheels and Dish.—I would like to say a few words on that wheel question. I got a set of wheels from Chicago and no two of them had the same dish. What could I do with them? I could not use them the way they were, and I have determined to set my own after this. I used to work in a carriage factory, setting tires. They had to be set just so, or they were sent back, and I am sure I could do this again. Every wheel was dished just so you could see the head of the rivets, no more or no less, and I think that is the right dish for a strong wheel. If you dish them more than this it will strain the spokes in the hub and also strain the rivets. If they are left straighter they are liable to go the other way. G. T. FARRELL, Iowa.

Files Every Number.—You recommend handing out a copy of the paper. I don't think I have a copy that I wouldn't sooner have than any of the premiums, and I am very careful to file every number away as soon as I read them. I am not much of a blacksmith, anyway; am more for machinery. I haven't done a day's work in my shop since the cotton ginning season commenced. I am running a cotton gin as a side line. I have never regretted subscribing to THE AMERICAN BLACKSMITH, and I am like the kicker, not much of a horseshoer, so would rather have the paper as it is now run than all horseshoeing. Still, in my opinion, it takes all of the different parts as it now is to make a complete craft paper, and I couldn't tell you where to commence to improve and better "Our Journal." JOHN R. SHOOP, Oklahoma.

Wants to Braze Rim on Shoe.—Please print in your next month's paper an explanation of how to braze a rim on a horseshoe with copper wire and what flux to use. I am a bit short of knowledge on this particular job. W. S., New Jersey.

In Reply.—I hope the following will be sufficient: To braze grabs with copper on light shoes I use two heats. First, have the fire clean, fit the shoe to the foot, and partly turn toe-lip; second, see if one part of grab fits well, place in vise under gentle pressure to make sure that it is close; third, place a small piece of copper wire, No. 16, on shoe with pulverized borax (compounds do not give the best results); fourth, place shoe on top of fire so you can watch the copper and blow gently; as soon as copper melts remove shoe and place in pressure of vise. Don't strike with hammer. Fit the other part of grab and repeat. Clean with wire brush and finish lipping. If you wish to refit a shoe, place shoe in fire and melt the



THE SECOND FLOOR OF MR. STEFFEE'S SHOP.

copper, brush off the old toe and copper, clean with a brush before a new toe is put on. ALBERT F. LIBBEY, Massachusetts.

A Well-Equipped Shop of Ohio.—I have a two-story shop, twenty-six by forty. I have one fire, three anvils, one iron cutter, which cuts from one half by four inches cold, one set of dies, right and left, from one eighth of an inch to one inch, two large power drills, one Mole tire setter, one iron planer, one wood planer, one rip saw, one machine for cutting tenons and boring rims, one emery stand with two wheels two by twelve, one emery stand with two wheels three by eighteen inches, one forge, a Singer sewing machine for making buggy tops and cushions, one large iron face plate, one four-foot mandrel, one shaping block, one Green River number three toe calk vise, a bolt threading machine, and, last, but not least, an eight-horsepower Badger gasoline engine. I will give some of my prices:

Horseshoeing	$1.20 to $1.40
Resetting four old shoes	.60
Four new buggy tires	4.50
Wagon tires, new iron	8.00 to 14.00
Buggy rims, per set four wheels	4.00
Wagon rims	5.00 to 7.00
Tire setting, ¾ to 1 inch	1.60
Wagon tire, 2 inches	2.00
Wagon tire, 3 inches	3.00
Wagon tire, 3½ inches	3.50
Wagon tire, 4 inches	4.00

Prices on other work are about in proportion. J. W. STEFFEE, Ohio.

And Still Another.—I had to laugh after looking over your November number, and I felt so amused that I cannot keep from answering the would-be blacksmith's letter that I found on the last page. I don't suppose I have been reading your magazine as long as he has, and perhaps I have not been blacksmithing quite as long, but I will say this much, I have been at the business about 27 years, and have worked at journey work about 20 years, principally in the cities, and I consider your book very interesting. Now, my advice to that brother who is kicking on engines is to close-up his little one-horse shop and get out, go to work at journey work, or go somewhere and finish serving his time. I think he is one of those horseshoers that was made in about a year, and that is just what keeps the business where it is today, through these short apprenticeships. Then they open a shop, depend on reading books and doing business on other people's knowledge, and when it don't come fast enough they put up a big kick. Now, I hope you will print this in your next number, so that this brother will have a chance to know that there are other readers thinking as well as himself. Just tell him your book is all right, the neglect is on his part. A SUBSCRIBER, Massachusetts.

Another Reply to the November Kick.—The November number came to hand this morning, and I must say that the letter from "Your Subscriber," which you have dubbed correctly "A Kick and the Other Side," is a genuine surprise to me. I am taking three trade journals and I cannot agree with him at all. I regard "my" journal as growing better each issue and I cannot see how a smith, old or young, can remain in doubt about the usefulness of THE AMERICAN BLACKSMITH. It comes to me as a great help, even after nearly forty years of experience in the shop. Even if one can't buy everything that is advertised for sale in its columns, they need not condemn special numbers, such as the October number, just because it was not all horseshoeing.

Now, it strikes me the man stands in his own light when he turns away from power in the shop. I would sooner think of throwing out my blower and going back to a bellows than to undertake doing all the work by hand that an engine and a few pieces of power machinery will do, to say nothing about the loss of many jobs that would naturally go to the competitor who has them.

Out here in California, the finest country on earth, no one thinks of doing without power longer than it seems necessary, and I sincerely hope "Your Subscriber" will be better natured when he writes again, and will have seen the error of his ways. Long live THE AMERICAN BLACKSMITH—"Our Journal." GEORGE E. HENTON, California.

Praise from the "Show Me" State.—In response to your request as to what we like best in your, or rather "Our Paper," I would say, no doubt there are some things in it that don't interest every one; for instance, away inland here where a great many never saw a ship, the articles on making fittings and forgings for vessels don't interest us. But as I have seen and sailed, and although away out here in old Missouri, I am still interested in that part of the craft. Still, to run a paper like ours, you have got to cater to the different branches of the trade in different localities, and if any article is published that don't interest one it will another.

I am very much interested in the articles on gas engines, as I own and operate one, and find a good many pointers in "Our Journal." Although I am not running a machine shop, still I am interested in the machine shop articles. Information is very easily carried around, and sometime may be worth a whole lot to any one running a common country shop.

Benton's talks are worth the price of the paper itself, and "Heats, Sparks, Welds" are all right. The poems also fill in, and are always good reading. The "Queries, Answers, Notes" are one of the main features of the paper, and should be kept up by all means. Ornamental work don't interest me so much as it may others, but still it no doubt may be the chief feature for some of your readers.

A series of articles on guns, revolvers, etc., would greatly please me, and so would the smith's work on the turbine battleship. To sum up, I think the paper is all right, as, at least, I am very well satisfied, and I think any will be, too, if they just think for a moment of the many different branches there are of our trade. And we all need to have a little information on our trade now and then. GEORGE McLEOD, Missouri.

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BROTHER J. H. TAYLOR, OF WEST VIRGINIA, HAS A VERY COMFORTABLE NEW SHOP

A Letter from Nebraska.—If brother F. C. Stracke will write to The Neustadt Automobile and Supply Company, 3954 Olive Street, Saint Louis, Mo., that company will supply him with all the necessary parts to build the kind of automobile that he wants. THE AMERICAN BLACKSMITH is a fine paper and should be read by every up-to-date blacksmith all over the world.

I wish that the brothers would write more on the lathe question, and how they do some of the difficult jobs that they have done. I have a large screw-cutting lathe with a ten-foot bed. It is a fine machine, and I don't see how a smith can get along without a good lathe. I also have a twelve-inch Crescent wood planer, a twenty-six-inch Crescent band saw, a Little Giant trip hammer, a power thread cutter, a power blower for blowing two fires, two hand blowers, a cold tire setter, a punch and shear, and a Champion lever drill. But best of all is the six-horsepower Waterloo gasoline engine that does all the work. I also have a Perkins one and a half horsepower, that I use to run the lathe and band saw. By using the small engine I save lots of oil, and the little thing is so easy to start, which saves lots of time. When I am in a hurry and want to saw out some felloes, I can have the band saw running in two minutes.

Don't be afraid to put in machinery; it will pay for itself in a short time. When you buy an engine, buy at least a five-horsepower, and it won't be long before you will have enough machinery to keep it busy. When I bought my engine (a six-horsepower) I just had an emery wheel to run, and everybody thought that the engine was too large; but now they have changed their minds and think that it is too small for my machinery. I will say, by all means put in machinery—it will pay you big. M. J. ALLEN, Nebraska.

Most of Them Say the Same Thing.—As I am very much interested in "Our Journal," it gives me great pleasure to answer the questions in the December issue as follows:

First. I am very much pleased with your present method of publishing our journal, that is, giving everything its proper place.

Second. While I may not be as much interested as some of our readers in the gas engine line, I am glad to see the many good hints you give us, and again, there are probably others that take as much interest in that line as I do in other lines. If nothing happens, I expect to be as interested as anyone in the near future.

Third. So far as machine work is concerned, I cannot say that I am much interested, as I have none of that to do, but have no objections to it whatever, as there are probably others that are interested.

Fourth. Benton's talks is the second article I usually read.

Fifth. Yes, I like to read those.

Sixth. Thornton's letter is the first article I read. Keep them coming; they don't take up any too much space.

Seventh. I am very much interested in the "Queries, Answers, Notes."

Eighth. I am not very much interested in ornamental iron work, as I have not got quite that far along yet.

Ninth. I think I should like articles on this line; some of these come in almost all of our branches.

Tenth. I think I should enjoy an article on this question.

Of course it would be impossible to publish a journal in which every article would please every reader, without every reader was in the same line of business, and then, if his branch was very broad, there would be some objections. So I, for one, will say, keep them coming as they are; every one like the December number, which is the best yet. J. D. ENNIS, Florida.

A Well-Equipped General Shop.—My main shop is thirty by sixty feet, the wood shop is sixteen by twenty-five feet, the shoeing department is twenty by twenty feet, and the office is eight by sixteen feet. My tools are: A six-horsepower White gas engine, a Little Giant trip hammer, a House cold tire setter, one Silvers power drill, a boring machine, a Reynolds tire bolter, a Goodyear rubber tire machine, a Silvers band saw, an emery stand, a rip saw, a cold punch, one power blower, an Edwards shear, one hot shrinker, three forges and anvils, two vises, one shoeing and bolt vise, one fireproof safe, one hand drill, one cone, three leveling blocks, besides other tools. This is a wheat-growing county, and most of our work is done in the summer time. This is a town of 1,700 or 1,800 inhabitants. The prices here are, the same as in other places, too low:

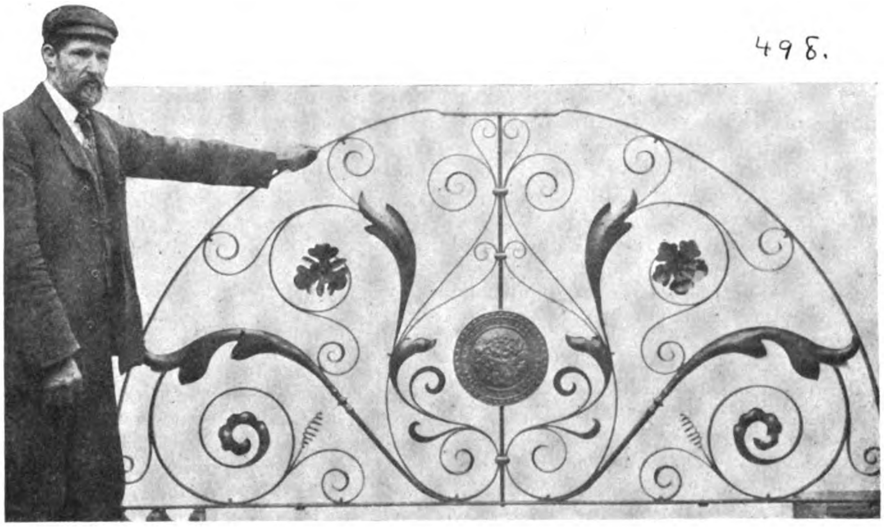
Sharpening plow lays....... $.15 to	$ .25
Lister plow lays..................	.25
Stubs up to 1 inch................	5.00
Stubs up to 1⅛ inches..............	6.00
Stubs up to 1¼ inches..............	7.50
Setting wagon and buggy tires:	
Each..........................	.40
Per set	1.50
New plow lays............. 2.50 to	3.00
New lister lay, 14-inch............	1.75
Tongues put in....................	3.00
Bolsters and sandboards, each......	1.50
Axles .... 3.00 to	3.50
Spokes and felloes, each............	.25
Buggy beds............... 6.00 to	9.00
Wagon beds, 26-inch................	20.00

I make some new work. I have sold two buggies, and have on hand one spring wagon. Now, I will tell you how to make a plow lay. First, fit land side to frog of plow. Next, fit blank lay to plow, and then I take a lap weld. Beginning at the heel and welding to point, I mark my quarter bar so I can see just where to put my lay in welding, and I have good luck this way, and it does not take long to make a lay and have a good fit. I guarantee all my work, and I have had to do very few jobs over. I never slight a job because I am in a hurry. I believe that what is worth doing is worth doing well. J. E. McCORKLE, Kansas.

A Price List from Minnesota.—According to the prices given on page 61 in the December number of THE AMERICAN BLACKSMITH, the prices quoted from the State of Minnesota are at present pretty low. But that is the smith's own fault, and not somebody else's. Just a few of my own prices on horseshoeing:

Four new horseshoes..............	$2.00
Four new horseshoes, heels steel plugged	2.40
Four new shoes, heels and toes steel plugged	2.60
Four new Neverslip shoes...........	3.00
Neverslip calks, each..............	.05
Four new shoes, stallion............	4.00
Resetting four old shoes............	1.00
Unruly and vicious horses, extra.....	1.00
Wagon axle, hickory, 3¼-inch........	4.00
Wagon pole, complete..............	6.00
Wagon pole only, with old irons and hounds........................	3.00
Wagon bolster, old rims and stakes...	2.50
Four 1½ by ½ inch wagon wheel tires reset..........................	2.50
Three new spokes..................	$ .75
Whole new rim 1½ by 2 inches, one wheel	2.00
New plowshares, soft center, 12-inch..	3.00
New plowshares, soft center, 14-inch..	3.50
New plowshares, soft center, 16-inch..	4.00
New plowshares, soft center, 18-inch..	4.50

498.



A FANLIGHT GRATING FROM THE FORGE OF AN ENGLISH SMITH

Plowshares sharpened, hardened, and polished, all sizes, 50 cents; painted, 50 cents extra; pointed and heel put on, $1.00 extra.

But we will change the prices on sharpening plowshares next spring, and the change at my shop will be as follows: 12-inch share, 50 cents; 14-inch, 60 cents; 16-inch, 70 cents; 18-inch, 80 cents. And if any rusty shares come into the shop, ten cents and above will be charged extra on each share.

Everyone else may stick to their old price if they wish. Look at the blacksmiths today, and about two hundred years back. You found the blacksmith of years ago at the king's right hand, but you will find a great big difference nowadays. C. E. ERICKSON, Minnesota.

An Interesting Letter from Missouri.—My shop building is in the shape of a letter L, fifty by twenty, two stories in front, and forty by thirty in the rear. I have a six-horsepower Weber gasoline engine to drive my machinery, which consists of a rip saw, a band saw, a press drill, a trip hammer, an emery wheel, a boring machine, a scroll saw, and a speed lathe. I run a grist mill as a side line. I keep meal on exchange at all times. I also have a feed grinder, with which two men can grind twenty-five bushels per hour. I find the grist mill brings me in some good money, and I find that the cobs that accumulate through the summer will supply the cook stove. And in winter the scraps from the woodwork bench, and about twenty-five bushels of coal, will keep my shop very comfortable.

I do a cash business, and that is the only way to do business. Of course, I have a few customers that have hired help on their farms, and when they send in a job by one of them, I have to book that. But such men as that pay me when I call for it. I have been in shops where the smith was sitting down waiting for a job. Don't ever do that, boys; you have always got something to do. Sweep out, clean up, and if you have not got a customer, shave a wagon tongue, fix up your tools—but do something. By all means, be busy when your customer comes in. It won't be long before you won't find time to do your work.

Try making a few good butcher knives. Since the money panic, and it being butchering time, I have made some good money out of these knives. I make them out of old ten-inch flat mill files, and temper them in wet sand.

I see F. C. Stracke wants to build an auto. That is what I intended to do this winter, but the panic stopped me. But I would say to Mr. Stracke that I would not get less than a ten-horsepower motor for my carriage, and you will always go when and where you want to. The outfit you speak of works O. K. if put up properly. I have been told by a man that has seen them. Mr. Stracke can get his motor from The Phœnix Auto Supply Company, of Saint Louis, Missouri. L. D. SANDERS, Missouri.

A Suggestion for Our Journal.—You ask your subscribers how they like the present method of featuring some branch of the craft each month. It suits me very well. The fact is, all in the journal, and the way it is arranged, is very interesting to me with the exception of "Horseshoeing," "Around the Forge Fire," and "The Machine and Tool Smith." These do not interest me enough to mention, as they are too far distant from my own trade, which is woodwork. And I have been working at it for nearly fifty years. Thus, of course, it is natural for me to hunt up that department, and all pertaining to it, as soon as I get the journal. So in general, the journal is interesting and very good so far as it goes, and I have no kick coming. But allow me to say one thing, and that is, I think the journal would be better and more complete, if it had added the department devoted directly to the interest of the apprentice in the common smith shop, and in the common wood shop. You know there has been much complaint from various sources, that the young man of the present day is too proud and indolent to work, and to apply himself as he should to learn a trade. And the sources of this complaint can be traced principally to the employers who take least interest in the apprentice, take less pains to show him, to instruct him, and then complain because he don't know and do. So after all, I conclude that the trouble lies more with the employer than with the apprentice. So, Editor, I think there ought to be a special department for the apprentice, to remedy this lack of practical knowledge that he fails to get in his own shop, where he is complained of from all sides, and has an extremely tough time of it. The information for this new department should be from contributors who thoroughly know their business, each his own branch, not from ones who have a little picked-up knowledge in several trades and give nothing. This information should be in the way of first principles. First, by giving instructions in the science of producing work, whatever it might be. Second, by giving instructions in the art of producing it. This new department can be made interesting and instructive to the apprentice, save many a one from being a botch workman, and give him a good start. Now is the time for this department, and the journal, I feel, will be incomplete until it is added. J. W. DARON, Missouri.

EDITOR'S NOTE.—Let us hear from other of "Our Folks" on this subject. The apprentices of today are the craftsmen of tomorrow. What do you suggest, Mr Reader?

A Letter from New Hampshire.—In the November number, page 48, is an article by a smith who signs himself, "Your Subscriber," entitled, "A Kick." He must overlook every other number of "Our Journal," or else his memory is not very good. I have been a reader of THE AMERICAN BLACKSMITH since it started, and I would not be without it for a great deal. I have not found one paper without several pages on horseshoeing and jobbing. Our brother should bear in mind that he is not the only man that takes the paper. Another thing, he wants it all treating on horseshoeing and jobbing. He is getting the paper for $1.00 a year. Let us drop all except those who do not want anything outside of horseshoeing and jobbing, and the subscribers will be so few that the paper would cost $2.00 or $3.00 a year. I think he would kick again. Now, I am not badly "engine struck," although I believe they are a good thing. I would not give as much for Thornton's letters as I would for some other articles, but Benton's recipes are all right for the man who is not too much stuck on himself to use them.

I have a shop that I built two years ago, 20 by 36 feet, one story. I have a Royal Western Chief forge and blower, and I like them very much; a Green River drill press, a Green River hot tire shrinker, a set of Wells Brothers' screw plates and taps, two vises for wood and iron work, a swage block, one shears which I made myself, and a spoke-tenoning machine, also homemade. I made this out of an old bench drill, and it does very good work. I also have a lot of small tools, but want a lot more. I am in a town of about 550 inhabitants and am nine miles from a railroad. The prices I get for shoeing are as follows:

Nos. 0, 1, and 2, four shoes	$1.00
Nos. 3 and 4, four shoes	1.10
No. 5, four shoes	1.25
No. 6, four shoes	1.30
Bar shoes, each	$.50 and .75

The prices on wagon repairs have increased so we cannot have a regular price list. A word about keeping shop. By all means keep it clean; have a place for everything, then keep things in their places. A good broom is a good investment. Have a place to keep your clothes where they will not get all dirt, and wear a good, clean suit of clothes to the shop. Take it off and put on your old clothes, and when you go home for dinner or supper change your clothes and wash up and look respectable. Your customers will think better of you, and your wife will be more pleased to see you. P. M. W., New Hampshire.

Decides to Become a Life Subscriber.—I've received my December AMERICAN BLACKSMITH, and can say that it pleases me very much. I am sorry that I did not subscribe long ago. However, I am so well impressed that I have decided to be a life subscriber, because it fills "a long-felt want." In response to the request for answers to the list of questions in the December number, can say that I am well suited with the present method of featuring some branch every month. I am much interested in "Queries, Answers, Notes," and also in ornamental work. A series of articles on repairing small things would interest me, and I am sure it would be appreciated by every reader, especially those who are in business for themselves.

I know of nothing that would interest me more than a series of articles on ship work as you suggest. I have kept watch of the mechanical papers for a long time for something on this line of work, but, as you undoubtedly know, when mechanical journals "write up" anything, they seem to "perish the thought" of the smith having anything to do in the production of such things. And if accidentally they do happen to print anything about the forge work, the matter is put up by someone who knows nothing whatever about a piece of forging, especially from the smith's standpoint, and, of course, in that case it has only a passing interest for the smith. But with THE AMERICAN BLACKSMITH putting out a series of articles on this class of work, the smith would be deeply interested, because they would be presented and described in a blacksmith's way, and from a blacksmith's standpoint, and therefore proving instructive and entertaining in a high degree. I hope to see such a series run in the near future.

Please permit me to say that the picture in the December issue, "On the Road to the Village Smithy," is as nice a picture of its kind as it has ever been my good fortune to see. It is absolutely true to nature, and I am going to frame it, and give it a conspicuous place in the limited collection which I have of such pieces. Were I possessed of any amount of this world's goods, I would give a large sum for one of these pictures done in colors, and the one printed in this issue is to me worth more than the price of my year's subscription to the paper.

As a stranger on your subscription list, I will not now take up your time, but would like sometime to write something for THE AMERICAN BLACKSMITH on the ornamental iron end of the smith's work. I have always been interested in this and am a very close student of work done along this line. STEPHEN F. KINSELLA, New York.

What Smiths Are Getting for Their Work in Various States.

Vermont.

Bar shoes, handmade, each	$ .75
Open shoes, handmade, each	.50
Setting old shoes, each	.15
Setting and toeing old shoes, each	.20
Setting and toeing old bar shoes	.30
Leather pads, per pair	.40
Four new Neverslip shoes	2.50
Four new machine-made shoes from No. 0 to No. 5	1.25
Four new machine-made shoes, No. 5 and No. 6	1.50
Two new machine-made shoes, side and toe weight, per pair	.75

Virginia.

Plain horseshoeing	$1.00
With toes	1.20
New tire, $\frac{7}{8}$ by $\frac{1}{4}$	4.00
New tire, 1 by $\frac{1}{4}$	4.75
Setting buggy tire	1.50
Setting two-horse tire	2.00
Four-horse or 2 by 1	3.00
Four-inch	4.00
Pointing plow shovels	.25
Axles from	$1.00 to 3.00
Tongues	1.50 to 2.00
Bolsters	1.50
Hounds	2.00 to 3.50

Washington.

Shoeing, Neverslip, per span	$7.00 to $7.50
Common shoes, per span	4.00 to 4.50
Resetting, per span	2.00
Plow lays	4.00 to 4.50
Points	1.00
Sharpening	.35
Setting buggy tires	4.00
Tongue hounds	3.00
Hounds, front, $4.00; hind	3.50
Axles	5.00
Bolsters	3.50
Cutting down wagon	14.00
New buggy pole, complete	7.50
Wagon and buggy spokes, each	.40
Felloes, each	.50

West Virginia.

Plain horseshoeing	$1.00
With toes	1.25
Setting axles	1.00
Welding buggy springs	.50
Sharp mattocks	.25

Wisconsin.

New shoes, each	$ .40
Reset, each	.20
Reset and toed, each	.25
New steel plugged, each	.50
New steel shoes, each	.50
Half rim buggy	.75
Half wagon rim	1.00
One wagon hub	1.25
Four buggy tires set	2.50
New point on plow	.50
Sharpening plow	.45
New 14-inch lay	3.50
New 16-inch lay	4.00

Wyoming.

Bar shoes, each	$.75 to $1.00
New shoes, each	.50
Reset shoes, each	.25
Sharpening plow	.35
Pointing plow	1.00
New share	4.00 to 5.00
Wagon tongues, each	5.00
Wagon tongue and hound, complete	7.50
New brake on wagon	7.50
Buggy pole	5.00
Buggy pole and doubletrees, complete	10.50
Setting wagon tire	1.00
Setting buggy tire	1.25
New wagon reach ironed	2.50
New wagon axle	5.00
Setting wagon skeins, steel	14.00
Setting buggy stubs and boxing	$14.00 to 18.00

VOLUME 7 NUMBER 6

THE AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

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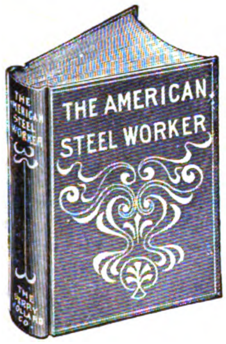

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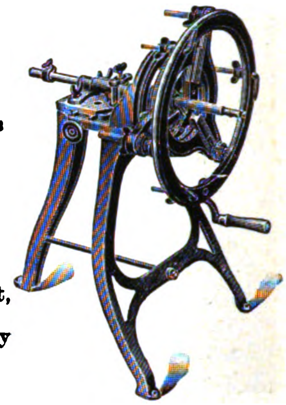

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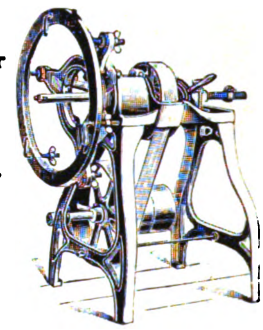

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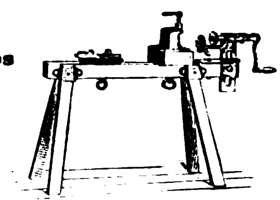

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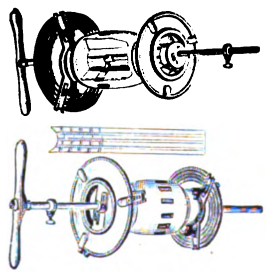

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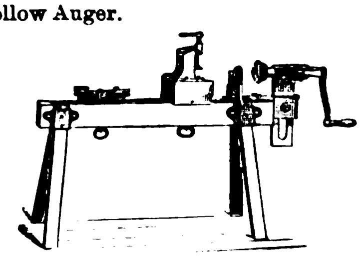
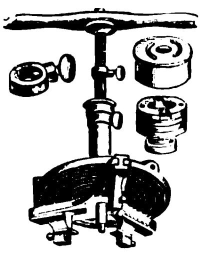


Rigidly constructed.

Dole's Hub Boxer



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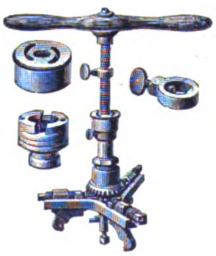

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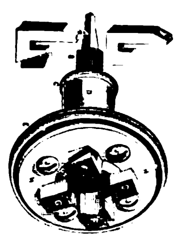
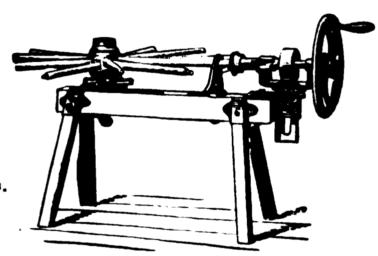
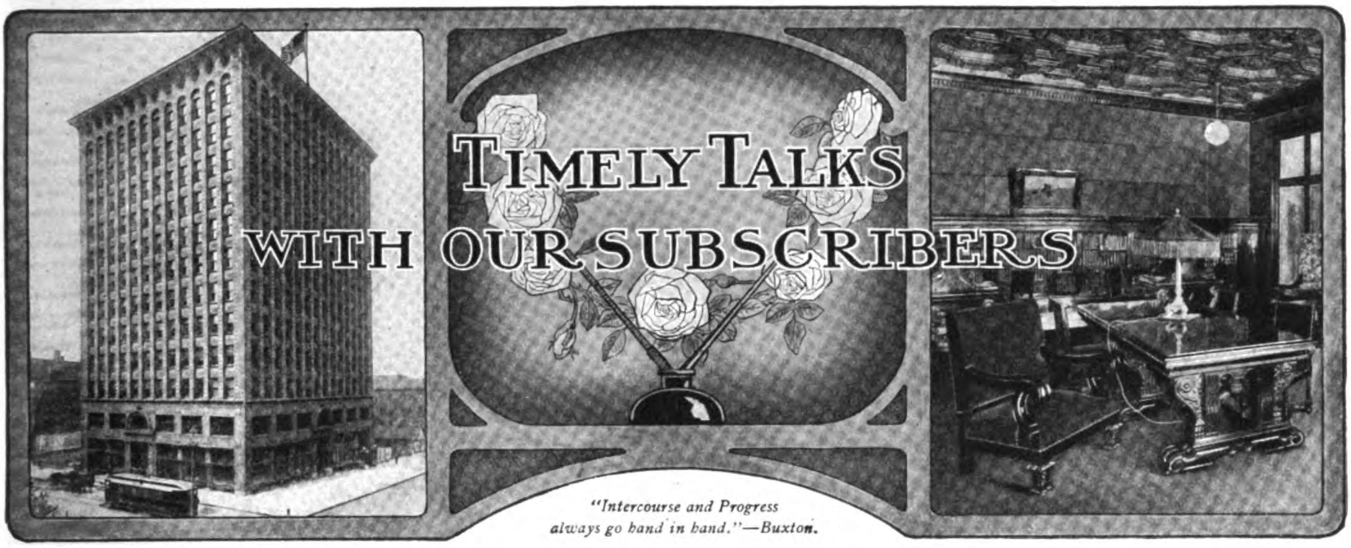


Star Hollow Auger used with Spoke Tenon Machine.





"Intercourse and Progress always go hand in hand."—Buxton.

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Subscribers should notify us promptly of non-receipt of paper or change of address. In the latter case kindly give us both the old and the new address.

The Issues Planned.

The coming numbers of "Our Journal" will feature ornamental ironwork, automobile repair and construction, power hammer work, up-to-date shops and shop layouts, advertising and business management, horseshoeing, manual training, and several other subjects connected with the smithing craft. And to make these numbers the successes we want them to be, we must have your assistance and coöperation. We want every one of our readers to send us something for these special features in coming issues. You surely can send us something for one or more of these numbers—a photograph for the ornamental iron or shop number, a business or advertising article for the business number, an auto kink, or a horseshoeing hint. We want interior and exterior views of shops; photographs or sketches of ornamental ironwork; floor plans, pencil sketches, and descriptions of well-equipped shops; explanations of difficult auto jobs—in short, anything and everything of interest to readers of "Our Journal." Don't trouble yourself about the language; just explain your sketch, photograph, or plan, in plain everyday English, and we'll do the rest. But get busy on this suggestion now. Send in your contribution early. You cannot give it to us too soon; sit right down now and write us.

The Best in the Field.

We cannot resist the temptation to give special mention to a letter recently received from an Ohio smith. This reader says, "THE AMERICAN BLACKSMITH is the best trade paper I receive, and I receive five trade journals every month." It is hardly necessary for us to comment upon this note of appreciation, but we just wish to remind you that we are still seeking that five-thousand mark. Have you thought about it? Show this number of "Our Journal" to your neighbor, tell him about the above letter, and then tell him what THE AMERICAN BLACKSMITH has done for you. You get six months' credit upon your own subscription account, or, if you prefer, a rubber stamping outfit for each new yearly subscriber whom you secure for us. Call on one or two of your neighbor smiths today.

Contents, March, 1908.

Harnessed Water Power.

We heard some time ago about a Western farmer who had harnessed a little creek that runs across one of his fields. He has turned water power into electric energy and runs everything about the farm by this invisible power. It pumps the water, churns the butter, cuts the feed, makes the cider, washes the clothes, and the hundred and one other jobs about the farm, besides supplying light and heat wherever needed. Wonder if any of "Our Folks" have utilized a neighboring creek or river as has this Western agriculturist. There are, no doubt, many out-of-the-ordinary sources of power used for running smith shop machinery. If you know of any such, we shall be glad to hear about it.

The American Association.

We announced on this page in the October number of 1907 that the Secretary of the American Association of Blacksmiths and Horseshoers desired very much to make the season of 1907 and 1908 a banner year in organization circles, and to say that his desire has been realized is putting the matter very mildly. More real organizing and good solid association work has been accomplished in the past five months than in any other similar season of association activity. Now, let us not rest on our oars, readers, but pull stronger than ever for that ideal of the near future when every county in every State of the Union shall be banded together for profit, strength, and harmony.

Change of Address.

The number of requests within the past few months for change of address, and which contained no reference whatever to the old address, again compels us to mention this oft-repeated caution: "Give both the old and the new address when advising us of your change of address." We have spoken of this matter time after time, and a notice appears at the top of this page every month. Still readers wonder why they do not receive their paper. If this rule were carefully and conscientiously followed, it is reasonable to believe that by far the biggest basis of complaint in the publication business would be eliminated.

JUNE, 1813.

WE the following SMITHS, in consequence of the very great expence of living, and other considerations, find it absolutely necessary to augment the Prices of some articles in our trade.

The following Statement we consider to be fair and reasonable for our enployers and ourselves.

CARTS MOUNTING.

Nave straps, thick edges, per lb.	0	6
Do. thin edges, per lb.	0	7
Cart wheels shod per stone,	1	0
Cart axles and draught bolts per lb.	0	8
Cart mounting with wood sterts per lb.	0	10
Do. with iron sterts per lb.	0	9
Waggons mounting per lb.	0	10

Old shods put on cart wheels each 2s. & upwards.

PLOUGHS MOUNTING.

New plough per lb.	0	8½
Do. Sock or mozell per lb.	0	10
Laying sock fether each	1	1
Do. the point each,	0	8

[These layings include the iron.]

Sock laid with steel	0	9
Coulter laid with iron per lb.	0	8
Do. with steel from 1s. to	1	4

[When people wants plough irons laid with their own iron, deduct the value of their from the above.]

HARROWS.

Teeth alone per lb.	0	6
Couplings do. per lb.	0	8
Full mounted per lb.	0	7
Teeth laid each, besides the iron,	0	1½
Sharping each harrow	0	8
Burning teeth in wood each harrow	0	2
Trees mounted per lb.	0	9

QUARRY TOOLS.

Mells per lb.	0	9
Do. steeling,	5	6
Mattocks and picks per lb.	0	8½
Jumpers per lb. from 7d to	0	8
Small hammers per lb.	0	10
Wedges per lb.	0	6½
Picks sharped for lime, or whin stone per dozen	1	4
Do. for free stone per dozen	1	0
Jumpers sharped and rowed each	0	2
Wedges dress each	0	2

Batts and bands per lb. 7d. and	0	8

Chimney and Swees per lb.	0	8

Spades per lb. 11d and	1	0
Shovels per lb.	1	2
Axes 4 lb. and under, with steel heads, per lb.	0	11
Adzes each	5	0
Claw hammers each	2	6

MASONS' IRONS.

Steel per lb.	1	0
Sharping do. per 100	1	4

Grapes per lb. 8d and	0	9

SCREW BOLTS.

Six inch by 3-8ths each	0	5
Six inch by ½ each	0	6
From 6 to 12 inch by 3-4ths per lb	0	8

HORSE SHOEING.

NEW SHOES BESIDES THE OLD ONES.

Shoes 1 lb. each	0	9
Do. 1½ lb. each	0	11
Do. 2 lb. each	1	1
Do. 2½ lb. each	1	3
Do. 3 lb. each	1	6

REMOVES.

Eight nails	0	3
Nine do.	0	3½
Ten do.	0	4
Shoes toed each besides the price of remove	0	2

[New shoes to saddle horses, extra.]

SHOES MADE OF OLD IRON BELONGING TO THE EMPLOYER.

A shoe of one lb.	0	2

and encrease at the rate of a 1d per lb. besides the price of remove.

*** It is recommended to purchase the old Iron, and sell the new shoes as directed above, it being much clearer dealing to both parties.

AN OLD SCOTCH PRICE LIST OF 1813. THE QUOTATIONS ARE GIVEN IN SHILLINGS ($.24 1-3) AND PENCE ($.02)

The Painting Department of the General Shop

M. R. LAMBERT

THE general smith who has an occasional call to do a painting job or who makes a specialty of vehicle painting must needs have some provision made for properly doing the work, and, after it is done, to care for the finished product. In many small shops, practically all painting work incident to the trade is carried on in one large room, and while this may serve fairly well at times, there will be some instances when several rooms will be very much desired. Some simple arrangement by which the painting room can be quickly and easily divided into two or three rooms is therefore required. This partitioning off can be easily accomplished by means of a sliding partition made of lightweight stock or light frames covered with cheap cloth and painted. The partitions can be made to slide in grooves on the floor and at the ceiling, and so arranged as to be easily taken down should the entire room be required unobstructed.

The engraving shows a paint room arranged to be partitioned into three divisions: a general painting room, a varnishing room, and also a set room where newly varnished work may be set to harden.

The general painting room should contain a bench for the mixing of colors, and a cabinet for holding the supplies, such as brushes, pots, paints, oils, and the like. This room should also contain such tools as are needed to unhang work. The fixtures of this room consist of wheel stands, gear horses, and gear and body trestles. These fixtures can all be very easily made in a general shop at a very slight expense, and will pay for themselves in a short time by enabling the painter to care for his work more easily and quickly than if he attempted his work without them.

The wheel stand is made of a piece of four-inch steam pipe for the body of the stand, while a flange for this size of pipe is used for the base. The spindle or rod for holding the wheel may be of $\frac{3}{4}$-inch round stock or may be fashioned from an old piece of buggy axle. This stand may also be fashioned with a T-shaped top to hold two wheels. The collar on the spindle prevents the wheel from coming into contact with the body of the stand. The spindle should also be bent upward slightly so as to prevent the wheel from running off the support when being painted.

A very handy gear horse is also pictured. This is fashioned to hold a running gear by supporting it at the four axle stubs. At least two of these must, therefore, be in the shop. The legs of the gear horse may be of 3 by $1\frac{1}{2}$-inch stock, while the top should be 3 by 4 inches in size. The length of the horse is determined by the width of the vehicle track. The iron standards on the gear horses are of $\frac{3}{8}$-inch stock $1\frac{1}{2}$ or 2 inches wide by about 30 inches long. One end is split as shown in the end view of the horse. The piece is then slotted as shown in the detailed top view of the standard, and then bent in the middle. The standards are then bolted or screwed to the top of the horse. The slotted holes in the standard allow for adjustment for gears of different widths, though it is unlikely that adjustment will be necessary if the standards are set to the center of the axle stubs on a standard-sized gear. The legs of the horse should be braced by a crosspiece near the bottom.

The gear and body trestle is very easily made, and to allow the work to be easily turned to the best light, the top is made so as to revolve. The legs of the trestle should be well spread and strong, so as to eliminate the possibility of a tip-over. The top of the trestle may be about twenty-five or thirty inches long and is made to stand about three feet above the floor.

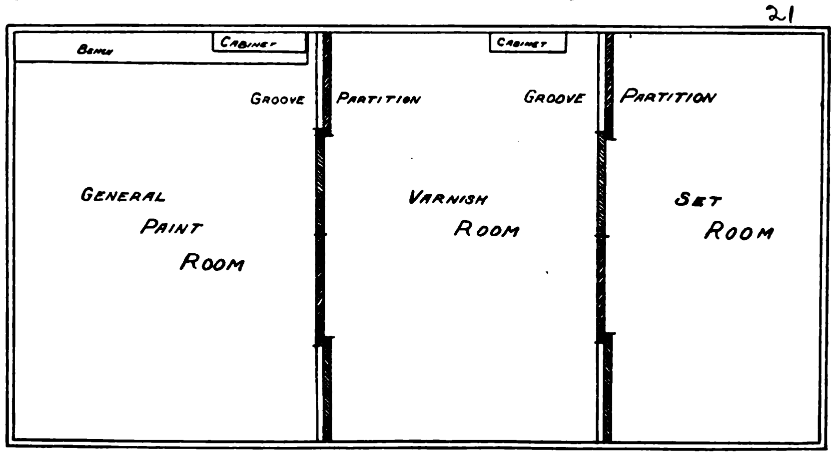
Another convenient aid to the painter is the varnish or paint stand. The legs and standard are of round stock, while the top is simply a piece of board about a foot square. The stand is about twenty-five inches high, and may be forged by any smith. It will be found of great convenience in the varnish room.

The brush equipment of the shop should be determined by the class of work to be done. The paints and varnishes to be placed in stock are also determined by the class of work to be accomplished. The brush equipment should consist of several dusters, a number of round paint brushes, flat color brushes, several flowing brushes, and at least one set of flat varnish brushes.

The paints and varnishes should comprise high-class finishing varnish, gear varnish, rubbing varnish, and coach japan, the paints to consist of white keg lead, coach black, and a succession of reds, greens, blues, and yellows, to take care of the ordinary demands of the general smith's trade.

The despatch with which the painter can secure any colors or pigments which he may require does not compel him to carry any great amount of stock. It may be well, however, to calculate, before starting a large job, just how much paint may be required, and if sufficient is in stock. What is on hand can then be used until a new supply is received.

As to the combinations and colors to be used on vehicles, these are usually determined by the customer. It is well,



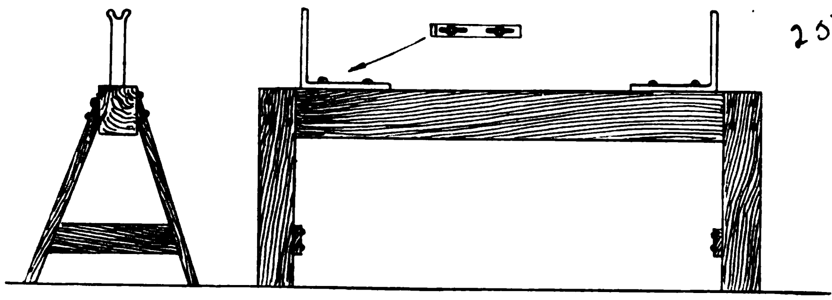
AN EXCELLENT ARRANGEMENT FOR DIVIDING A LARGE PAINTING DEPARTMENT however, for the vehicle painter in the general shop to be able to make suggestions and recommendations for his customers. And, in making suggestions, it is well to bear in mind that the wagon or business vehicle is an excellent medium for advertising. Any color or combination of colors that makes the vehicle stand out distinct from the general run of business vehicles is the color best suited to the advertising idea.

Discipline and Classification of Work in the Blacksmith Shop.

S. UREN.

In the first place have the foreman of the shop disciplined himself. He should set a good example to the employees out of the shop as well as in the shop. He should be a good practical as well as theoretical mechanic. He should be a good judge of human nature, must have executive ability, and must command the respect of the employees. He must also treat all the men respectfully. In all cases treat your men as you would expect to be treated under similar conditions. If you have the above qualifications, you will without doubt make a good disciplinarian.

The classification of appliances for producing the many complicated forgings required in a shop, such as in the Southern Pacific shop at Sacramento, is quite a factor in discipline and classification of productions. All forgings produced by machinery must be done in large quantities to make the machine profitable. In many cases you have to change the dies and make alterations in the furnace. If you have to make these changes three or four times in one day, for the purpose of making five or six pieces of each differently shaped forging, the blacksmith would accomplish almost as much at the forge. If the forgings that are to be produced, say in a four-inch forging machine, are properly classified, so that changing dies will only be required about once a day, we can accomplish as much in one day as the blacksmith at the forge can in ten days. Similar conditions exist with the bulldozer, the bolt machine, and the steam hammer dies.



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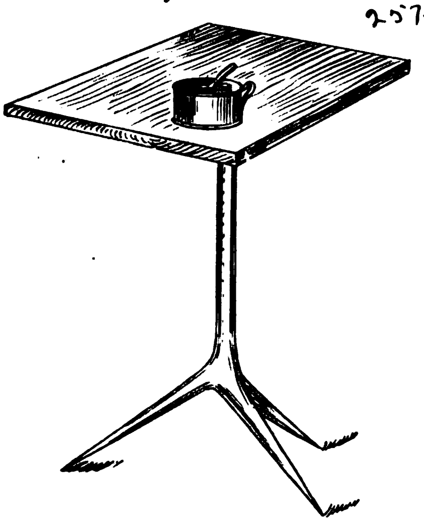
A VERY HANDY GEAR HORSE EASILY MADE



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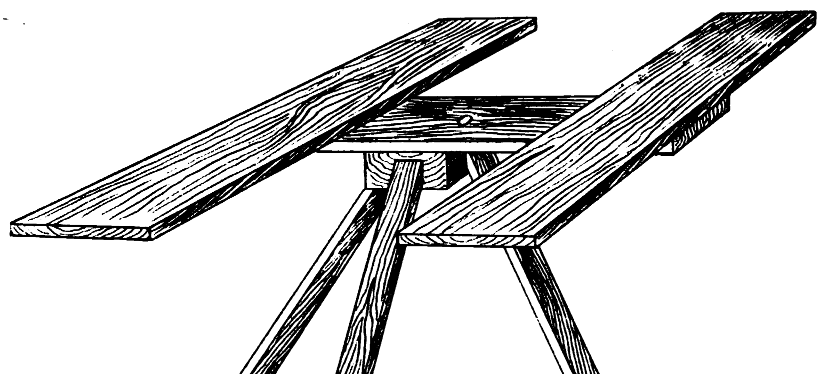
ANOTHER CONVENIENT AID IS THE VARNISH STAND



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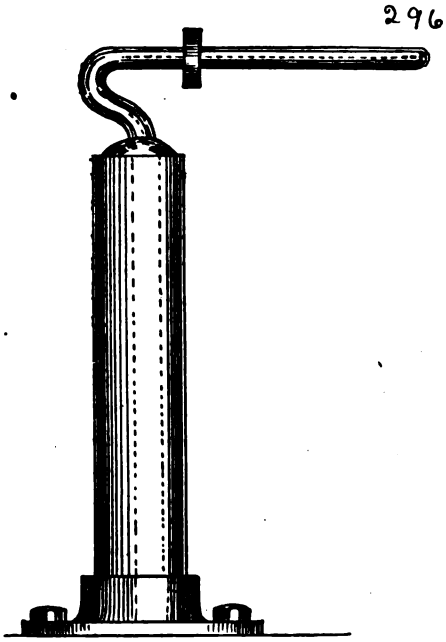
A GEAR AND BODY TRESTLE OF SIMPLE DESIGN

The classification of the mechanics in the blacksmith shop requires good judgment on the part of the foreman. He must be familiar with the ability and genius of each smith in the shop. In a shop where all classes of work are done, as in the Southern Pacific shop, such as marine, locomotive car forgings, track work, bridge, and building, etc., we cannot classify the many intricate forgings that are produced. For in nearly all cases the work for these departments are emergency cases which oftentimes take the precedence, consequently we have to stop on the regular work and get out the special work. I have a case of this kind on hand now. One of our steamboats broke her walking beam, consequently destroying much of her machinery. All the other work that requires first-class smiths is delayed to get the steamboat running as soon as possible. Conditions of this character are occurring daily. It can readily be seen that we cannot classify emergency cases, as the best talent in the shop is forced into service night and day. However, there is much work that can be classified, such as frogs and nearly all track material that is produced from rails, also all kinds of switch rods. As most of our car and track material is produced by the forging machines and bulldozer, this work must be classified and produced in large quantities for each pattern. If not worked by this method your machines are useless.

Steel work in nearly all shops classifies itself. In nearly all cases the smith will separate the tools, such as chisels, planer tools, and lathe tools, and take up each kind in their regular order.

One gentleman at our last convention remarked that classification of work made too many specialists. It is a fact we have too many specialists and too few all-round workmen. The fault of this is in training our apprentices. My experience is that most of the specialists have been promoted from helpers, and in many cases the class of work these specialists are doing will not be done by good all-around blacksmiths. From the writer's point of view all work done by specialists should be classified and done by contract. This can be done in large manufacturing



A WHEEL STAND OF SCRAP MATERIAL

shops, but cannot be done in small repair shops, as so many emergency cases are coming into the shop that the few smiths you have should be first-class all-around mechanics.

In large shops we have many apprentices that start in at a low wage and expect to become good mechanics at the expiration of their term of apprenticeship. The foreman should interest himself in those young men. It is in the power of the foreman to make specialists of these young men or first-class mechanics, if the young men aspire to be first-class blacksmiths. If they do not show an inclination to learn the trade, the foreman should at once put them back helping, reporting the same to their guardians. It is useless for a foreman to try to teach a boy a trade for which he has no inclination. For the young men that are anxious to become first-class blacksmiths, he should do all in his power to instruct and help the young men along, and not keep them on one class of work indefinitely. As fast as he becomes proficient in the lower grades of smithing he should be advanced to higher grades of forging. The fact that it is more profitable to keep the boy at one class of work is not doing justice to the young man, and, instead of teaching him a trade, is making a specialist of him.

Our good blacksmiths of the future must come from today's apprentices with proper discipline. We should turn out first-class blacksmiths in four years of apprenticeship. The Southern Pacific shop in Sacramento employs 75 smiths. Three fourths of them are young men who have learned their

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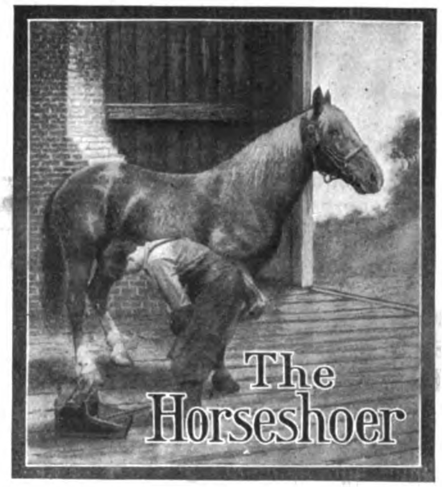
trade in the same shop, and, I am pleased to say, prove themselves to be good mechanics. Many of them have gone into other shops and are today holding good positions.

Mr. McCaslin, in his article on a similar subject, expresses my views, consequently will quote the paragraph in full. "The following are also a few of the arguments in favor of making and retaining our own workmen: they know the foreman, his disposition, ambition, etc., and are unconsciously governed accordingly, while the foreman does not only know the disposition of his own men and the abilities of his own men, but recognizes their weak points as well, and in helping them overcome these he makes them better men themselves, as well as better and more profitable men for the service of the company. They (our own men), know every tool in the shop, know where it is kept, and have used or seen it used. They know the established daily output, and again are governed accordingly. We will also have less labor troubles with men educated in our own shops than with the itinerant mechanic, whose employment may make a parallel to the case of one rotten apple spoiling every other apple in the box. In explanation and qualification of the last statement, will say, if we engage several workmen from as many different shops, permitting each one to bring with him the discipline, time for doing the work, and the ideas of quality that govern these points in the shop each one came from, our shop system will speedily become demoralized.



A Rope Shoe to Prevent Slipping.

FRANZ WENKE.

Some time ago I promised to send you a description of a rope shoe, which I intended to have patented, but there is a similar thing patented in Argentina, South America. The engraving of the shoe will explain sufficiently, so I will give only the main points. The rope is half-inch grass rope coiled and stitched from side to side with wire. Two wires, one at the toe and one at the heel, are enough. Two thin springs, SS, are then riveted across the rope. These springs must be flexible enough to allow of their being inserted into the shoe after it is nailed on. The sketch shows the hoof surface of the shoe. This rope pad is a splendid thing on slippery roads. The pad should stand slightly above the shoe after it is put in place, and the springs should bulge it slightly in the middle. In this way the pad will prevent concussion and will also prevent slipping on asphalt or icy roads. The springs also permit the caretaker of the horse to remove the pad, clean the animals' feet, and give them the necessary air. The pad can be made quite cheap, as even old rope may be used, and the apprentice can make it at odd times when work is slack.

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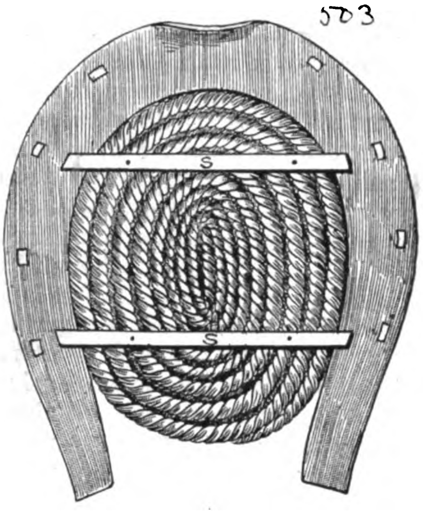

A SIMPLE BUT EFFECTIVE MEANS OF PREVENTING SLIPPING

Anchylosis.

A. F. LIBBY.

Anchylosis is of two kinds, complete and incomplete. The first is that condition when the joint has become united by bony deposit caused by the ulceration of the cartilage of the joints and the heads of the bones. The incomplete condition is caused by strains and bruises. This applies to the horse in cases of ringbones, large side bones, and some cases of spavins. For ringbones and sidebones in the acute stage, I use a roller rocker shoe as shown in Fig. 1, having the high point in the shoe over the center of gravity in the foot. To make this shoe, I take a common front shoe and fit it to the foot. I use iron

$\frac{5}{16}$ by $\frac{3}{4}$ inch. For a very large foot, use larger size of iron. Make the rockers and fit them neatly and snugly to shoe before you try to weld them on. Take a heat and catch one corner, then take a good heat, and you will have no trouble. For cases that are not so severe, I use the four-calked shoe shown in Fig. 2, giving a ground bearing of about half the length of the foot with the calks tapered both ways, as in the engraving.

In cases with spavin, I shortened the toe of the foot and then apply a shoe with a low toe and with high heels, but there is a better way than that. Place a long tapered side calk (see Fig. 3) on each heel, but use no toe calk. The horse slides the lame foot when he travels. If he fails to go right with this shoe, stand behind him and look at his hips. If the spavined side appears lower, place a common shoe on him with three calks from $\frac{5}{8}$ to 1 inch higher than the other shoe. This is necessary, as sometimes the bones are driven together making, the leg shorter. I have shod feet this way and have them get nearly sound.

Shoeing a Horse According to Nature.

E. H. MALOON.

The object of this article is to give some young man just starting at shoeing horses a bit of experience out of my life. I have worked forty years at horseshoeing and have the reputation of being a good workman. When I had worked but two years, it dawned upon me one day that horses did not very often interfere until after they were shod, hence the fault must be in the shoer. I made up my mind then to let theories go and follow nature, and I

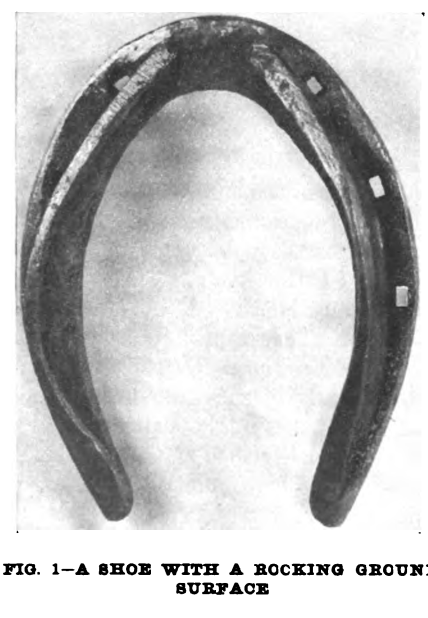

FIG. 1—A SHOE WITH A ROCKING GROUND SURFACE

FIG. 2—A SHOE WITH FOUR TAPERED CALKS

have followed that idea until now and have formed my chain of success.

My way in beginning with a green horse is simply to fit the bottom of the foot to receive the shoe, put on just as little iron as possible. Judgment must be used in determining if the foot is too long. If the wall needs to be lowered, take as much from the inside as the outside, and keep the feet as near as you can to the way he has worn them, always remembering one thing—the foot must be made as short as possible. I mean by this, remove all the hoof you can from the bottom; make the heels low, and give your horse's foot frog-pressure if you can.

Now, for horses that have been shod and have interfered. When practicable, take the shoes off, round the edge of the hoof to prevent slivering, and let the horse go barefoot. This gives the ankles a chance to heal, and he will wear the foot as nature designed he should. And it will tell you what you want to know, and, with no special effort on your part, when he must be shod again. I take an extra light steel shoe, fit the outside a bit longer than the hoof, and turn the heel out just a little on the inside. Begin at the third nail from the toe and draw the heel tapering, making it very thin at the heel like a tip, hemming it in all the way; clip off your nailheads, and you have as good a shoe as anyone can make. In this shoe you remove everything that can wound the opposite ankle. You give the horse frog-pressure on the ground, so he knows just where that foot is. Try this simple rule on your livery horses and gentlemen drivers, and you will be surprised to see how many horses go clear. Stop bracing the feet by side weights, toe weights, twisted ankles, etc., and let your horse have a chance to carry his feet along in a free and easy manner, and he will help build up your reputation as an expert shoer. For when an expert shoer has put on his fancy shoe and stopped his horse from interfering it is generally after several trials; he has simply carried out the above trick; and you can do it the first time if you will let the horse show you how.

Now, the above, as a rule, applies only to slow-moving horses, as wonders can be done with trick shoes on fast horses and horses that put some vim into their stride, and are driven that way or at a walk. I never yet put a trick shoe on a slow-moving horse that ever changed his gait, even a little. Let nature prepare the foot, and you put on as little weight as consistent with his work. Following this closely, you have done all that can be done with slow-moving horses.

The Failures and Successes of an Apprentice.—1.

BY AN OLD-TIMER.

It is not the intention of the writer to discourage anyone who would become master of the art of working iron metal, but rather to encourage him by giving him the opportunity to profit not only by the skill of another but by his mistakes also.

Twenty years ago the apprentice did not have the chance he has today. There are more books now treating on the art, and more trade schools than

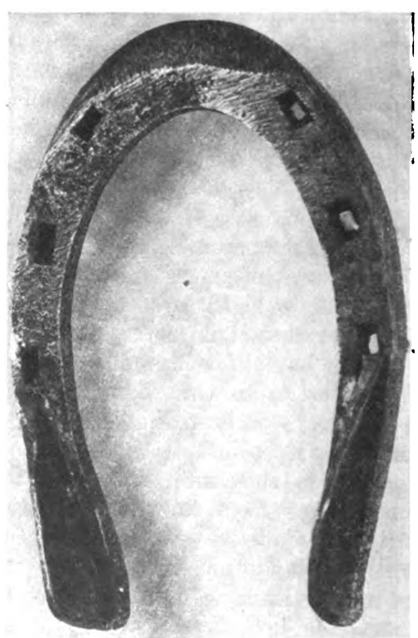

FIG. 3—TAPERED HEEL CALKS ON SHOE TAPERED AT THE TOE

ever before; besides, the apprentice receives more attention himself. With all these helps there is a shorter cut to the trade now than in the olden time. I believe it is a mistake for a man to be ten years working out for himself what he could get from a skilled mechanic.

My first work on entering the shop was to sweep. Well, I was sworn at for making so much dust, and told that I ought to have known enough to wet down before sweeping. The next job was striking on a horseshoe. I did not strike quick enough at first, then too quick, and then too heavy. I could not finish up a horse's foot to suit. There was nothing right on bench work, either. I had bad luck; I broke one tap, and spoiled the half-inch dies trying to cut a thread on hardened steel. I was told to drive some staples into a cart rail. The holes were bored too small for the iron, and, of course, the rail was split.

One afternoon the owner went away and I helped his man weld up some large cart tires. They bothered him in welding. He got the first one too large and the next one too small. It took all the afternoon to get them the right size. He laid the blame all to me, and told the boss he could have done them in two hours if he had had a decent helper. Well, boys, I had at this time been four years before the mast and had sailed under three different flags, but I never was used so mean as I was in that shop. At the closing of the third day I said to the boss, "I guess I will go home." He looked at me in a half-pitying way and said, "I think you had better," and I went.

(To be continued.)

Broken pipes in the water, fuel, or lubricating systems of an automobile are easily repaired by means of rubber tubing. This is sold in all sizes and lengths and may be procured at any rubber supply house or dealer in auto supplies. W. B., New York.

The joints of the exhaust system are usually packed with combination washers of copper and asbestos. In repairing any of the joints, and not having any copper-asbestos washers on hand, lead wire, copper wire, tin foil, or thin aluminum may be used. Wind any of these materials once around the joint, and when the bolts of the joints are tightened the packing will flatten out. E. J., Ohio.

Automobile Repairing.

CHARLES E. DURYEA.

We are more afraid of the ills that are unknown than of equal ones with which we are acquainted. This fact should be kept in mind by the carriage blacksmith when a job of auto repairing comes to his shop. Because of groundless fears and lack of experience many a job is sent on to a shop no more capable and with no better men, with resultant loss of opportunity to the blacksmith and inconvenience to the man in trouble. While this may be the correct policy when work is brisk and familiar jobs are waiting, it certainly seems bad policy to refuse work that comes to one's door, at other times. What one man has learned another can learn, and a determination to master the intricacies of the automobile sufficiently to restore the more easily repaired parts will often open up a new source of income and extra profit.

The motor vehicle is with us, and will continue. The motor buggy is coming in force and will be much nearer the horse buggy in its parts, and thus much more closely in the line of the carriage blacksmith, and will undoubtedly serve as a connecting link between the two styles of vehicles. This business by right belongs to the man who has repaired vehicles in the past, and it should not be allowed to pass into the hands of others, as did in large part the business of repairing bicycles.

In the main, the work only requires that same intelligence and ingenuity that is required to successfully and quickly repair other things, although the intricacy of the mechanism, the difficulty of getting at the part, and its delicacy and accuracy may make it seem different. It will be found that the principal difference is in the time required, but the owner understands this and is prepared to pay accordingly. Often a broken part has parted where it cannot be readily gotten at with the hammer for welding, and here a sister art, that of brazing, is useful.

To many blacksmiths brazing is a mysterious something that has been heard of but is not within the reach and practice of the everyday smith. To others it is an art beneath the dignity and not up to the ethical requirements of a first-class smith who prides himself on his ability to weld. As a matter of fact, it is a very useful art that has its place and often comes handy. It is simply a form of soldering, with the two essential differences that the parts must be almost as hot as for welding, and the solder is brass, copper, or silver, instead of tin or lead. The flux used is usually powdered borax or boracic acid, made into a cream by the addition of water. A little baking soda added to the boracic acid may help it a little. The borax is usually on hand and should be used freely. Brass wire or sheet is generally to be had easily and is used because it melts at a lower heat than does the copper.

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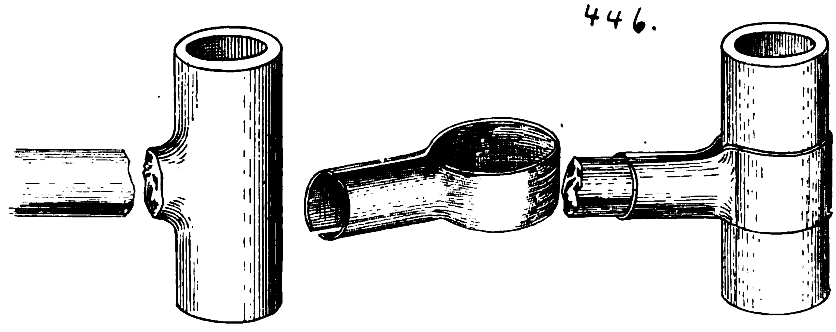
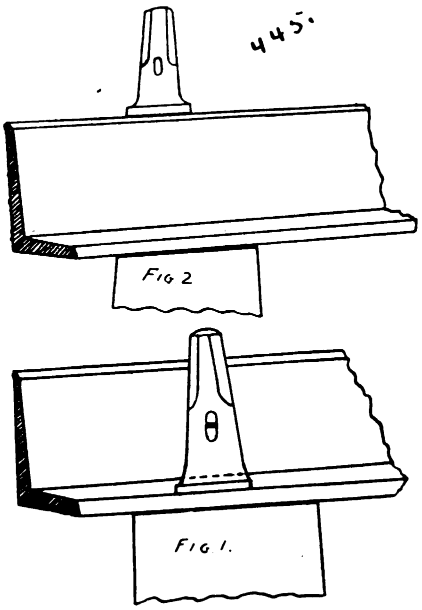


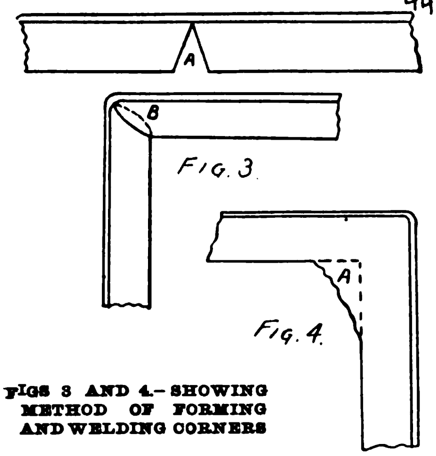
THE BREAK, THE SLEEVE, AND THE REPAIR

Suppose a steering arm has broken



FIGS. 1 AND 2 — SHOWING THE CORRECT AND INCORRECT METHOD OF STRAIGHTENING ANGLE BARS

from the neck so short that it cannot be even temporarily repaired by welding or riveting. It can often be made right in a short time by brazing and serve permanently or till a new part can be had. First, clean the break and adjoining surfaces by scraping, filing, and finally by washing in gasoline so as to have a bright surface for the brass to adhere to. Next, fit to the part a splint of steel. Sheet metal can gen-

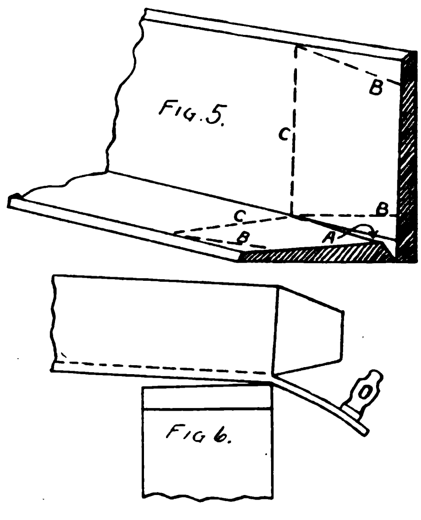


FIGS 3 AND 4.— SHOWING METHOD OF FORMING AND WELDING CORNERS

erally be used, but in its absence, and in some places from preference, short lengths of wire can be used. This splint lying around the break adds a much greater strength than the same weight of metal in the original arm. The splint must also be bright and clean. Hold it in place by small rivets or by a wrapping of fine iron wire, taking care that the wire, if used, is not so fine that it burns off and loosens the splint. Then fill all crevices with the flux and heat slowly. As it begins to get white-hot place some pieces of brass on top of the break, or touch it with the end of a brass wire an eighth of an inch or more in diameter. The brass will melt and run into the crevices, where it will hang by capillary attraction. If it does not flow freely there is not sufficient heat or else not sufficient flux. When it seems to have entered all the crevices, and more put on the top runs off the bottom, remove it from the fire and cool slowly. If the parts not to be brazed are painted with a mixture of stove polish and water they will scale less and the brass will not get on them accidentally. When cool, file or grind off the wrapping wire and smooth up the outer surface, and the job will generally be as solid and firm as when new, or even more so. The brass will be found to have run into the break itself, and adds its strength to that surface as well as insuring the strength of the steel used in the splint or splice. In doing this work it is well to remember that brass has but one half to one fifth as much strength as the steel used, and, therefore, the ends of the splice or splint must be each four times or more longer than the thickness of the metal, a fact which applies to soft solder as well. If the stub of the broken arm is long enough to permit it the splint may be a piece of steel tube forced over each end hot and so made to fit nicely. The engravings illustrate a form of repair.

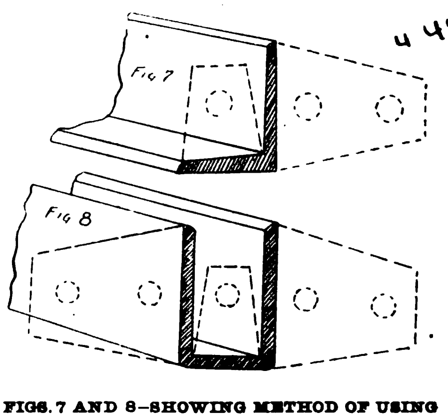
The General Smith and the Automobile.

If the general smith is anxious and ambitious, he can, with a small outlay of money, build himself an auto that perhaps would not come up to the high-priced cars turned out by the large factories in appearance, but would answer all purposes. In the first place, he would have to buy a motor, either secondhand or new, then build his frame to suit the size and shape of his motor. Aside from the motor and tires he could build the entire machine. In the near future we will show the smith how, by the use of an automobile, he can run a number of small machines in his shop. But to return to the frame for his purchased motor: this must be built from angle steel or channel steel, those two classes of bar steel being the strongest yet produced, and the most important feature in the construction of automobiles so far as the smith is concerned. The sizes usually used are as follows: $1\frac{1}{4}$ by $1\frac{1}{4}$ by $\frac{3}{16}$ inches; 2 by 2 by $\frac{1}{4}$ inches; 2 by $1\frac{1}{2}$ by $\frac{1}{4}$ inches; 2 by 3 by $\frac{5}{16}$ inches. If about to straighten a piece of angle steel, which should always be the first operation previous to forging to shape, do not place the flatter on flat part of bar as shown in Fig. 1, but place the flatter on edge as shown in Fig. 2. You will see at once if you take the kink out of the edge the flat will come along, but not so with the operation in Fig. 1. If you keep this up you will have a piece of kinked-up angle iron that will tax your best efforts to get in shape for use. If you find it necessary to weld any part of the frame and have never welded any angle steel, perhaps a few words on this will not be amiss. It is not the easiest thing in the world to do, as many a smith has



FIGS. 5 AND 6 — ANGLE AND CHANNEL IRON IS THE BEST FOR AUTOMOBILE FRAMES

found out; in fact, a number have "given it up as a bad job." Now observe Fig. 3 at A. The bar should have a V cut out as shown. The piece in Fig. 3 is bent at a right angle, and B shows it scarfed ready to be heated for welding. Have a good solid bottom in the fire and also cover the part to be welded well with clean coke. Do not use green coal. Give it a good coating of borax or welding compound, and heat very slowly. When you have the right heat and take it out of the fire,



FIGS. 7 AND 8—SHOWING METHOD OF USING ANGLES AND CHANNELS

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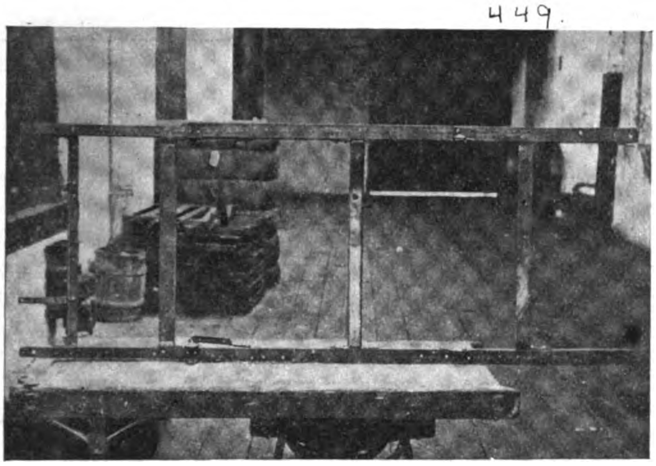

FIG 9.—AN AUTOMOBILE FRAME OF ANGLE STEEL READY FOR THE ENGINE

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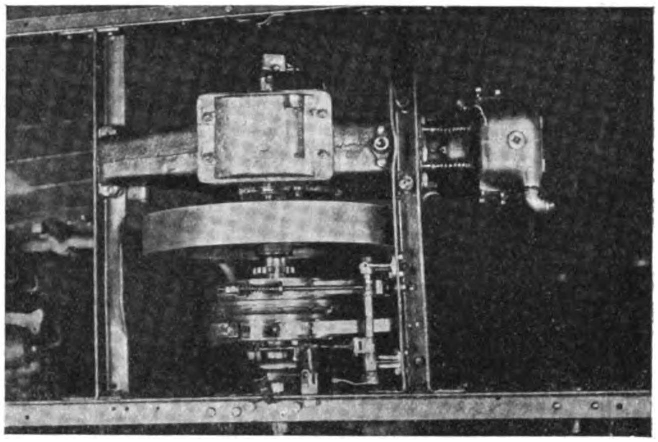

FIG. 10—THE MOTOR IN THE FRAME AND SECURELY FASTENED TO CROSS PIECES

be sure to brush off all dirt and dust. Then go after it with rapid, solid blows. The corner will come out as at A, Fig. 4. Do not attempt to drive this back with hammering, but trim off along dotted lines with chisel. Angle iron or channel iron can be bent and formed to almost any shape, and, as before stated, is the best for automobile frames on account of its strength and lightness. For instance, if you want to make a cross member for your side frame and also to hold your motor at the same time, cut along the inside corner as at A, Fig. 5, and trim off along dotted lines B. Now, bend one up and the other down, or one in and the other out, as in Fig. 6. This forms a good strong pair of lugs to be riveted to the side frames. (See dotted lines in Fig. 7.) The same operation can be performed with channel iron, as in Fig. 8, which shows a section of channel, and lugs shown by dotted lines.

The engraving, Fig. 9, shows an automobile frame made from 2 by 2 by $\frac{1}{4}$-inch angle steel and $1\frac{1}{4}$ by $1\frac{1}{4}$ by $\frac{3}{16}$-inch angle steel, and one piece 2 by 2 by 2 by $\frac{1}{4}$-inch channel steel. This frame is all ready for the motor department, and was entirely made from the raw bar in the blacksmith shop and riveting department of one of the largest automobile factories in the world, where thousands of those rigs are built and sold every year. The engraving, Fig. 10, shows the same frame in the motor department with motor in place and securely fastened to cross members of frame. Fig. 11 shows the same frame in the erecting department, with axles, springs, muffler, water tank, and gasoline tank in place. In fact, it is ready for the wheels and body, which are shown in Fig. 12.

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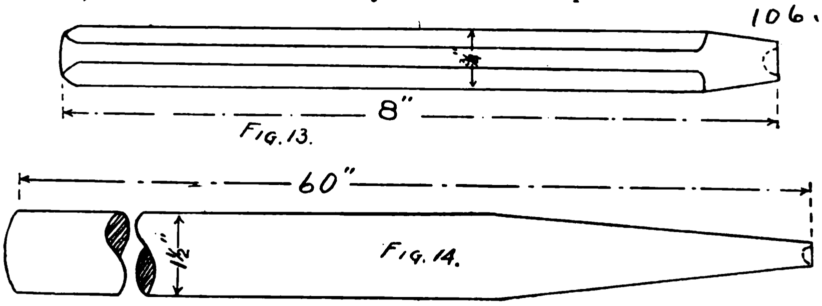

FIGS. 13 AND 14—SHOWING A RIVET SET, AND ALSO A BAR FOR HOLDING HEAD OF RIVET

I also want to call your attention to the fact that no cold riveting should be done; cold riveting crystallizes the iron and renders the rivet almost useless. Hot riveting is best by far, and a handy way for the smith to heat the rivets is to take a piece of boiler plate about three eighths of an inch thick and drill it full of holes one sixteenth of an inch larger than the rivet to be heated. Place the plate over the fire and drop the rivets through the holes to hang by the head. By having a thin-jawed pair of tongs he can slip them under the rivet head and help

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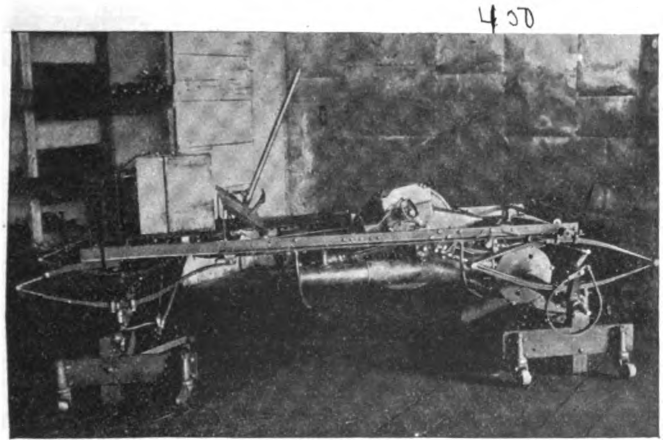

FIG. 11—THE FRAME, WITH MOTOR, AXLES, SPRINGS, MUFFLER, WATER TANK, AND FUEL TANK READY FOR WHEELS AND BODY

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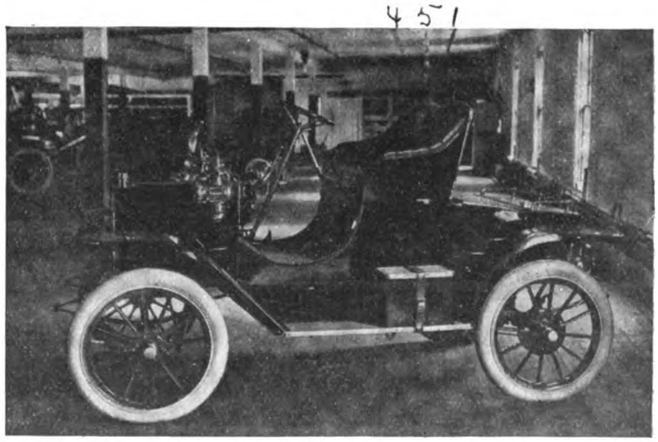
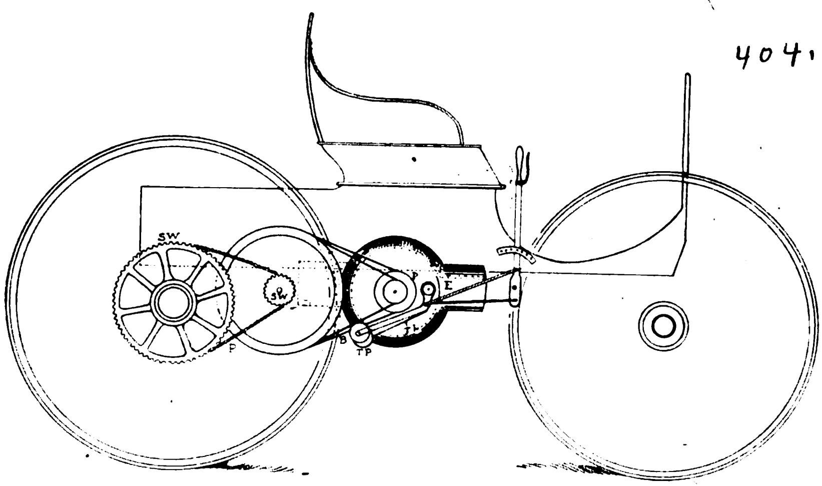


FIG. 12—THE COMPLETED CAR READY FOR THE CUSTOMER—PAINTED, VARNISHED, AND FINISHED, WITH TIRES INFLATED

himself to the rivets as fast as he can use them. Then he must have a rivet set, Fig. 13, made from octagon tool steel.



A SIDE VIEW OF TRANSMISSION FOR AUTO BUGGY

The set should be made so as to form riveted end about same shape as head, but not quite so large. A good rule is to allow about three-eighths of an inch for riveting a ⅜-inch rivet, five-sixteenths of an inch for a $\frac{5}{16}$-inch rivet, and so on. Have a long bar with one end same as a rivet-set for holding on to the head of the rivet. It should be long enough to reach across the frame and enough to spare for a man to hold with both hands, or about five feet long, and made from 1½-inch round machine steel, with a tool steel tip tempered about the same as a cold chisel. (See Fig. 14.) It should be tapered long and small to allow getting into all corners without letting the rivet get chilled. These rules should also be observed in repairing automobiles, as a poor job of repair riveting is liable to result in a lack of business, while a good one is the best kind of an advertisement for the smith, and the autoist will call again even if he has to go a few miles farther to do so.

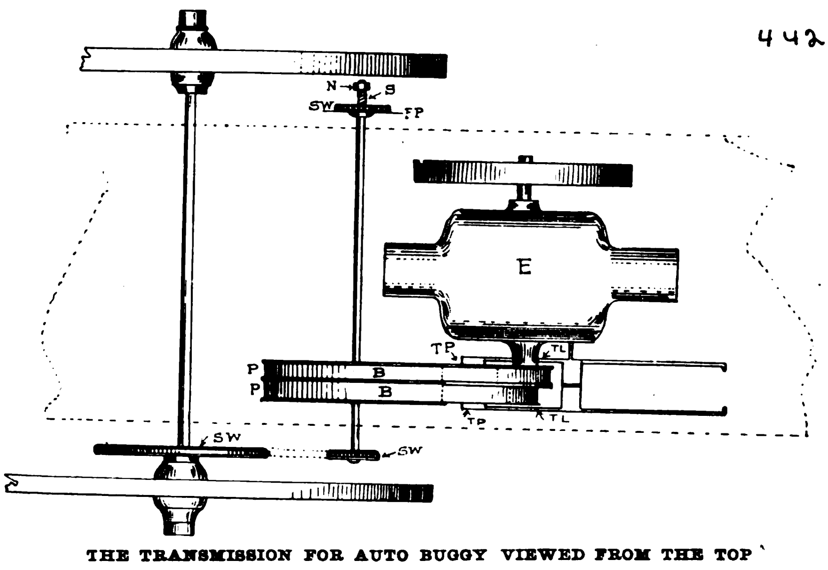
How I Built an Auto Buggy.

B. D. HUNGERFORD.

These plans are partly the result of my own experience, together with a few improvements that suggest themselves. The engravings are not intended to go into detail; that part will have to be worked out as the case requires; a sort of a suggestion for the builder, a plan to work on.

In making my machine I used only one speed ahead, while in the engravings I have provided two. I find it is hard to use a speed that will be satisfactory for starting, hill climbing, etc., so will use a small pulley to start with and for hard places, then the faster pulley may be made somewhat larger. As regards reversing, there may be another small pulley added and a corresponding section on the large one, and you may use a crossed belt with another tightener, but I have seen many teams of horses that would not back, and they could get along some way, so I don't believe it is necessary to add the reverse.

The worst difficulty encountered by the average smith in the building of an auto is the transmission. This, I think, I have worked out in simple enough manner so it can be made with a little care without the use of a lathe or anything uncommon in the way of machinery. The belt pulleys must have flanges to guide the belts as they run loose and are tightened with the tightener pulleys TP. The small one on the engine, E, may be made of wood, but iron is, of course, better. It should be quite small, say two and four inches.



THE TRANSMISSION FOR AUTO BUGGY VIEWED FROM THE TOP

All should take 1½-inch or wider belt, according to the size of the car. The large pulley may be made by taking a flat-faced pulley off some machine and setting a ring of ¾ by ¼-inch iron in the center and one at each edge, making two separate spaces for the belts. These pulleys are marked PP. The tightener pulleys TP should have flanges also and should be hung to press on the lower side of slack of the belt. These are hinged just in front of the engine shaft and are connected with the hand lever, as seen in the engraving, so that when the lever is set on center they are both loose. When the lever is set back the slow speed is on; that is, the belt is tight on the small pulley. When the lever is set ahead the high speed is tight, which gives double the speed of the slow speed.

In the engraving I have arranged for double chain drive. This will be necessary if you want to use large-sized wheels. The equalizing gear (to let one wheel turn faster than the other) is accounted for by making one sprocket wheel fast to the countershaft and loosely fastening the other with a spring against a plate so that it may impart power enough to turn the wheel under ordinary conditions, but may slip when necessary.

If you wish to use the live axle all you have to do is to put one small sprocket wheel near the middle of the countershaft and the large one on the axle to correspond with it. In this case, the driving wheel must be fastened onto the axle similar to the loose wheel on a countershaft.

In building the body make it plenty wide enough to have room for all the machinery necessary. I got mine too narrow and had lots of trouble. A width of two and a half feet is narrow enough; three feet is better.

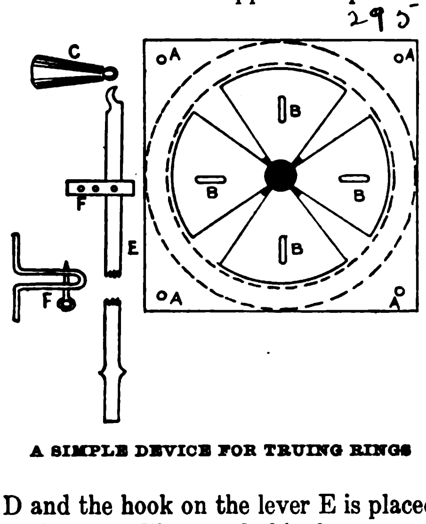
In selecting an engine, don't get one too small. It would seem that a two-horsepower engine should run a two-horse wagon, but when you put it in it is something like lifting one's self with one's boot straps. A two-horsepower engine will do if you do not gear it too high, but a five-horsepower will give better satisfaction. The air-cooled is the easier to install and will probably be the cheaper, but some say they are not successful. Personally, I do not know, but think I would be willing to try one.

A Device for Truing Rings.

W. HUDSPETH.

The accompanying sketch shows a reliable tool for truing and rounding fifth wheels. A plate AAAA is about an inch thick, the width of which depends on the size of the rings to be made. This plate is bolted onto a strong wooden table and has a large center hole to receive the mandrel C. Four cast-iron plates, BBBB, have each a slot hole through which loose bolts are placed to keep the plates from rising whilst being operated. A cast-iron cone-shaped mandrel C has an eye in the point. This mandrel fits in the center of the plates BBBB. The hole in the base plate is made large enough so the mandrel will drop well down when put in eye first. A lever E passes under the table and hooks into the eye of the mandrel and fits into the bearing F, which is firmly bolted under the table.

To operate this tool, a number of rings are heated to a dull red and are then placed, one at a time, on the plate. The mandrel C is dropped into place at



A SIMPLE DEVICE FOR TRUING RINGS

D and the hook on the lever E is placed in the eye. The mandrel is then tapped on the bottom with the sledge hammer while the lever handle is pulled up. This forces out the segments of the circle BBBB, and causes them to press onto the hot ring and thrust it out into its right shape. When the bar has been well pressed out and flattened, the lever is released and the tension is taken off. The ring is now removed, and the next one placed on. The whole operation takes only a few minutes, and the job is finished cleanly and neatly.

"Hello there, Benton, old man! How are you? Haven't seen your smile for over a week." And the Editor welcomed his visitor with a hearty handshake.

"Well, I'll tell you, Mr. Editor," began Benton, after seating himself comfortably and lighting his pipe. "I've been down in the country a spell and stayed considerably longer than I expected. Been visiting smith shops, roadside auto repair shops, and generally looking into the auto repair situation as viewed by the general smith."

"Glad to hear it, old man," returned the Editor. "What report?"

"Well, I find that smiths generally consider auto repairing should come to them and not to a special auto repair man. They consider this new field as a good chance to raise the standard of the craft, and the extra profit opportunity is no small inducement to take over this work." Then, continuing, Benton said, "Practically every smith I talked with said he was anxious to get next to the auto stunts, to know what general equipment is needed to care for a general auto-repairing business, and to get on the inside track of this new field. I picked up a few things that I think are pretty good, and—" But Scott interrupted at this point by appearing at the door.

"Say, Benton," exclaimed the newcomer, "I've got an engine coming, and I want a little talk on the speeds of pulleys. How do you determine or figure speeds?"

"I'm glad to hear that you're going to install power. And if you don't kick yourself hard for not putting in an engine before, I'll miss my guess." And Benton pulled out his little book and then continued: "But to get down to business. In calculating pulley speeds you must know the diameter and speed of either the driving or the driven pulley, and either the diameter or the speed of the other pulley, as the case may be. And when I say speed I mean the number of revolutions made per minute by the pulley. For instance, suppose we want to find out what size of pulley is required to drive another pulley of known size and revolutions per minute, the revolutions of the driving pulley being known. To figure this we multiply the diameter of the driven pulley by the number of revolutions it makes in a minute and divide the product by the number of revolutions made by the driving pulley.

"Suppose we know the size of the driving pulley, and the number of revolutions it makes, but want to know what size of pulley to have on the machine to run a certain number of revolutions per minute,—how do we proceed then?" queried Scott.

"To find the diameter of the driven pulley," continued Benton, "multiply the diameter of the driving pulley by the number of revolutions it makes and divide by the revolutions made by the driven pulley."

"And for finding the speeds of the pulleys how do you proceed?" again asked Scott.

"To find the speed of the driven pulley, multiply the diameter of the driving pulley by the number of revolutions it makes and divide by the diameter of the driven pulley," returned Benton. Then continuing, he said, "And for finding the speed of the driving pulley, multiply the diameter of the driven pulley by the number of its revolutions and divide by the diameter of the driving pulley."

"I think, Benton, that you have gotten me so twisted about revolutions per minute and diameters that I don't know now whether diameters are divided by diameters or if revolutions are multiplied by revolutions." And Scott scratched his head and tried to figure it on paper.

"A simple general rule," put in the Editor, who had been quietly listening to the discussion on pulley speeds, "is to multiply the two figures of the known pulley and divide by the other known figure. For instance, if you've been observing you'll have noted that Benton's rules are to multiply the quantities describing the known pulley and divide by the given quantity of the other pulley." Then, continuing, the Editor said, "In every case, the diameter of either pulley multiplied by the number of its revolutions equals the diameter of the other pulley multiplied by number of its revolutions, and, therefore, proportion may also be used in figuring pulley speeds. For instance, the speed of the driving pulley is to the diameter of the driven pulley as the speed of the driven pulley is to the diameter of the driving pulley."

"That makes the thing somewhat easier," said Scott. Then, continuing, "But how about getting the length of the belting?"

"That is very simple," put in Benton, turning the leaves of his notebook.

Before he could reply, however, the Editor said, "Add the diameters of the two pulleys over which the belt is to travel and multiply by $3\frac{1}{7}$ or 3.1416. Then divide by two and add twice the distance between the centers of the pulleys or the shafts upon which the pulleys are to run."

"That is simple to figure out," said Scott. "I didn't suppose it possible to get that so easily."

"Seems to me you know more than you generally pretend," put in Benton addressing the Editor.

"Well, we do know a few things," returned the other.

Scott thanked both men for the information, invited them to call and see his engine, and went out.

Keep A-Goin'.

If you strike a thorn or rose,
Keep a-goin'.
If it hails or if it snows,
Keep a-goin'
Tain't no use to sit and whine;
When the fish ain't on your line,
Bait your hook and keep a-tryin'—
Keep a-goin'.

When the weather kills your crop,
Keep a-goin'.
When you tumble from the top,
Keep a-goin'.
S'pose you're out of every dime:
Gittin' broke ain't any crime:
Tell the world you're feelin' fine —
Keep a-goin'.

When it looks like all is up,
Keep a-goin'.
Drain the sweetness from the cup;
Keep a-goin'.
See the wild birds on the wing;
Hear the bells that sweetly ring;
When you feel like sighin', sing—
Keep a-goin'.

(Contributed by D. Foster Hall, Massachusetts.)

One need never leave his forge to go fault-seeking.

Even if this is leap year a man need not jump before he looks.

Do you owe the shop, or is it in debt to you? There's a difference.

If you're not as busy as a bee, you're not so busy as you might be.

Do you keep the shop or does the shop keep you? There's a difference.

A good start doesn't necessarily mean a good finish, but it helps a heap.

Franklin said, "None preaches better than the ant, and he says nothing."

Be sure you are right; then go ahead. But be sure you're pretty sure before you're sure.

Right now, just before spring, is a good time to put in a side line. It means extra profit for you.

A man's future is more clearly indicated by the hard spots on his palm than by the lines and creases.

No man ever reached the pinnacle of success by comparing his product with that of his competitors.

There'll be more call this season than ever for rubber tires. Are you prepared for it? Get busy now.

Over seven hundred miners are said to have been killed in the Pennsylvania coal fields during December.

Some men think themselves real, live hustlers when they've only been pushed out of other people's way.

Does business increase as the days lengthen? A generous dose of advertising tonic will help your business.

Your herd been heard? Paste a pink buffalo on every letter you write to advertisers and brother craftsmen.

We've been looking for it. Sit right down now and write that article for publication. Of course, we want it.

In Iceland horses are said to be shod with sheep's horn, while in the Soudan camel's skin is used for shoeing horses.

Grasp time by the forelock, not at the coat tails. Get things in shape now for the spring rush. 'Tis none too early.

A man should be contented and discontented always—contented with what he has, but discontented with what he is.

Make a practice of treating and shoeing horses scientifically, honestly, safely, and well. And let your customers know it, too.

While independence is commendable, 'tis the pulling together that brings results. Organization will secure needed reforms.

Most smiths would have more than enough to do if they got after business as persistently as they kick about the hard times.

When you don't know—when you forget —when in doubt—read THE AMERICAN BLACKSMITH and tell the neighbor to do the same.

You can't afford to cut the quality of your work or material. Neither can you afford not to raise prices when advanced costs cut profits.

'Tis not length of experience alone that makes a man proficient. Breadth is the important factor. Forty years' experience may mean little or much.

A smith with business is usually a business smith. Success through the smithing trade can be attained only by running the business on business principles.

Run over now—take this copy along. Your neighbor smith 'll be glad to see it. Don't come away without his order. It means six months added to your time.

'Tis poor advertising that won't help business, and it's poor business that can't be helped by advertising. Also, it's a poor rule that won't work both ways.

Do unto your neighbor as if you were the neighbor. Do you enjoy having him cut prices? The price-cutter is a loser in every way. When tempted to cut—don't.

A helper desiring to locate in Missouri will find an opening by writing to Mr. C. C. McDaniel, R. F. D. No. 1, Arbela, Mo.

A man with a conscience need never fear for his reputation.

"'Most too cold," said Tom, when asked why he'd closed shop during February. We found out later that our friend had several of his fingers frozen in attempting to fish through the ice on the lake.

Honk! Honk! Honk! "Can you fix my auto?" What is your reply to the unfortunate automobilist who stops at your door? Get interested in our new department and increase your profits.

"The windows of this shop will never be painted," said Thornton. "Those who wish to look in can visit us, and the men are allowed to look out. Another thing: the sunlight's free, and the shades are always up."

The good ship "Organization" has carried many a band of smiths from the land of low prices and hard times to the land of better profits, protection, and harmony. Ask the Secretary for passage today.

'Tis business that rightly belongs to the smith. And automobile repairing nets big profits. Are you ready for this work? Lots of "Our Folks" are preparing for a big auto-repairing season. Get interested in the new department.

Get right down to figures when a neighbor smith says organization won't pay. He'll soon think as you do and be enthusiastic. Send today for easy plans. The Secretary says there is yet time to get a branch in working order and to reap full benefits from the spring rush.

A paper horseshoe was recently invented by a German. The shoe is prepared by saturating paper with turpentine and other ingredients and then glueing layers of the paper to the hoof until of the desired thickness. The shoes are said to be durable and impenetrable by moisture.

An anti-slipping device, of new design, is one recently invented. It consists of several pieces of chain so fastened to the horse's foot that two pieces run across the ground surface of the hoof and shoe. The chains are held in place by straps, and may be easily removed or put on.

The largest veterinary hospital in the world is said to be located in New York. Among its modern equipment is an operating table of peculiar style. The horse is led to a large steel frame and then securely strapped to the padded bars. When all is ready the animal is swung into any position most convenient for the operation. The steel frame is hung on an axis, and revolves like a wagon wheel.

An immense gas power plant, said to be the largest in the United States, is now under construction near Chicago. It is estimated that 100,000 horsepower will be produced. Sixteen blast furnaces and an immense number of coke ovens will constitute the gas plant. The gas engines for this plant will in some cases be of 3,000 horsepower each. The cost of the plant will run into the millions.

Tinol is a patented preparation which should simplify the tinning of metal articles. For very heavy coatings the old sweating method cannot be improved on, and for a regular output of tinware or tin plate the dipping methods are quite satisfactory. Tinol, however, involves no machinery nor even the use of the large quantity of melted metal that is necessary for dipping an occasional piece. It is a ready-to-use preparation which is applied with a brush to the surface to be tinned. The article is then heated until a metallic gleam appears on its surface—in other words, to the point of the fusion of the tin—and it is then wiped with a greasy rag.

"Was examined yesterday," said Tom. "That's my certificate," and he proudly pointed to a many-colored sheet tacked up over the old drill. Upon inquiry we learned that someone had called upon our friend, asked him a few questions, and had left the many-colored paper after securing five dollars for his services. Of course, the inspector was a fraud, but we didn't tell Tom so. They say some things are blessings in disguise,—perhaps the certificate will affect his conceit sufficiently to get him out of the rut.

American Association of Blacksmiths and Horseshoers.

And this month I want you to read a letter we received from one of our New York friends. Read every word of this letter. It will interest you from a pocketbook standpoint.

"The prices received by some smiths is an outrage on the man who toils for a living. I have been tempted many times to do just what I am doing in this instance. All the small concerns, from two to ten or more hands, throughout the country should organize into local sections and state bodies for protection, and by some means bring the trade up to its proper stand. I am not a labor unionist, but I am the strongest kind of a unionist on matters as above. The discrepancy in prices for work can only be remedied by united action.

"If there is one part of THE AMERICAN BLACKSMITH that gives me more interest than any other it is the price lists as set forth by shopkeepers all over the country and abroad. I noticed from one list, spokes are put in at 15 cents each, and felloes at 20 cents. Another man gets 20 cents for a spoke and 25 cents for a felloe, and his price for four shoes is $1.50, while he gets 80 cents for resetting. These four items are enough to demonstrate. The prices as above set forth are equal to, and some of them less than, smiths and woodworkers charged sixty and more years ago. Twenty-five cents was the lowest price for one spoke or felloe; $1.25 to $1.50 per set for shoes, and resetting shoes never less than 25 cents or an average of 30 cents apiece.

"The writer fails to understand how a spoke can be placed in a hub and the felloe replaced for 15 cents or even 20 cents. To lay out and saw a felloe, and dress it ready for boring and fitting will, with a quick workman, require the best part of an hour. Now, then, fit and bore it, make the joints, put in the dowels, and drive on the felloe, and ninety minutes are consumed, which, at the rate of 15 cents, only allows 10 cents per hour for labor. Where does the pay come in for material, shop rent, wear and tear of tools? It is to be seriously regretted that the labor of the American vehicle builder is held at so low a figure in our rural districts. There cannot be much competition with shops ten or more miles between. Does the smith or wheelwright, in making his prices, ever stop to think what his material costs? Or does he put in a spoke for 15 cents because Jake Buster does it for that? Or is he aiming on a corner on spokes and expects to get there on the 15-cent rate? One good brother craftsman says, 'On small repair work we put it on pretty stiff,' and finds cause therefor. While it is a frank admission of self-defense, or an attempt in that direction, it does not show very great business tact. He admits that he is being robbed by his patrons, and this is his cure.

"Brother workmen, let's organize for protection and against ruinous, silly, and petty competition. Let's accept the clarion call as sounded by THE AMERICAN BLACKSMITH and the American Association of Blacksmiths and Horseshoers, and unite and organize ourselves into a healthy combination for a living wage and a fair price. Not for exorbitant prices or extortion, but for prices that will permit of taking our places among men as becomes American mechanics. Such sentiment and such action as a body will command the respect of your patrons, and cause them to recognize your just and equitable demands. JOSEPH EBERLEE."

Can you disagree with any part of Brother Eberlee's letter on organization? He's been through the mill and knows. Take his advice and send for my easy plans today. "P. O. Box 974" on the postal, and it will reach me.

THE SECRETARY.

Iowa State Blacksmiths' Association.

J. A. HAMILTON, SECRETARY.

Result of Ballot No. 1, Voting by Mail.

THE AMERICAN BLACKSMITH is made the official organ of the Association.

Article No. 3 of the by-laws provides that any person or firm conducting a blacksmith or wagon shop in Iowa may become a member of this Association. It was voted to cut out the word Iowa in this article. Any blacksmith in the world may now be a member for $2.00 per year.

A resolution was passed advocating the election of a president or local leader in every county in the State of Iowa. The authorized schedule of prices with secretary's address may be had for ten cents per copy. Price for hanger is five cents each, or $2.00 per hundred.

There were three candidates for the office of director in the tenth district. Mr. L. A. Gronwall, of Algona, received a majority of all votes cast.

Article No. 6 of the by-laws provides that the compensation for directors' services when called away from home on official business shall be $2.50 per day and expenses. The collection department makes a good showing. Of all "dead beats" reported, over thirty-five per cent. have paid in full. There are less than fifty "dead beats" reported in the first red book of January 1, 1908.

The Apprentice Problem.

Beginning with this issue of "Our Journal," we will publish a series of articles titled, "The Failures and Successes of an Apprentice." This series is by an old-timer, as the title indicates, who prefers to have his correct name remain unknown. We make this special mention of this series of articles, for we firmly believe that they will be of more than passing interest to every shop-owning blacksmith in the country, and every blacksmith who has come into contact with the apprentice problem. We want every one of our readers to follow this series carefully, to read the installment each month, and to comment upon them, if they desire.

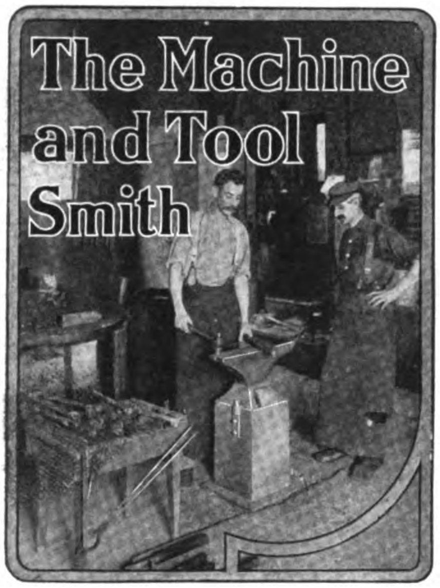
This series of articles will detail truthfully the actual experiences of a live, present-day blacksmith. The incidents and happenings mentioned are actual facts. We believe this series of articles is timely, and if they result in even a small degree in bettering the apprentice's position and solving the apprentice problem for the shop-owner, the author, as well as ourselves, will be more than amply repaid.

Repairing Sarven Wheels.

M. SELLS.

In the repairing of sarven wheels there is one important point that has not been mentioned by any of the brothers, and so I am going to give my method of repairing a sarven wheel.

When the wheel comes in notice whether the flanges are tight on the hub. If they are not tight the wheel is in bad shape. I never waste time on one like this. Given a sound hub and tight flanges, I first remove every alternate rivet which will allow the removal of two spokes to each one. Fit new spokes and drive the four pairs, using good glue, and replace the rivets. And here comes the most important part of the whole proceeding: First, use the rivets, which fit snugly; second, use a light hammer in riveting, so the rivets will not bend, as they will with a heavy hammer, and then draw tight. Then the other four rivets can be removed and the remaining four pairs of spokes driven and riveted as the others were with moderate blows from a light hammer, so as not to bend the rivets or flanges; for if the rivets bend the job is worthless. A good hub fitted in this manner should be as good as ever. I can tell of one set of sarven wheels that I repaired about ten years ago. They are still doing good work every day, often carrying 5,000 pounds, and the wheels are only 1¾-inch spokes at that.

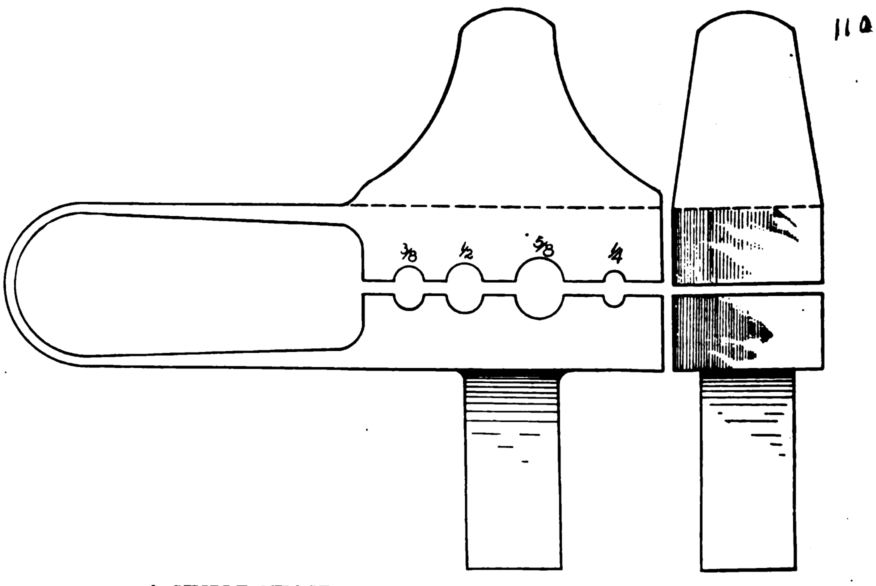


A Swage for Anvil Use.

W. H. MORRIS.

This swage is to be made from hard steel and if made from this material you will not have to make another very soon. This is to be used with or without a helper. It is not necessary to give any dimensions, as any brother can make one from the engraving. The jaws, as indicated by the arrows, should lie together so as to hug the work.

This is full size and it can be made without that top, as dotted lines, for light work only. For heavy work I think the top, as shown, is a good idea. As a swage, I think this beats brother Hall's idea, because the top on his will become swollen from the blows which it gets, and, of course, it will give trouble. This swage can be made for various sizes of stock to suit the work which is to be done in it.



A SIMPLE SWAGE EASILY MADE FOR ANVIL USE

The Manufacture and Repair of Locomotive Main Frames.

GRANT BOLLINGER.

In the manufacture of wrought-iron frames, one of the most important features is the selection of good scrap. Another important feature is the selection of a foreman who is thoroughly familiar with the results necessary to make his work a complete success. Our practice in the manufacture of wrought-iron frames at the Altoona shop, is to pile the scrap on boards 12 inches wide and 24 inches long, each pile containing 750 pounds. From this we secure a slab about 3 by 18 by 48 inches, and, in forging the rail, about four or five of these slabs are taken, according to the size of the frame desired.

The rail is forged in one solid piece to the desired length, and our braces are also forged in one solid piece. The frame is then taken to the blacksmith, who welds the braces to the rail at the center of the pedestal leg. This requires but two welds to the brace, thus obviating the danger of so many welds. The frame is then ready for the machine shop. Our experience has been that frames manufactured in this way have given excellent service.

The next thing to be considered under the subject of main frames is one that has caused our best mechanics and scientific men a great amount of study: namely, the cause of the breakage of main frames. I believe the breakage is due to insufficient bracing, and my belief in this is strengthened by the fact that since the adoption of the Walschaert valve gear on the late type of locomotives we have had to repair but six frames during a period of two years on locomotives using this gear. At the present time we have about four hundred engines of this class in service. The use of this gear enables the builders to brace the frame at the weakest point.

The theory has been advanced that the breakage of main frames is caused by crystallization. The opinion of our best scientists today, however, is that this theory is wrong. Their opinion is based on the fact that when the metal is heated, the fiber returns, thus demonstrating that crystallization has not taken place, but showing conclusively that the metal has simply become "tired" through long service and constant use, which produced the same condition as would exist in crystallization, until the metal is "rested" by reheating, which returns it to its natural state.

We will next take up the subject of repairing main frames. The most economical way of doing this work is on the engine, when the fracture is at such a place that it can be properly gotten at. Our system of doing this is to spread the frame by using a jack between the pedestal legs to open the fracture sufficiently to allow a piece of wrought iron from three fourths to one inch in thickness to be inserted, taking care that the grain in the piece runs the same way as the grain in the frame. We then build a furnace around the fracture, out of ordinary fire brick, and bring the frame to a welding heat by the use of fuel oil. When the proper heat is reached, the jack is quickly released, and the frame drawn to the proper length by the use of clamps. The furnace is then dropped and the weld made by the use of rams from either side. Some foremen use a special furnace made from fire clay which usually breaks when the furnace is dropped, requiring a new furnace for each weld, and which is much more expensive than our furnace made of fire brick, as we are able to use the same brick for two or three welds.

When the frame is broken in such a way or place that we are unable to weld it on the engine, it is sent to the shop to have repairs made, and, wherever possible, the old end is welded on again, thus saving a large amount of machine work, which is necessary when a new end is supplied. This gives just as good results, and in this way, we keep the cost of repairing main frames down to a minimum.

Two Styles of Wrenches.

J. D. YOUNGER.

This sketch represents a wrench that is very quick and handy. We use it for assembling harrows. The brace part is made in the same proportions as an ordinary boring brace out of stock half an inch round. The boss A, or jaw part of the device, is forged separately and has a square hole. Different sizes of jaws can be made and thus easily interchanged. The jaws are forged from low carbon steel and then casehardened, and will stand a long time. When using it tighten as far as possible with the brace, and then use handle at end, which makes it a very powerful wrench.

In answer to Tubal-Cain, in the November number, I submit the accompanying engraving as the proportions I have used in forging a wrench, the size of the nut D being used as the basis of all measurements as shown. I fully agree with him when he says the smith is king of all crafts, but when he says the smith, through his dissipation and carelessness, was the cause of drop hammers and forging machines being brought into use, I would like to have him prove it. I think when a spirit of antagonism exists it is from a different cause. There is no doubt that good general forgers are getting scarce, and under existing conditions I don't see how we are to get them. I would like to see an answer to this letter in an early number.

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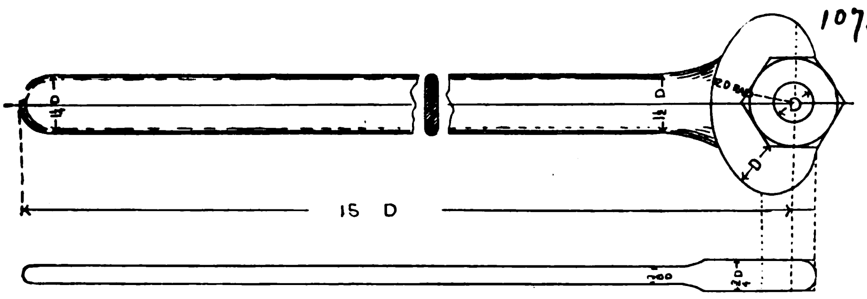


THE PROPORTIONS ARE BASED ON THE SIZE OF THE NUT D

Some Casehardening Experiences.

E. R. MARKHAM.

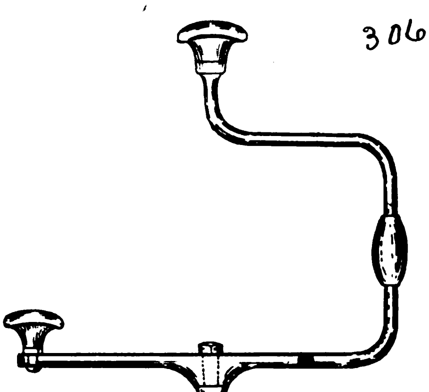
I had occasion to recommend a change of stock a while ago. The parties had been using a good grade of tool steel for a certain purpose. This was machined to grinding size, hardened, and ground to finish size, at a high cost. A good grade of open-hearth steel properly casehardened would, I was satisfied, answer the purpose better than the material being used and at a lower cost for material and labor, as it could be machined more rapidly, and, if properly casehardened, it would not need to be ground to finish sizes, as it could be machined to these sizes and hardened without any change of size and shape.

When I recommended the change to one in charge, he said, "That is good: any fool can caseharden; and we have had to pay a man good money to harden these pieces." Well, I don't know but what he said is true; perhaps "any fool can caseharden," but how? Many times it requires a greater amount of ingenuity to properly caseharden to accomplish some desired object than it does to get the pieces ready to be thus treated. Sometimes it is necessary to call into play all the resourcefulness of a man of vast experience to accomplish some desired object.

At times it is necessary to use a steel of a certain composition in order that we may be able to accomplish a certain result, and then to treat this stock by certain methods to get desired results. I have found gun frames, which when made from a Bessemer steel of forty points carbon, would be so brittle that they would break from the concussion of firing the gun, after the gun had been discharged a few hundred times. This because the steel contained too high a percentage of phosphorus. These same frames, when made from open-hearth steel of the same carbon content, or from steel containing fifty points of carbon and where phosphorus was low, gave us no trouble. If the frames that were made from open-hearth steel were packed in the hardening box with raw bone they proved too brittle; but when packed in charred bone they worked nicely. Yet the Bessemer steel frames gave trouble even when packed in charred bone, as the phosphorus was in the steel, while in the case of the open-hearth steel packed in raw bone, the phosphorus from the bone was taken up by the steel and so produced unallowable brittleness.

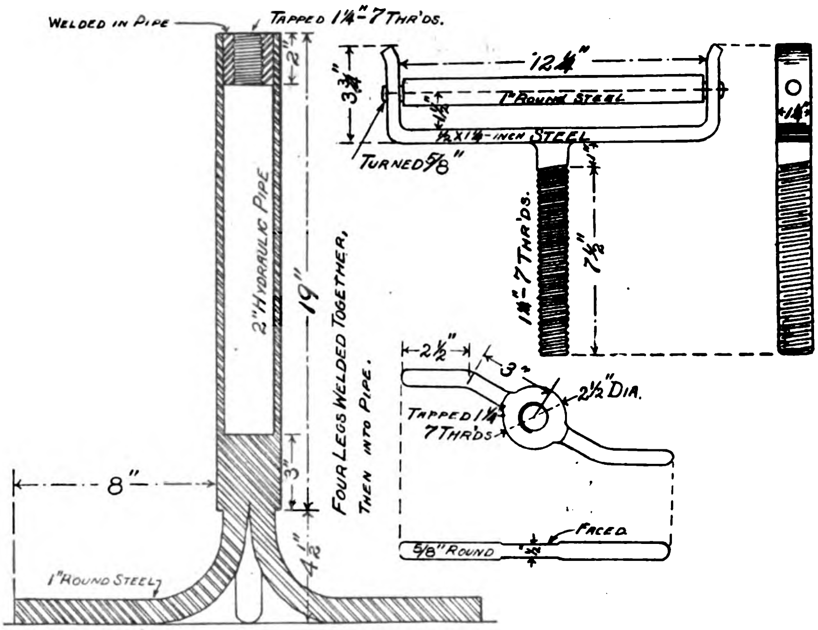
Certain pieces of peculiar shape having some comparatively weak portions must be made from the proper stock and treated by exact methods, or undesirable results will follow. Many times such pieces must be packed in a mixture of materials which must be exactly proportioned; the boxes must be of a certain size, the pieces packed just so, the furnace run at an exact temperature, the heat being gauged by a pyrometer, and the boxes of work left in the furnace an exact number of minutes after they are red hot. They must be dumped into a bath of certain temperature. All this in order to get the results desired. Perhaps "any fool" could do it. I never happened to employ one to work in my hardening room, so I cannot speak with authority. But I have seen a good many smart men that couldn't do this class of work in a satisfactory manner. The operations of casehardening very closely resemble the cementation process of making

306.



A HANDY WRENCH FOR ASSEMBLING HARROWS

steel, only it is converted into steel by charging carbon into it, the carbon penetrating to the center. In case box without any charging material, heated to the temperature mentioned above, and dumped into the bath. A



THE MATERIALS FOR THIS SERVICEABLE HELPER MAY BE FOUND IN THE AVERAGE SCRAP PILE

hardening, we convert the outside of the material into steel, thus forming a steel case around it. If the material being treated is steel we charge a high per cent of carbon into the surface so it will harden harder than it will in its natural state.

The operation or process of charging carbon into steel is usually accomplished by using comparatively high heats. As a result the pores of the steel are opened and the texture of the metal is coarse. Steel is weakened by the open texture and coarse grain. If the stock is charged with carbon at low heats the process is a slow one and a much larger percentage of the carbon gas escapes from the box. In many cases the open grain and consequent weakened condition of the hardened product does little or no harm; in such cases it need not be considered. There are many cases, however, where it is essential that the pieces be the hardest and toughest possible. When it is essential that the grain be fine it may be accomplished by giving the work two heats. The first charging heat, that is, the stock is packed in the box in the usual manner and exposed to heat until the carbon has penetrated the desired depth. The box is then removed from the furnace and allowed to cool. The pieces are removed, reheated to a low red heat, and dipped in the bath the same as if made from tool steel. Or, if the nature of the work allows, they may be placed in an iron fine grain and maximum strength follow this treatment.

Local casehardening is often necessary; that is, we find it necessary to harden certain portions of a piece and leave certain other portions soft. The method employed to accomplish this must depend on the character of the work. Sometimes it is possible by the use of properly shaped tongs to grasp the heated piece and immerse it in the bath, the tongs covering and so protecting the portions from the action of the bath. The portions desired hard are exposed to the bath and so are hardened.

At other times the portions desired soft are covered with fire clay held in place by iron binding wire; or these portions may be nickel or copper plated, and, as carbon will not penetrate through this plated surface, these portions will not harden. It sometimes happens that a piece is of such form that it is possible to cut it off to a length, then pack it in a box with carbonaceous material, run it until the carbon has penetrated the desired depth, then machine to size and cut away the carbonized surface where it is desired soft. In fact, the method must conform to the work in hand, and it is necessary to have a man who can devise ways to accomplish the desired result. I always consider that the most necessary part of the outfit of a successful hardening plant is a plentiful supply of brains. I have little patience with the claims of some makers of hardening furnaces, pyrometers, or other devices used in the hardening room, that by use of such apparatus cheap help can do the work as well as high-priced men could without them.

I believe in the installation of the very best apparatus the market or ingenuity affords, but it should be with the idea of improving the quality or increasing the quantity of our work, but never to allow us to lower the standard of our work shop, as, the better equipment, or the more ingenious the apparatus, the brainier should be the men in whose charge it is placed.

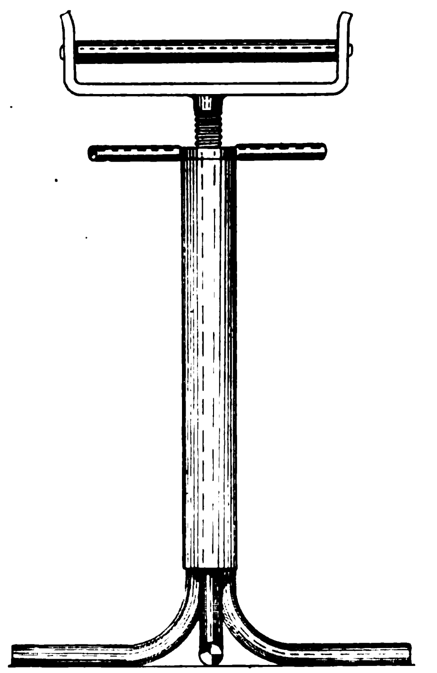
I have been instrumental in reducing the expense ten, twenty-five, and even fifty per cent in many hardening rooms, but never by advocating the services of a cheap man. If a concern is casehardening nuts that are not to be subjected to great strain, perhaps little attention need be paid to the man doing the work. If they are attempting to caseharden delicate pieces in quantity, then the very best is the cheapest.

I feel that men of experience should enjoy an exchange of opinions, so they may be of mutual benefit.

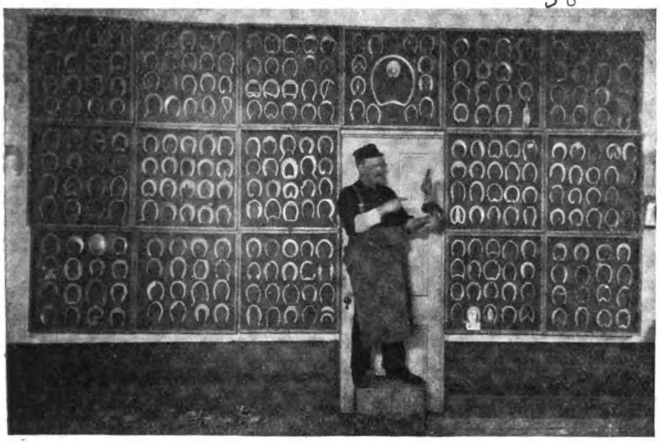
An Adjustable Iron Rack for the Blacksmith Shop.

FRED KINNEAR.

The several engravings show a very serviceable helper for the blacksmith. It is easily constructed and will last as long as anyone could wish. The stand is adjustable to any reasonable height, and can be made mostly from material that is otherwise useless. It is unnecessary to explain the making


AN ADJUSTABLE IRON RACK IS A GOOD HELPER

38



SIXTEEN CASES OF SHOES, SHOWING OVER 280 DIFFERENT STYLES

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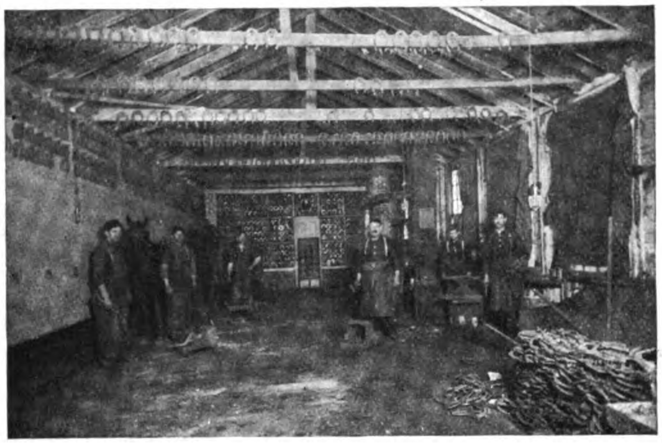


INTERIOR OF PROFESSOR RICH'S SHOP, SHOWING SHOES ON REAR WALL

of this device, as the engravings show all dimensions and how it is put together. The finished stand is also shown, so that no one ought to have any serious difficulty in constructing one of these helpers during odd moments.

A Shoeing Shop of Ohio.

PROFESSOR GEORGE E. RICH.

My main shop is seventy feet long and twenty-four feet wide, with four fires all equipped with b'owers and anti-clinker tuyère irons. I have over three tons of shoes in my shop now. I use the United States horseshoes, and I use about a ton every month, and a ton and a half of iron and steel in making up special shoes. I keep four men all the time, besides using my scholars to give them the practical experience. I have another room twelve feet square with forge and anvil for scholars to commence in, where no one will meddle with them. I have a fine office and lecture room with over one hundred different kinds of shoes, and I give my class a lecture each day.

Gas Engine Ignition Batteries.

WALTER IRVING.

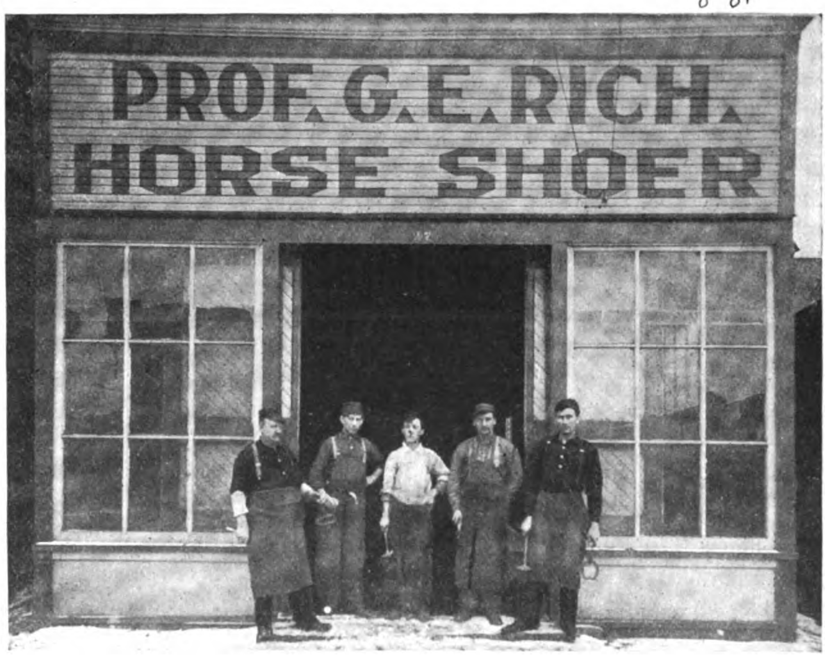
Early attempts to apply electricity for igniting the combustible mixture, or charge, in gas engine cylinders were so crude and so disappointing, because of the unreliability of the apparatus employed, that the hot tube system of ignition was the principal one in vogue up to within the last decade. More than a quarter of a century has elapsed since the hot tube system of ignition was first put into use, and yet, although electric ignition devices have been wonderfully perfected and are now generally employed, there are at present in service many engines equipped with hot tube igniters. Before the introduction of the hot tube, various schemes for firing the charge by the direct application of a flame had been adopted, but such methods are now obsolete.

One of the principal objections to the hot tube system of ignition is that the *time* of ignition cannot be varied satisfactorily to secure the most economical results. When running at normal speed ignition should take place just *before* the piston reaches the end of its compression stroke. If, however, the charge be fired *after* the piston reaches the end of its compression stroke, the average pressure on the piston, and hence the power developed, will be reduced considerably. To a certain extent the time of ignition may be varied by changing the position of the Bunsen flame of the hot tube apparatus, but this method of control requires very careful adjustment, and in any case does not result as satisfactorily as is possible with electric ignition devices.

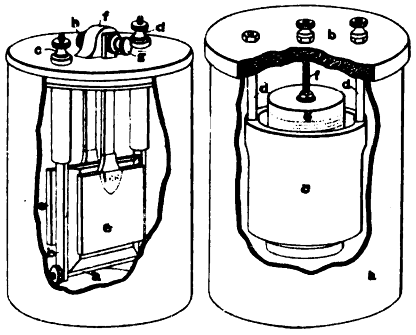
One of the most important elements of any electric ignition system is the battery or source of electric current. The term *battery* is not applicable to a single cell; it is used to indicate two or more cells connected in one electrical circuit. Primary batteries made of ordinary six-inch dry cells, such as are sold almost everywhere at twenty-five cents per cell, are commonly employed for ignition purposes. For stationary engines, however, the wet cell, one example of which is shown in Fig. 1, is particularly favored.

Before proceeding to describe this cell, it may not be entirely out of place to refer briefly to the principle of action of all kinds of primary batteries. Early in electrical experimentation it was found that when two substances, such as zinc and copper or zinc and carbon, were immersed in acidified water the chemical action set up between the two substances would cause a con-

88.



EXTERIOR OF PROFESSOR RICH'S SHOP, WITH GROUP OF STUDENTS tinuous current of electricity to flow from one substance to the other through a connecting wire or other conductor



FIGS. 1 AND 2—SHOWING TWO STYLES OF WET CELLS

outside the liquid. It was assumed that within the liquid—commonly called the *electrolyte*—the current flowed from the zinc to the copper, while outside the current flowed from the copper to the zinc. The plates immersed in the liquid are called *electrodes;* the one on which the electrolyte acts most vigorously and from which the current is assumed to flow being known as the positive electrode, the other as the negative electrode. The term *cathode* is applied to the plate through which the current leaves the cell, while the term *anode* is applied to the plate by which the current is received.

For the attachment of wires the electrodes are provided with binding posts, known respectively as the positive and negative *terminals,* indicated by plus (+) and minus (—) signs, the positive terminal being attached to the cathode, or carbon electrode, and the negative terminal to the zinc electrode, or positive plate of the cell. Right here it is important to fix in mind that the positive plate and the positive terminal are not one and the same thing. While it is true that the point *from* which the current flows is regarded as positive and that *to* which the current returns as negative, it should be remembered that within the cell the current starts *from* the zinc plate, which is, therefore, the positive plate, and flows *to* the carbon plate, which is, therefore, the negative plate. The positive terminal, however, is attached to the carbon, or negative plate, and the negative terminal is attached to the zinc, or positive plate. It is necessary that this should be so, for in the wire or other conductor outside the cell the current flows *from* the terminal on the carbon plate *to* the terminal on the zinc plate, and it is apparent that the naming of the terminals corresponds to the scheme followed in naming the electrodes of the cell.

The path of the electric current is known as its *circuit,* the path inside the cell, or whatever may happen to be the source of electricity, being called the *internal circuit,* while that outside the cell is called the *external circuit.* When the path of the current through the external circuit is broken by disconnecting a wire or opening a switch, the circuit is said to be *open*; on reconnecting the wire or closing the switch the circuit is said to be *closed.* When any part of the wire or other conductor forming the external circuit comes into direct or indirect contact with the ground the circuit is said to be *grounded.*

When the circuit of an open-circuit cell is closed the chemical action of the electrolyte on the positive and negative plates, or electrodes, sets up in their electrical condition a difference corresponding to differences in head between separate bodies of water at different levels. In electrical science the term *potential* is used to express what corresponds to head in hydrostatics and to pressure in pneumatics. Just as water will flow readily from a high level to a lower one, and as gases will flow from a high-pressure tank into one of lower pressure, so electricity will flow from one substance at high potential to another at lower potential. Between bodies of the same potential there can be no flow of current any more than there can be a flow of water from one vessel to another when the water stands at the same level in both vessels. To effect a flow a difference of potential is as necessary in the one case as is a difference of level in the other.

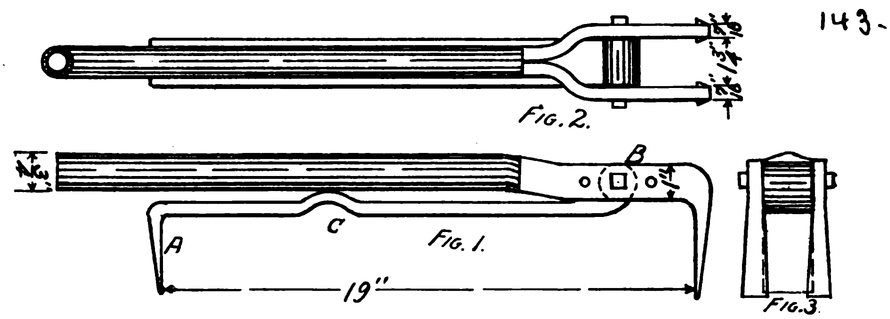
Assuming the earth to be an electrical reservoir of infinite capacity, its potential is zero, and hence, when the requisite path is provided, a current of electricity will flow to the earth from bodies at higher potential than is the earth. The difference of potential producing a flow of current is termed *electromotive force* and is measured in *volts* by means of a *voltmeter.* The voltage, or electromotive force (usually abbreviated to E. M. F.), generated by wet and dry cells is due to chemical action, while that produced by dynamo and magneto generators is due to magnetic induction. The E. M. F. of primary batteries varies with the character of the materials employed, but with cells of the same kind the potential generated is independent of the size of the cell, a small one having the same E. M. F. as the larger ones. The capacity of cells of the same kind, however, does depend on their size, the length of their life being determined by the quantity of electrolyte and the size and weight of the positive and negative elements. The voltage of primary cells in service is considerably less than is shown on test when fresh.

As commercial zinc contains impurities on which the electrolyte acts much less rapidly than on the zinc, there is set up between the zinc and the small particles of impurities a useless and wasteful local electromotive force that causes the zinc to be consumed until the impurity is set free and falls away. To prevent this *local action,* it is customary to *amalgamate* (that is, to coat or alloy) the zinc with mercury, which seems to have the effect of covering up the impurities.

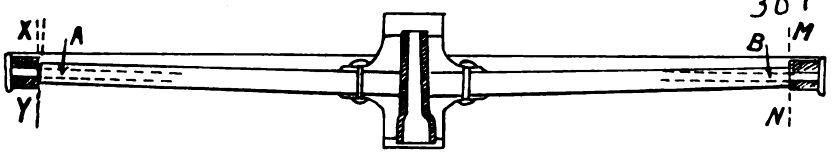
Primary batteries are subject to another trouble known as *polarization.* This is due to the collection of bubbles of hydrogen gas on the cathode, or carbon plate, so that the electrolyte cannot come into contact with it, thereby stopping the chemical action required to produce a flow of electric current. Batteries are useless when polarized. To prevent it the cathode is usually surrounded by some substance such as manganese dioxide, with which the hydrogen is free to combine chemically Depolarization may also be accomplished by agitating the electrolyte, or by giving motion to the cathode, but chemical depolarization is much more successful and convenient, and is employed to the practical exclusion of all other methods.

In the cell shown in Fig. 1 polarization is prevented by making the cathode of

143.



SPECIAL TONGS FOR HANDLING PAVING BRICKS black oxide of copper compressed into a briquette, or plate. The electrolyte is made by dissolving one pound of



HOW SHOULD A WHEEL BE BUILT?

caustic potash in three pounds of water, the solution being stirred constantly until all the potash is dissolved, thus preventing it from solidifying at the bottom of the mixing jar. The solution should be stirred carefully so as to avoid splashing, as it will burn both skin and clothes. If quickly rubbed off the skin with tissue paper no harm will result. The solution may also be rendered harmless by applying any animal or vegetable oil or grease, but mineral oil is not suitable for such purpose

The copper oxide plate *a* is suspended in a grooved copper frame *b*, attached to the cover by thumb nuts *c* and *d* that serve as the positive terminals of the cell. At either side of the copper oxide plate is suspended a zinc plate. A bolt passing through the knob *f* in the cover holds the plates in the same relative position at all times The thumbnuts *g* and *h* are the negative terminals of the cell. Since the electrolytic action is more pronounced at the top than at the bottom of the zinc plates, they are made tapering, the thick part being uppermost.

The E. M. F., or voltage, of the cell decreases very slowly with use. The cell has an initial E. M. F. of .95 volt, dropping to .7 volt on closed circuit. Inasmuch as the internal resistance of the cell is low, decreasing somewhat with use, the available E. M. F. is high and constant, there being little waste of energy in overcoming the cell's internal resistance to the flow of electricity. Just as friction impedes the flow of water in pipes and reduces the head, so the internal resistance of a cell hinders the flow of current and lessens the available E. M. F. The resistance of all cells, wires, and, in fact, every part of an electrical circuit is measured in *ohms*. The internal resistance of this cell is lowered with use, because while the circuit is closed the oxide of copper, which is a poor conductor, is reduced to metallic copper, which is a good conductor, making the passage of the current easier.

In order that the interdependence of voltage, amperage, and resistance in any electrical circuit may better be understood, and that a clearer idea may be had as to the value of the electrical units thus far mentioned, it may not be out of place to explain here that the unit of potential, the volt, is the electromotive force required to maintain a flow of current of one ampere through a resistance of one ohm; an ampere, the unit of electric current, is the rate of flow, having a resistance of one ohm and a difference of potential of one volt between the ends of the circuit; an ohm, the practical unit of resistance, is the amount of resistance offered to the flow of a current of electricity having an electromotive force of one volt and a current strength of one ampere.

From the above explanation it is evident that in any given circuit the current strength, or rate of flow of electricity, is proportional to the difference of potential between the ends of the circuit. The *proportional* relations between voltage, amperage, and resistance are expressed empirically by what is known as *Ohm's law*, which, stated by means of formulas in which I represents strength of current in amperes, E the electromotive force in volts, and R the resistance of the electrical circuit in ohms, is as follows:

$$1.\quad I = \frac{E}{R}$$

$$2.\quad E = I \times R.$$

$$3.\quad R = \frac{E}{I}$$

According to formula 1, the strength of current in amperes may be determined by dividing the known electromotive force in volts by the known resistance of the whole circuit in ohms. Formula 2 indicates that the electromotive force may be found by multiplying the current strength in amperes by the resistance of the circuit in ohms. Formula 3 is used to determine the resistance, which is equal to the electromotive force divided by the amperage.

The current output of a battery of cells having a high internal resistance will be appreciably less than that of a battery made up of cells whose internal resistance is low. For example, suppose a battery of 6 cells in series, having an internal resistance of 3 ohms and an electromotive force of 6.48 volts, is to supply current through an external circuit having a resistance of 3 ohms, thus making the resistance of the whole circuit $3 + 3 = 6$ ohms. According to formula 1, the strength of the current would be $6.48 \div 6 = 1.08$ amperes.

(To be continued.)

Tongs for Handling Bricks.

NELS PETERSEN.

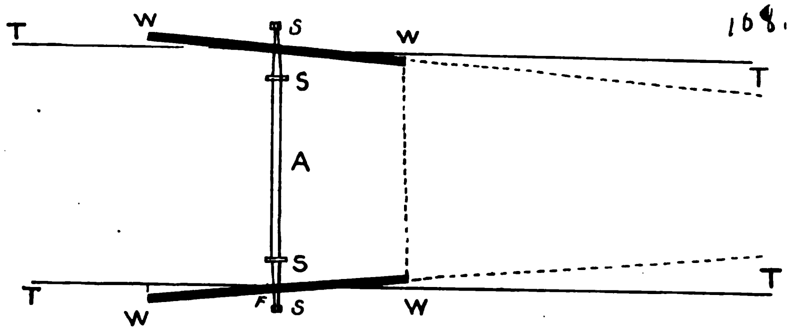
This drawing represents a pair of brick tongs which are used for handling bricks when paving the streets of large cities. The forked part is made of 1 by ⅞-inch stock. Cut this piece 20 inches long and draw the ends down tapering, as shown in drawing, then double the piece and take a light heat on the solid end and swedge it down to about ¾ inch for a distance of 1½ inches. A piece of ¾-inch gas pipe is used for the handle. Heat one end of the gas pipe and drive it onto the fork while hot. Then take a heat over the joint and weld it down solid. The fork can then be spread and shaped as indicated in drawing. The lower jaw A, Fig. 1, is made of 1¾ by 5/16-inch stock. Cut this piece 22 inches long and turn an eye on one end, as shown at B, to take a quarter-inch bolt. A short bend should also be made at C to keep the handle from striking the lower jaw and injuring the hand. The other end is then drawn down tapering, and a bend four inches long makes the total distance between the jaws nineteen inches, as indicated by dimension figure.

How Should a Wheel Be Built?

NELS PETERSON.

First, let me ask if every tire put on wheels of the same height and size had one quarter inch draft, how much dish would the wheel have? Now let the wheelwright answer. He certainly ought to be the most competent person to answer this question. My own answer would be that it depends on the condition of the wheel, which is the greatest factor in determining the amount of dish a wheel will have or must have to stand the strain it is subjected to. In my experience in setting tires, I have found a vast difference in the construction of wheels, and it is a fact that no two wheels will dish alike with the same amount of draft in the tire. And why this difference? I claim there is absolutely no excuse for building a wheel so that it will dish backward when the tire is put on, and I have heard experienced wheelwrights say that they cannot cut the tenons of the spoke in such shape so that when the rim is put on the wheel will dish back before the tire is put on. This is accomplished by cutting the tenons so that they will be in line with the center of the spoke, as shown at A in illustration. It will be observed that you could continue to cut till you reached the hub and still have your tenon in the center of the spoke. The result is that when the rim is driven on, it would bend the tenon backward. And when the tire is put on, the entire pressure would fall on the back side of the shoulder of the spoke, leaving an opening on the front side as shown by dotted lines XY, in engraving, page 139.

All spokes as made in the wheel factories have more or less taper, usually one quarter inch for a Sarven wheel. The mortises in the hub being cut straight, it is obvious that the spoke ought to be shaved off on the back side so that the tenon is straight, before driven into the hub. And if this is done, and the spoke is driven so that if a straightedge was placed across the face of the wheel the spokes would be equally distant from the straightedge at the hub and rim, then if the tenons are cut in a straight line with the face of the wheel, as shown at B, you would have a wheel that never would dish back. It may be noticed that the pressure will fall equally all around on the shoulder of the spoke, as shown by dotted line MN. It will also be noticed that if you would continue to cut your tenon, the closer you get to the hub, the closer you approach the face side of the spoke. And when the tire is put on, the whole pressure would fall in front of the center of the spoke in the hub. If the rim was fitted so that it would rest even on the shoulders of the spoke, leaving no opening at the joints, there could be but little variation in the dish, especially on a good grade of wheel. A wheel that will dish back when the tire is set is built wrong and will never stand at all, unless it is overdished; and to this cause may be ascribed the advantage of irregular dish, if you may call it such. Because in order to get any service out of it at all, it must be dished sufficient to prevent it from going back when turning a short corner.



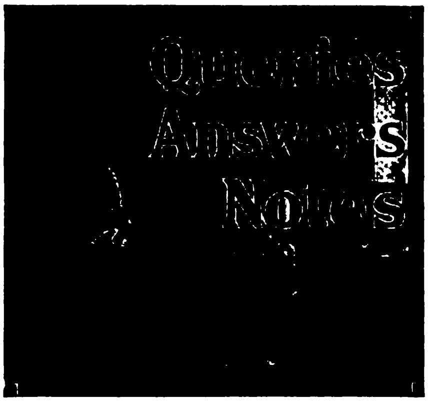
SLIDING FRICTION IS SOMETHING TO BE RECKONED WITH IN AXLE SETTING

Sliding Friction and Axle Setting.

J. W. DARON.

Brother Gunn seems to take exceptions to the factors I employ by which to set axles, and thinks it is more theory, with me, than practice. He admits, though, that the taper of the axle arm may have some bearing in the matter; but as to the reality of the sliding friction of the wheel he denounces it wholesale, and assures us that it becomes the smallest of unknown quantities in practical analysis. Now, what I understand him to convey by this expression is that it is a mere theory of mine, and if it is in the category of the unknown quantities, as he says it is, what means does he employ by which to conclude that it is the smallest? But let us come to the facts of the case by tracing out the different points of the sketch. A, from collar to collar, is the axle; SS and SS from collars to nuts are the spindles, or arms; WW and WW, which are full lines, represent the wheels, while the full lines TT and TT are the track of the wheels. Now, the position of every part is plainly seen here in relation to every other part, and the first question I wish to ask is, Why are the spindles, and, of course, the wheels, too, put into this position? The answer is, For the purpose of counteracting a portion of the resisting forces of the taper of the spindles from the collars to the nuts. Well, if this is the special purpose, why not counteract these forces altogether by inclining forward the points of the spindles until their front surfaces are on a line with the front surface of the axle? The reason is that the very moment we begin to incline the points of the spindles forward, that same moment the resisting forces take place from the outside of the wheels, which is produced by the sliding friction of the wheels on the ground at the points F and F. Therefore, the more the spindles are inclined forward at the points the more these forces of sliding friction are increased. Fearing there may be someone who does not fully understand just how these forces of sliding friction are produced, I again refer him to the sketch, where he will see how the wheels stand. They are exactly in line with the dotted lines, which show the directions in which the wheels would run if the spindles would move in at the same ratio. But as they are stationary with the axle the wheels are forced to run in the direction of the solid TT. Hence, anyone can see there is a sliding movement taking place with the wheels while they are revolving. So here is where the art of setting spindles or skeins comes in: to know just what positions to give them in relation to the axle so as to equalize the force produced by the sliding friction that moves in with the force produced by the taper of the spindle that moves out. The rule is, incline the points of the spindles forward one twelfth of their taper. This is all there is in horizontal spindle setting. But if anyone sets spindles by any other means without taking these factors named into account, he will be confused to get the rule by which to set spindles. It requires experience in addition to algebraic calculation

Brother Gunn claims that the centrifugal force in a wheel of considerable dish is greater than the centrifugal force in the same kind and height of wheel with less dish, and he claims more gather of wheels will counteract this force. I cannot comprehend the difference, and if he has discovered anything new in this respect I should be glad to have him illustrate and explain through "Our Journal," as that is what it is for. I know one thing, however, and that is that the whole catalogue of axle setting and wheel gathering could be dispensed with by simply shaping the spindles or skein with no taper. If there is anyone who does not believe this, I will illustrate and prove it.



The following columns are intended for the convenience of all readers for discussions upon blacksmithing, horseshoeing, carriage building and allied topics. Questions, answers and comments are solicited and are always acceptable. Names omitted and addresses supplied upon request.

He Certainly Enjoys it.—I have been a reader of THE AMERICAN BLACKSMITH for only two months, and I certainly do enjoy reading it. I wouldn't take the subscription price for the two copies and do without them. R. C. DUKES, Tennessee.

Who Has Used a Plow Welding Machine?—We should like to ask if any reader has ever used a plow lay welding machine, to weld and fit lays, or, rather, to shape them? We want to know where they are made and how long it takes to weld a lay with a machine. JUENGER & HUSTON, Oklahoma.

Wants Expert Coal Information.—I should like to hear some of the old experts put in a word about coal, tests, etc., also proving it. I get tangled up with some "bum stuff" occasionally myself. I should hate to try to keep house without THE AMERICAN BLACKSMITH. A. C. SAMPLE, Colorado.

Is Worth Ten Times Its Price.—I should not like to do without the paper for ten times the amount. I think the paper is just right, but I see there is a kicker in the November issue. Well, let him kick away until he tires, then he will get a gasoline engine. E. W. GROH, Wisconsin.

One of the Charter Members.—I have been a regular subscriber from the beginning and have every copy now that has been published. I don't see how you can make any improvement on it. I read everything in it, advertisements and all. Could not run my little shop without THE AMERICAN BLACKSMITH. W. A. DAY, North Carolina.

A Kentuckian's Appreciation. — THE AMERICAN BLACKSMITH is always a welcome visitor at my home. I read it and study it, and there's no doubt that the articles it contains are written by the most scientific of the craft. May its monthly visits continue to be a pleasure and inspiration, and add prosperity to each and every reader. C. S. BEAVEN, Kentucky.

His Rock Drills Break.—I am sometimes annoyed by the breaking of rock drills about five and one quarter inches from the end of the part which enters the chuck. The drills are of cast steel. This part of the drill is creased to one and one eighth inches. Is it possible to braze or weld the part on so that it will again be serviceable? A reply to this question through the paper will greatly oblige. ANDREW STEWART, Scotland.

He Painted His Raveled Belt.—I am very fond of Benton. The way I prevented my 165-foot four-ply seven-inch rubber belt from raveling, I just rolled it up tight, laid it on a clean floor, and painted the edges of it with a good thick paint. I also removed the guides.

I would like if some brother would tell me how to melt brass. An article on this subject in place of Thornton's letter would suit me fine. M. S. HATHAWAY, Manitoba.

Some Pennsylvania Prices.—We've just raised our prices here so that we are doing better.

4 new shoes	$1.50
4 new shoes, No. 7	1.75
4 old shoes toed	1.00
4 old shoes set	.80
4 old shoes sharpened	.80
4 steel shoes hand turned	2.50
Bar shoes, each	.75
4 Neverslip shoes	2.50

R. M. LIEB, Pennsylvania.

A Question on Upsetting.—I would like to ask if you or some brother can explain how it is that when you upset a tire or axle in an upsetting machine, having a white heat on the piece to be upset, that it always upsets the most where it is red heat instead of where it is a white heat. I have noticed this a number of times, but could not find the cause. I should think it would upset the most where it is white hot and the softest. ARTHUR ROSS, New Jersey.

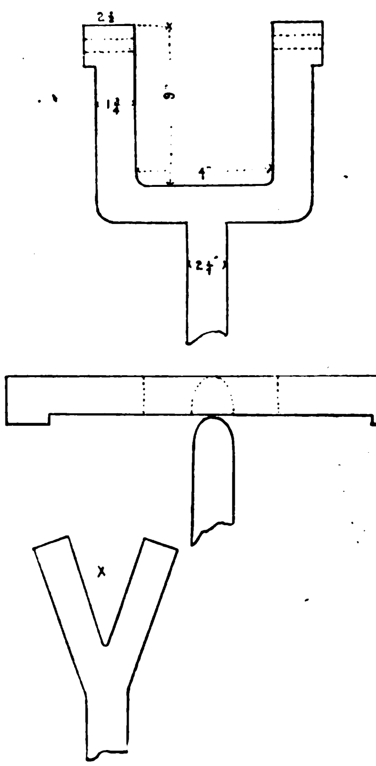
Several Questions from New Zealand.—I would like to know how to make the fork shown in the accompanying engraving. Please give size of stock to work from and full particulars. I would also like to know what rule to apply when making a ring of angle iron out of three by three-eighths inch stock, three feet two inches in diameter. What rules will apply to get the right length, allowing for welding? Angle iron must, of course, be figured different than flat stock. A NEW ZEALANDER.

In Reply.—The fork is a very simple forging to make and may be made in two ways. First, by taking a piece of one and three quarters inch stock twenty-seven inches long, upsetting both ends to two and one half inches for the same distance back. Then measure for the center, and bend at right angles two inches each side of the center mark. The shank is now welded to the center of the U-shaped piece by means of a split weld. The other method is to split the end of a piece of three and one-half-inch stock, as shown at X, upset the ends of the two arms, then forge back and square up to the desired shape. The holes in the ends of the two arms must, of course, be drilled after the forging is finished or they will not be in line.

In figuring and forging rings of angle iron the following rules will apply in finding the amount of stock necessary. When the flange is to be on the inside, take the outside diameter, add twice the thickness of the root of the angle, multiply by twenty-two and divide by seven. When the flange is to be on the outside, take the inside diameter, add twice the thickness of the root of the angle, and multiply and divide as before. The thickness of the root of the angle is the distance from the inside corner of the angle to the outside corner. For some smiths it may be necessary to allow more for welding, and in that case three or four times the thickness of the root of the angle may be necessary to accomplish this weld. B. W., New York.

Paring the Feet and Fitting.—In looking over your paper, I have not seen anything about paring a horse's foot for a shoe so it would fit well. How should a shoe lie on the foot when pared out, and how much weight should the sole bear? Please illustrate how a shoe should bear on the foot before it is nailed on. I have not seen anything about ox shoeing in your valuable paper. As I have heard so much about different ways of paring a horse's foot, perhaps some one of my fellow craftsmen will give us the best method to do such important work. JOHN R. THOMPSON, Massachusetts.

Wants to Build a Power Hammer.—Since writing you last I have put power into my shop. I have a four-horsepower engine, an iron turning lathe, a drill, and an emery stand which I made myself. There are two other shops in the town besides mine, and they do work cheaper than I, but I will say that I have the best business and the "cream" of the trade. I would not be without your paper for anything. I want to make a trip hammer, so if there is any blacksmith that can give me some information, I will be very thankful. WALTER MAIN, California.



A NEW ZEALAND SMITH WANTS TO KNOW HOW TO FORGE THIS FORK

A Letter of Appreciation from England.—I am pleased to forward you a year's subscription for THE AMERICAN BLACKSMITH journal, which I prize much for the good information which I gain. It is interesting and practically useful for those who wish to improve. To keep up with the times we must be continually learning. I have come to the conclusion that THE AMERICAN BLACKSMITH is our great storehouse of knowledge. It is full of instruction and contains such a variety of useful hints. The more I learn the more there is to understand, in horseshoeing as well as other things. J. WALLIS, R. S. S., England.

Shoeing the Wire-Cut Hoof. — Some brother blacksmith wants to know how to shoe a horse with a barbed-wire cut. I will try my best to describe my way of shoeing a foot cut with barbed wire. I generally make a bar shoe and cut all the hoof away right where the cut is so there is no bearing on the shoe. I find that this is the best way to shoe a horse with a barbed wire cut. Where I am located it is very seldom we shoe a horse that is not cut with barbed wire. If some other brother has explained it to you, try his way, and if it does not prove satisfactory, try my way, and I think you will be pleased. C. M. SORENSEN, California.

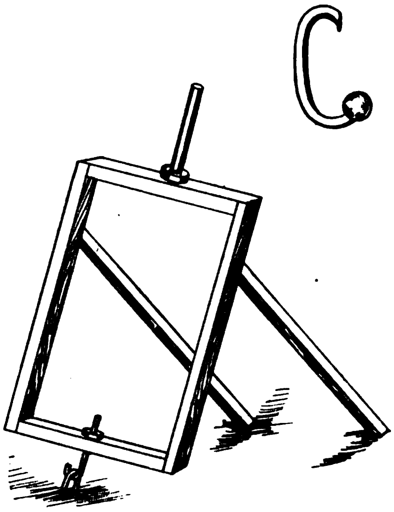
Several Useful Kinks.—I see one brother in Australia speaks about his rims splitting at the holes. We all have had that trouble sometime in life. Pass a hot iron through each hole to sear the wood and then file a flat place on the spoke tenon and you have no more trouble. Another brother asks how to make a wheel rack. Mine is made of two by ten and two by six-inch stock fourteen inches long and nailed together like a box. Legs made of one by six-inch stuff are then put on at an angle from top to bottom, each one running in the same direction. That spreads the legs on the floor any distance you want them. We have all had trouble with the wedge falling out that we put in the felloes and rims to close them up, so I made one to slip in on the top and to balance underneath that works like a charm. Take a piece of three-eighths-inch iron and forge wedge-shaped, drawing one end down to a feather edge with a long slope. Now, bend as if you were going to make a staple crook under the long end like a letter C. Now, make a ball on the long end heavy enough to balance your wedge in an upright position, as in the illustration. Push this into the joint from the inside and you will have no more trouble with the knife or wedges falling out while you saw.

92.

A GENERAL SHOP OF MISSOURI

92.

A SHOEING SHOP OF IOWA



A SIMPLE WHEEL RACK AND A BALANCED WEDGE

How do you file your AMERICAN BLACKSMITH? I take two strips of wood, two inches longer than "Our Journal," take two No. 6 finishing nails, and drive them through one board. In the other board I bore holes to fit the nails. Then I punch holes in the journals to fit the nails, allowing strips to project one inch at each end. Then I drive two spikes in the wall and hang up the journals. When volume is complete, bend and brace nails. The leaves hanging down keeps them straight and the dust out. J. F. BOYD, Missouri.

Can't Find Any Fault.—I have been a reader of "Our Journal" since May, 1907, and can candidly say that I enjoy it thoroughly. I don't see how any person can register a kick on it, for the time that I have read it, I can see no fault. I like to read of general shop work, and to give us this, I don't see how you are going to leave out the power question. I am satisfied that power properly applied is not only a time and money saver, but is also a saver of bone and sinew, and I think that is what we should look to as much, if not more. than the money. Some men don't look at it that way; it is only for the money they put in the power. Generally when you get a good man and get him used to everything, he quits you, but your engine don't. I would like to have some one give a good plan of an iron shear to cut stock up to two by one half and heavier.

And I also will say that I like Thornton's talks, and Benton's, and I hope they will continue to talk for some time to come.

THOMAS H. FREETORN, British Columbia.

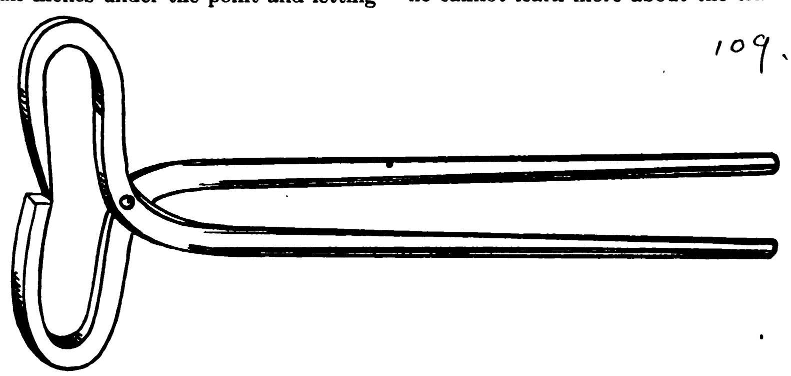
A Short Talk on Corns.—I am not as good at handling the pen as I am at handling the hammer. I like all the articles in the paper, but am interested in horseshoeing more than anything else. I like Benton's talks and also Thornton's letters, and I like your Queries and Answers, and also enjoy Heats, Sparks, and Welds. I like to study the anatomy of the horse's foot. I see so much talk about corns in the foot. I have shod horses for twenty years, and have had no trouble in getting rid of them. If you keep the pressure off them they will disappear. Corns are produced by leaving the shoe on too long, and the greatest cause is given as short shoeing. Some smiths will make their shoes too short, and then the shoe will rest too much on the plantar cushion and is bound to make a corn. Then some turn their shoes in against the frog. Keep your shoe away from the frog, and make the shoe fit the foot. A horse is just like a man: if the shoe fits good and easy he will travel all right; if not, he can't go. Our prices for shoeing are $1.20 for new shoes, 60 cents for removing, and $1.50 for steel shoes. EMANUEL V. BYERS, Pennsylvania.

Wants to Study the Anatomy of the Horse's Foot.—Can you give me a recipe to preserve a horse's foot and also the bones of the foot? How can I remove the flesh from the bones? W. M. MANK, Ohio.

In Reply.—The best method for procuring specimens for the purpose of studying the anatomy of the horse's foot and leg is to secure all four feet of the dead horse, having them cut off at the knee. Take one foot and bury it in the ground, leaving it until all the flesh has fallen away from the bones. Take the second foot and place it in a kettle, boiling it until all the flesh is removed. Take the third foot and cut it off at the coronet joint; then saw into it lengthwise from the center of the frog. Cut the fourth one off at the pasterns and cut out the frog, then cut the sole out all the way around and close to the wall. After you have removed the sole you can see the several parts of the foot, the two bulbs, the navicular joint, and the coronary joint. You can also see how the ligaments and tendons run along the leg and connect with the navicular joint and how the nails should be driven without injuring the foot. This also gives you an idea of the thickness of the sole. D. F., New York.

A North Carolina General Shop.—I have been taking your paper for six years and want to say that it is all right. I have been intending to write you a long time. I have just built a new shop. It is 18 by 45 feet, single story, half of it floored for wood shop. The building is rather small, but it was the best I could do at the time. My tools consist of one blower, a forge made of a boiler section three feet in diameter with a coal box 10 by 24 feet on one side, a shop-made tire bender, one hot tire setter, one one hundred and eighty-two pound anvil, one punch and shear, one drill, one Reynolds tire-bolting machine, one foot-power emery wheel, one set of Little Giant dies, an eighty-pound vise, and one mandrel, or cone, for rounding bands or rings. I also have a twenty-seven-inch band saw and I have just ordered a two-horsepower Stover gasoline engine. I have several good tools of my own make, such as trestles, a spoke-tenoning machine, and a machine for bending angles, bands, rings, or eyes. As far as your paper is concerned, it is worth twice its cost. I expect to have it sent as long as I live and as long as the paper is published. ROBERT JONES, North Carolina.

Several Wagon and Plow Questions.—I have been taking the paper a year now and find it well worth the money. I would like to have some plans for building log wagons for single teams. We use a three-inch tire on a forty-inch wheel, and for the four-horse wagon we use a four-inch tire on a forty-inch wheel. We have been building the front carriage on the four-horse wagons with short hounds and of the tongue and let it run back against sandboard and bolt a four by four on the bottom the axle, making a stiff tongue of it. It is very hilly here, and all wagons have to have brakes. We use what we call a tail brake on the log wagons. The brake beam works on the top of the hounds and is set with a lever from behind, which is held in place, when on, by a ratchet which is bolted on the hind bolster. I would like to have the readers' ideas of a good tail brake and also which they think best—short hounds or a fifth wheel for the front carriage of a log wagon. Which is the best way to make a swivel hook for stretchers? I would like to know the best way to cut stock to put share on a fourteen-inch plow which is used for railroad work where there are rocks and roots. Which is the best way to cut stock to get a good, heavy point? We have been welding on point out of one and one half by one half inch steel. We double the steel and slip it over the point of share, leaving about two and one half inches under the point and letting it run up on the top for about four inches. H. R. DERKS, Missouri.



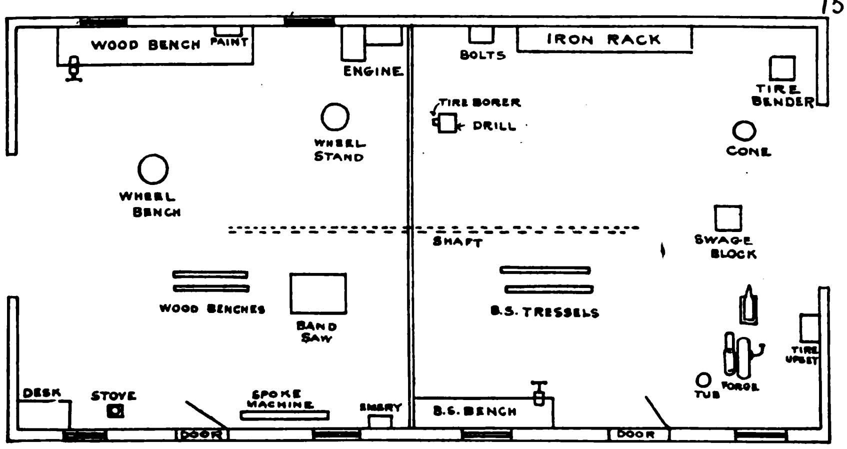
A HOOF TRIMMER PLANNED BY AN AUSTRALIAN

Another on High and Low Wheels.—I have been reading with interest for some time the "ins and outs" of the high and low wheel question and thought, perhaps someone would bring it out to an answer. But I, and everybody else, give it up, for it all depends on the road on which the wheel can be used to the best advantage. As to our country, we use wheels all the way from two and one half feet to five and one half feet for carriages and wagons and from six to eight feet for log carts. And there cannot be any difference recognized between the low and high wheel. I notice that our brothers try to make their illustration by running a wheel over a piece of timber or some bulky substance. Well, it's true and cannot be denied that a high wheel will run over a log or large stone easier than a low wheel. But, as a wheel is supposed to be run on a road and not in woods, I don't believe there is any difference in it. Now, someone says that a five-foot wheel will run lighter than one three feet high. If so, how much higher must we build them so they will run themselves, and thus do away with horses, donkeys, gasoline engines, etc.? Now, don't conclude that I think or claim to know it all, for I will admt that I don't, and whenever any of us begins to think that we know everything, then we are just at the point where we know nothing.

I am a young man, but, being in the business since my infancy, can say that no man can say that he has got blacksmithing and building wheels "down pat," for he never will get too much experience, or where he cannot learn more about the trade.

I notice that there has been some complaint made on the publishing of prices. Let's have more published price lists, and if our paper doesn't suit the other fellow, let him publish one of his own awhile and see if he can please everybody.

NOAH A. MATTHEWS, South Carolina.



THE FLOOR PLAN OF A WELL-EQUIPPED GENERAL SHOP OF NORTH CAROLINA

An Interesting Australian Letter.—I have read with interest some of the questions asked through your columns and have been on the point of answering some of them. Things which seem easy to some of us in this far-off land seem to puzzle our American cousins, such as welding large tires. I find no trouble in welding them straight across. I use sand in small quantities.

I find the tire upsetter and welder a great convenience, and would advise that, next to a drilling machine, one of these machines be bought if any great amount of welding be done. In our country towns, a smith has to be able to do all classes of work in iron, whether sheet or bar. Power is only in its infancy here, as the cost seems very great alongside that quoted in your paper. Take horse stocks, for instance. Twenty pounds ($97.34) is the price our merchants quote us, which I think is a very large margin on manufacturers' prices. Many of your readers would welcome a price list attached to the advertisements in cases like the one mentioned above.

I think I have a device which any smith can make for himself. It is a hoof trimmer. Make a pair of pincers with handles fifteen inches long, of five-eighths inch round, with straight jaws, which I made from a worn-out rasp. I make them like an ordinary tongs first, then set the jaws back and bring them around the cutting edge, having one corner left so as to pull out a nail, should there be one left in the foot. The edge, instead of being straight across, I set down a little, so that when used it does not go close to the sole of the foot. I can cut shoe and hoof together through the nails on a very tough hoof without first taking off the shoe. This I learned from one of my former masters. They can be made cheaper than the cutters can be purchased, and will last equally as long as any I have seen, and they work just as well. I also have a brace attachment and drill chuck that are two handy tools. The attachment takes the half-inch round shank of a Morse twist drill, and you can bore holes where you could not with a drilling machine or a ratchet brace. In the chuck I use my broken Morse drills in up to $\frac{5}{16}$-inch for holes to be drilled with the attachment. They are a first-class pair. Our prices for work are much the same as your American lists, as far as we can understand. The names of your wagon parts are different from ours, so we can't compare them very well at present. J. W. GRIBBLE, Australia.

EDITOR'S NOTE.—Our brother is, no doubt, unaware that the original question on the welding of wide tires came from one of our Australian readers.

Several Questions on Power.—I am installing electric power in my shop, and, being new at the power business, would like to ask a few questions of brothers of more experience in that line.

What size, thickness, and grain number (coarseness) is best for emery stones to be used on general work, mostly on plow and shovel work? and what make of wheel is best? I have ordered a Little Giant power hammer and would like to know if it would be advisable to make a cement or concrete base to set it on. My shop floor is two-inch plank, resting on the ground cross sills, which have been sunk. Would cement be suitable for the emery stand base? Would you put in countershaft for each machine? I wish the man Benton would drop me a line at once in regard to above. Would also be glad to hear from brother blacksmiths later through the columns of THE AMERICAN BLACKSMITH.

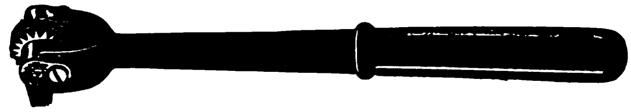
I appreciate "Our Journal" very highly, especially your article on anatomy of the horse's foot in the December issue. There are lots of good pointers on shoeing in every number, and now that I am putting in power I shall get lots of good in that line. I keep all back numbers, and am looking them over again for pointers along that line. They make a great book of information, and if properly marked, so as to find what you want, it makes it mighty handy.

This is the first time I have written, but intend to tell some of my ideas, prices, etc., later; also, what I think of power, although I think now that it is the only successful thing for an up-to-date general shop. L. F. SLICK, Illinois.

In Reply.—You may be sure of getting a good emery wheel by ordering one manufactured by a well-known, reliable firm, and, in ordering, tell them just exactly what you want to use it for and they can advise you better than anyone as to just what grain, size, and thickness of wheel of their particular make is best suited for your needs.

In reference to the base of the power hammer I would say that a good heavy planking would absorb the shocks of the hammer better than a concrete base. The concrete foundation is also likely to crumble in time, unless made by an experienced hand. For the emery stand, however, the concrete base would be very good, and there is much in its favor over any other material.

In reference to the countershafts for each machine, you will find this to be cheaper in the long run. It will, of course, add materially to first cost, but a countershaft for each machine will be found a great convenience and time-saver.



THE HUNTINGTON STYLE EMERY WHEEL DRESSER

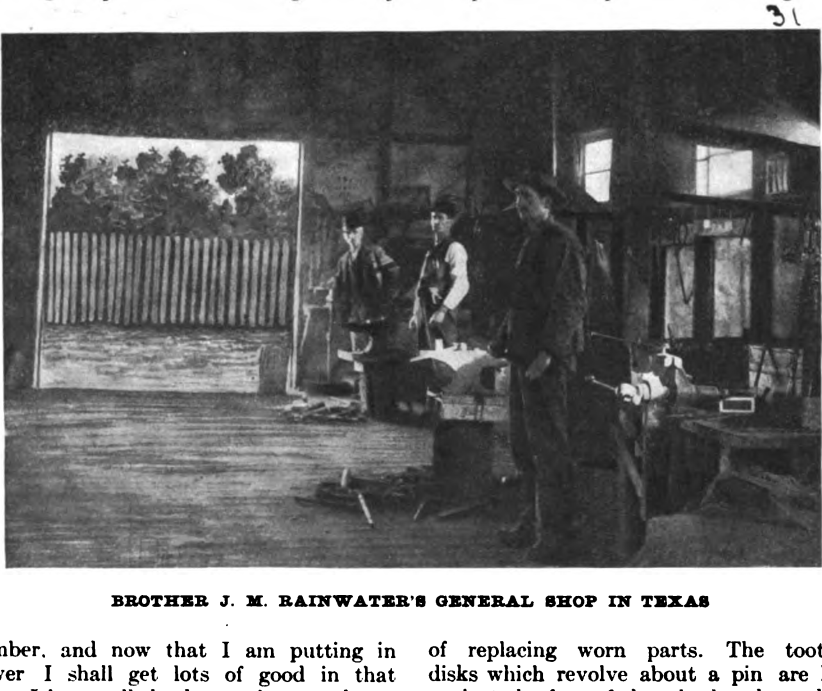
Dressing an Emery Wheel.—We notice in the January number, on page 92, an inquiry from a Mr. Luke Blabey about what to use to true up the face of an emery stone. Most shops use the Huntington style emery wheel dresser because of its comparative cheapness and the slight cost of replacing worn parts. The toothed disks which revolve about a pin are held against the face of the wheel and made to revolve by the revolutions of the grinding wheel, and as they move at a high rate of speed, the points of the toothed disks strike one after the other against the face of the emery wheel with greater or less force, thus picking or hacking out those grains of emery that lie on the surface and which may have become worn and smooth from use, thus bringing new and fresh grains to the surface. This same tool, when properly used, will dress off the high parts of the wheel, thus truing it up by removing emery in the same way as if it were used merely for dressing or opening up a wheel that had become smooth from use.

B. L. K. states in reply, however, that the wheel must be revolved slowly at a speed of eighty to one hundred feet per minute. That would not work satisfactorily with the Huntington dresser, for this tool is used with the wheel running at its ordinary speed, this being much more convenient and satisfactory than if it were necessary to remove the belt and revolve the wheel by hand.

To use this dresser, the rest, which should always be had with every grinding machine, should be set firmly a little higher than level with the center of the wheel and far enough from it so that when the claws of the dresser are hooked over the inner edge of the rest, the points of the cutters will not quite touch the wheel when the tool is held level. Then, by bringing the cutter into contact with the wheel by firmly but gently raising the handle of the tool, the high and uneven places will be cut down. This dresser should be slid or passed slowly back and forth across the face of the wheel, but using somewhat less pressure at the corners of the wheel. The tool should be held in such a manner that the cutters will revolve with the wheel and in line with its motion, and the wheel should never be allowed to run or cut across the points of the cutter.

If the fire flies while using this tool it is a sure sign that the wheel is grinding away the points of the cutters, because they're running hard for want of oil or through an improper position of the tool. The tool must be kept well oiled. Oil it every time it's used, if necessary. Never allow it to get hot. If it's used continuously for any length of time it is liable to get hot and should be plunged into cold water and then oiled again. Of course, with use the cutters become worn and the points of the teeth become blunted or dull from wear, but these cutters are made by a number of different firms and are produced by the million, and may be had at a reasonable price from any of the supply houses that handle grinding wheels. It would be well, however, to see that cutters are had of the proper temper. If they be too hard, they're very liable to be so brittle as to break readily in use, but if not hard enough the points are liable to mash down and double back, or the edges of the plain disks are liable to be bent over in use, crowding sideways to such an extent that the cutters will bind and refuse to revolve.

This simple tool was the invention of a Mr. Huntington, and was patented some twenty-five years ago, but is now made by a number of different firms, as suggested. It has probably done more to bring the emery wheel into general use throughout the shops and factories of the country than any other one invention in connection with this great labor-saving tool, the grinding wheel. E. H. BRUNER, Illinois.



BROTHER J. M. RAINWATER'S GENERAL SHOP IN TEXAS

VOLUME 7 | NUMBER 7

THE AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

BUFFALO N.Y. U.S.A. | APRIL, 1908 | $1.00 A YEAR 10c A COPY

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From a Kentucky Smith.

Along with a new subscription order we received the following little note: "Words are but useless shadows of speech in an attempt to express my appreciation of your extremely fascinating, interesting, and instructive AMERICAN BLACKSMITH. It is the most instructive book on blacksmith work I have ever found. A neighbor blacksmith handed me a copy of the paper, and I am now sending for a year's subscription. I have a number of friends whom I will put in touch with your paper at once." Uncalled and unasked, but none the less welcome, does this note of appreciation come to our desk. Will you, dear reader, do as this man's neighbor and hand your smithing friend a copy of "the most instructive book on smith work"? Put your friends in touch with the paper, and if you will do it, we'll soon have that fifty thousand.

Every Reader a Reporter.

Since the printing of the first issue, THE AMERICAN BLACKSMITH has always been called the "Smith's Own Paper," and subscribers have always considered it as their very own. And rightly, too, for "Our Journal" has ever been for, by, and with the smith. Now, we want every reader of the paper to consider himself a reporter—a correspondent to report on all matters of interest and value to the craft. If a new smith has made his appearance in your vicinity, let us hear about it. If you have purchased a new machine, tell us how you like it. If your competitor is cutting prices, write us about it. In short, let us have anything and everything of smithing interest that happens in your neighborhood. Nothing is too trivial to be reported. Keep your eyes and ears open and don't think that you can write us too much or too often. We want to be in touch with craft conditions at all times. We want you to consider THE AMERICAN BLACKSMITH as your very own paper—we want your help and coöperation all the time.

Contents, April, 1908.

The Opportunity Column.

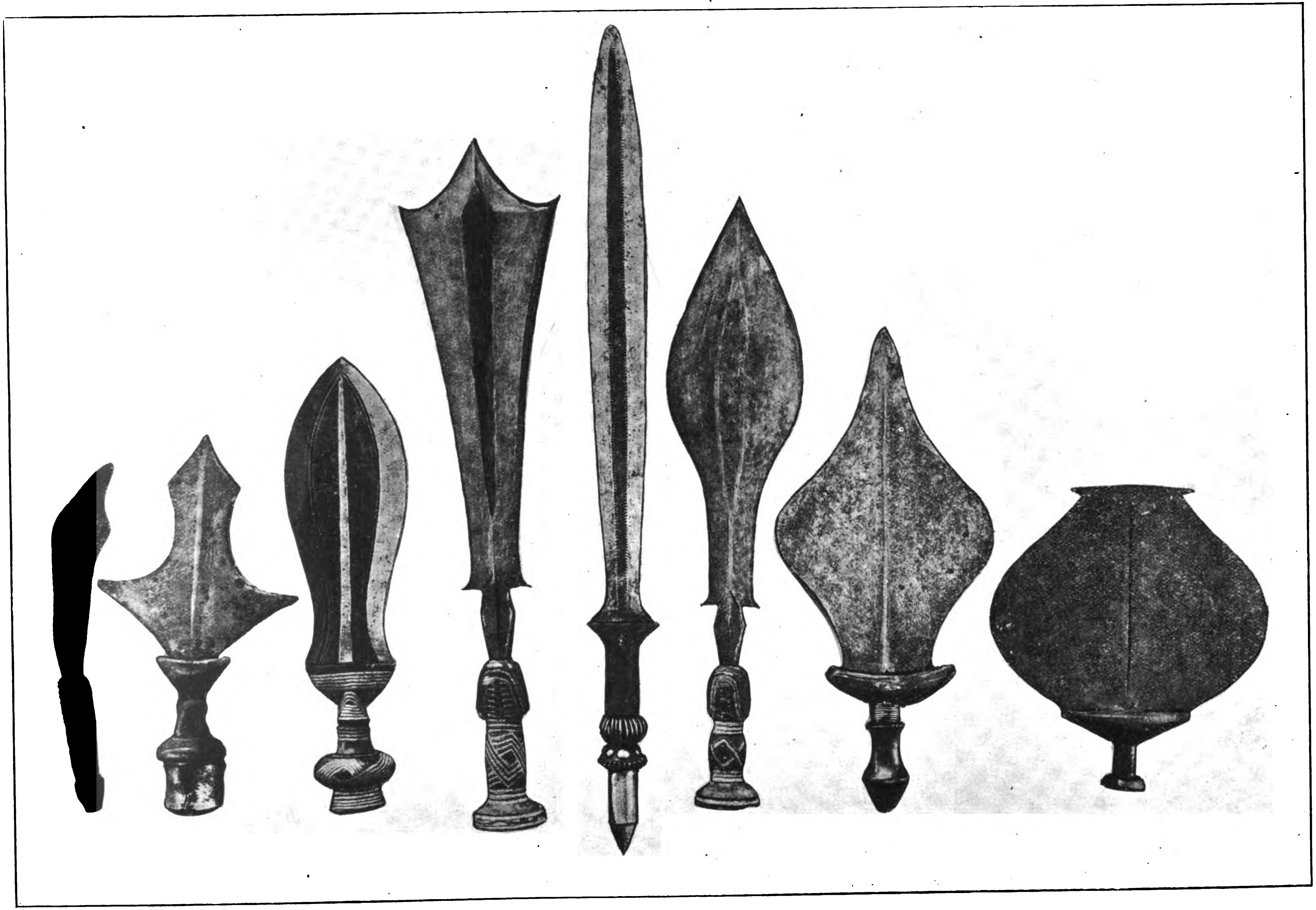
Have you ever considered what an opportunity is presented you by our want columns? Do you know that at small cost you can talk to a larger number of smiths than are reached by any other publication? If you want to sell your services, your business, part of your equipment, or anything else in the smithing line, our want columns will help you. The small cost is no indication of the value in this instance. For at the small rate per line, you can bring your offerings to the attention of every one of "Our Folks"—the best magazine family on earth.

Pink Protectors.

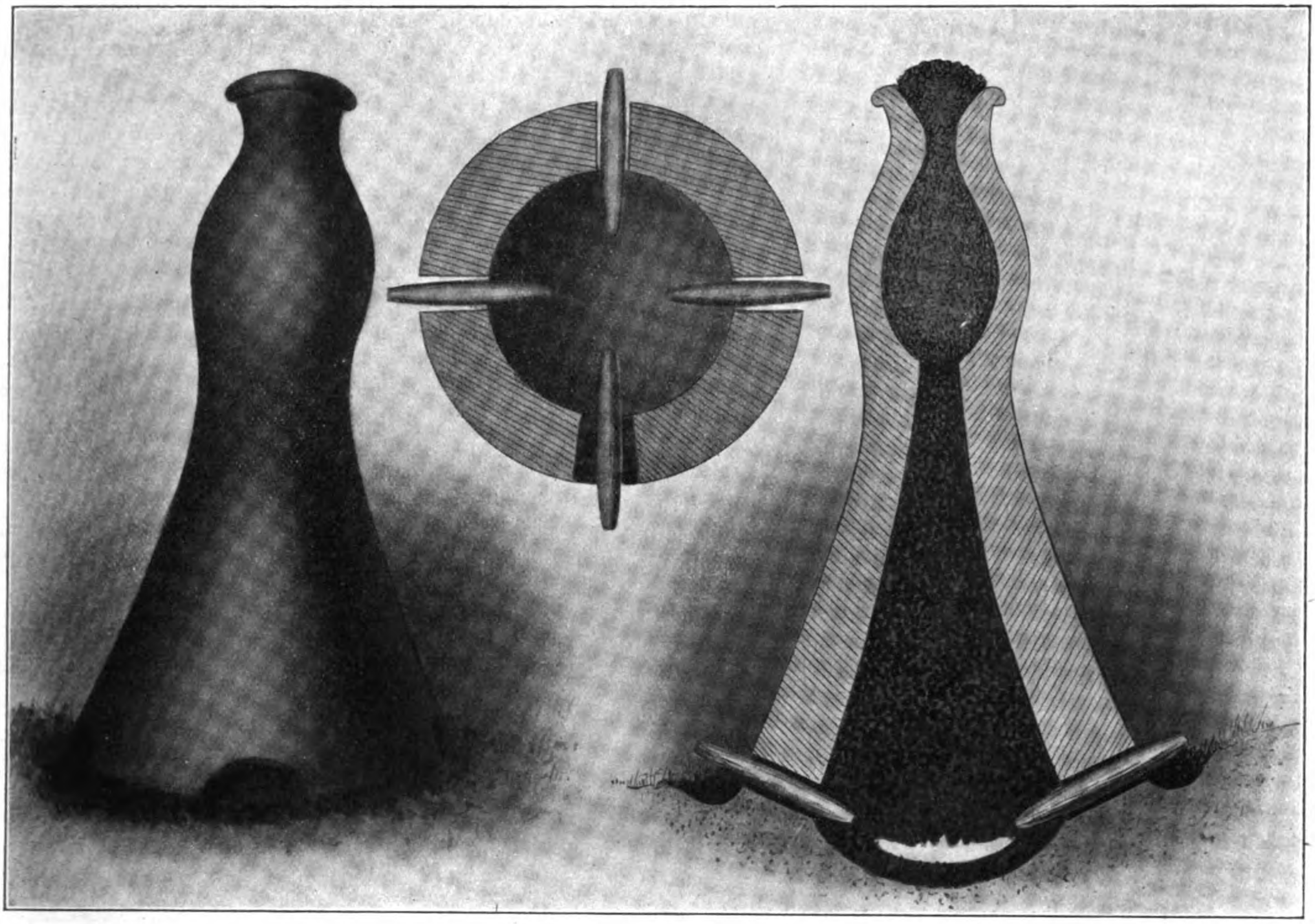
The kind that really protect are AMERICAN BLACKSMITH protection stamps. There is considerable being said continually about the unfair practice of some farmers and others who get supplies at wholesale prices. A Michigan smith solved the problem by using the pink squares. He writes: "Send me a supply of fifty pink stamps. I find them a fine thing to use on my orders to jobbers, for if the order does not bear a stamp they won't fill it. This prevents farmers from getting supplies in my name." Protect yourself, Mr. Reader, by using the pink buffaloes freely. If your supply is low, send a postal request for more. Don't wait until you're entirely out of 'em.

Are You Boosting?

Boosting for the craft, we mean. Are you doing your part for all you're worth? Are you helping the trade—helping people to consider the smith as one of the foremost, if not the foremost man of trade? If you're not doing this, then you are wanted as a member of the Boosters' League. If you are doing your part, then we want your support in the league. When you hear something about the smithing trade that is not complimentary, challenge the speaker and boost for the best trade on earth. If you will do this and everyone will do it, the trade cannot help but receive the attention it deserves from the public. Be a Booster.



THE CENTRAL AFRICAN SMITH DISPLAYS MUCH SKILL IN THE FORGING OF KNIVES, DAGGERS AND SPEARS



THE SMELTING FURNACE OF THE DYNOOR TRIBE IS CONE-SHAPED, WIDENING AT THE TOP INTO A GOBLET SHAPE

The Blacksmith of Central Africa and His Work

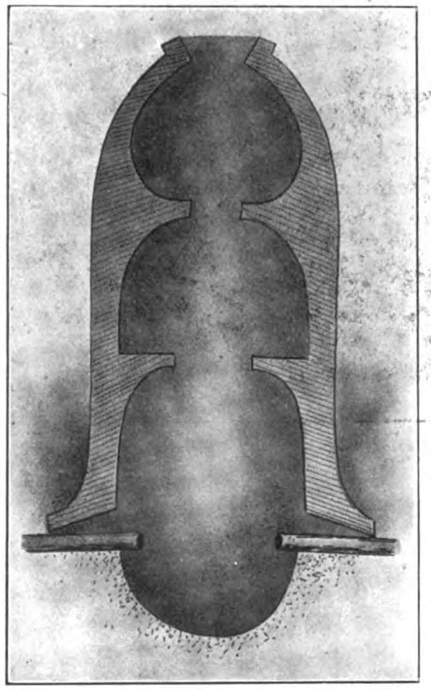
IF YOU will turn in your atlas to the map of Africa and note the square described approximately in the center of the Dark Continent by the twentieth meridian on the west, the thirtieth meridian on the east, the equator on the south, and the tenth parallel on the north, you will have some idea of where the people live who are the subjects of these articles.

This section is approximately in the very heart of Africa, and is a portion of the Congo Free State, a corner of the world which is just now in the limelight by reason of the attention being paid it by John Bull and Uncle Sam.

The people inhabiting this portion of the African continent are, of course, Negroes, and are found in various stages of semi-civilization. The tribes represented here are known as the Niam-Niam, the Monbuttoo, the Bongo, and the Dynoor. All of these people are more or less versed in the art of working iron, copper, and wood, and in pottery making. Their tools are, of course, very crude, but the finish and the workmanship of their products are in many instances remarkable. In viewing the examples of their iron and copper work, one is immediately struck with the originality of these people. The little pinchers, or tweezers, shown in the engraving are remarkable for their original design. These tweezers, by the way, are used by the Bongo women for plucking out their eyelashes and eyebrows. Unlike the fair sex of our own country, they remove the eyelashes and eyebrows instead of cultivating them, and the Bongo suitor is not captivated by "long sweeping lashes" as is the unwary lover of our civilized countries. These pinchers, or tweezers, are of peculiar design, as shown, but appear to serve their purpose admirably. They are forged by the native smiths from rough lumps of iron. Another example of their originality is the knife used by the Bongo women. This differs from an ordinary knife in that it has two handles, one on either end, while the blade in the center is sharpened on both edges. These knives are produced by the Bongo smithy and are used constantly by the Bongo housewife in peeling and slicing her vegetables.

The reader is questioning, no doubt, regarding the methods used by the Central African in securing the metal used for the various examples of smith work shown in the engravings. The methods used are crude, of course, while the smelting furnaces are correspondingly crude. The Dynoor uses natural draft only in his smelting process, believing that forced draft produces too fierce a fire and thus increases the loss of the metal. The Bongo, however, uses a bellows, if it may be so called, similar to the arrangement used by him in blowing his forge fire.

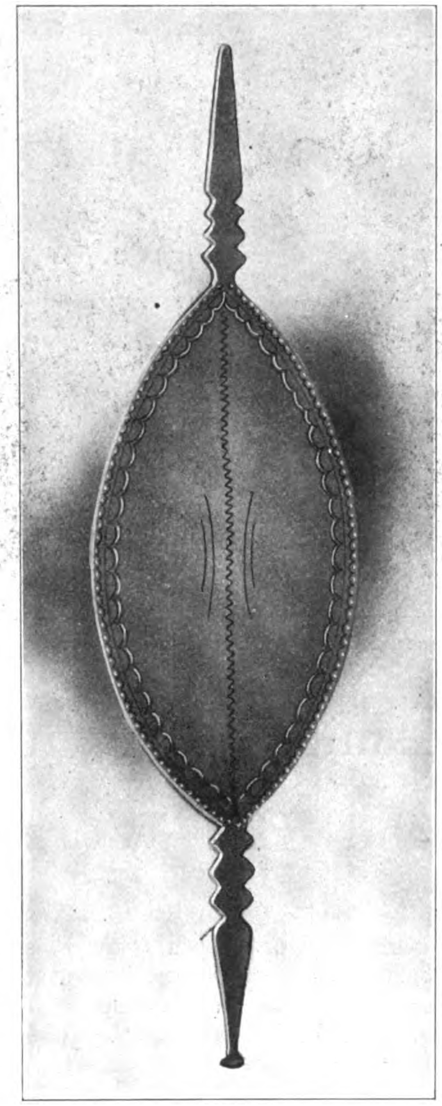
The engravings show a sectional view of the Dynoor and also of the Bongo smelting furnace. Both of these smelting apparatus are of clay, the Dynoor furnace being about four feet in height, while that of the Bongo measures about five feet. The Dynoor furnace is cone-shaped, widening at the top into a goblet shape. The cup-shaped top communicates by a very small aperture to the cavity below. The lower cavity



THE BONGO FURNACE HAS THREE COMPARTMENTS

is entirely filled with fuel, while into the upper hollow are thrown pieces of iron ore about an inch square, until the receptacle is full. The lower hollow in the furnace extends slightly below the surface of the ground, and the melted metal finds its way through the red-hot fuel and collects below in a pile of slag. At the base of the clay cone are four openings. One of these openings is much larger than the others and is used for removing the ashes and cinders. The other three openings are for admitting short iron rods for the purpose of keeping the apertures open and free for the admission of air. It is easily understood that without such provision the openings would soon become clogged. The bellows is never employed by these people, as they believe that too fierce a fire is injurious to the metal and causes a loss. The time required to secure the product of one kindling is usually a day and a half, or about forty hours. When the flames from the lower chamber in the furnace have penetrated the mass of ore in the top receptacle, the burning is said to be satisfactory.

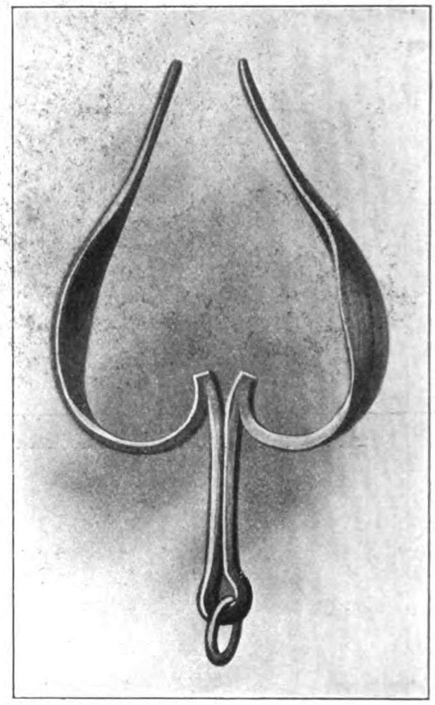
The foregoing method differs somewhat from the smelting method used by the Bongo tribe. These latter people



A UNIQUE KNIFE FORGED BY THE BONGO SMITH

construct their furnaces in three compartments, and they fit them with a primitive bellows. They also alternate layers of fuel and ore in charging the furnace. The deposit of metal is then heated a second time, and the heavy portion, which is detached in little leaflets and granules, is once more subjected to fire in crucibles of clay. The red-hot particles are then beaten together between stones, and by repeated hammering the mass is made to throw off its final dross. In regard to its homogeneousness and its malleability, the iron produced by the Bongo tribe is quite equal to the best forged iron of our own country.

The Bongo smelting furnace, like the smelting furnace of the Dynoor, is of clay. The three compartments are all of approximately the same size. The middle one is filled with alternate layers of fuel and ore, while the top and bottom divisions are filled with fuel only. Around the base of the furnace are four holes into which pokers, or iron bars, are thrust, and to which the bellows are applied to increase the draft and the intensity of combustion. A fifth hole serves as a door through which the metal may be raked



TWEEZERS OF PECULIAR DESIGN USED BY THE BONGO

out after it has trickled down into the cavity made for that purpose. This door may be closed or opened as many times as necessary for the removal of the metal. It is closed with a ball of clay, which may, of course, be easily and quickly removed. The Bongo tribe carry on a considerable trade in iron with their neighboring tribes on the north.

The forge, the tools used, and the methods of forging will be explained in a succeeding number. The examples of smith work shown in the several engravings will, no doubt, surprise the reader not a little. The engraving used as a frontispiece shows a number of swords and daggers. Here again is the originality of the Central African shown. The knives and swords used as weapons are not generally orna-

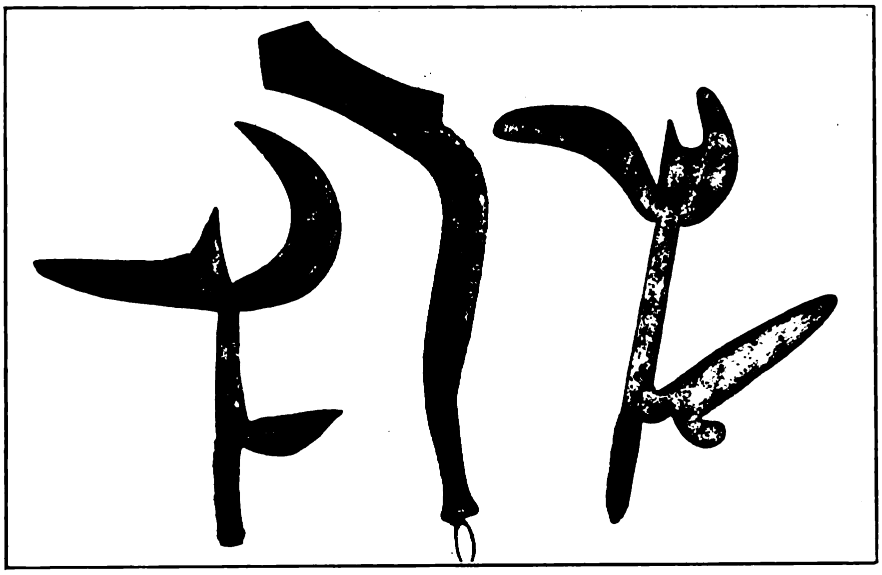


FIG. 1.—THROWING KNIVES OF PECULIAR DESIGN FORGED BY THE CENTRAL AFRICAN

mented as are those used as ornaments only. The difference is quite apparent if one will compare the knives shown in the frontispiece with those shown in Fig. 2. The knives in the frontispiece are of real utility, some attention being paid to the ornamentation of the blade, but more care being expended on the handle, which in many instances is inlaid with a winding of the flat copper wire which the Central African smithy forges in great strands several yards in length.

The knives shown in Fig. 2 are used principally as ornaments. The designs on the blades are in many instances damascened with copper, while at other times the ornamentation consists of chisel markings only. The clubs shown at the extreme right and left of this engraving are handles for the native adze. The blade, which is wedge-shaped at one end, is forced into the ball of the handle, point end first. Use of the tool tends to fasten the blade more firmly at each stroke. The spears shown in the engraving are but slightly ornamented on the blade, while the shafts or handles are twisted. It is almost unnecessary to say that the Central African is an expert in throwing or casting these shafts of iron. And one traveler in the Congo region tells of an elephant hunt during which the native hunters threw their spears and lances with such precision as to hit the beasts in any vulnerable part.

The knives shown in Fig. 3 are used primarily as daggers. The grooves on the third and fourth blades are blood channels. They are characteristic of the Niam-Niam tribe, of which more will be said in a following installment. The knives shown in this engraving have much of the appearance of being used with a forward and backward motion when in actual use.

In Fig. 1 are shown the throwing knives so characteristic of the Niam-Niam or Zandeh. The native name for these terrible-looking weapons is "pingah." The entire edge of the knife proper, with the shanks, is keenly sharpened, and one can easily see that it is almost impossible for one of these dangerous looking instruments to strike the object aimed at without presenting a sharp edge.

The examples of the African smith's handicraft shown in Fig. 4 are, of course, simply explained, but the reader is in error to suppose that the long object is a sword, that the many-pointed, many-angled piece is a throwing knife, or that the piece in the lower right corner is a kind of caliper. As a matter of fact, the article with the rule beside it is a piece of money, and must be at least five feet in length. It is not supposed that anyone would care to become very rich in coin of this kind, and we can only guess at how the native carries any amount of this money about with him. The second piece also represents money, and would also present a few difficulties in handling and carrying, especially so as the native African is given principally to nature's garb. The caliper-like specimen is an ornamental variation of the native execution knife. What would appear to represent the handle in the real knife is wound with flat copper wire.

The stage of evolution reached by the Central African may be described as the iron age. They know nothing whatever of gold and silver, and when a silver plate was presented to one of the Monbuttoo chiefs, he expressed no surprise and remarked only that it was of "white iron." Copper and iron are practically the only metals found in use among these people. An occa-

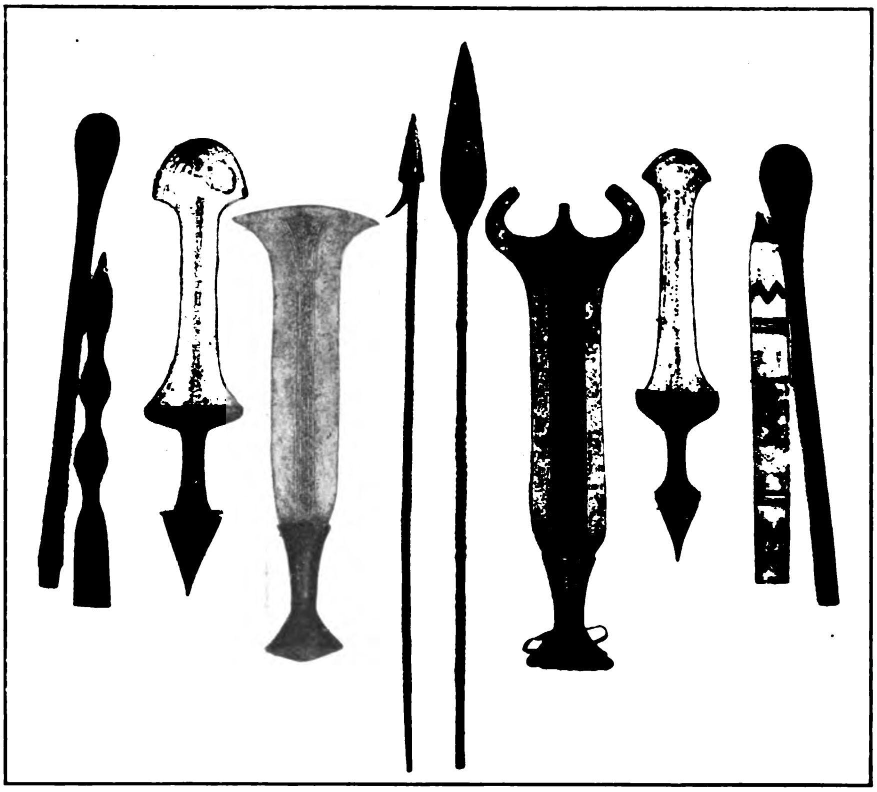


FIG. 2.—THEIR TOOLS ARE, OF COURSE, VERY CRUDE, BUT THEIR WORK, IN MANY INSTANCES, IS REMARKABLE

sional piece of brass is encountered, but among the tribes of the central portion of the continent it is little used.

(*To be continued.*)

Prices, Profit, Credit, and a Few Other Smithing Problems.

J. F. BOYD.

In your December issue you asked how each of us liked THE AMERICAN BLACKSMITH, and had we any kick coming. I haven't any, whatever. "Our Journal" costs but a fraction over eight cents each, and Benton's recipes alone are worth that, to say nothing of the other instructive information. Trying to please everybody is a failure. It reminds me of the man who rode the mule and let his boy walk. The first man they met told the father to get down and let the boy ride. The next man says, "Why don't you both ride?" The next man shamed them for both being on the mule and rode the animal himself.

As to the printing of price lists, wouldn't it be better to tell what our profit is? Here we can buy wagon timber from the sawmills for $1.50 per hundred, hauled to the shop. Other towns have to pay a great deal more and then pay freight. Then there are three or four grades of ready-made timber, like spoke shafts, rims, cross-sticks, singletrees, etc. Suppose one man buys the best and another the poorest: their prices should not be the same. As example, one printed price list gives buggy poles at $2.50. A good pole costs $2.00, leaving 50 cents for the labor, which is not enough. If you reset a set of tires you must figure out your bolts and coal. Then on buggy stubs; they run in buggy size from $1.45 to $6.00. Unless there would be a uniform price on material of all kinds it would be hard to figure out a price list that would conform with all places. A shop in the city pays high rent, high taxes, a license, light, and water. A village smith gets his produce cheaper; his fuel, rent, and taxes are also lighter; and so his profits (if prices should be less than city prices) will compare favorably with city prices.

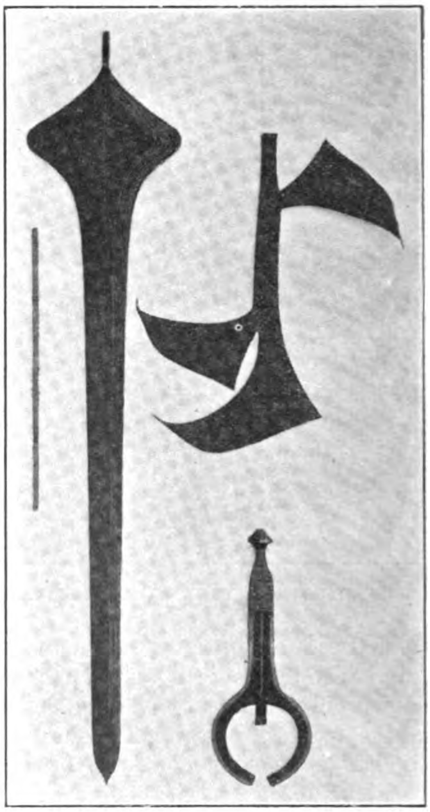


FIG. 4.—THE NEED OF A FLEXIBLE CURRENCY IS VERY EVIDENT

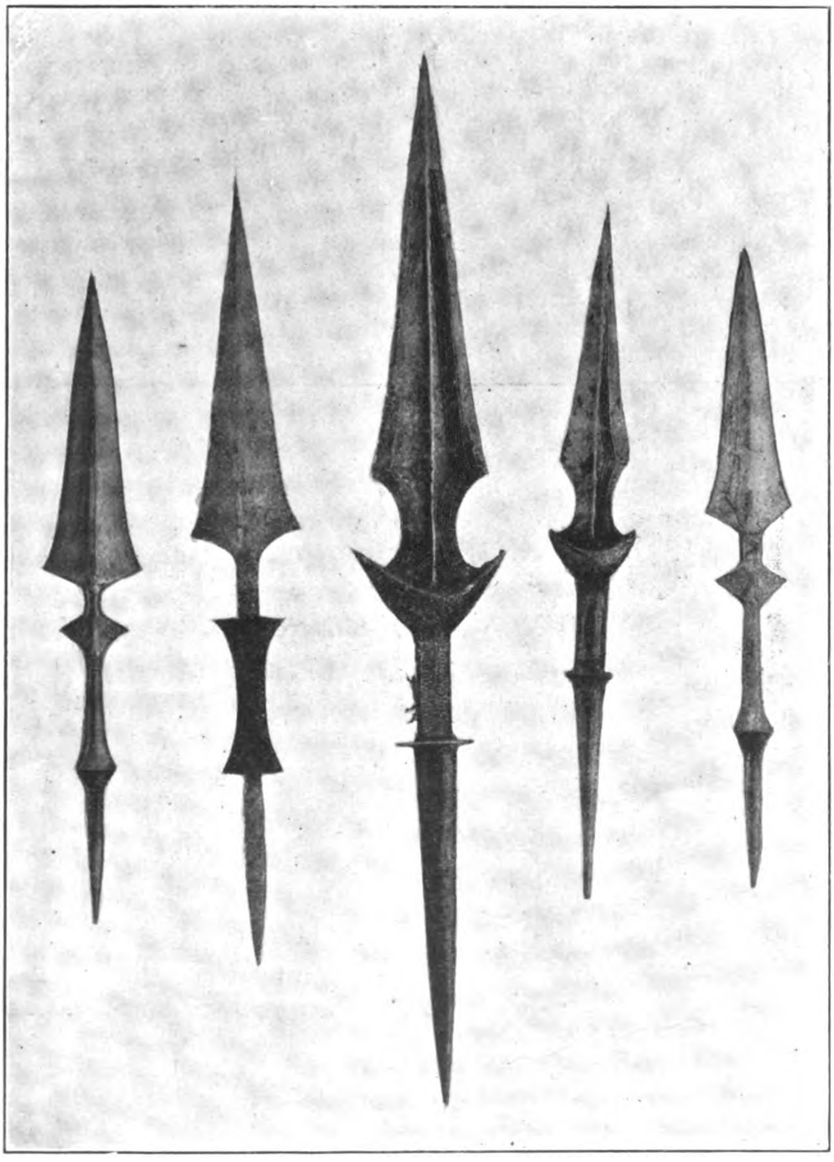


FIG. 3.—THE DAGGERS FORGED BY THE CENTRAL AFRICAN ARE BY NO MEANS PEACEFUL-LOOKING WEAPONS

I figure a profit of $1.00 per new tire, 45 cents for an old tire, 10 cents for a spoke, $2.50 for new rims, 80 cents for a reach, $1.25 for each stub and box, $1.00 for a tongue, $1.25 for a circle, $1.40 for a wood bow in top, $2.00 for lining a top, $4.00 for a piano box bed, $1.50 for a side of bed. Setting box and welding shaft iron, etc., are about all profit, and I do not figure that, but the others I have mentioned, and many not mentioned, a person can figure his labor and add to price of material to get his price for a job.

Another thing I wish to speak of is credit. A farmer gets cash in hand for his eggs, butter, wheat, wood, meat, etc., and everything else that he sells. Ask a farmer to run your family on his produce and see how quickly he will tell you the chickens, turkeys, butter and eggs belong to his wife, and she told him to get so and so for whatever he sells for her. His meat, corn, hay and wood he wouldn't sell, only he had to raise some money. He always has an excuse. Yet these same farmers will expect a blacksmith to take the money he needs to live on, buy material, do the work, and credit them from three to nine months. Go carefully over your book accounts, figure up the money you are out on each account, and you will be surprised at the amount of money you have loaned. Start out a week before Christmas and try to collect. Almost everyone will sing you the hard-up song. Carefully watch these same parties, and you will find they each spend from five to twenty-five dollars for presents, paying cash for same, or they will take the family and go visiting during the holidays. A wholesale house won't sell you anything on time until they find out how you are rated for honesty, and then they give you only thirty to sixty days and they must have the money when due. Then why should we give longer credit? Should we give credit from now till any old time? Should we permit the wholesale houses to close down on us and put

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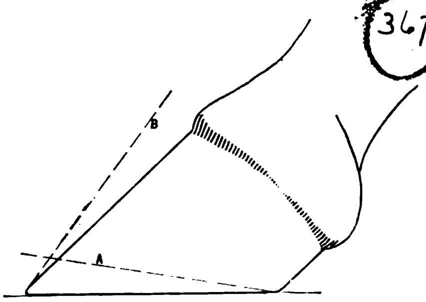
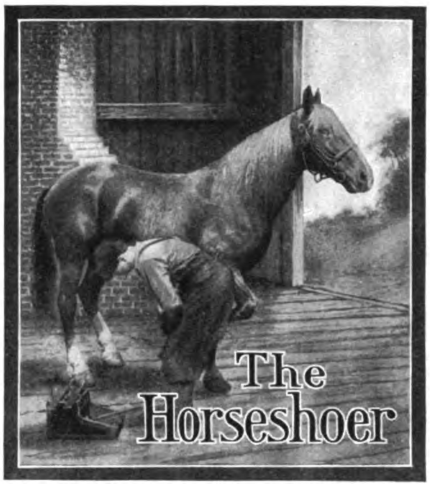


FIG. 1.—SHOWING A FOOT WITH AN OVER-ABUNDANCE OF HORN AT THE TOE

us out of business? Tell your customer the truth when he asks for credit. Tell him just how long you can carry him, and then see that he pays. Don't credit a man that you know owes a bill at another shop. If he won't pay the other shop he won't pay you.

I have been here four years. My books show that I have done (carriage work alone) $5,561.71 worth of work. I will make oath that my books show less than $30.00 outstanding, and but $16 of that I consider no good. My work for the year 1907 was worth $1,665.85. Of that amount $1,092.12 was for my labor. January and February were light, and December but $42.00 for material and labor combined. My wheel work for the past year was: new spokes, 758; old tires, 557; new tires, 279; wheels rimmed, 112.

Let us have more on these subjects from other smiths. Profit and credit are too important not to receive a good bit of our attention. The smith should not let these items take care of themselves if he intends to succeed. Let us have more letters on profit and credit matters.



Preparation of the Foot.

W. O. JULIUS.

In the March issue Mr. John R. Thompson requests instructions on "paring the foot and fitting the shoe." In the first place, let me say that volumes can be written on the subject of preparing the foot, so it is, therefore, absolutely necessary for us to consider here one distinct phase of the subject. And the particular division that we will consider is the preparation of a normally healthy foot on a normal limb. For even the novice can readily understand that one must deviate from accepted rules when the case in hand presents extraordinary conditions.

Considerable has been said by most all shoers about "fitting the foot to the shoe," and vice versa. And I presume this particular matter will continue to interest the farrier for some time. And rightly so, as it is a most important matter and is not to be disposed of one way or the other without some thought. Of course, it is generally accepted that the shoe must be fitted to the foot, but that is by no means all. One can easily imagine what sorry-looking objects some feet would be if, when the horse was brought into the shop, the old shoes

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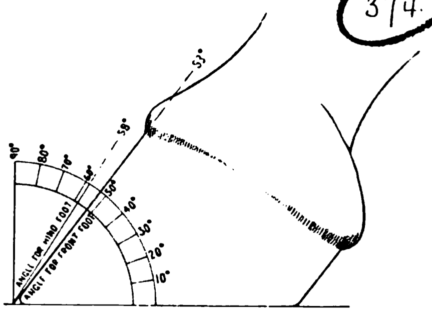

FIG. 2.—SHOWING A FRONT FOOT WITH THE WALL AT THE PROPER ANGLE

were removed and the new shoes "fitted to the foot." Foot and shoe must be fitted to each other. There can be no halfway business about it. When it is understood that the living foot is continually growing and changing, one can readily see that the bearing surface of the hoof must change. And to give the animal a proper and correct bearing it is absolutely necessary to fit the foot to the shoe and the shoe to the foot.

Now, having explained the principle of fitting to the foot, we will consider the preparation of the foot for the shoe. It is supposed that our querist understands the removal of the old shoe. Having accomplished this, the shoer should proceed to put the foot into perfect condition as far as the removal of horn will allow him. For instance, suppose the animal's foot has grown considerably at the heels while the toe has been worn down. This naturally throws the wall of the hoof forward and increases the angle of the foot. To restore the foot to the normal angle the

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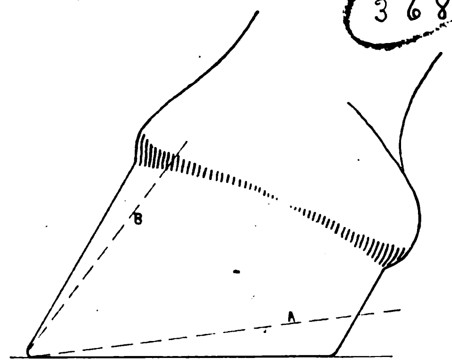


FIG. 3.—SHOWING A FOOT WITH AN OVER-ABUNDANCE OF HORN AT THE HEEL

heels are cut down, as shown by the dash line at A, thus bringing the wall of the hoof back to line B, as in Fig. 3.

At Fig. 2 is shown a front foot with the wall at the proper angle. It is, of course, only natural that this angle should vary in different horses, but fifty-three degrees is generally considered correct for the fore feet, while fifty-eight is a good average behind. For finding the angle of the foot an angle gauge is a very serviceable device. There are several of these on the market, and they may be obtained at a very reasonable figure.

At Fig. 1 is shown a hoof which has grown abnormally at the toe, while the heels have worn away. It will be seen that the wall has been tilted back to a lesser angle, and the point of the toe must, therefore, be dropped. Cutting the hoof, as per the line A, will throw the wall of the hoof into line with B, the angle desired.

Our querist asks how a shoe should lie on the foot when the foot is pared and how much weight the sole should bear. In a healthy condition the foot should touch the shoe equally at every point around the wall. Fig. 4 shows how the ground or bearing surface of the foot should appear when ready for the shoe. The bearing surface is that portion between the inner edge of the foot cavity and the outer edge of the foot wall. This includes the wall, the white line, and the margin of the sole. This surface should be perfectly horizontal. At the toe the hoof is slightly rounded, or rolled. A side view of how the shoe and hoof should bear is shown in Fig. 5.

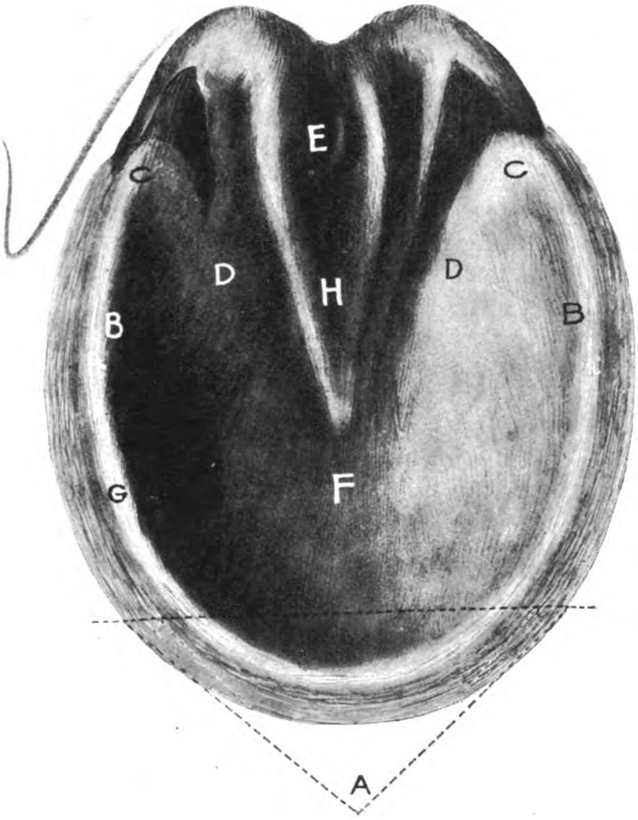


FIG. 4.—SHOWING THE GROUND OR BEARING SURFACE OF A PROPERLY TRIMMED FOOT

Here is also shown the slight roll at the toe. The heels, or branches, of the shoe usually extend slightly beyond the heels of the foot. If no calks are to be used the foot would bear in the same manner on the shoe.

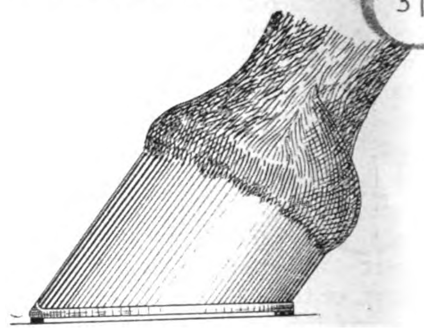
Horseshoers and Horseshoers.

THOMAS J. STEPHENS.

The horse is the noblest animal God has given man. There is no other animal that could take the horse's place and give as good service as does the horse. And as his strength and movements are the most important points to be considered, it naturally follows that man must guard those powers in his horse in order to retain his value and usefulness. The natural growth of the hoof is not sufficient to offset the wear caused to the hoof of saddle or harness horses by the continuous travel on the hard country roads or the paved streets of the city. Nature then calls for assistance, to which call the horseshoers must respond. Now it is up to the horseman to take his animal to a shoeing shop, and he should stop right here and ask himself, "Who is competent to shoe my horse?" There are a great many different kinds of horseshoers, for anybody that shoes horses is termed by himself and others a horseshoer. Now the question arises, what kind of a horseshoer to choose. There is the man that is a horseshoer because his father was, and he has received the profession as a gift of nature. Then there is the blacksmith who does not profess to be a shoer, but has the work forced upon him, which he does to the best of his ability. Then we have the man to whom the science is a kind of second nature, and, of course, he knows it all and has nothing to learn. Then we have the competent horseshoer who can name any part of the horse's anatomy, and locate the different diseases of the foot and leg, and prescribe and apply with skill the proper remedy.

The average horseman doesn't even give this all-important question any thought, but takes his horse to the nearest shop, or, perhaps, what is still worse, to the cheapest man he knows of, who is very apt to be the poorest horseshoer in the neighborhood. The reason for this may be to some extent due to the fact that he is not able to distinguish between them, for there is many a horseman that really does not know as much about the animal in his care as he should, and thus becomes an easy victim—or, rather, allows his horse to become the victim—of the "cheap John" shoer.

Suppose you were to buy a big steam engine and place it in the hands of an unskilled person to operate and repair. Would it last as long and give as good service as if you were to put it in the hands of a competent engineer who knew every part of it by heart, and the

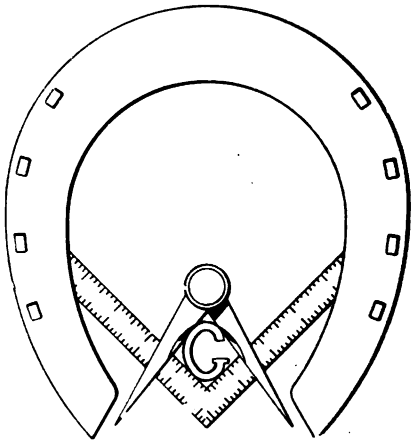


FIF. 5.—SHOWING THE SHOE AND FOOT PROPERLY FITTED

relation of all the parts to each other? Now, the mechanism of the horse is much more complicated than that of an engine, so that it follows that it is as necessary for the shoer to be familiar with the anatomy of the horse as it is for the engineer to be familiar with the working parts of his engine.

Nature is silently working all the time, making repairs to injured or defective parts. If it were not for this, most horses would very early in life be put on the retired list. But remember that it will take nature weeks, and even months, to repair injuries caused by an unskilled shoer, and some day nature will give up in despair, and your horse will be the victim of ringbone, corns, or some painful disease brought on by the continuous practices of an incompetent shoer.

So the horseman should choose a competent man to shoe his horse, a man that actually has a knowledge of the anatomy of the horse's leg and foot at least, and good sound judgment to back it up. For I do not believe there is any set of rules that can be followed



MASTER HEMKER'S MASONIC EMBLEM

MASTER VOLLY HEMKER BEHIND THE ANVIL

that will prove correct for all cases. Each case must be carefully considered and prescribed for, and thus the shoer must work in harmony with nature.

Now, brother craftsmen, are you familiar with the anatomy of the foot and leg of the horse that you work on every day? To those that are not I will say, learn the name of one bone of the foot today. It might be the pedal, or os pedis, which we might term the first bone of the foot. Next in order is the pastern, which is between the pedal bone and the long pastern. Then comes the long pastern, which is between the short pastern and canon bones. The lower end of the canon bone joins with the upper end of the long pastern, forming the fetlock, or pastern joint. We find also the two sesamoid bones helping to form this joint. Then we have the navicular bone, which is located in the foot behind the pedal bone, and forms part of the bearing for the lower pastern bone. Now, it will be a very easy matter to learn the name and location of one of these each day, which would only take six days and will not require five minutes each day. So you see at the end of one week you would know the name and location of the bones of the foot and lower part of the leg. That would not be much, but I dare say that half of the men working at the profession are not able to do this simple thing. But do not stop here, for now you are ready to consider the organs of motion, which are the muscles and tendons, and their application to the bones. I just give this illustration to show you that you are not too busy to learn the all-important part of your trade. By learning the action of the tendons as they operate on the levers (the bones) and thus produce motion, you will readily see that such knowledge will enable you to locate the cause of any trouble that might arise, and thus teach you the remedy.

Two Thirteen-Year-Old Blacksmiths.

The "Show-me" State, from where we recently reported a young lady blacksmith, is again to the front with a young smith but thirteen years of age. This youthful Vulcan is Master Volly Hemker. The young man is five feet tall and weighs 119 pounds. He toes all the shoes at his father's shop, when not at school, and welds anything he undertakes.

The young smith has been initiated into the craft by his father, who says of him: "The boy makes as fine butcher knives as any smith. He can put shoes on a gentle horse; but I do not let him do any shoeing, as it will break him down. He can point plows, and has made as good a plow mold and share as you would want to see. In short, he can do anything he is large enough to handle."

The masonic emblem and horseshoe is an example of Master Hemker's work, and is shown here slightly smaller than actual size. The other engraving shows Master Volly at the forge finishing a shoe.

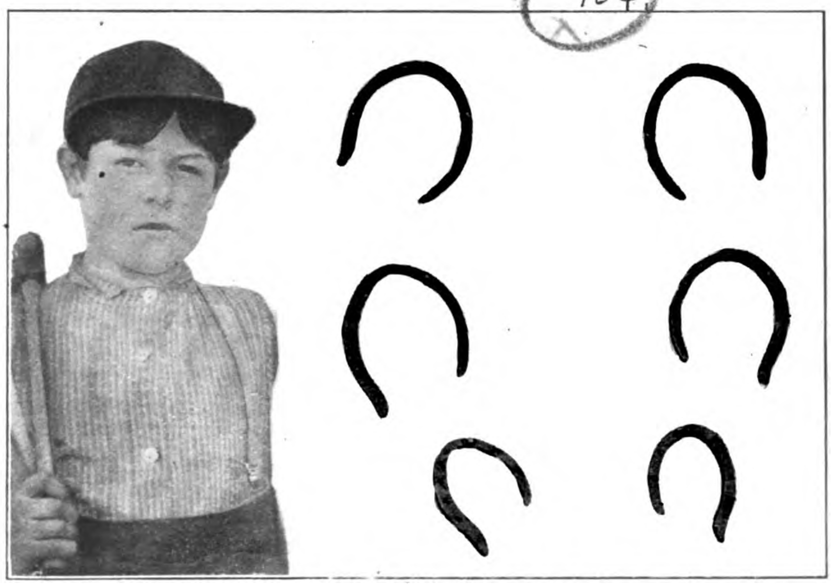
The other youthful smith is Master Albert F. Valentine, of Illinois. He writes to say: "This is my first attempt at turning handmade side-weight shoes. Master Valentine is also but thirteen years old, but the examples of his first efforts show considerable skill with the hammer and tongs.

If there are any other youthful smiths among "Our Folks," let us hear from them. Suppose we all start on a hunt for the youngest blacksmith? Who knows of one younger than Masters Valentine and Hemker?

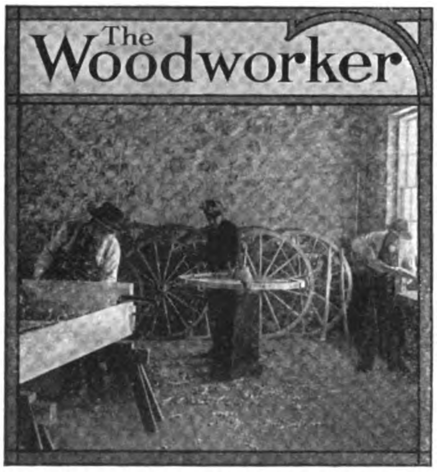
Shoeing According to Nature.

HORSE'S FRIEND.

I am very much interested in the horseshoeing department. The items are up to date, and are written by men that are as far advanced as anyone on the subject they discuss. But I see that some shoers are away back in their methods, and they use shoes and methods that have been discontinued by the advanced thinker and shoer. Now, I would like to ask the men who advocate toe weights and side weights, and twisted ankles, Are you satisfied with the results you get? If so, I



MASTER ALBERT VALENTINE, ANOTHER YOUTHFUL VULCAN have nothing further to say, for you have graduated. If, on the other hand, you are not satisfied, I would say, Read, think, and ask questions, and you will certainly reach a better system of shoeing, and will get more satisfactory results. I used side-weights and toe-weights, and tried to improve on the power that created the horse for twenty long years. Then I gave up the "whole push," and commenced to study and think for myself, and the results are better satisfaction to myself and to my customers, and less misery for the horse. There are no hard and fast rules for shoeing a horse, but each man must make up, out of his own experience and the experience of others and his own common sense, his "medicine" for the individual case he is shoeing. I have been forty years at the business, and am still anxious to learn, and am willing to give freely of what knowledge I have obtained. What I talk or write applies to the general driving horse, horses that go from six to ten miles per hour. I have never had any experience with fast horses.



An Australian Wagon.

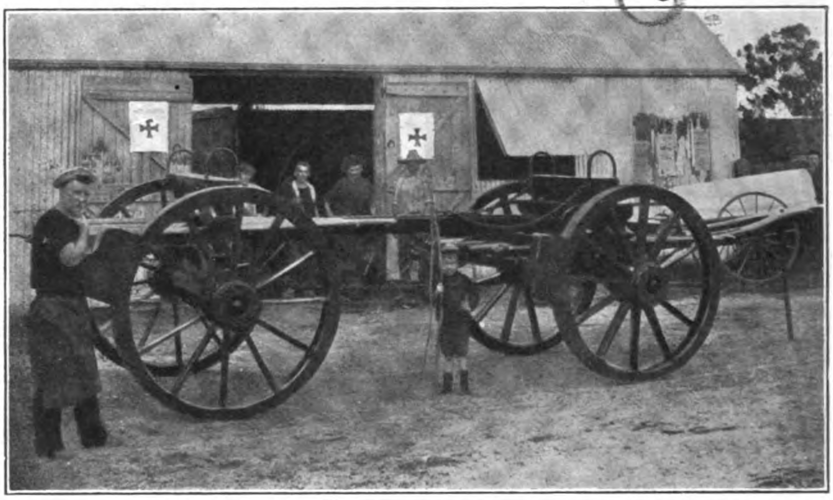
The accompanying engraving shows a large wagon recently turned out at the shop of Mr. D. E. Bonstead, one of our Queensland (Australia) readers. The wheels of this wagon are five feet in diameter, while the tires are five inches wide and one inch thick.

Mr. Bonstead says he has read with much interest the discussion in "Our Journal" on the subject of welding wide tires. It is evident, from the description, of the tires used on the wagon in the engraving, that brother Bonstead is thoroughly familiar with wide tire work. The wagon should certainly be capable of carrying a considerable load.

A Shop-Made Pole and Circle.

J. W. RYDER.

The accompanying engraving shows a pole circle and pole. The circle is made of $1\frac{1}{4}$ by $\frac{1}{2}$-inch iron. It is twisted as shown at E. The pole may be set at practically any angle by the amount of twist at E. In making the circle I bent one end first, laid this out on a board, and then bent the other end accordingly. A piece of hickory is used in the center to take up the space between the top and bottom irons. This design will probably enable some brother readers to make their own circles and thus make a very material saving over those purchased from the manufacturers or supply houses. The size and dimensions may be such as to suit the vehicle or the individual taste of the maker or the customer.



A LARGE AUSTRALIAN WAGON WITH FIVE-FOOT WHEELS

Thornton's Letters.—17.

Being "Straight-from-the-shoulder" Talk from a Prosperous Self-made Smith to his Former Apprentice, now in Business.

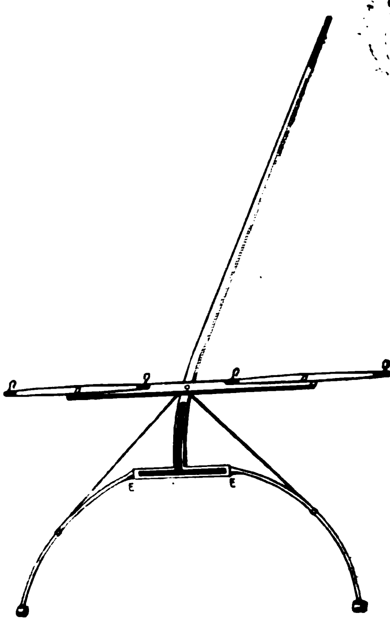
Dear Jim:

I see by your last letter that you're getting careless, slipshod, traveling the road of least resistance. And Jim, my boy, do you know what that means? The line of least resistance is another way of spelling laziness. It's not the simplified way, it's the way the chap of little ambition explains and excuses his near-failures. He calls them successes, but they are simply near-failures.

You know the condition, Jim, my boy. It's that station on the road to success where the lightning express to failure often stops. The station sign is one of these three-in-one affairs that read three ways. Right now that sign says "failure" for you.

No, Jim, I don't want to scare you except to hustle you onto the right road. Here's the thing right in a nutshell: I correspond with a young fellow smith, and delight in getting his letters. He writes in a friendly business way on business paper. His letters are neat, well-written, and everything is going fine, until his latest came to hand. I was going to answer immediately, Jim, but I thought later that your case needed more study. And the more I look at these careless sheets of your careless letter the more I'm inclined to believe that you are traveling along the line of least resistance.

Buck up, Jim. Stop right here, you're cutting across fields to failure fast, and I won't stand for it. I thought at first that perhaps you had spring fever, but it's too early for that. I don't understand what has started this attack of yours, but it's very sure that you've got the "careless bug."



A SHOP-MADE POLE AND CIRCLE

Now, Jim, I want you to get hold of yourself the first thing. Then I want you to look over your stationery, and throw out all the stuff that has forge smudge on it. Do that with your bill-heads, letterheads, envelopes, statement heads, and every bit of stationery you have on hand. Get your books shipshape, and then get at the rest of the shop. Clean up generally. I just bet you have let things slide until your place is a fair imitation of Tom Tardy's shop.

Now, I don't like to talk like this, Jim; but I'm pretty sure you deserve it, and I don't want you to fall down now. Another thing: don't attempt to keep your shop in proper shape by spurts and splashes. Keep going at an even pace—have each day take care of each day's work. Of course, there are times when a rush will make it necessary to let some things go, and as a rule it's the cleaning up that suffers. But then catch up with your work at the first opportunity.

The trouble with you is that you cleaned up so thoroughly during inventory time that you thought it would last forever. Now, it won't, Jim. Not as long as you open shop and do business every day.

Tomorrow morning when you enter the shop, enter it with a customer's eyes. Look at things from the stranger's viewpoint. Ask yourself what you would suggest if the shop belonged to your brother.

And another thing, Jim, which has a direct connection with this very matter of keeping the shop shipshape: How can you expect people to call or come into your shop, if it isn't inviting? Of course, if the outside appearance of the shop is repulsive, you can't expect anyone to inspect the interior. But again, the outside may attract a man, as a magnet does a needle, but if the first impression of the inside isn't inviting you can't expect your customer to come in.

I called on Jack McTigue the other day, and found he had just white-washed the walls of his shop. He said that if he had known that it would make so great a difference in the place he would have whitewashed it long ago. Now, I'm not saying your place needs whitewashing, but if I were you, I think I would whitewash whether it needed it or not. And one result you will note is that the boys will keep things in shape of their own accord. You might have a talk with them on the subject.

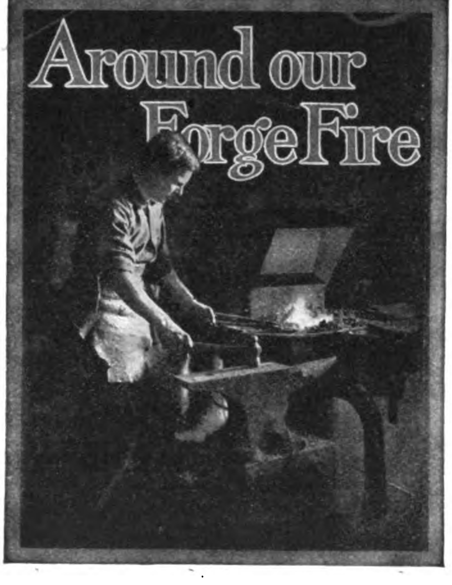
There is lots to say on the subject of neat shops, but I think this suggestion will do. Before closing just let me remind you again on the matter of stationery. Don't dare to write to me or anyone else on smudgy paper. It isn't good advertising.

Yours for neatness,

Thornton

The Automobile Question Box.

While the "Queries, Answers, Notes" department seems to be filling its place very thoroughly, we wish to mention here that questions on automobile construction and repair are especially invited and will receive prompt replies, either through the reply department or by mail. Our readers will, no doubt, come across many jobs in their automobile work which will puzzle them and for which they will find no immediate solution in our automobile department. When you come across a job of this kind, explain it fully and carefully to the automobile department, and a reply will be given you as soon as possible, either by mail or in the paper.



Benton was quietly smoking in his accustomed chair when the Editor broke in on his smoke thoughts. "Have you ever used a soda bath to clean brazed articles? One of our subscribers writes in about it and also says that small brass wire is more convenient than spelter for light work."

"I have used the brass wire where spelter was rather difficult to handle," returned Benton, "but the soda bath is a new one. Guess I'll have to try it some time."

"Know anything about cold chisels?" questioned the Editor.

"Well, I know something about them," answered the other. "We used a good many in one of the shops I was in. The chisels had to stand an awful banging—we used them on castings and they were, of course, subjected to some pretty rough usage."

"Here's a man wants to know how to harden and toughen chipping chisels," said the Editor, picking up a letter. "This man wants you to help him."

"Well, the first thing required is good steel," began Benton. "You can't make a good chisel without a good foundation to begin on. In forging the chisel draw it down as quickly as possible, and don't hammer on the edges, but do all your hammering on the two sides. Hammering on the sides and then on the edges weakens the blade of the chisel, and consequently defeats your purpose to make a good tool."

"Isn't there some hardening compound that will make a chisel hard and tough regardless of the method used in forging?" questioned the Editor, with a smile.

"No, all the patent compounds in the world won't make a poorly forged chisel stand up to hard usage," answered Benton. "A good bath for cold chisels is made of salt and water. After the chisel is forged and shaped as wanted, about two inches of its business end is heated to a cherry red, and it is then dipped in the bath, but not held in until entirely cold. When the chisel has been cooled in this way it is laid on the floor to cool off entirely. A chisel hardened in this way will stand up if forged right from the right stock."

"Don't you recommend a hardening compound or something of that sort?" asked the Editor.

"I suppose if I were one of these 'gallery-playing' chaps, I would have some sort of 'hocus-pocus' compound that had to be mixed by the light of the moon on the thirteenth of the month. But a simple method such as I have explained is so simple that some smiths think it's no good."

"You hit the nail that time, Benton," admitted the Editor. "There are lots of people—and some of them are smiths, too—who, if asked to pay something for a formula or compound, will readily come up with the price. It reminds me of an old chap who went from town to town selling plain, everyday pump extract for German cleaning solution. How did he do it? Well, in our town—this happened some years ago—he followed up his nightly free concert with a talk on the science of cleaning solutions in general and his in particular. And after getting one of the boys to volunteer he would smear the sleeve of his coat with the end of one of the candles stuck up in one of the bottles. He would then pour a little of the marvelous cleaning solution on the spot, rub slightly until a lather resulted and then wash the lather off with water. Of course, the spot was clean."

"How do you figure that plain water would remove candle grease?" asked Benton.

"Who said anything about candle grease?" questioned the Editor smiling. "There wasn't any candle grease used. The end of the candle used on the boy's coat sleeve was of soap, and, of course, supplied the lathering element for the demonstration."

"Well, that's a pretty clever stunt," agreed Benton. "But, how'd you find out about it?"

"I saw the professor filling his bottles from the creek one day, and the next night one of the boys took one of the candles home with him."

The Man Ahead.

In almost any newspaper
You're pretty sure to find
A lot of gush, in printer's ink,
About the man behind.

There's the man behind the counter,
And the man behind the gun,
The man behind the kodak,
And the man behind the sun.

The sleepy man behind the times,
The man behind his fist,
The man, alas! behind his rent,
And so throughout the list.

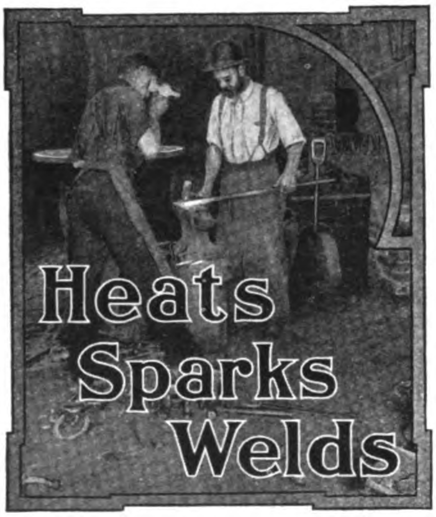
But they've skipped another fellow,
Of whom nothing has been said—
The fellow who is even,
Or a little way ahead.

Who pays at once for what he gets,
Whose bills are always signed;
He's a blamed sight more important
Than the man who is behind.

All the editors and merchants,
And the whole commercial clan,
Are indebted for existence
To this honest fellow-man.

He keeps us all in business,
And the town is never dead;
And so we take our hats off
To the man who is ahead.

—*Exchange.*



Pull together for the interest of the craft.

Success is obtained by grasping every opportunity.

Don't worry—work. You'll forget your worries then.

The blacksmith's hammer is a good thing—hang onto it.

Winter has passed—now let's pull harder than ever for more trade.

Hot air represents wasted energy unless put through a compressor.

Ever notice that the bigger the scrap pile the bigger the mortgage?

Let the engine warm up to the work before throwing on a heavy load.

The reason common sense is mentioned so often is because it's so uncommon.

"**Success depends** on management," says Thornton. "No business will manage itself."

Are you a member of the Boosters' League? Make the knocker eat his own words.

Do it now. It's not too late, even now, to clean up the shop and get ready for spring.

When you have a good craft idea, don't cage it, but tell your brother craftsmen about it.

Before you find fault with a machine or anybody, be sure you're not the cause of the trouble.

Any auto repairing jobs coming your way? Investigate, perhaps your competitor is doing the work.

Any of "Our Folks" called upon to repair any of the New York to Paris autos? Let us hear about it.

You're losing time if you haven't yet started that association. Write to the secretary right now.

Brief notes, as well as long articles, on automobile repairing are appropriate for the auto department.

"**A little lame**" generally bites a big piece off the selling price of a horse. It's usually up to the shoer.

There are all sorts of exterminators for most of the bugs, but bear in mind that the humbug still flourishes.

If you would have your work well done, let a gas engine do it—it will do you a good turn at every revolution.

Some mighty big failures have come from not being ready. Let's be prepared so as not to be caught napping.

'Tis not the fast horse himself that brings racing into disrepute. It's the strain of fast men bred by fast horses.

A box for the wrenches, and the wrenches in the box, when not in use, will save these useful tools from the souvenir hunter.

You can't lay the foundation of your success by lying in bed when you should be laying in some good licks at the shop.

Our friend Tom didn't open shop at all last Tuesday. No, it wasn't a holiday. He simply didn't feel like working, so stayed at home.

Smile right out loud when something hits your funny spot. A cheerful disposition is an excellent tonic, and it helps business too.

Now is none too early to get the youngsters interested in a garden. Encourage it. You will find fresh flowers a comfort after a long, hard day.

An American blacksmith of Missouri says of THE AMERICAN BLACKSMITH, of Buffalo, "I read fourteen different papers, but like 'Our Journal' best of all."

How does March of this year compare with last year in a business way? Is your business growing or shrinking? Of course, you keep strict tabs on what business you do.

A good breeder is careful for the young horse. 'Tis easy to spoil a good colt by one heavy strain. And the same applies to boys. Keep a watchful eye on the shop lad.

That honest dealings paragraph and the pink squares certainly make a happy couple. Are you thoroughly acquainted with them? Ask for an introduction if you want the protection of "Our Big Stick."

A fireless steam engine is said to be the latest in German locomotive construction. The engine is run by superheated steam under high pressure and is used in yards where the presence of fire and sparks would be dangerous.

After eighteen days of running through snowdrifts and mud, the Studebaker dispatch car, carrying a message from Governor's Island, New York, to Fort Leavenworth, Kan., reached its destination. The motor car traveled day and night on this record-making trip.

Aluminum for coinage purposes is said to be used for the first time by the English mint. The coins are made of low denomination, and are for use in several African countries under British control. The coins are all perforated in the center, so the natives can string them and thus carry them with ease.

A side line suggestion comes from an Iowa smith: "I have never noticed the concrete tile and block industry mentioned as a side line. It seems to me to be best suited for the smith. Many debts could be collected by having the debtor do teaming, as the raw materials must be had, and the finished product delivered."

A method of tempering armor plate by electricity has recently been invented by a navy officer. Carbon is distributed in powdered form over the face of the plate, and electrodes applied. The carbon then works down into the plate as far as heated, thus hardening the face of the plate, but leaving the inside tough and pliable.

Motorite, the new motive power, invented by Hudson Maxim, the inventor of the Maxim machine gun, is composed of certain powerful explosives, and, it is believed by its inventor, will revolutionize torpedoes and torpedo boats, and may possibly in the future replace steam as a power for ships. This new power is said to send torpedoes through the water at a speed of sixty miles an hour, as against thirty-five miles for the fastest gasoline-propelled torpedo.

The cost department of a large plant is the wall between profit and loss. And in a small shop costs are just as important. How do you figure your costs? To get a selling price, do you add fifteen cents to the buying price? Your time, rent or taxes, coal, light, fuel, repairs, and tools? Every expense must enter into cost of production. Every job you turn out should carry its proportion of the running expenses. A shop which is run without any regard for the running expenses cannot be run profitably. And profit spells excuse for being in business.

Boats of concrete are being built in Rome, Italy. 'Tis said that the boats have a displacement of from one hundred to one hundred and fifty tons. The frames are of reinforced concrete and are covered on the inside and outside with a concrete covering, reinforced with wire netting, water-tight compartments being thus formed between the two layers of concrete. It is claimed that boats built in this manner have a high capacity for withstanding outside forces, that they can be built more cheaply and more quickly than ordinary boats, and that they are fireproof as compared with wooden boats.

American Association of Blacksmiths and Horseshoers.

Does April find a branch association in your county? Better get busy NOW, Mr. Reader. You know you need protection, you need better prices, you need the coöperation of your fellows in the craft. Why not get together *now?*

Here's a letter from a member of an English association:

"We started an association here in Yorkshire, and succeeded well. Our first aim was to advance prices. Other counties gradually joined us, until, with some changes in the original plan, we organized a national association. This is now progressing very nicely. We have a considerable list of members, and allow each branch to arrange its own prices. All members in good standing are entitled to the full benefits of the association. The dues or assessments are very light. There is also a benefit arrangement by which a member who is unfit for work receives an allowance. We also give £50 ($243) to a member's family when such member dies."

Now read the report from the Somerset (Pa.) County branch and see what other smiths are doing:

We had a general meeting of Somerset County branch on February 11th, and adopted the by-laws as sent us. We also elected county officers and adopted a price list, which is as follows:

New shoes, No. 0 to 5	$ .30
New shoes, No. 5 to 7	.35
Good old shoes	.20
Resetting	.15
New shoes, fitted and sold, No. 5 to 7	.25
New shoes, fitted and sold, No. 0 to 5	.20
Sharpening and driving	.20
Neverslip shoes	.50
Neverslip calks	.05
Buggy tires, per set	5.00
Resetting buggy or light wagon tire	.50
Heavy wagon tire, each $.75 to	1.00
Setting 4-inch wagon tire:	
Each	1.50
Per set	6.00
For work on wagon tire, new, per set:	
$\frac{3}{4}$ by $1\frac{3}{4}$ and $1\frac{7}{8}$, cost of material added	6.00
2 by $\frac{3}{4}$, $\frac{7}{8}$, and 1 inch, cost of material added	8.00
3 by $\frac{3}{4}$, $\frac{7}{8}$, and 1 inch, cost of material added	10.00
4 by $\frac{3}{4}$, $\frac{7}{8}$, and 1 inch, cost of material added	12.00

Spring wagon tire, cost of material added: for work, from five to seven dollars per set; work by hour, sixty cents per hour, material added.

We have quite a few smiths in the county that are shoeing for one dollar per horse, but we hope to get their coöperation along this line. We have succeeded with these men in quite a few cases.

Officers elected as follows: M. E. Goller, president; Noah Menser, vice-president; Alex Markle, secretary; Clayton Markle, treasurer.

Now, Mr. Reader, if our English cousins can work up a national association in a comparatively short time from a small start in Yorkshire, is there any reason why you can't get the association ball moving at a good pace in your county? Get the boys together in your neighborhood—ask their views on the subject. You may be pretty sure that they are of one mind—and that is to form a protective association, and form one quick. It's not uphill work by any means; all you need do is to start the thing going. Help? Of course, you'll need help, that's why I am writing this—I want you to ask for my help. All you need do is to say, "Easy plans," and by return mail will come my easy plans for forming branch associations. Write today—a postal will do. Just address it to the Secretary, P. O. Box 974, Buffalo, N. Y., and we—you and I—will have that association going full blast by the time the bees hum. Don't pass this by, Mr. Reader, but sit right down NOW and address that postal. It will take but a minute, and after it's done you will be able to finish reading "Our Journal" with an easier conscience. Try it.

THE SECRETARY.

An Interesting Letter from Scotland.

JAMES THOM.*

We keep two fires constantly going, and have plenty of work for myself and my two sons, aged twenty-four and twenty-two, respectively. We do general country work, horseshoeing (about ninety horses regularly), plows, grubbers, harrows, etc., both making and repairing of farm implements, and also farm carts. I am now busy finishing two farm tilting carts to go to Sussex, England. I made three horse hoes for Sussex last summer; so you see we send our work a good bit from home sometimes. Our heaviest work is cart axles. Each one weighs about eighty pounds without the bushes and mounts. I get the axle blocks forged at the steam forge at Girvan, about fourteen miles from this place. I don't think I need detail the different jobs we have to do, as I know the work and the implements here are entirely different from your American ones, although we do have some American and Canadian plows here, too. I enclose price list for the year 1904. Prices are a little reduced since then, but will very soon be raised to the figures in the 1904 list. You know we buy all our iron in this country at per hundredweight (112 pounds), not, as you do in America, at per 100 pounds. I enclose an invoice of December 16th, 1907, for a mixed lot of iron I received and which is at a cheap price. Our smithy coal costs us just now twenty-two shillings ($5.35) per ton. (One ton is 2240 pounds.) These old-country invoices and prices, together with the 1904 price list, should give your readers an idea of how the blacksmiths in the old country are paid for their labor.

*NOTE.—The old Scotch price list reproduced on page 122 of the March issue was sent in by Mr. Thom.

Price List of the Ayrshire Blacksmiths' Association, agreed to at general meeting in Ayr Arms Hotel, Ayr, on Saturday, March 12th, 1904.

Horseshoeing.

Heavy lorry horse	6s.	6d.	($1.58)
Contractor's horse, toed	5s.	6d.	($1.34)
Contractor's horse, plain	5s.	0d.	($1.22)
Gentleman's horse	5s.	6d.	($1.34)
Gentleman's horse	6s.	6d.	($1.58)
Pony	4s.	0d.	($ .96)
Posting horse	4s.	6d.	($1.08)
Farmer's horse, minimum price	5s.	0d.	($1.22)
Farmer's horse, maximum price	4s.	0d.	($1.22)
Milk pony	4s.	6d.	($1.08)
Shoes removed and toed	3s.	0d.	($ .73)
Shoes removed, plain	2s.	6d.	($ .61)
Leather soles, per sole	1s.	0d.	($ .24)
Cog holes punched, per hole	1s.	0d.	($ .24)
Cogs, per dozen	1s.	0d.	($ .24)

Jobbing.

Wheel shoeing, cart $2\frac{1}{2}$ inches, per stone (14 lbs.)	0s.	10d.	($ .20)
Wheel shoeing, broad, per stone	1s.	0d.	($ .24)
Wheel shoeing, gig, $1\frac{3}{4}$ by $\frac{5}{8}$ inches and nailed, $2\frac{1}{2}$ per lb £1	1s.	0d.	($5.11)
Wheel shoeing, gig, $1\frac{3}{4}$ by $\frac{3}{4}$ inches, and nailed, $2\frac{1}{2}$ per lb. £1	5s.	0d.	($6.08)
Tightening wheel tires, ordinary	5s.	0d.	($1.22)
Tightening wheel tires, only one	3s.	0d.	($ .73)
Tightening broad wheel tires	7s.	6d.	($1.70)
Tightening broad wheel tires, one only	4s.	0d.	($ .96)
Cart nave strapped, light, per set	12s.	0d.	($2.92)
Cart nave strapped, heavy, per set	14s.	0d.	($3.38)
Gig wheel nave strapped, light	5s.	0d.	($1.22)
Gig wheel nave strapped, heavy	6s.	0d.	($1.46)
Wheel riveting, washer and rivet, each	3s.	3d.	($ .06)
Cart axle (complete) ordinary £2	0s.	0d.	($9.73)
Cart mountings (body fast) £1	2s.	6d.	($5.47)
Cart mountings (coup cart) £1	12s.	0d.	($7.79)
Set of cart shaft mountings, from	5s.	6d.	upwards
Cart cape mountings, from	7s.	6d.	upwards
Long cart mountings £1	8s.	0d.	($6.78)
Pair steel axle pins, from	4s.	0d.	upwards
Pair draught nails, from	2s.	6d.	upwards
Pair sand rings, from	1s.	6d.	upwards
Plough mountings, two socks £1	12s.	0d.	($7.79)

Plough mountings, one sock............	£1	5s.	0d.	($6.08)
Cranked coulter, from...		5s.	0d.	($1.22)
Straight coulter.........		3s.	0d.	($ .73)
Sock laid..............		1s.	9d.	($ .42)
Coulter laid............		1s.	3d.	($ .30)
Sock and coulter dressed		0s.	6d.	($ .12)
Sock pointed...........		0s.	6d.	($ .12)
Large plough muzzle and pin, from............		5s.	6d.	upwards
Small plough muzzle and pin, from............		0s.	9d.	upwards
Drill plough mountings (metal)..........	£1	10s.	0d.	($7.28)
Drill plough mountings, steel............	£1	15s.	0d.	($8.52)
Drill plough sock.......		10s.	0d.	($2.38)
Drill plough sole, ordinary................		4s.	6d.	($1.08)
Drill plough sock, laid, from................		1s.	0d.	upwards
Laying drill grubber, per tin..................		1s.	0d.	($ .24)
Laying two-horse grubber, from............		7s.	6d.	upwards
Laying extra heavy grubber, from............		12s.	0d.	upwards
Laying iron harrows (with steel)..........		15s.	0d.	($3.65)
Laying iron harrows (with iron)...........		12s.	0d.	($2.92)
Iron harrows, dressed, per set of 60 tins......		5s.	0d.	($1.22)
Wood harrows, sharped, set of 40 tins, from.....		3s.	6d.	upwards
Harrow tins, each.......		0s.	6d.	($ .12)
Wood harrows, tin laid from each...........		0s.	2½d.	($ .05)
Plough tree frizzler, each from................		0s.	8d.	upwards
Plough tree frizzler, laid and put on, each......		0s.	4d.	($ .08)
Plough tree frizzler, put on, each.............		0s.	2d.	($ .04)
Set field gate mountings, ordinary, from........		3s.	6d.	upwards
Field gate mountings, heavy, per lb., from...		0s.	4½d.	upwards
Iron barrow wheel, 19 inches in diameter....		8s.	0d.	($1.82)
Set ordinary barrow mountings..........		6s.	6d.	($1.58)
Hooping barrow wheels from................		2s.	0d.	upwards
Barrow feet rings, per pair, from............		0s.	8d.	upwards
Pick laid and steeled, from................		1s.	8d.	upwards
Pick steeled............		1s.	0d.	($ .24)
Pick sharped...........		0s.	2d.	($ .02)
Drain spade steeled, from................		1s.	0d.	($ .24)
Traveler esses, ⅜ inch, each		0s.	3d.	($ .06)
Ordinary chain repaired:				
First link		0s.	2d.	($. 04)
After first, each			1d.	($ .02)
Plough tree esses, each...		0s.	4d.	($ .08)
Mason's irons, dressed per hundred..........		1s.	4d.	($ .32)
Ess links (ordinary) each		0s.	1d.	($ .02)
Journeyman and assistant, with use of fire and coal, per hour, from		1s.	4d.	upwards
Journeyman, per hour, from........		10d. to 1s.		($ .20 to $ .24)

NOTE.—"Sock," as used in the above price list, is the same as "share" in this country, while "muzzle" is the same as our "clevis."

Partial Bill of Blacksmith Supplies.

Six bars 1⅜ by ½ inches B. H. S. iron.........		16s.	9d.	($4.05)
Ten bars 1¼ by ½ inches B. H. S. iron.....	£1	6s.	6d.	($6.44)
Two bars 1¼ by ⅜ inches B. H. S. iron.........		5s.	9d.	($1.40)
Two bars 1¾ by ¼ inches Com. iron...........		3s.	1d.	($ .75)
Two bars 1½ by ¼ inches Com. iron...........		2s.	9½d.	($ .68)
Two bars 1¼ by ¼ inches Com. iron...........		2s.	3½d.	($ .56)
Four bars 1 by ¼ inch Com. iron...........		3s.	8d.	($ .89)
Four bars ¾ by ¼ inch Com. iron...........		2s.	10d.	($ .59)
Two bars 1 by 5/16 Cope iron..................		3s.	2d.	($ .77)
Two bars 1½ inches square Com. iron...........		14s.	½d.	($3.39)
Two bars 1⅜ inches square Com. iron...........		14s.	11d.	($3.60)
Two bars 1-inch round Com. iron...........		5s.	10d.	($1.42)
Two bars ⅞-inch round Com. iron...........		4s.	8½d.	($1.13)
One bundle ¼ by 5/16 by ⅜..		10s.	9d.	($2.56)
One bar 2 by ½ inches flat.................		3s.	9d.	($ .91)
One bar 2½ by ½ inches flat iron.............		4s.	9½d.	($1.18)
One bar 5 by ¼ inches Best Best............		6s.	11d.	($1.68)
Twelve cwt. No. 6 Strand wire................	£1	6s.	½d.	($6.33)

NOTE.—The "B. H. S." iron, or best horseshoeing iron, is what is called "Dundyvan Best Crown Horseshoe Iron." The "Com.," or common iron is what is called "Best Grown Iron."

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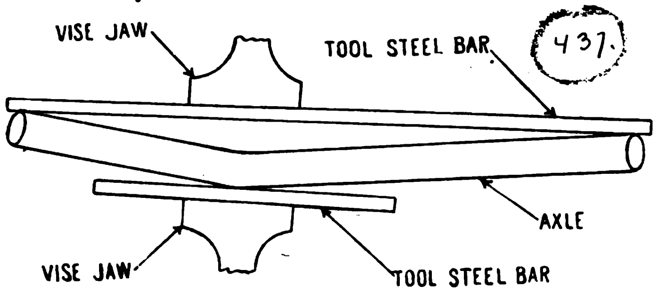
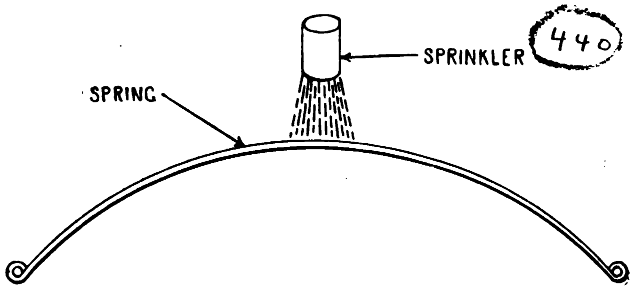
How to Straighten Automobile Axles.

Most front axles are made from a very stiff grade of seamless tubing, and if heated in the forge and allowed to cool off it will be very soft, and will go down under a very light load. The proper way to straighten an axle is to do it cold with an arbor press, if one is at hand. If no press is to be had, then use a blacksmith's vise. Take a bar of tool steel a little longer than the axle. Place this along the concave side of the bend, and then take a shorter piece of tool steel and place this along the convex side. Then put all three pieces between the vise jaws as in Fig. 1. If the tool steel pieces are strong enough, you can, by tightening up on your vise, soon bring the axle back where it belongs and in a very short time send the autoist away rejoicing. A couple of pieces of tool steel should be kept on hand for this emergency, as it is a frequent mishap with the autoist to bump something with the front wheels and bend the axle enough to cripple his machine. In fact, sometimes the axle gets bent so badly that it is necessary to heat it in order to straighten it properly. In this case the axle should, after being straightened, be reheated, sprinkled with cyanide, and cooled off in cold water. This will prevent it being soft and perhaps be the means of securing another customer.

Another frequent mishap is the breaking of a spring. If a farmer calls with a buggy spring to be welded he perhaps is very thankful to have the two pieces put together, to say nothing about the spring being retempered. But with the auto spring, if we do not retemper the spring after welding it, it will certainly go down and cause trouble. Now, we all know that we cannot temper part of a spring, and have the whole spring hold up. There are bound to be two soft spots, one on each side of the place heated and dipped. If the tempering is done as follows, the spring will come out O. K. If you have an oil tank large enough, and some good fish oil, just heat the entire spring to a uniform low red. You can do this by building a wood fire out of doors the same as you would heat a tire for setting. Do not attempt to do the heating in a forge if the spring is over ten inches long—and there are very few that are less than sixteen inches, and from that to forty inches in length. When trying to heat a long spring in the forge you get hot spots that will harden too hard, and the spring will snap in several places. If this happens the autoist will not call again unless to "call you down," and it will injure your business to such an extent that you will see at once that it pays to be more careful even if it takes more time. The autoist does not mind paying a good price for a good job, but he does not want to be sidetracked five minutes after leaving your shop. Neither do you wish him to be. When the spring has reached a very low red, dip the whole spring lengthwise in the oil tank, leaving it until cool. Then remove it and place it over the fire long enough to burn the oil off. Now dip in oil again, and remove to cool enough to be handled for replacing in car. You will then feel (after pocketing your fee) that you have done justice to all concerned.



THE AXLE MAY BE STRAIGHTENED BETWEEN THE JAWS OF A VISE



THE BROKEN AUTOMOBILE SPRING MUST BE RETEMPERED AFTER WELDING

And you will not have that guilty feeling which the man has who does a poor hurry-up job regardless of the consequences. If you have no oil tank you should have one put in, as you will need one if you remain in the repair business. But in the meantime, if you are called on to weld a spring, after welding, reheat the whole length in a wood fire, if nothing more convenient is at hand, and take a sprinkling can, or any old can, with a few small holes in it, and treat the spring, as shown in Fig. 2. Do not cool off but just run over it quickly until the spring turns black. Then lay it down to cool off. This operation will stiffen and prevent the spring from going down when put in place, even if under quite a load.

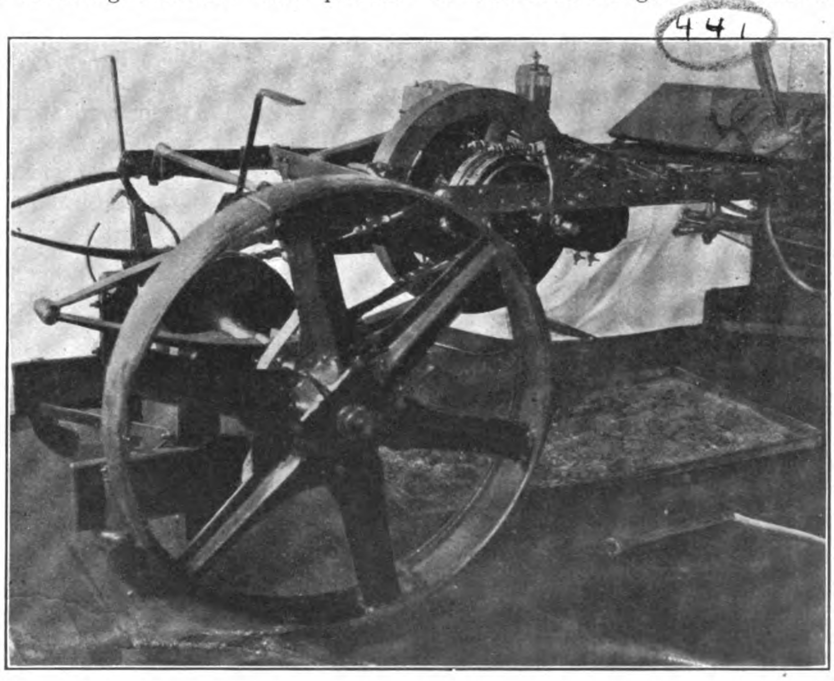
Running a Shop with Automobile Power.

The accompanying engraving shows an automobile equipped with a light wooden pulley on the rear axle, the rear of the vehicle being raised so as to clear the floor by about two inches. The body is removed to show motor, but it is not at all necessary. This auto runs a fan, a small lathe, a drill, and a shaper, and could, in a short time, be equipped for a journey of several miles to bring supplies. If the smith hasn't an auto, it surely would pay him to build one. There are also plenty of chances to buy a secondhand automobile. And if overhauled a little, a good serviceable machine will be had to knock about with in the country. Then, again, by either building one or by buying a secondhand auto and rebuilding it, you will learn enough from the experience to make you an expert repair man and instead of taking pointers you will, in a short time, be able to give a few.

Brazing in Automobile Repairing.

Brazing is about the most important part the general smith has to perform, either in repairing or building an automobile. There are many different parts in an automobile that are brazed, and the brazer in the factory is liable to do a poor job through carelessness. Consequently, when the piece gives out, the autoist may have to send it miles to be rebrazed. Brazing is a simple job if one knows how it is done, but it is very difficult if one has not done any of this work or seen it done. All smiths will find it profitable to equip themselves to take care of this class of work. For brazing cast iron, use the following mixture: two pounds brass spelter, one-half pound boracic acid, four ounces chlorate of potash, three ounces carbonate of iron. Mix this well, dry, and keep covered when not in use. Now, we cannot braze anything if it is dirty, greasy, or rusty any more than we can weld or solder pieces in such condition. The parts to be brazed must be cleaned and free from rust, scale, or dirt. Then make a paste of boracic acid and water, and give the piece to be brazed a coating around the joint, and let paste dry. Now, place pieces in furnace or forge, heat to a bright red, and then apply the spelter mixture given above with a hot spoon. Do not cool spoon off, as the spelter will stick to a cold, wet spoon, and will not adhere so well to the hot piece to be brazed. If brazing steel or wrought iron, equal parts of brass spelter and boracic acid mixed will be found to be all that is required. Make a paste and apply as before stated.

When an auto stops in front of your place of business, and the autoist wants to know if he can get his machine fixed right away, don't get excited. The autoist, being used to riding fast, expects, of course, to have his job of repairing done fast, but *you* keep cool. Go at the



AN AUTOMOBILE CAN ALSO BE USED TO OPERATE THE SHOP MACHINERY job easy, and find out first of all what needs fixing. Perhaps it is something you can not repair with your present equipment, but find out all about it, and you will profit by it the next time one stops for repairs. If it is a job you can do, then by all means do a good job, and the autoist will, like the tramp, mark your shop for a second call, or perhaps tell a friend who will call, and after a while you will have a growing business in the auto repair line. If it is a job of brazing, do not put it in the fire all grease and dirt, but clean it thoroughly, either by washing with gasoline or by burning the grease out from between the parts to be brazed. It pays to take a little time to prepare for a good job of brazing, as there is nothing that will fool you easier than a poor job of this kind of work. For instance, you can heat the piece and put the spelter on and to all outside appearances it will look O. K. At the same time the spelter perhaps did not run through at all. A job of repair brazing was called to the writer's attention the other day. A malleable casting broke in such a way as to render it useless. A new casting was out of the question just then, and to try to forge one would be unreasonable, so it was repaired by brazing as follows:

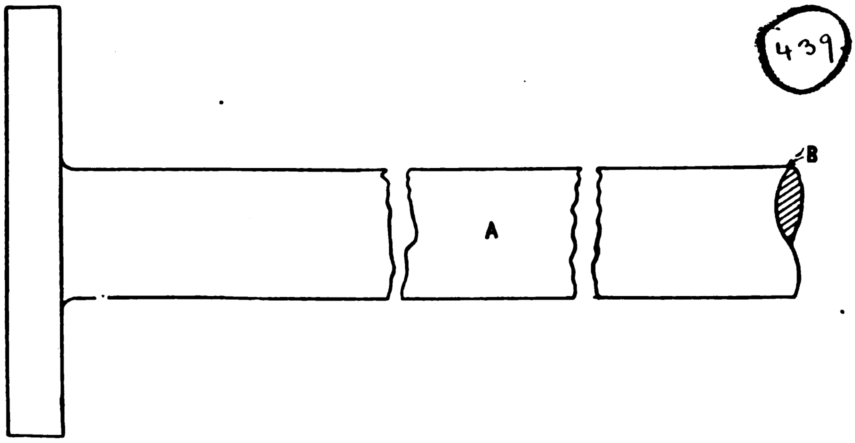


FIG. 1.—BRAZING PLAYS AN IMPORTANT PART IN THE REPAIRING OF AUTOMOBILE PARTS

The part A in Fig. 1 was, as shown, broken out of the bar part of casting and, of course, the end B is an extension of a very complicated piece, making it impracticable to try to forge a new one, to say nothing about machining it after it was forged, if such was possible. The part A was about three inches long. A half-inch hole was drilled endwise through this piece, the drill being also run about one inch into the broken ends of the other pieces. Then a piece of machine steel of the proper length was filed to about one sixty-fourth of an inch smaller than the holes, and the pieces put together, as shown in Fig. 2. Then a quarter-inch hole was drilled through each broken end FF, and the machine steel piece C and a pin D driven into each hole. This held the pieces together firmly, but would hardly do alone, so it was placed in a brazing furnace, and the spelter put on when the piece was hot enough to melt it. The spelter was worked in around both ends of the pins, and when it was seen to run out at breaks EE more spelter was put on the breaks, and a first-class job of brazing was completed. The ends of the small pins were then sawed off, and the piece ground upon emery wheel, and, except for two small rings of brass around the bar, no one would ever know anything had happened. We will not tell what this cost the owner, but he was glad to be relieved from what he supposed was a week's lay-up, and would gladly have paid ten times the price had it been asked, for (not belittling the general smith's patrons in the past) you will find the autoist a liberal and prompt paymaster.

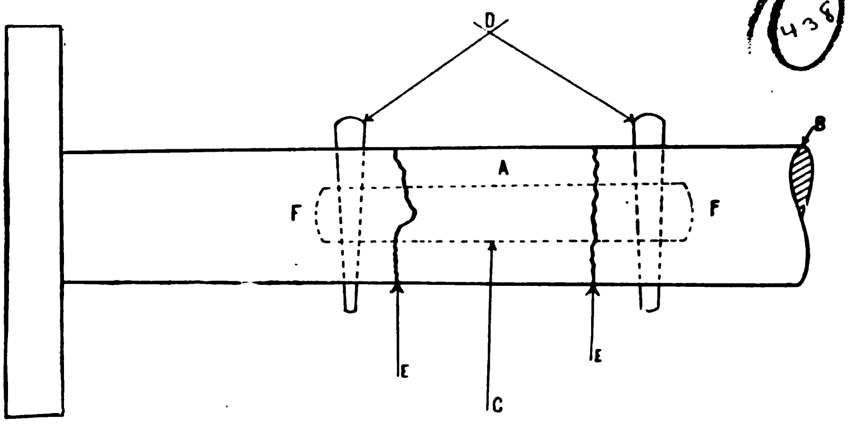


FIG. 2.—IT IS ESSENTIAL THAT THE BROKEN EDGES OF THE PIECES BE ABSOLUTELY CLEAN

Gas Engine Ignition Batteries.—2.*

WALTER IRVING.

Now, suppose that a six-cell battery having an internal resistance of .3 ohm and an electromotive force of 4.32 volts is applied to the same circuit. Although both amperage and voltage are lower than in the first case, the current strength, as determined by formula 1, is higher, because the resistance is lower; thus, $4.32 \div (.3 + 3) = 1.3$ amperes. Moreover, since the drop in potential across any particular resistance in the circuit is proportional to the ratio of that resistance to the total resistance of the whole circuit, it follows that the proportion of the E. M. F. absorbed in overcoming the internal resistance of the cells in the first case is as $3 : 6 = .5$, whereas, in the second case the proportion of the E. M. F. absorbed in overcoming the internal resistance of the cells is as $.3 : 3.3 = .0909$. In other words, fifty per cent of the generated E. M. F. is required to overcome the internal resistance of the cells of the first battery, while with the second battery only about ten per cent is required for the same purpose.

To prevent the electrolyte from creeping up the zincs and thereby shortening the useful life of the cell shown in Fig. 1, the solution is covered with a heavy mineral oil that also serves to prevent evaporation. Should the oil be omitted the zincs above the solution would be attacked by carbonate of potash, formed through the extraction of carbonic acid from the air by the creeping electrolyte. The upper part of the zincs would finally be reduced to a pasty condition, the part within the solution being unimpaired. The most satisfactory results are obtained by using the oil furnished by the manufacturers of the cell, because the creeping of the electrolyte will not be prevented unless

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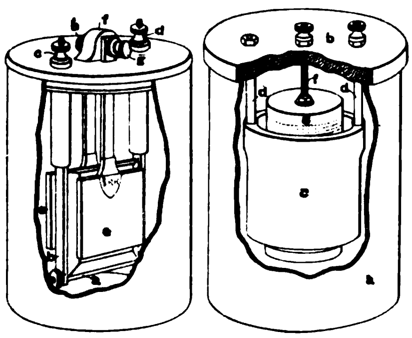
the oil used is of sufficient body. The layer of oil should be at least three eighths of an inch deep.

To insure good electrical contact, the necks of the zincs, where they are bolted to the long binding-post bolt, should be kept clean and bright and the grooves in the copper frame in which the oxide plate is held should be cleaned with emery cloth when the battery is renewed.

When the oxide plate is red throughout its entire mass, as determined by picking into it with the point of a knife, it is completely exhausted and should be renewed. If, however, there appears an interior layer of black oxide, the plate is still good, the length of its remaining life depending on the thickness of the black oxide. On renewing the oxide and zinc plates it is necessary to renew the electrolyte also, because the old solution is then completely saturated with zinc oxide, which solidifies at the bottom of the cell in the shape of needlelike crystals.

Before putting the new plates into the new solution they should be allowed to stand in water until they become thoroughly wet, because the film of oil that would otherwise adhere to them would interfere with the action of the electrolyte, making it impossible to get the maximum output from the cell immediately. Exhausted oxide plates cannot be used over again. The oxide plate should never be removed



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FIGS. 1 AND 2.—SHOWING TWO STYLES OF WET CELLS

from the electrolyte and allowed to dry in the air, because the surface of the plate becomes reoxidized, and the oxide formed by the absorption of oxygen from the air is much more difficult to reduce to metallic copper than the black oxide of which the plate is made.

One of the most important points to be observed in "setting up" or renewing the type of cell shown in Fig. 1 is the height of the solution; in fact, the success or failure of the cell may be said to depend on a difference of an inch in the height of the liquid. The top edge of the oxide plate should be fully an inch below the surface of the electrolyte, and, hence, about an inch and a half below the top of the oil. This is necessary because the reduced surface of the copper oxide plate is covered with finely divided copperlike dust, some of which becomes detached, rising to the surface of the electrolyte and floating under the layer of oil. Hence, if the surface of the solution be permitted to fall so as to be on a level with the tops of the oxide and zinc plates the particles of copper dust will in time form a bridge between the plates, thus short-circuiting the cell, thereby destroying it, the zincs being eaten off at the level of the solution.

Batteries made up of dry cells are economical only when the current is used at intervals, the cells recuperating more or less after each period of use until they are finally exhausted.

Fig. 2 shows a 300-ampere-hour cell for closed-circuit stationary and traction gas engine ignition service. For stationary use the vessel *a* is of porcelain or glass, but for traction engine or other portable service it is made of enameled steel or of hard rubber, with a liquid-tight cover *b*. The positive plate consists of a cylindrical amalgamated zinc casting *c* suspended from the cover by two substantial supports *dd*, as shown. The negative plate consists of a porous cup *e* filled with oxide of copper and suspended from the cover by the support *f*. The electrolyte is a saturated solution of caustic potash, the chemical action of which is the same as in the cell already described. The surface of the electrolyte, which should be half an inch above the copper cup, is covered by a heavy paraffine oil to a depth of about a quarter of an inch in order to prevent creeping, evaporation, and decomposition of the electrolyte.

The cross section and sectional elevation shown in Fig. 3 serve to illustrate the internal construction of a six-inch dry cell of the ordinary type. As indicated by the cross sectional view, the carbon plate, or rod, *a*, is corrugated, so that the surface in contact with the active material may be as large as possible. The upper end of the carbon rod is flattened where it passes through the sealing compound. The zinc plate *b* is made in the form of a cup and holds the carbon rod and the active and depolarizing material *c* surrounding it. In assembling the cell, the zinc cup is lined with blotting paper *d*, of which several washers are made to fit the bottom of the cup, as shown. The carbon rod is placed in the center of the cup, and a mixture of black oxide of manganese (depolarizer) and granulated carbon, moistened with a saturated solution of sal ammoniac, is then packed tightly and evenly around it until the cup is nearly full. The granulated carbon is used to increase the carbon surface, and a little graphite is sometimes introduced to insure good conductivity. The upper edge of the blotting paper lining is then turned down so as to cover the mixture, and a pasteboard washer *e* made to fit inside the cup and serves as a bottom for the sealing compound of molten asphalt or pitch which fills the cup to the brim

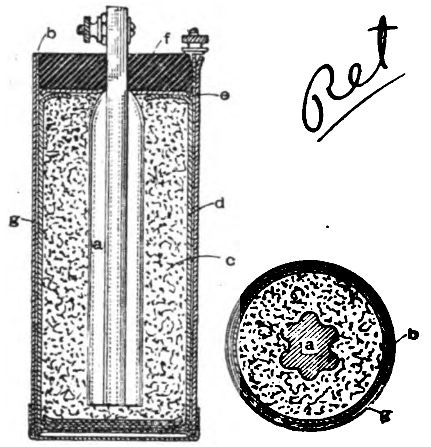

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FIG. 3.—A DRY CELL SHOWN IN SECTION

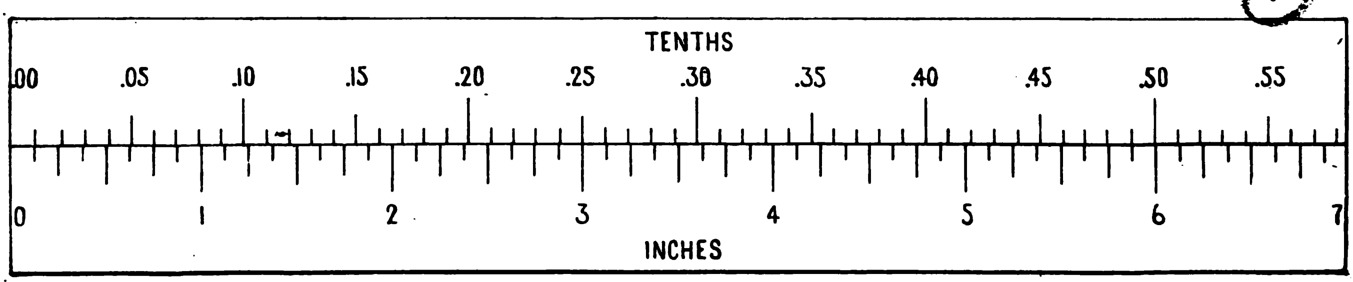
as shown at *f*. The completed cell is then placed in a pasteboard tube that serves to insulate the zinc cups fom one another when the cells are crowded together. This outer covering may be made moisture proof by boiling it in paraffine or in a mixture of equal parts of paraffine and beeswax.

Because there is very little difference in external appearance between different makes and grades of the dry cell, it is commonly assumed that the same results are obtainable from cells of the same size, regardless of their initial cost. As a matter of fact, there is a wide range of variation in the cost of making cells of the same external size, so that differences in price may usually be taken as evidence of corresponding differences in construction. As to which cell shall be emplo ed is a question that must be decided by each individual consumer. Even though cells be fresh and of the same make and size, it will be found that in electrical activity they are far from uniform, some cells being much longer-lived than others, but neither the internal mechanical construction nor the external appearance of the cells gives any indication of their current-producing capacity or comparative longevity. Moreover, if one cell in a battery becomes bad, the output of the whole group is affected, the life of the good cells being shortened by the increased load thrown upon them through failure of one or more cells.

The life of a dry cell depends on the exposed areas of the zinc and carbon. The larger these areas, the lower the internal resistance, and, consequently, the greater the current discharge. Hence, if the rate of current discharge is low while in service, the useful life of the cell will be correspondingly lengthened. The capacity of all types of primary cells is expressed in *ampere hours*, this term being employed to indicate that, approximately speaking, a cell having a rated capacity of, say, 25 ampere hours would supply a current of one ampere for 25 hours, or one half ampere for 50 hours, or one tenth ampere for 250 hours. As a matter of fact, however, with dry cells the higher the rate of current discharge the smaller becomes the available capacity of the cell or battery.

The available capacity, as well as the useful life, of dry cells, is also affected by the thickness of the zinc cup, because thin zinc is more quickly eaten through, the activity of the cell being destroyed by evaporation of the moisture that should be retained in the blotting paper and mixture between the carbon and zinc plates. Cells frequently dry out because of cracks made in the sealing compound as a result of rough handling, but such cracks may readily be resealed by using a hot iron to melt the sealing compound. The use of inferior chemicals and cheap grades of zinc and carbon frequently cuts down the life and efficiency of dry cells, the contained impurities causing local action and the cells gradually deteriorating even when idle.

(To be continued.)



HOW TO MAKE A RULE GRADUATED INTO TENTHS AND INCHES

How to Build a Motor Buggy.

CHARLES E. DURYEA.

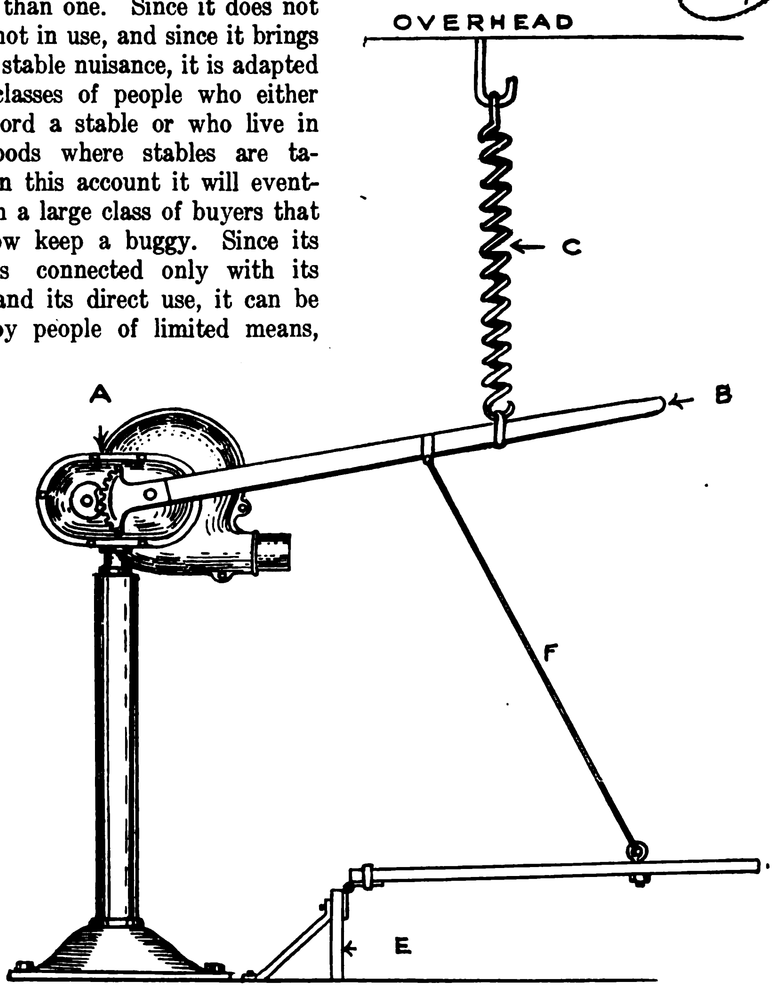
My first advice is that of Sydney Smith to a friend about to marry—"Don't." Motor buggies are like every other complicated product in that they are produced in best and cheapest form by specialists in that line. It seems ver simple to attach a motor to a buggy, with some form of power-transmitting device leading to the wheels, and with something that will turn the front wheels out of their course, and call it a "motor buggy." The cuts of products already on the market show very little that looks different from an ordinary buggy; and, knowing the ease with which all parts of the common buggy can be bought, the novice is led to believe it easy to do likewise and produce a motor buggy. He sees motors advertised; hears of transmission gears all ready to hang in place; finds axles with steering knuckles made on purpose; is offered steering wheels, balance gears, carburetors, coils, and all the other necessities, until he sees nothing to do but buy one of each and assemble. He can even buy partly assembled, but if he is an acute observer he will notice that as the assembly becomes more complete the price more than keeps pace and the imaginary profits seem to be going to the man who did the assembling. This fact may serve to open his eyes to the probable cost of the "assembling," or it may produce just the opposite result and make him more determined than ever to become an assembler and get some of those "profits" himself. In the buggy business, long years of experience have eliminated the faulty stuff and continued the good. The size of axle proven right under one job is not far wrong under another of the same kind. The length of clip used by one man will be found easily fitted to a rig turned out by another. The quantity of buggies built every year makes it necessary for the supply houses to carry large stocks, and from these he selects the part wanted without a thought of what would be his lot if he did not happen to want something about like what others had wanted and pretty regularly used before.

And here is where the mistake is usually made. The motor buggy is a different thing. It is pushed instead of pulled. It is heavy where the other is light. It is fast when filled with power instead of when light as possible. It must be long, whereas a horse buggy should be short. These and similar differences demand a different line and kind of parts and fittings, and these are not on the open market yet. Auto makers have largely been responsible for a demand for new and better steels. They have adopted new proportions of bolts and new screw thread sizes for these steels. The cycle makers before them did much the same. The sewing machine maker does not use the screw thread sizes of the carriage shop. The assembler therefore at once gets into difficulty. His parts do not fit. Or, if they fit, they are not properly proportioned. Or perhaps the strength is insufficient. And thus it goes till, convinced that assembling is not what it is represented to be by those having parts to sell, he either gives it up in disgust, and at a loss, or takes hold more energetically, and, by fighting out each problem separately, finally gets it right and becomes a full-fledged maker of motor buggies, a specialist in his line.

I trust this makes plain my meaning that if one is not prepared to work hard for success he had better take the negative advice and keep out of the motor buggy field. On the other hand, "Faint heart never won fair lady" or anythino else of great value; and if determined tg enter this field the first thing to do is to get all the information possible on the subject, that, being forewarned, you may be forearmed and prepared to meet the difficulties successfully and economically.

I will therefore give in these columns some facts as to the size of the market, the class of buyers to be supplied, the history of the art particularly as it applies to buggy construction, descriptions of different typical constructions now in successful use, and information as to the details of assembling and building an up-to-date motor buggy.

The market is an unusually large



THIS BLOWER MAY BE OPERATED BY EITHER HAND OR FOOT POWER

one, for every family is a possible customer. In this respect the motor buggy resembles the bicycle more than it does the sewing machine, for there are many families that will own more than one. Since it does not eat when not in use, and since it brings with it no stable nuisance, it is adapted to great classes of people who either cannot afford a stable or who live in neighborhoods where stables are tabooed. On this account it will eventually reach a large class of buyers that do not now keep a buggy. Since its expense is connected only with its purchase and its direct use, it can be afforded by people of limited means, just as high-priced pianos are acquired by people of small means. And this is true in spite of the fact that a motor vehicle is used harder and therefore wears out sooner than a horse vehicle. This rapid depreciation, while not largely decreasing the number of users, will increase the number of vehicles needed to supply the market. In comparing with the horse vehicle trade, such facts as these must be kept in mind.

The United States census reports, made every five years, show us the enormous size of the horse vehicle trade. Also its growth and the comparative importance of the various divisions of this business. They show that in 1905 there were over 937,000 family and pleasure carriages made, an increase of about 33,000 as compared with 1900. The value of this output is given at nearly $56,000,000, as compared with $51,000,000 in 1900. This does not take into account the sleighs used for pleasure purposes, which will be largely supplanted by the buggy because of its speed and tirelessness, which things give the sleigh its charm. Neither does it consider the horses and harness employed with these buggies. Just the value of these necessities we cannot definitely know, but in all probability it at least equals that of the vehicles. It therefore seems safe to assume the value of the average pleasure outfit as no less than $125. The average price of the present-day motor buggy is about five times this; so on a strict price comparison alone there is every reason to believe that 30,000 to 40,000 motor buggies can find a market each year. This is on the assumption that reducing the price to one fifth increases the market twenty-five times. The truth of this assumption becomes apparent at once if we imagine motor buggies selling at horse vehicle prices, for then all horse vehicle buyers would buy, instead, the newer and better device. The apparent error of this assumption is in the fact that the estimated number of motor buggies is not being sold today. This, however, is because they are not made and offered. The sale of this number of autos at four times the motor buggy price is good evidence that the buggies can be sold if made. There were probably less than two thousand motor buggies sold last year, so this large market is as yet practically untouched, and the would-be maker need not worry about finding an output for his goods if they are good and the price in proportion to the quality. The market is simply enormous. The census reports also show a fact of interest to the small builder, in that the number of establishments had decreased nearly twenty per cent in the five years. This means that the large factory specializing on certain products has taken the market, and the small builder could buy of them complete with greater profit than he could buy the parts and assemble for himself. The lesson of this is—make one part and make it better and cheaper than anyone else and own a noncompetitive business.

(To be continued.)

How to Make a Rule Graduated Into Tenths and Inches.

E. M.

The accompanying engraving shows a very simple rule graduated into inches and tenths, which may be made by anyone. Take a piece of steel of the desired length, about one inch in width and about one thirty-second of an inch thick. Now, apply a coat of beeswax to the steel, being sure that the beeswax is warm when applied. On one edge of the steel, mark off the inches, and on the other edge, mark off the tenths, using a sharp scratch awl, and making sure that the beeswax is removed from the steel on the places which have been scratched with the awl, but left at other places.

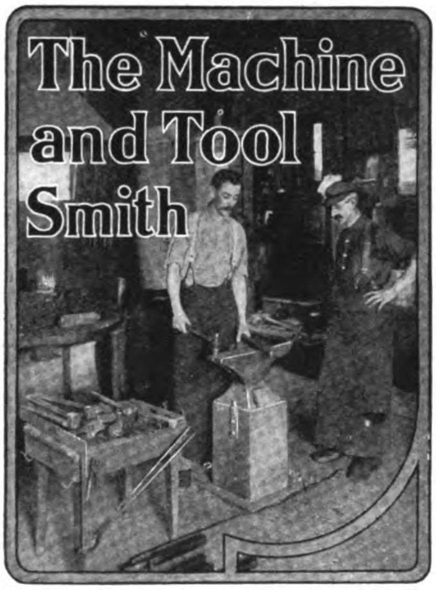
Now, take four ounces of nitric acid and one half ounce of muriatic acid, and mix together. Apply the mixture with a feather, filling each mark, and letting the mixture remain about five minutes. Then wash the acid off with water. When the wax is removed the inscription on the steel will be plain.

Caution should be taken in handling this acid, being sure that none gets on the fingers or clothing, as it is extremely injurious.

A Foot Lever for the Lever Blower.

GEORGE NOBLO.

I recently bade good-bye to the bellows which, I must in justice say, has served me faithfully during a long term of years, and have installed in its place a No. 306 Buffalo blower. My attention was called to the blower by the advertisement in THE AMERICAN BLACKSMITH, and what struck me most favorably was the lever instead of the crank movement, which did not require any change in the blowing movement. The difference, however, is that the blower can be operated with the greatest ease and gives at the same time a much stronger blast than the largest bellows ever did. I then thought some improvement could be made so as to enable me to use both hands when required. So I attached a foot pedal in the manner shown in the engraving. The blower is at A, B is the lever, C a coil spring to balance the foot pedal, D a hinged stand, E is fastened to the floor, while at F is shown a rod connecting the lever with the pedal. The arrangement as shown is very simple and inexpensive, but very useful just the same.



Forging and Hardening Modern High-Speed Steel.

STEPHEN F. KINSELLA.

Much has already been said on this subject, although five years ago this steel was just making its appearance and, of course, all the practical knowledge of the efficiency of this steel, and the best means of bringing it about have been developed and demonstrated in that time. And now we are accomplishing things with this steel that, compared with the conclusions of a quarter of a century ago, seem beyond belief. However, we have this new high-speed steel with all the wonderful things it is doing in its line, and it is only reasonable to expect that in the next five years it will greatly surpass the developments of today. But it is the treatment of this steel that I intend to touch upon, so that I will confine myself to that particular point.

A great and serious mistake was made when this new metal was called "steel." To the blacksmith this name is misleading, because the name "steel" had a tendency to hold him to his accustomed method of heating and forging tool steel, and that is the particular thing to be avoided, because the method employed in heating and forging tool steel will surely prove fatal to high-speed steel.

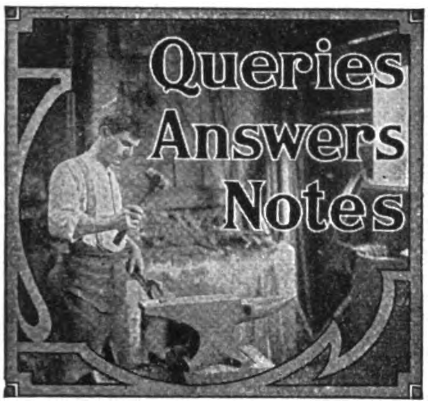
In the first place, the very best heat to forge this steel at is the heat just above a lemon yellow, and it should be kept at this heat all through the forging process. When the heat gets down to a lemon yellow, it should be returned to the fire and heated again. When the steel is put into the fire, it should be heated very slowly so that it will heat evenly. It should not be allowed to lie in the fire and "soak," but the fire should be run so that the heat will constantly increase at a rate at which the steel will be heated evenly and thoroughly up to the point at which it is to be forged.

And now a word as to the proper heat. The writer has been the tool smith in some large shops, and has seen a great many men work steel, and one thing noticeable (to me at least) is that there is a wide range to the "cherry-red heat" as understood by many smiths. Some smiths work steel at a yellow heat, and claim it is a red heat, another will work at just above a liver-colored red, and what is a white heat to some smiths is a red heat to another. This goes to show that all men do not get the same meaning from the color of a heat by name. The writer has found that the best heat at which to work high-speed steel is at the point when the steel commences to "sweat" or its surface looks greasy, and that is just under a white heat. Worked at this heat, the steel will be found to work easily, and will give the best results when in use as a tool. When worked at a higher heat, the tool will be more brittle, as will also be the case if worked at a lower heat.

A very amusing thing about the introduction of this new steel is that the makers and jobbers, who put this steel on the market, in selecting their demonstrators to teach the trade how to work and treat the steel, seemed to be very particular to avoid sending out any blacksmiths, and they thereby retarded rather than advanced the knowledge necessary to the proper handling of this steel. I believe that all tool smiths who read this will agree with me when I say that there seems to be something lacking in most of the fellows who come to instruct us in handling this steel. Doubtless they are all good men in their line, and well up in the matter of making and selling steel, but they are surely a little behind in forging and hardening the steel for a tool. This latter is the work of a toolsmith, and I brook no contradiction when I say that it is done best by a toolsmith.

Now, to harden the tool: When the tool has been forged it should be heated to the normal heat and set aside to cool in a dry place free from drafts. When ready for hardening, the fire should be clean and of good coke. The same care must be taken in raising this heat as with the first heat, so as to heat evenly and thoroughly. Place the tool in the fire with the cutting edge down, so that the extreme heat necessary for hardening will be taken up mostly by the "business" part of the tool. Now, if the tool is to cut cast iron it should be heated up to the fusion point, or, plainly, the heat at which you would weld wrought iron. As soon as you get this heat, remove the tool as carefully as possible and place as quickly as possible in the air blast to cool off. Here is a point in contradiction to the instruction given me by all the demonstrators I have met. They always claim that compressed air is far superior to the fan blast for cooling this steel. Now, my experience with this steel (and it has been extensive) is that the fan blast is far the better for tools that are to do heavy work. It is volume and not pressure of air that does the trick. If you have a good strong fan blast in the shop, have a set of spurs put on the blast pipe at the tool fire; one spur of two-inch pipe and one of three-inch pipe, and if you are using larger steel than one and one half by two inches, have a larger spur so as to take your largest size. When you take the tool from the fire, set it, hot end first, into one of these pipes and open the wind gate, and when the tool is cold, if it has been handled at the proper heats and is to cut rough cast iron, it can be depended on for the maximum amount of work.

A tool for cutting wrought iron or steel should not, in hardening, be brought to as high a heat as one for cutting cast iron. To harden a tool to cut wrought iron or steel, heat the tool up slowly to the sweating point, watching for this point very closely. When the tool begins to sweat you can see the small bubbles, about one sixteenth of an inch in diameter, boil out on the surface. Hold your heat at this point for about two minutes so as to give it a good sweat, and then plunge it into fish oil. If the tool has been properly handled throughout it is now ready to do a lot of work. In hardening taps, reamers, or milling machine cutters, heat in lead. First, heat the pieces slowly in a forge fire to above the expansion point or to a bright red (be very careful not to scale them), and then hold in the lead crucible to bring them up to the high heat necessary for hardening, then plunge them quickly into fish oil, and they will, when cold, come out of the oil glass-hard, and as smooth as a piece of velvet.



The following columns are intended for the convenience of all readers for discussions upon blacksmithing, horseshoeing, carriage building and allied topics. Questions, answers and comments are solicited and are always acceptable. Names omitted and addresses supplied upon request.

Wants a Band Saw.—Would some brother smith kindly give me some ideas on how to make a frame for a band saw, also a head for a jointer. JOHN ADRIANS, Wisconsin.

Wants to Make Ice Shoes.—Will some brother blacksmith inform me what size of stock to use, and how to make ice-racing shoes with solid calks and large clips. L. M. GEORGE, New Hampshire.

How to Shoe a Pacer.—In our February journal, brother J. H. Pastorfield wants to know how to shoe a pacer. Try to shoe him with an eight-ounce flat shoe in front, and from sixteen to eighteen-ounce, or leave toed and heeled, behind. I hope this will help you. F. O. HERRMANN, Wisconsin.

Wants to Make Wet Batteries.—I would like to ask, through the columns of your excellent journal, for instruction in constructing wet batteries for igniting gasoline engines. Can cement stone jars be used? Full instruction on this subject will be greatly appreciated. A. L. BROWN, Oregon.

Wants to Temper Pitchforks.—I have four or five pitchforks that have been burnt and have lost their temper. I wish someone would tell me, through the columns of THE AMERICAN BLACKSMITH, how I can temper them so they will be as good as when purchased. GEORGE P. HOLMES, Pennsylvania.

Another Method for Measuring Links.—I read the article written by Mr. G. Graves, of New Zealand, on getting the length of metal to make a link. I will give you the method I use: Take twice the length, of the link, inside measure, and five times the diameter of metal. Perhaps this may help some of the boys. I. N. BOWEN, Washington.

Wants to Make Plaster of Paris Casts.—I would like to know how to mix plaster of Paris for making casts so it won't stick to the metal patterns of molds. Will the molds have to be coated with something? If I mix the plaster with water it crumbles badly, and the pattern never comes out clean. Can some brother tell me? WILLIAM ANDERSON, California.

A Word of Praise from Virginia.—Glad to see the interest taken by you in the promotion of mechanical thought in our line by setting apart such valuable space in THE BLACKSMITH for the interchange of views on instruction, whether theoretical or practical. Yet, I am more pleased with the bright discussions and admirable cuts, which impart such valuable information to the trade. W. H. GUNN, Virginia.

Wants to Braze a Band Saw.—I want to ask brother Benton to give some information on brazing a band saw in the next issue. What is best to use in that case? I have a saw, and, being without experience, I might break some part of it, and would like to know how to repair it best. I should like to meet brothers Benton and Thornton, for theirs are talks from men of experience. A. B. WILKINSON. Pennsylvania.

How to Shoe the Toe Dragger.—In January T. W. Fowler asked how to shoe a horse that drags his toe. I have one horse that has this habit very bad. The accompanying engraving shows how I shoe him. Weld a toe calk on top of the shoe in place of drawing up a clip, and by hardening the toes, I have had fair success in keeping him from wearing down the hoof. If shod in the regular way he gets the hoof so thin that he cannot be driven. I. J. STITES, New Jersey

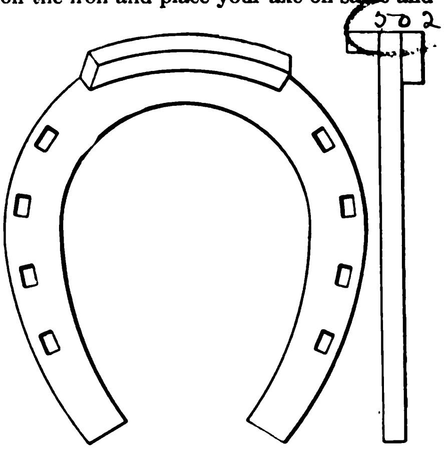
An Engine Help.—Here is something that may help some with their engines. All engines start hard when they are cold. The way I do is to heat up about eight quarts of water and put it into the pipe that carries the warm water from the engine, letting the warm water into the cylinder jacket. The engine will start with the first turn of the wheel. The way I have mine arranged is with a T about six inches above the cylinder and a valve. When I put the water in I shut off the valve and open the cylinder valve, and it is all right. M. K. FRECK, Wisconsin.

Wants a Hardening Recipe.—I am a reader of THE AMERICAN BLACKSMITH, and get lots of information from it. I would not do without it for twice the price. Please ask Benton and the craft for a recipe for a compound for hardening and toughening steel for making cold chisels to cut hard castings. I have seen a compound for that purpose, but the man wanted $50, and I thought that too much. It was all O. K., however. If you will ask Benton and the rest of the craft for a good recipe it will be of great assistance to me. J. H. CLARK, Louisiana.

Wants to Use Air for Cooling.—I would like to ask some of my fellow smiths through your valuable paper the following question: I am thinking of doing away with the water tank on my engine and using a blower to force the cold air over the valves. I think something like the Royal Blower would do the business if driven from the shaft of the engine. The water portholes on my engine are 3½ inches, with 2½ inches of water around the valves. Now, will the air keep the engine cool enough, and will it work as well as the water? Will some one who knows about such things please answer? GEORGE WENTWORTH, Kansas.

A Word on Shoeing.—I have shod horses for twenty-five years, and I advertise to stop a horse from interfering in two shoeings. I find out what makes him strike, and then I stop him. Now, I would like to hear from some of the brother smiths on "green" shoers; all they know how to do is to drive a nail. I wish the government would send out an inspector and see what they know. There is a shop near me that shoes for $1.25 a horse. I get $1.50 and get six horses to his one. I have made horseshoeing and horse anatomy a study from a boy up, and have shod horses from Boston to Eastport. A. C. TAYLOR, Massachusetts.

Another Method for Ax Tempering.—In "Our" latest issue, November, I notice an article on the tempering of an ax. In answer, Mr. A. F. Francis gives a way, but I think that I have a better way than he has. First, have your tub full of good clean cold water, then heat your axe to a deep cherry—that is, your blade—and plunge into water. Now you have your axe as brittle as you can make it. Now get a piece of iron wide enough so all of your axe blade will lay on it. Then get a good heat on the iron and place your axe on same and



A GOOD SHOE FOR THE TOE DRAGGER

watch the temper, and the color you want to temper with. If you want a hard axe, let the color get golden, but a pigeon blue I think is the best. The iron you use should be good thick stock, so it will hold the heat. W. T. HESLINGTON, Florida.

You Must Shoe According to the Foot.—I would not like to be without "Our Journal," as it gives all sides of the question on horseshoeing. I see that some of the correspondents object to it because it does not agree with them on all questions. They seem to think they are right and everybody else wrong. There is no one set of rules to go by in shoeing. You must shoe according to the form of the foot and leg. What will keep one horse from interfering might not help another at all. Therefore, we must be governed by the form of the feet and legs and the way the horse moves. This has been my experience in shoeing. MILTON TRULLINGER, Oregon.

A Reader in Mexico Writes.—In answer to your questions in the December number of 1907, I will say, Yes, I like your present method of featuring some branch of the craft each month. If you would give sizes of belting and shafting, and power of engines to drive certain machines, I would like your articles on gas engines and power very much better. I am very much interested in machine shop work and would like a series of articles on this work. I also like your "Queries, Answers, Notes" department. I am also interested in foundry work, soldering and tinners' work, hardening and annealing of steel, and flat steel work in general. L. A. CUPP, Mexico.

A CALIFORNIA GENERAL SHOP RUN BY MR. H. N. MULLIN

An Agreed Price List from Ohio.—The blacksmiths of several counties have signed to uphold the following prices:

To set new shoes, each	$ .40
To set old shoes, each	.20
To set hand-turned shoes, each	.50
To set barred shoes, each	.75
To set Neverslip shoes, Nos. 1, 2, 3, 4	2.50
To set Neverslip shoes, Nos. 5, 6, 7	3.00
To set old Neverslip shoes, each	.20
To recalk Neverslip shoes, each	.05
To set stallion draft shoes	2.00
To reset stallion draft shoes	1.50
To sharpen plow and cutter	.35
To set buggy tires	2.00
To make new nose and sharpen plow	.75

We started the movement last fall, and everything is working out O. K.

C. A. GARY, Ohio.

Horseshoeing and Interest on Accounts.—In answer to brother B. G. Sugg, of Arkansas, I wish to say: Trim the foot, take all the bearing off the right quarter, then put on a half-bar shoe. I think the horse will go all right. I have shod a lot of them and have had none go lame yet. A full-bar shoe is very good.

I have a little sign in my shop which I think is pretty good for the customer who says he will be back tomorrow. It reads like this, "Cash Today and Credit Tomorrow." When a man has run a bill with you for a year and then pays you, how many of you figure eight per cent interest? I do this, as we have to pay interest on bills that are overdue. W. J. B., Iowa.

A Kentucky Price List.—I have been a reader of THE AMERICAN BLACKSMITH for nearly two years, and could not sleep without it in my house. I am a young smith in the business, having worked but eight years, and find a heap of information in your paper. I will mention a few of my prices:

Shoeing, plain	$ .80
Removing shoes	.15
Toeing shoes	.25
Resetting buggy tires	1.60
New buggy tires	5.50
Resetting wagon tires	2.00
New wagon tires	8.00
Filling buggy wheel	2.50
Cutting down wagon	8.00

All of my other prices are in proportion to the above. W. A. BRENT, Kentucky.

Here Are a Few Smithing Stunts.—I can start on a heavy set of tires, 2 by $\frac{3}{4}$ inches, at seven o'clock in the morning and have them on at three in the afternoon. This I do all alone, and for one tire I weld two pieces together, welding and bending without a helper a set of four tires. And here is another one: I take a heavy tire, 2 by $\frac{3}{4}$ inches, that has a thin spot worn in it about twenty inches long. I cut it out and then I take another old tire about the same thickness, cut twenty and one half inches off it, scarf the four ends, and then I put the tire in the fire and the piece upside down in the fire. When I have a welding heat I take the piece in my right hand, at the same time with my left hand hold the tire to my head. Then I put the tire on the anvil, the short piece under the tire, and the other end I lay inside the tire. I then begin to strike, and generally get that weld done with one heat. I am then ready for the next weld, which is not so troublesome. C. W. SCHWAER, Pennsylvania.

A California Letter.—My business has increased wonderfully this last year. I aim to give every one just value for his money, at the same time allowing myself a decent profit. I never joined an association, principally because I am located on cross corners, and three years ago when I started, I asked several smiths their prices on certain lines, and strange to say, they would give me no satisfaction, so when they were forming their association I declined. I was very familiar with prices in other localities, but, as you know that they range so differently, I want to be in line with them. But they would not, or did not want me to live. Having worked at the business for 24 years, I am considered one of the best all-around smiths in the State. I naturally made a success because I was familiar with any class of work brought to the shop, and I never take a job that I know will be no good when patched up. Thereby, I have gained the confidence of the customers. W. G. WISE, California.

A Power Shop of Mississippi.—I would like to write something that would be helpful to your paper. I am not much of a writer, but have been taking the paper for three years and find it to be very helpful. I am a young smith, have worked about nine years, and, except the first year, have never worked for any one except myself. I have power in my shop, a three horse-power International engine, a band saw, a drill, a wood lathe, an emery stand, and intend putting in a power blower in the spring. I do all kinds of repairing in wood and iron, and will give you some of my prices:

Filling wagon wheel, spokes only, $3 and up.	
Filling wagon wheel, including felloes	$4.00 to $4.50
Wagon tongues	2.50
Buggy tongues	3.00
Set of four shoes	1.50
Set of four new shoes, toed	2.00
Resetting old shoes, each	.25
Sharpening plows, 8 to 10 inches	.10
Hand saws sharpened	.25 to .35

My other prices are proportionate to the above list. W. A. VANNOMEN, Mississippi.

Wants to See All Represented.—I want to write in answer to that man who did all the kicking in the November issue. He seems to think that THE AMERICAN BLACKSMITH is printed for horseshoers and horseshoers alone. He said that there were ten pages devoted to gasoline engines. That is all O. K. I have seen several issues prior to the October issue that were devoted principally to horseshoeing, and no one raised a kick about that. I say this much, if Mr. Kicker does not own a gas engine he need not think that there is no one else who owns one. I own a gas engine, and was just as glad to see so much information on gas engines as he is when horseshoeing is the feature. I say, brother smiths, come on with your gas engine instructions and horseshoeing articles too. There are lots of smiths who don't shoe horses, and if the paper was confined principally to that they would call their names off, for it would be of no benefit to them. Come on, Benton, with your suggestions; and to Thornton I say, Write more letters. I say come on with them, let's have a paper for all. I like to see articles for all the craft. Success to "Our Journal." C. F. RHODES, Arkansas.

A Reply to the November Kick.—In the November issue I saw an article headed, "A Kick and the Other Side." We all find articles in the paper we have no use for at present, but lay them aside and they will come in handy sometime. As to the gas engines, he may never want one, but some other smith who knows a thing or two may be sadly in need of one. Yes, Thornton's letters are all right, and so are Benton's talks. There's good knowledge in both. If Mr. Kicker will study them he will find good hints in both and very useful. Speaking of all smiths not being engine struck, now, I will venture to say, any smith who knows his business, even if he hasn't any engine, would like one if he is able to buy one. Now, I have no engine, not because I am not engine struck, but because I am not in a position to buy. Come again with your special issue, brother Editor. What some do not like others do; we cannot all be pleased. You are all right yet and will get just as many readers as you ever did. See if you can find out what our brother does like and give him a special issue. I think "Our Journal" is the best of its kind, and there are many that attempt to represent the craft. A. S. PRIMMER, Missouri.

The Location of the Forge.—In regard to Mr. Edmond Shoemaker's question, he wants to know if there is any advantage in having the forge out in the shop. I can answer his question with just one word, and that is, Yes. But a shop really ought to be at least thirty feet in width. I have always found that a forge tucked up in a corner, or against the wall, to get it out of the way, or "to make more room," as some will say, is the greatest mistake a blacksmith ever made. My plan is to get it right in the middle of the shop where it is in the way the most, and you will catch every job that comes along. If you have it up against the wall there will be lots of jobs that are very difficult to do, and some you will miss. If the forge is out in the shop you can work on all sides of it, and it doesn't take up the room that it will against the wall. If the forge is up against the wall, when you make a weld on long stuff, if you don't get it welded the first heat you are up against what I call a hard proposition, and you have a bad job. If you have your forge out in the room you can easily make the second heat if necessary. C. W. METCALF, Iowa.

A Well-Equipped Missouri Shop.—As I am a reader of THE AMERICAN BLACKSMITH, I thought I would write and tell you what kind of a shop I have. It is 20 by 50 feet, and the wood shop is 14 by 28 feet, all new, built nearly two years ago. I have two brick forges, two blowers, a three-horsepower gas engine, a power drill, an emery stand, a rip saw, a cut-off saw, a disk sharpener, a trip hammer, a power grindstone, a tire shrinker, a hot tire setter, and a good outfit of small tools. I run a good business and we have about all that three men can do the year around. I am lame at present, and I need a good man to help me in my spring work. I do woodwork of all kinds myself, when needed, and I don't know which trade I am the best at, wood or iron.

I like to read your journal very much, and always read it as soon as I get it. I like Thornton's letters and the prices I find. I am on an average with other smiths in prices. My motto is, "Not how much I can charge and collect, but how much I can give a man for a dollar, make a fair profit, and run my business so I can collect every cent of it." I cannot run a tricky cash business, but I always have an understanding with my customers, and I collect promptly. J. W. JEFFRIES, Missouri.

Another Reply to "Subscriber."—It is a little late, but I would like to have a word with the smith who kicked and who says, "We are not all engine-struck." That is certainly so; neither are we all stuck on horseshoeing; so if the question is equally divided all get a chance. As to Benton's talks, they are all right, and when I find a recipe that I haven't got in my scrapbook it goes in. It may be useful to me sometime, and if not to me it may be to someone else. As to price lists, I think they are all right, as it gives one a chance to know what others get. I believe all smiths should pull together; then they can get good prices; and if you can't get what the work is worth, then shut up shop, as it is better to do no business than to work at a loss or just a bare living.

Now, what has become of "Tubal-Cain"? I did not see his answer to the size of the wrench he had in a recent issue. That is the kind of work I like to have in the journal, but as there are others who have no use for it they must not think it should not appear in the paper, any more than I should work that they are interested in. "Live and let live," is a good motto. It does no harm to know all one can of other lines of work, as it is no burden to carry such knowledge. H. N. POPE, Connecticut.

An Electrically Operated Shop.—I have an up-to-date shop and do everything but shoeing. My shop is 30 by 80 feet, all one room, with only one post in it, and that is way back where I keep my lumber. The other timbers are trussed. It was built for a tobacco sweat house. The floor is three thicknesses of seven-eighths inch boards with paper between. The sides are the same, and overhead it is two thicknesses. I have a 40 by 40 foot paint shop that leads from my shop. From the accompanying plan you can see how I have it fixed up. My power is a five-horsepower Wagner electric motor. The town furnishes the power, and I pay three dollars a month. I have to pay whether I use it or not, but if I use it five hours a day it won't go over that.

$\frac{7}{8}$ by $\frac{1}{4}$ inch steel tires	$ 6.00
$1\frac{1}{4}$ by $\frac{5}{16}$ inch steel tires	7.00
$1\frac{1}{8}$-inch rims	6.00
$1\frac{1}{4}$-inch rims	7.00
$1\frac{3}{8}$ by $1\frac{7}{8}$-inch buggy shaft	2.00
Pair of shafts, old irons	4.00
$1\frac{3}{8}$ by $1\frac{7}{8}$ inch crossbar in shafts	1.25
Whiffletree, wood, old irons	1.25
Buggy spokes:	
One	.25
Whole wheel, each spoke	.20
Mending shaft iron	.50
Setting four buggy tires	2.00
Setting four buggy tires, 3 inch	4.00
Setting 4-inch tires	6.00
Kelly rubber tires and channels, $\frac{7}{8}$-inch	25.00
Sleigh shoes	3.00

Day work, 50 cents an hour; other prices in proportion. J. H. PHILLIPS, Massachusetts

That Unknown Lathe.—A York State Shop.—I see by the January issue of 1908 that Mr. Ed Lander, of Kansas, wants to know the manufacturer of a lathe which he has, and I will say from my knowledge of lathes I should say his is a Putnam, made by The Putnam Machine Co., of Fitchburg, Mass.

I would also like to state that I think the "Queries, Answers, Notes" and the advertisement section of THE AMERICAN BLACKSMITH alone worth the price of the paper. I would certainly like to see the automobile section continued. I run a power shop and the equipment consists of one forge, an anvil, two vises, a drill, a power band and circular saw, carborundum and polishing wheels, a grindstone, and a nine-foot by nineteen-inch swing screw-cutting lathe, all run by a four-horsepower Star gasoline engine. I also have a Reynolds tire-bolting machine, a Mole tire shrinker, a tire bender, a bolt clipper, and all the latest wrenches, bits, etc., as I believe in keeping up with the times. We cannot possibly repair the latest inventions in the machinery line with the ordinary homemade wrenches as blacksmiths did twenty years ago.

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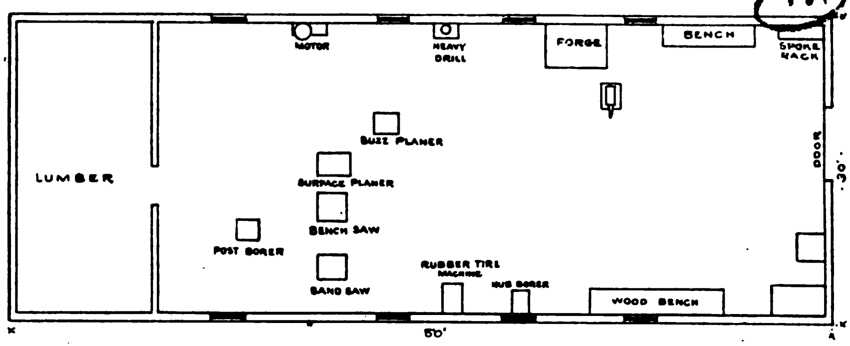


FLOOR PLAN OF A MASSACHUSETTS SHOP OPERATED BY ELECTRICITY

The local blacksmiths organized here six months ago and established a schedule of prices, but did not form a permanent organization. I certainly would like to see the blacksmiths of Rensselaer County form a permanent branch of the American Association of Blacksmiths and Horseshoers. As matters stand here now the farmers go to the city and buy their iron and woodwork, take it to some of the country blacksmiths and get the work done at the rate of about one dollar per day. They thus save one third to one half, as the farmer can buy of the jobbers near here just as cheap as the smith can. I do not consider this fair. I would not kick on my own account, as I have all the work I can attend to, but there are several smiths whom I know would be benefited by a general understanding, that are now working by hand and have a hard time to get along. D. E. SEYMOUR, New York.

A Young Smith of Minnesota.—I am a constant reader of your paper and don't think I could get along without it. I do all kinds of work in the blacksmith line and do from nine hundred to eleven hundred dollars' worth of work a year. I have always been alone until lately, when I happened to get a boy to learn the trade. I am only twenty-two years of age, and started to learn the trade at thirteen. My ather is a blacksmith, but I came away four years ago and have been running this business for the last three years. A year ago last fall I bought it for myself, and am quite well satisfied. I have a gasoline engine of five and one half horsepower, and a Little Giant trip hammer on which I do all my plow sharpening. I also have a disk and coulter sharpener, a drill machine, a power blower, and an emery stand. I intend to put in some more machinery this winter if I get time. The only way to make money nowadays is with machinery in a shop to do work quickly.

The blacksmiths in this vicinity have agreed on higher prices and joined the association, but some of them are not keeping the new prices as they should. They are always hanging back and are afraid they will lose a job or two, but I don't believe in that; charge a good price and do your work right, and you will not have any trouble. People are always satisfied with a good job, and, knowing where to get it, they will come back. I don't believe in working for nothing. If a man asks to have a job done and asks for the price, I tell him. Sometimes they tell me they can get a job done at this or that place at this or that price; then I tell him that is the place for him to go. That's the way I do, and that's the way I feel about it too. I have trouble quite often; they will leave once, but are glad to come back. JOHN SCHAFFER, Minnesota.

A MINNESOTA SHOP OPERATED BY POWER

A Cost Price List and a Selling Price List.—Although I am no blacksmith, I am a wheelwright. I have been reading the price list of P. V. Burgess, of Missouri. I will give you some of my prices on wood work:

Wagon box, complete	$20.00
Bolster, front or hind	2.50
Sandboard	1.50
New wagon axle, front or hind	4.50
New wagon tongue	4.50
Tongue hounds, each	1.25
Circle hounds	3.50
Hind hounds, each	$1.50
Bend rims, per wheel	3.00
Spokes and felloes, each	.30
Wagon reaches	$1.25 to 1.65
Bolster standards, each	.25
Brake beam	2.50
Brake blocks, per pair	1.00
Cutting down set of four wheels	11.80
Filling one front wheel	5.00
Filling one hind wheel	5.75
New buggy pole	5.00
Pole circle	1.00
Buggy reaches, each	1.25
Buggy doubletree	1.25
Buggy singletrees, each	.75
Head blocks, each	1.00
Spring bars, each	1.00
Axle bed	2.00
Brake blocks for buggy, per pair	.50
Buggy shafts, each	1.50
Crossbar for shaft	1.00
Filling one buggy wheel, spokes and rim	6.00
Half rim	1.00
Full rim	2.00
Buggy spokes, each	.25
Buggy body, frame bottom complete with seat, two coats of paint, no iron	2.00
Plow work, new beam	3.50
New plow handles, each	1.00
New plow rounds, each	.25
Repainting buggies	5.00 to 10.00

All other work in proportion. The Missouri brother may think that I am very high-priced, but I have to pay more for my material than he charges for some of his work and material. Of course, all my work includes painting. Now, I will give you a price list on what the material costs me: A wagon tongue costs me $2.25; wagon axle, $2.25; paint, $1.00 a quart; buggy pole, $3.00; doubletree, 75 cents; singletrees, 50 cents; head block, 75 cents; buggy reach, 75 cents; wagon bolsters, $1.35 each; spokes and felloes, 15 cents; a piece or two for half-bent rim, $1.00 per rim; tongue hounds, 60 cents each; circle hounds, $1.50; hind hound, 80 cents each; wagon reaches, eight feet 85 cents, ten feet $1.00, 12 feet $1.25; plow beams, $2.50 each. The price of oak lumber is $160 per thousand feet in this part of the country. S. F. MILLER, Nebraska.

A Letter from Indiana.—I will tell of our efforts in raising prices here. We met, last April, in this neighborhood and got sixteen blacksmiths and thirteen shops represented. We advanced prices on May thirteenth, with thirty-two smiths and fourteen shops represented. On the thirtieth of May we held a meeting, with forty-five smiths and twenty-six shops represented. On September fourth, we held another meeting. Our advanced prices are being held up fairly well. We had some kicks at the beginning, but they soon found it was no use. Finally two shops went back to shoeing for about the same old price. I heard they let the farmers bluff them out by saying that they (the farmers) would do their own work. I wish they could see the merits of good prices and hold to them. There is no need of having ill-will toward our neighbor. We should be able to confide in each other with our ups and downs, and to warn each other regarding dead beats. If a blacklist was published and we all agreed not to work for those listed until they paid those to whom they are indebted, we smiths would get lots of money that belongs to us. Why do we shield the dead beat? He can "skin" me, then go to my neighbor and tell him what a poor excuse for a blacksmith I am, and my neighbor will tell him that he could have told him that before, and first thing he knows he is "skinned" too. Then he will come back to me with the same tale and pay me cash for a while, and the reason I don't shut him off is because I have no confidence in my neighbor and he has none in me. Consequently, the dead beat has confidence in both of us and we are thus easily "skinned." I refused, this forenoon, to shoe a liveryman's horse, and he offered to pay me in advance. I told him, "No, I will not do any more work for you until you square up that old account of $22.32." I gave for my reason that if I did do his work, he would let the old account go and I would lose it anyway, and I did not want to and would not accommodate him even for cash. So he left and I went back to playing checkers with a loafer. I heard in the afternoon of the same day that the other smith shop had two of the horses locked up in his shop holding them for the price of shoeing. I wish I had it in my power to get every blacksmith to take your paper.

I enjoy Benton and Thornton; in fact, I like almost every article in "Our Journal." I read it all, then look forward to the next one. I have been working at the trade only one year. I do all my own work through the winter season. Here are a few of my prices:

Four new shoes, plain	$1.30
Four new shoes, toed	1.50
Four old shoes, plain	.80
Four old shoes, toed	1.00
Wagon axle, front	3.50
Wagon axle, hind	3.00
Front wagon hounds, iron complete	7.00
Same hounds, old irons	5.50
Wagon tongue, stiff	2.25
Wagon tongue, drop	2.50
Drop tongue hound, each	1.00
Neckyoke	1.00
Wagon singletree	.75
Wagon doubletree	.75

The prices of other work is in proportion. W. H. CHAMBERS, Indiana.

VOLUME 7 NUMBER 8

THE AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

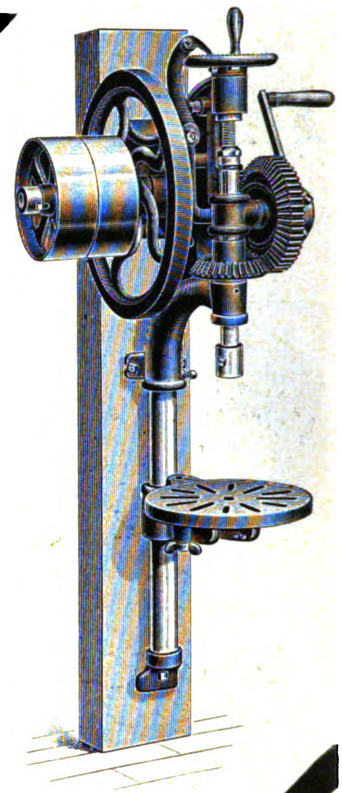
BUFFALO N.Y. U.S.A. MAY, 1908 $1.00 A YEAR 10c A COPY

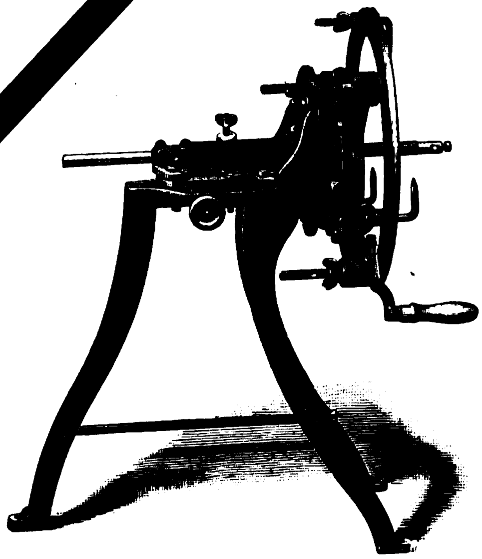
Which Booklet Do You Want?

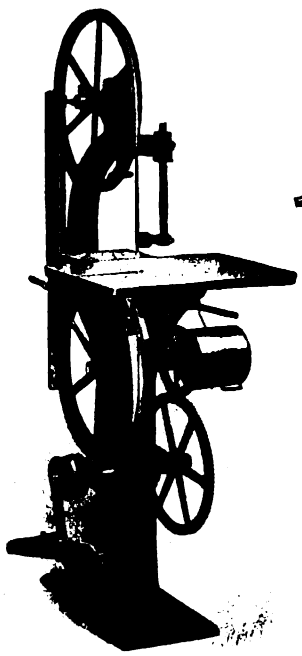
We have four new, tasty, illustrated booklets now ready, as follows:

> ***"Hub Boring and Spoke Tenon Machines"***
> ***"Portable Forges"***
> ***"Power Drills"***
> ***"Post Drills"***

Any of these booklets will call, if you say so on a post card to us.







The booklets fully illustrate and describe our complete lines of the machines indicated by their titles. The 20-inch combined foot and belt power Band Saw shown is of an entirely new design. It is also made for foot or belt power only, and in larger sizes for belt power.

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"Intercourse and Progress always go hand in hand."—Buxton.

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Our New Quarters.

Since our talk in the April paper we have made ourselves comfortable in new quarters Our removal from the Prudential Building to the new Sidway Building gives us just four times as much space as formerly. Our new home is the newest office building in the city, and is located at Main, Goodell, and Washington Streets. The building is of the most approved fireproof construction and is thoroughly modern in every detail. Here we have plenty of room for all of our departments, with some extra space for growth. This is another step forward in our satisfactory service to subscribers. We are now better fitted for promptly and efficiently caring for our subscribers' wants, needs, and desires, and we shall continue to add to our already very satisfactory service as occasion permits. We extend a most hearty invitation to all of our friends to visit us at our new home, and we trust that when in our beautiful city, whether on pleasure or business, you will not fail to pay us a visit.

This Issue.

And now comes a number with special reference and attention to the horseless vehicle. We believe that you will find much of value and interest in these pages this month. The automobile is gaining more ground every day, and while there is no likelihood of its eclipsing the horse entirely, the industry has certainly grown marvelously. The present season promises to bring more automobile work to the doors of the general smith than ever before. Buggy automobiles, or "buggy-abouts," are being placed on the market by a considerable number of concerns, and farmers and merchants are certain to buy these reasonable-priced vehicles. An agency for some good make of the smaller horseless vehicle should certainly pay the up-to-date smith very well. Then the side lines made possible in connection with auto repairing are almost without number. Autoists are generally good and liberal pay, and the smith should certainly grasp the opportunities presented by the evident popularity of the automobile.

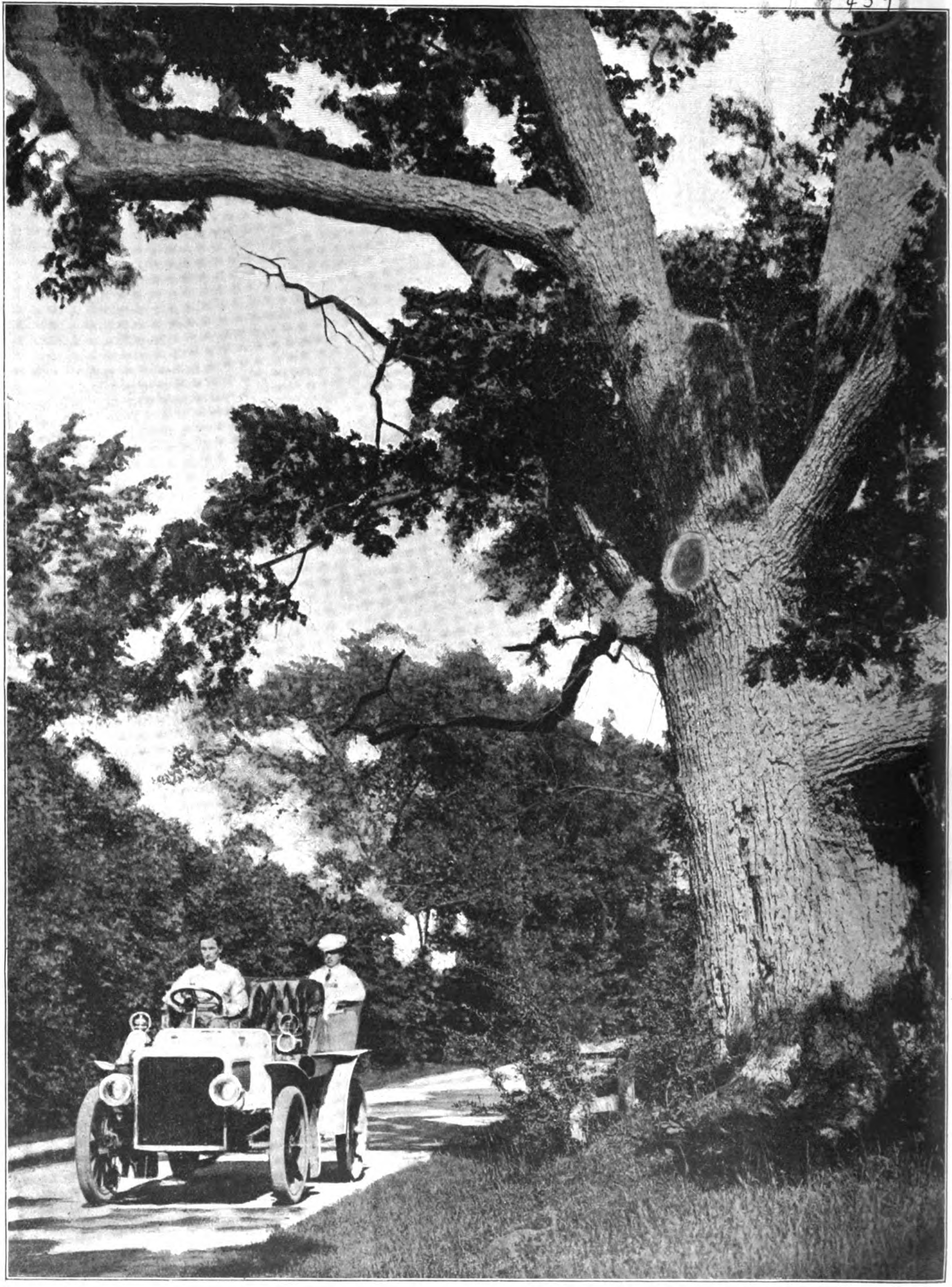
Contents, May, 1908.

From Texas.

"I consider it the best paper on earth for the craft. Any smith who does not take The American Blacksmith loses money, for it is a teacher. I am over sixty-one years old, have been at the trade for over forty-three years, and have learned lots from your valuable journal." Thus writes a Texas reader—over sixty-one and still learning. Show this to your neighbor who thinks he knows all there is to know about the craft. Let him read this letter from a man with over forty-three years of craft experience who is still learning from the pages of "Our Journal." Get right down to facts with your neighbor and show him just where and how The American Blacksmith can and will help him. There must certainly be some good reason for our Texas friend writing this way. The reason is simply this: the paper is making good; it is helping him and giving him information that his forty-three years at the trade did not teach him. Tell your neighbor—take this paper with you, get his subscription order and secure for yourself six months' credit on your own account. If you'll do it the fifty thousand will soon be a reality.

A Word of Caution.

In the hope that it may save "Our Folks" from loss, we make the following suggestions regarding dealings with solicitors, canvassers, and others who falsely represent themselves as agents of "Our Paper." When a canvasser is unable to prove that he is an authorized representative of The American Blacksmith, and is unknown to you, give him your order if you wish, but send your money direct to us at Buffalo. Where the solicitor shows proper proof of his being an authorized representative of "Our Journal," you may be assured that your wishes will have proper attention. But, when in the least doubt as to the honesty of the canvasser, send your money direct to Buffalo. If, at the same time, you will mention the name of the solicitor, the latter will obtain full credit for securing the subscription, and you will at the same time be protected from loss should the solicitor chance to be dishonest.



THE TOURING AUTOIST WILL DEPEND THIS SEASON MORE THAN EVER UPON THE PRACTICAL GENERAL SMITH

436.

FROM NEW YORK TO PARIS. THE THOMAS AUTOMOBILE ON ITS JOURNEY TO THE FRENCH CAPITAL

The General Smith and the Automobile

A Few Timely Hints

RICHARD KANE

OCCUPYING, as it does, so important a position in present-day affairs, the automobile is not a thing to be passed along by the general smith. While we occasionally find a smith doing bicyclerepairing, the smith equipped for general work should not allow the so-called automobile expert, with little, if any, more mechanical skill than the average smith, to take over the bulk of this repair work, as did the numberless bicycle repairers with cycle work when the cycling craze was at its height. And those general smiths who have not already prepared to care for the automobile had best get busy now. It requires no special education. The general smith, being already of a mechanical turn of mind, should have little or no difficulty in making himself so familiar with general automobile construction as to make a repair with ease and dispatch. It is, of course, impossible to know each make of motor car perfectly, but it is by no means impossible to so familiarize one's self with the more popular cars as to make intelligent examination of them when broken down or when stopped by a lesser trouble.

The smith having a gas engine in his shop and understanding the principles of its operation will find himself very much more at home when repairing an automobile engine using gasoline for fuel, than the smith to whom gas engine operation is somewhat of a mystery. Of course, there are numerous other parts of the horseless vehicle which must be understood. Besides the motor or engine, there are the ignition system, the cooling system, the exhaust and lubrication systems, and the transmissions. The axles, wheels, springs, and frame are already a part of the general smith's education, while the tires of the horseless vehicle should give him little trouble.

CAPTURED BY THE INDIANS

The troubles which occur in connection with the motor are not usually serious. There are, of course, times when the smith may be called upon to repair a badly damaged motor. But it is the exception, rather than the rule, when the repair cannot be made quickly and easily. Broken valve stems,

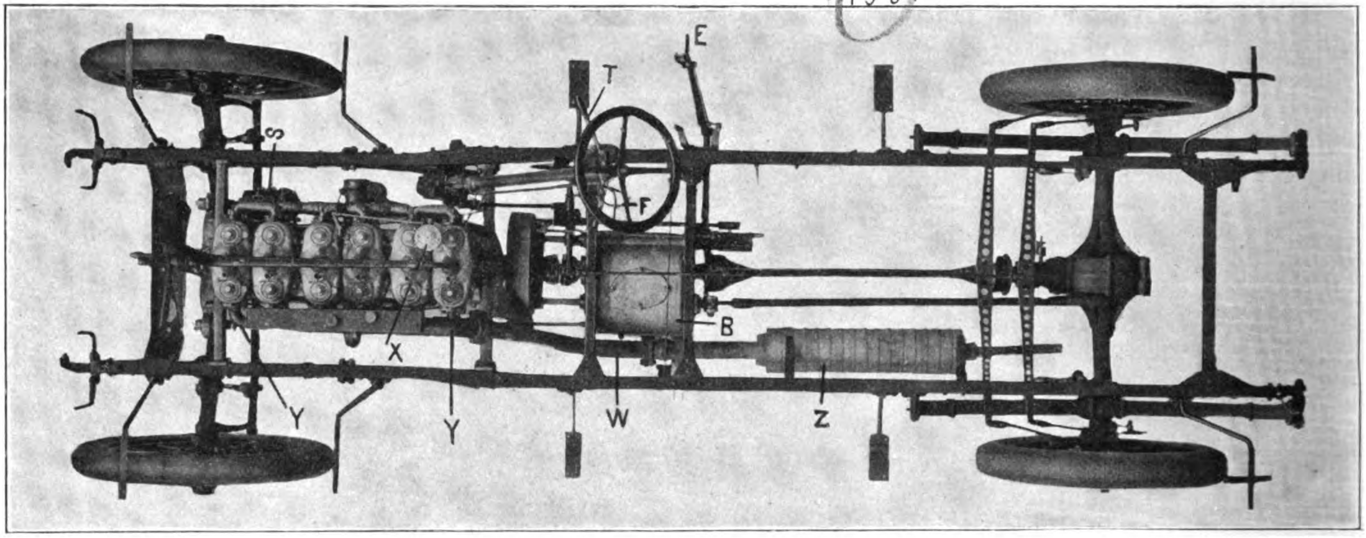


FIG. 2.—THE CHASSIS OF A PIERCE SIX-CYLINDER AUTOMOBILE SHOWING MOTOR AND BRAKE MECHANISM

cracked cylinders, broken connecting rods, piston, rings, and the like will sometimes tax the ingenuity of the smith, but good common sense mixed with mechanical training will usually suffice to accomplish a repair for the autoist and a generous fee for the smith.

It is impossible to detail the troubles likely to be brought to the attention of the general smith. The ignition, cooling, and lubricating systems are all liable to failures the same as the engine, but some familiarity with the systems and a liberal use of common sense will usually suffice to affect a repair.

As to the minor troubles, let us consider that the smith has accomplished the repair but in attempting to start the engine he finds it will not go. There are a number of causes for this failure, viz.: the fuel supply may not be turned on, or the fuel supply pipe may be clogged; there may be too much or too little fuel in the carburetor; the valves may be stuck or broken; the batteries may be too weak, the switch may be off, or the battery connections be broken; the spark plug may be sooted or moist; the timing device may be inaccurately set, and if cold weather the gasoline may condense. To remedy any of these troubles let the smith go carefully over the various parts of the motor. A frantic turning of the starting handle only makes matters worse, and after the engine refuses to respond to three or four turns a careful examination of the machine should be made by the smith.

In the event of the engine running with the switch off, there is very likely a short circuit somewhere in the ignition system. This may, however, be caused by something inside the cylinder which ignites the charge by becoming incandescent. Still another reason for running when switch is at off position is a defective switch.

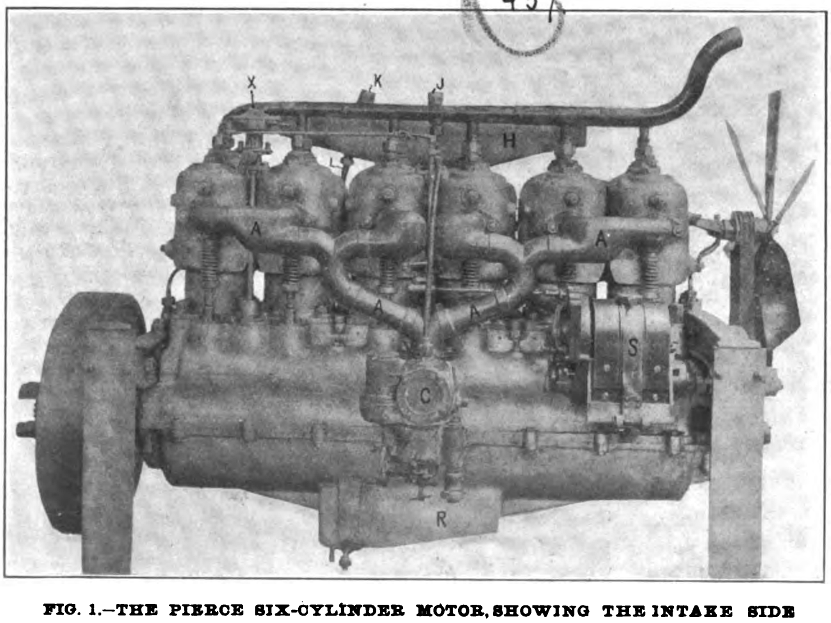


FIG. 1.—THE PIERCE SIX-CYLINDER MOTOR, SHOWING THE INTAKE SIDE

Another trouble which the smith may come in contact with is the binding of the piston in the cylinder. The reason for this may be lack of lubrication in the cylinder and consequent overheating; it may be overheating by reason of insufficient cooling, or it may be caused by a broken or cracked piston ring. The binding of the piston makes itself readily apparent by the difficulty or entire refusal of the starting lever to move.

If there is a knocking in the engine it may be caused by improper lubrication or by water in the cylinder, the spark may be advanced too far, bearings may be worn or loose, tops of piston may be fouled with carbon, or the cylinder may be loose on the crank case.

In conclusion, let us consider the operation of valve grinding. To do this as it should be done, remove the inlet and exhaust pipes and then compress the valve spring and remove the key from the valve stem. The valve caps are then removed and the valves lifted out. Now, coat the bearing surface of the valve with a paste made of fine emery flour and oil. The valve is now put in place and turned backward and forward with a screwdriver. After turning a few times in this way, raise the valve, give it a quarter turn, and repeat the grinding. This is continued for several minutes, the paste being replenished as it is rubbed off the valve seat. When the valve seat and head are of an even brightness throughout their entire circle of contact, the grinding should be discontinued. The valve seat, stem, and every adjacent part is now thoroughly cleaned with gasoline and carefully wiped of every particle of grinding mixture. The valve stem may now be rubbed with a little graphite and the valve replaced as originally.

Good common sense, mixed with a natural ability for mechanics, will enable the practical smith to successfully cope with automobile problems, and little, if any, difficulty will be experienced by the man "who uses his head." It means extra profit, and without any great amount of outlay.

An old toothbrush is an excellent thing for cleaning the soot from the spark plug and its porcelain body. Good thing to keep one handy. T. A. B., New York.

A good big package of common sense is the best assistant the auto repairer can have. But he should carry it with him always. THORNTON.

Black smoke at the exhaust says "too rich a mixture," that is, too much gasoline for the amount of air in the fuel. Blue smoke says "too much cylinder oil." This latter causes sooting of the spark plug. E. G., Ohio.

The Pierce Six-Cylinder Forty-Horsepower Car.

The accompanying engravings show a top view of the Pierce chassis and also a view of the intake side of the six-cylinder motor. The car of which these are parts is a 43.8-horsepower machine, with a seven-passenger body, a wheel base of 130 inches and 36-inch road wheels. The motor is equipped with double ignition and is oiled by what is known as the mist system.

In Fig. 1 the oil tank is shown at H. From here the oil is fed by gravity by a system of seven leads to the seven engine bearings. Upon reaching these bearings it passes through the bored crank shaft to the lower connecting rod bearings. The overflow from these is thrown off and broken up by striking on the crank case into a mist, in which form the pistons suck it up through the openings for the connecting rods. The surplus oil drops back into the crank case, drains into the reservoir R, from where it is pumped to the tank H. The filling cap for this tank is shown at J. The cap K is for the purpose of removing and cleaning the filter gauze at the top end of the return oil pipe L.

The fuel is supplied to the cylinder through the carburetor C and the pipes AAAA. The graduated pipe D on top of the cylinders carries the water to the radiator. The fan at the right, being behind the radiator, keeps it cool. Ignition is obtained by either of two means: one set of spark plugs is connected with the Bosch magneto at S, while another set, separate and distinct, is connected to a storage cell, a six-unit coil on the dash, and the commutator on the top of the vertical shaft at X. Spark regulation is accomplished by means of the lever F in Fig. 2, attached to the steering column.

The exhaust system is not shown at all in Fig. 1, being on the other side of the engine. In Fig. 2 the exhaust may be traced from the cylinder at YY through the pipe W, and to and through the silencer, or muffler, Z.

The speed control is shown at T. This lever regulates the three forward speeds, while the reverse is controlled by a lever immediately beneath T and also attached to the steering column. This lever is not shown in the engraving. The gears are inclosed in the gear case at B. This is suspended beneath the cross members of the frame and thus permits of being demounted without necessitating the removal of the car body.

The brakes, of which there are two, —i. e., the regular service brake and the emergency—are controlled by means of the lever E for the emergency and a foot pedal below the steering wheel for the regular service brake.

On the Care of Automobile Tires.

F. R. BUTLER.

Tires are to the automobile what shoes are to the horse, and, being of such importance, a certain amount of care is needful to their full and proper use.

It is generally known that oil of any kind is injurious to rubber. It is, therefore, imperative that a car be never allowed to stand with the tires resting in any oil. If lubricating oil is by chance dropped upon the tires it may be removed with gasoline, which, evaporating quickly, causes no injury to the rubber.

The best place to store tires is in a dark, cool place. Sunlight and heat are both injurious to rubber, and any great amount of exposure to sunlight and heat will make the tire hard and brittle. It is, therefore, unwise to display casings or inner tubes in the window, or where they will be subjected to the direct rays of the sun or to heat.

When a car is idle for any great length of time it is well to support it on horses, so as to remove the great strain to which the tires are subjected when they support the car. Should the car be idle for several weeks, the tires may be partly deflated after the car is placed on horses. Four supports, or horses, may be very easily made of stout timber,

THE THOMAS RACER IN INDIANA ON ITS WAY FROM NEW YORK TO PARIS and placed under the axles after using the jack.

As for the wear of tires, it is the best of economy to have the tires retreaded—i. e., a new tread put on—as soon as the fabric of the tire begins to show. As

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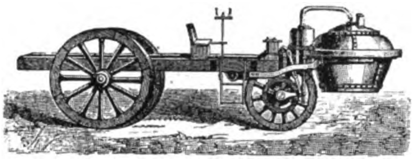

CUGNOT'S GUN CARRIAGE OF 1769

long as the fabric is protected from moisture by its rubber covering, it will retain its strength, but as soon as the moisture and grit of the road is permitted to penetrate the fabric, it begins to wear, and its strength and resistance fail. For this reason tire blisters should receive immediate attention, as they soon allow sand, grit, and moisture to get under the rubber covering and thus to wear the fabric of the tire.

The Self-Propelled Buggy.

C. E. DURYEA.

The history of the self-moving buggy is locked up in that of all vehicular traffic; for it is practically certain that the genius who first employed wheels also yearned for some method of propelling them without muscular labor. Homer, nearly three thousand years ago, told of them (Iliad, eighteenth book), and describes Vulcan "puffing loud" and "bathed in sweat" as he worked because

"That day no common task his labor claimed:
Full twenty tripods for his hall be framed,
That placed on living wheels of massy gold,
(Wondrous to tell.) instinct with spirit rolled
From place to place, around the blest abodes
Self-moved, obedient to the beck of gods."

This short description appeals to me as prophetic; probably because it strikes the bottom thought of the self-moving carriage so aptly. A three-wheeler is the simplest form; no mechanism except "spirit" (gas) is indicated, and they moved without the manipulation of many levers, handles, and steering wheels, apparently at the beck of the operator. The motor buggy that will eventually be used by the masses must

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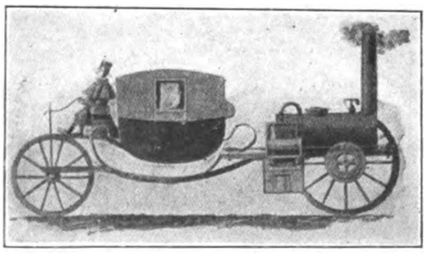

SYMINGTON'S STEAM COACH OF 1785

come well toward this simple form and easy manipulation, although it may seem impossible today.

The Chinese are said to have propelled vehicles by sails centuries ago. Roger Bacon, a learned Franciscan monk, writing about 1300 A. D., said, "We will be able to propel carriages with incredible speed without the assistance of any animal."

One or more carriages are known to have been propelled by springs about the middle of the sixteenth century, but no real progress was made till the latter part of the eighteenth. At this time the success of the steam engine fixed the attention of the public on power-driven devices, and many plans for propelling vehicles were presented. The credit for the earliest of the actual constructions of this period seems to belong to Cugnot, a Frenchman, who built a steam carriage about 1760 which would run ten or fifteen minutes at a time and then stop to get up steam. A later one, built under the auspices of the French Government, wrecked itself while going at the rate of three miles per hour, and because of the prejudice of the public was not rebuilt.

In England, progress was most rapid. Symington showed a neat compact model of steam coach in 1785. The next year Oliver Evans, of Philadelphia, received a patent from the State of Maryland for his steam carriage invented more than a dozen years before. Watt included his ideas on the subject in a British patent, and Murdock made a small model that outran him on its trial trip.

The imperfect knowledge of the subject, the scarcity of suitable machinery to produce such devices, and the infancy of mechanical power generally, prevented the production of really practical vehicles at this time. The next century opened, however, with a high-pressure noncondensing engine made by Trevithick and Vivian, which drew a load of ten tons besides its own weight on a Welsh tramway. In 1825 the Stockton & Darlington Railroad was carrying passengers. From this time forth, the locomotive running on tracks succeeded rapidly and took precedence over its father, the road vehicle. A number of reasons contributed to this. Public prejudice was against the road vehicle, but did not exist against the track one which ran on its own right of way. There were many predictions of dire things to happen, and assurances that one might as safely be fired off on a rocket as to trust one's life to steam cars going at eighteen or twenty miles

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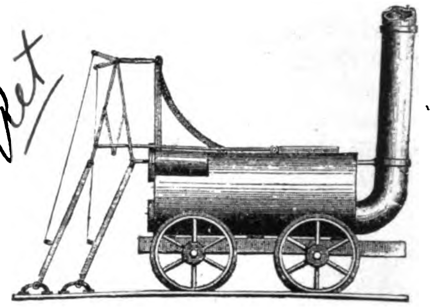
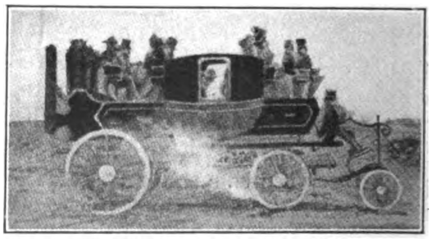


BRUNTON'S "MECHANICAL HORSE" OF 1790

per hour, but the service rendered was the best answer, and on special tracks the new vehicle could run satisfactorily and economically.

Development of road vehicles did not then cease, however. From 1824 to 1830, James, of Birmingham, made several public vehicles, but they were not successful financially. Gordon's device, 1824, and Gurney's first machine had propelling feet, it being believed that wheels would not give sufficient traction. Two years later, 1826, Gurney built another, discarding the feet, and in 1829 built a third, which ran from London to Bath at the rate of fifteen miles per hour, a most creditable showing on the road. Hancock and others built steam coaches, some of which ran about London and covered distances of more than one hundred and twenty miles in a single day. These attempts continued with increasing success until about 1844, when adverse legislation limited the speed and required a man ahead with a red flag, practically terminating this promising industry. For half a century and over it was tied by law, while in later years France and America took up the problem and forged ahead of England, with the result that now England is making strong efforts to catch up and supply her own market and keep at home the money now sent to France and America, to say nothing of the foreign trade she would have had.



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GURNEY'S STEAM CARRIAGE OF 1827

It will be noticed that, thus far, the buggy idea hardly appears. The two main reasons for this are that there were few carriages of any kind and the light motor suitable for a buggy had not been made. The buggy is a modern

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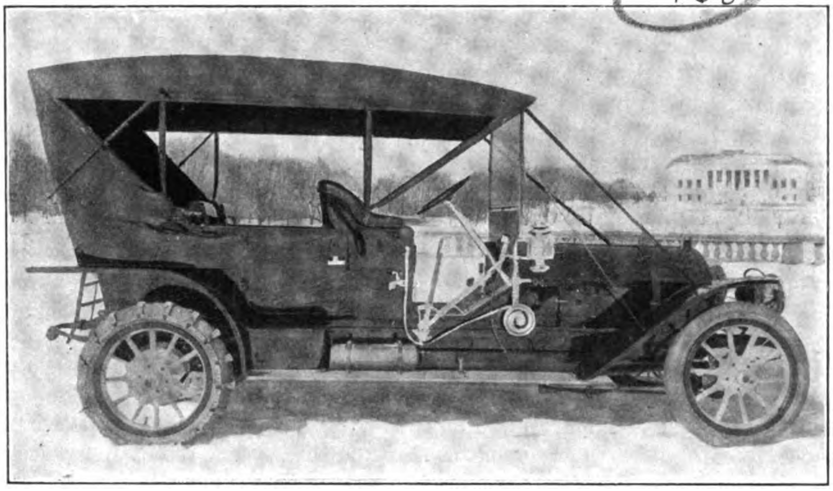
device. It is true that Joseph, 1700 B. C., sent wagons to carry the goods of his brethren, and that Egypt had chariots. The Romans built roads several centuries before Christ and made use of them with wheeled vehicles. Nero is said to have had a thousand carriages in his retinue. But the greater part of the world had no roads. Traveling, other than on foot, was by water or on horseback. There were but three carriages in Paris in 1550, and coaches were introduced into England in 1580. Even Queen Elizabeth had, prior to this time, when she appeared in public, ridden on horseback behind her chamberlain. Not only were there no roads fit for use, but, as always happens, the desirability of wheeled carriages had to be known before roads were made for them. Within the next century streets and roads had been so improved that there were six thousand coaches in London. The condition of the roads may be better appreciated from the statement that a Danish prince, visiting England, spent six hours going nine miles on a common road, attended by a body of men on each side of his coach to keep it from upsetting. It is quite evident that with such roads there was little use or pleasure from carriages of any kind, and we should keep in mind that the desirability of the motor buggy will do more to bring good roads, with their many profits and pleasures, to this land than any other one thing. It is true that present constructions can and do pass over all roads that ordinary traffic employs, but it is also true that this is done with heavier and more costly mechanism and at greater expense than would be necessary if the roads were improved to the high degree that marks almost every other item in daily use. Road improvement will not only come with the use of the buggy auto, but it will permit a cheapening in price and improvement in quality such as was seen in the buggy during the past half century, till now almost every farmer boy has his own buggy and several of these vehicles are found on practically every farm.

(To be continued.)



THE THOMAS SIX-CYLINDER SEVENTY-HORSEPOWER AUTOMOBILE

Emergency Automobile Repairs.

F. J. C.

The blacksmith shop is very often the only place where repairs on an automobile can be made, and in this article an attempt will be made to give a brief outline of the principles of making emergency repairs in motor vehicles.

In every case the greatest care should be taken that the repaired piece is of the same length as it was originally; otherwise, the entire adjustment may have to be changed. The correct method to use in ascertaining this is to join the two broken pieces and measure between two prominent points, getting measurements on at least two sides to insure the proper dimensions. Then, after making the welds or other repairs, these measurements may be again taken. If the piece is found to be too short it may be drawn out with very little difficulty, or if too long it may easily be upset.

When it is impossible to make a weld of the piece, a sleeve, which should be put on hot to allow it to set tight, is bolted or riveted on, and will, in most cases, make a sufficiently strong temporary repair. Repairs of this class depend largely for their success upon the ingenuity of the blacksmith and his

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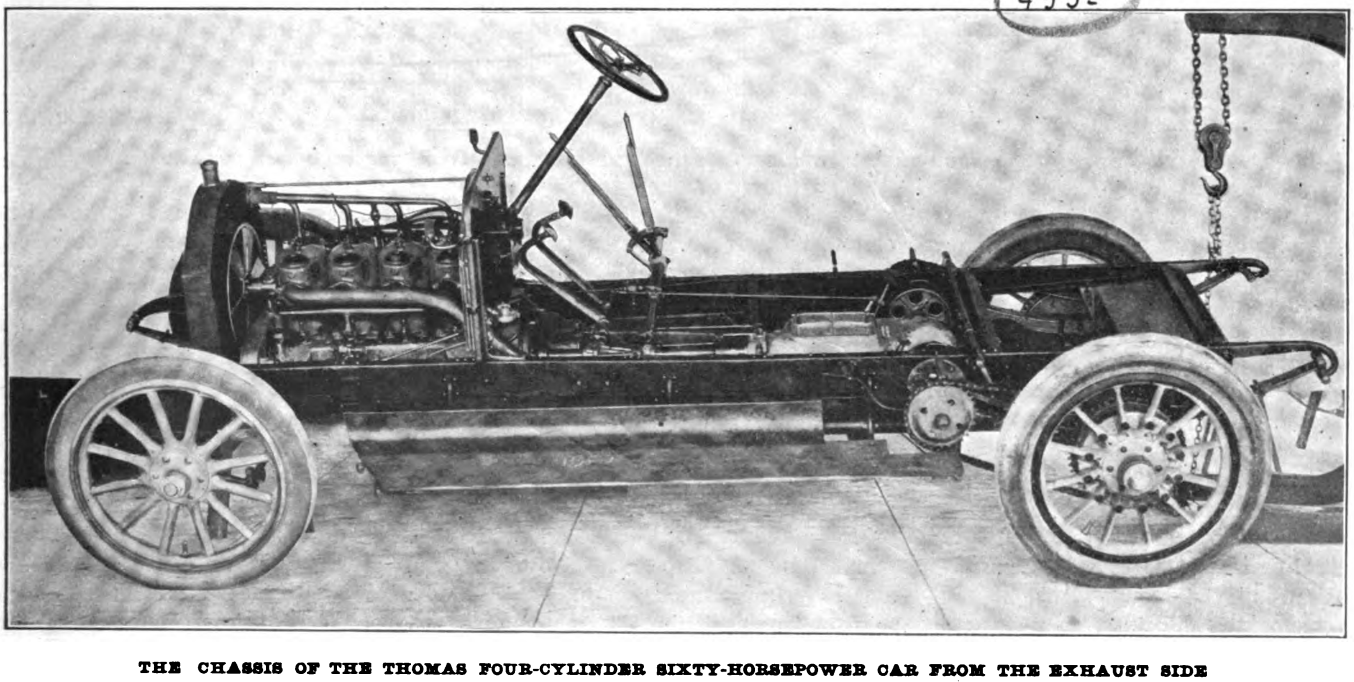


THE CHASSIS OF THE THOMAS FOUR-CYLINDER SIXTY-HORSEPOWER CAR FROM THE EXHAUST SIDE ability as a general all-around handy man. In many cases, it is necessary for him to figure out ways and means after the injured part has been removed from the car; and the writer has seen some remarkably clever makeshifts employed by blacksmiths in various parts of the country.

The harder class of repairs, as far as the ordinary blacksmith is concerned, is that where the trouble is with some adjustment or other part of the mechanism which cannot at once be located. In this case it is necessary first, to locate the trouble and, after it is located, to discover some means of repairing it. We will try to outline a method of discovering the trouble:

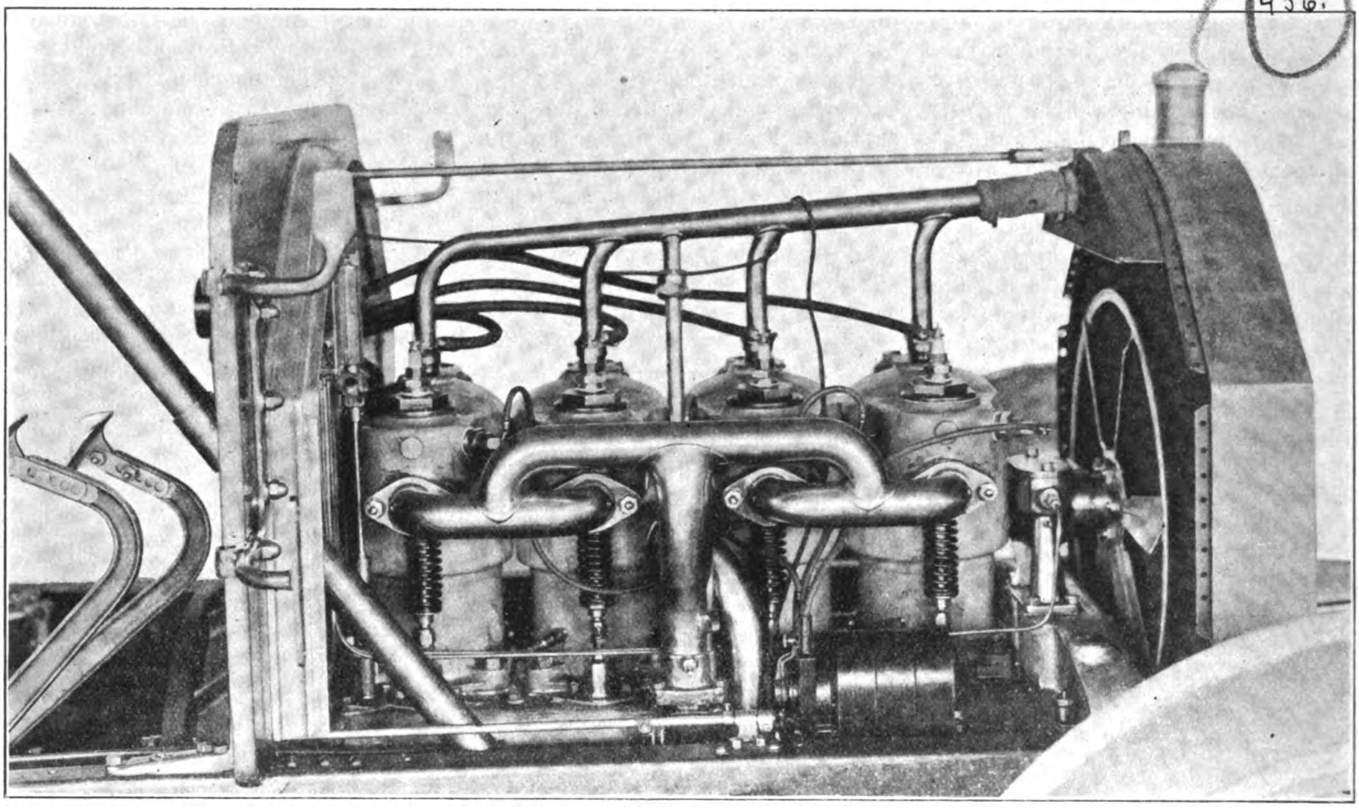
If the motor is running, engage one of the gears and start up the car; engage, possibly, the first speed. If the motor is running well, and the car moves well on first speed, the trouble must, necessarily, be in some of the other gears of the transmission. Then try the other speeds in succession, and discover which gear is at fault. It will then be necessary to remove the cover of the transmission, and, after placing the gears in their respective positions for the various speeds, so adjust the actuating lever, or whatever appears to be causing the trouble, that it may overcome the difficulty.

In case, after the gears engage, the machine refuses to run properly on the first gear, try the second gear. If cars run badly on the second gear, as well as the other gears, the trouble is not in the transmission, but must be between the motor and the ground, somewhere outside of the transmission, if the motor is running well. Then examine the clutch. Have your assistant engage the clutch slowly while the motor is running, and the trouble in this will be easily discovered. Some cars have very complicated clutches and will require considerable tinkering, but in most of the high-grade cars the clutch has been reduced to such a simple design that it can be easily adjusted and repaired by anyone with a slight knowledge of mechanics.

Should the trouble be not in the clutch, it must be between the transmission box and the axle. If the car is a double side-chain drive, see that the sprockets are securely fastened, that the bearings are snug, and see that the shaft is snug in the differential gear box. If it is a shaft-driven machine remove the cover of the rear axle, examine the gears, and see if they mesh properly, if the shaft ends are properly secured; and it may be necessary to remove the driving shafts from the axle to examine the bearings.

If the trouble is in the motor and the motor refuses to start, this procedure should be followed: With the current on the coil and being sure to have gasoline in the carburetor, take hold of the starting crank. Pull it slowly upward and assure yourself that there is compression in each cylinder. If there is no compression, discover which cylinder lacks this, and tighten it up by trying all the plugs with a wrench, and if that does not suffice, shoot a quantity of oil into the cylinders through the spark-plug aperture. If this does not remedy the trouble, you may be sure that the valves leak. You should then examine both the intake and exhaust valves, and determine which one is the cause of the trouble. Then, with regular valve-grinding compound, or with fine emery and oil, the valves should be ground in until proper compression is obtained.

If the motor still refuses to start, examine the ignition apparatus. Assure yourself that the motor can run since the ignition was tampered with, and that the spark appears in each cylinder at the proper time. To examine spark plugs, remove them, turn the engine over by the crank and see that the sparks occur at the proper time and with the proper intensity. Should it not occur in any of the plugs you will find first, the trouble is with the primary wires between the battery and the coil, one of these being "open," that is to say, the circuit being



A CLOSER VIEW OF THE FOUR-CYLINDER SIXTY-HORSEPOWER THOMAS MOTOR, SHOWING THE INTAKE SIDE

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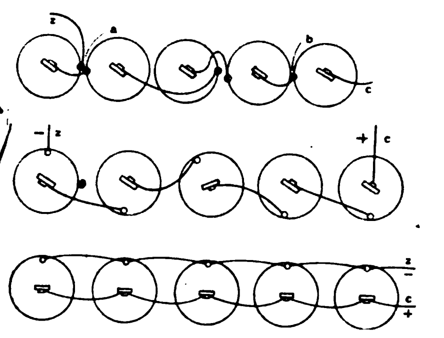

FIGS. 4, 5, AND 6.—SHOWING FAULTY AND CORRECT CONNECTIONS FOR CELLS

broken; second, that the batteries have run out; or, third, that the circuit is broken somewhere within the coil itself. To test this, attach a wire to each terminal of the battery, after having assured yourself that the batteries are properly connected among themselves, and place the two ends of these wires upon the tongue. This will not result in any physical pain or a shock, but a salty taste will assure you that there is current. Another way of determining that there is current is to place one wire firmly upon a file and rub the other wire rapidly up and down the file. If a spark is produced, there is current in the wire; if no spark results you may be sure there is no current.

(To be continued.)

Gas Engine Ignition Batteries.—3.*

WALTER IRVING.

What is known as a "reserve" dry cell has been placed on the market by one manufacturer, especially for automobile engine ignition service, but it is equally well adapted for stationary engine ignition work. As its name implies, the cell is for use as a reserve when the regular battery equipment gives out. The deterioration to which the ordinary dry cell is subject when not in use is prevented in this so-called

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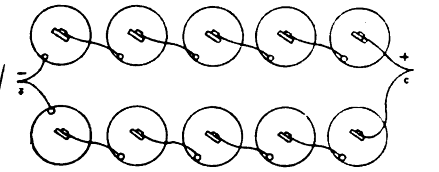

FIG. 7.—CELLS CONNECTED IN MULTIPLE SERIES

"reserve" cell by leaving out all moisture in making up the cell, thus rendering the contained chemicals inactive until water is introduced through the carbon plate, which is made hollow for that purpose. After the water is put in, the cell becomes active and is then identical with the manufacturers' standard type of dry cell. The makers recommend that the two sets of cells usually carried on automobiles be coupled in multiple series in order to secure the maximum length of service from the two batteries, an extra battery of reserve cells being carried for use in case of emergency. Another concern manufactures what is termed a "semi-dry" cell, wherein is used a sal ammoniac jelly, or paste, from which the term "semi-dry" is derived. In this type of cell the polarizing material is packed tightly around the carbon plate under a pressure of about 10,000 pounds, forming a mass or cartridge of such size as to leave an eighth of an inch space between it and the outer zinc cup. This space is filled with the "semi-dry" electrolyte jelly, and the cell is then sealed like an ordinary dry cell. When short-circuited, however, the electrolyte will be forced out of the cell, which thus differs from an ordinary cell, which gives indication of a short circuit. It is claimed that this method of manufacture makes it possible to use a greater quantity of electrolyte without reducing the quantity of depolarizing material, thus increasing the capacity and durability of the cell. The cells give efficient service even when their current output capacity has been reduced below the point at which some types of ordinary dry cells become practically useless because of polarization.

Primary dry-cell batteries should be kept in a dry place, preferably in a covered box, for if the paper boxes surrounding the zinc cups of tightly crowded cells become wet, the cells will be short-circuited and the battery thereby ruined. The cells should be arranged so as to obviate the possibility of short-circuiting any one of them when wiring them, care being exercised to keep the zinc connections of one from touching that of another, as at *a*, Fig. 4, or from coming into contact with the edge of the zinc cup of the next cell, as at *b*, Fig. 4.

According to the service required of them, primary cells are connected up in three ways: in *series*, in *multiple*, and in *multiple-series*. When wired in series, as shown in Fig. 5, the positive, or carbon, terminal of one cell is connected to the negative, or zinc, terminal of the next cell, and so on. When coupled in series the strength or amperage of the battery current is the same as that of a single cell, but the voltage is multiplied as many times as there are cells connected up. For example, if five cells of 1.5 volts are connected in series, the battery voltage will be 5 x 1.5 = 7.5 volts.

Cells are connected in multiple in order to increase the current strength, or amperage, without increasing the voltage of the battery above that of a single cell. As shown in Fig. 6, all the positive terminals are connected to one conductor and all the negative terminals

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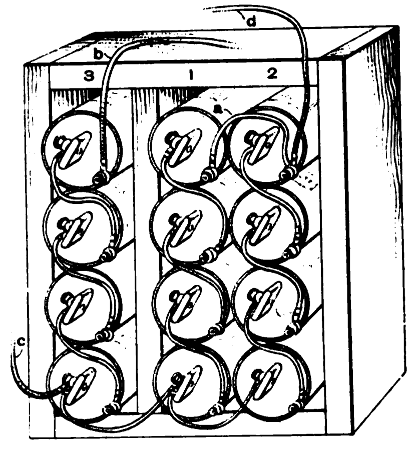

FIG. 8.—A BATTERY BOX CONTAINING TWELVE CELLS

to another. If all of the cells are of the same kind, and alike in electrical condition, the E. M. F. produced will be the same as that of any single cell of the group, but the strength of the current that will flow when the external circuit is closed will be multiplied as many times as there are cells connected in multiple. In other words, a battery made up of five cells showing singly a current strength of 22 amperes would produce a current of 110 amperes.

Multiple-series connections represent a simple combination of the series and multiple methods of connection, making it possible to adjust the tension (voltage) and strength (amperage) of the current output to suit whatever conditions are to be met. Each set of cells in series is called a *series unit*, the voltage of which depends on the number of cells used. The strength of the current produced depends on the

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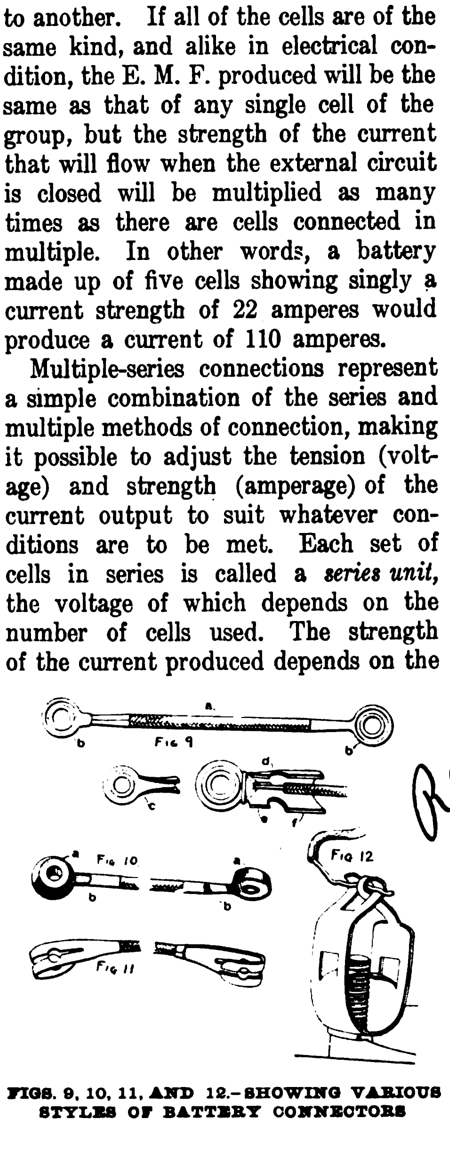

FIGS. 9, 10, 11, AND 12.—SHOWING VARIOUS STYLES OF BATTERY CONNECTORS

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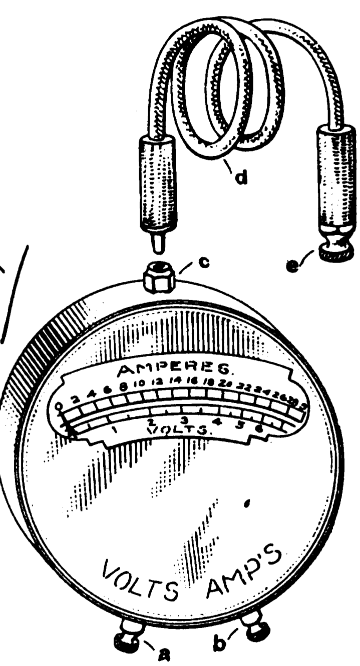


FIG. 13.—SHOWING A VOLT AMPERE-METER

number of series units connected in parallel. Hence, the voltage of the battery shown in Fig. 7, having two series units of five cells each, is five times that of a single cell, while the amperage is twice that of a single cell. After connecting the cells in series, as shown in Fig. 4, the positive terminals of the series units are connected to one conductor and the negative terminals to another, thus placing the series units in parallel, thereby increasing the strength of the current as many times as there are series units.

An actual battery box of twelve cells connected in series-multiple is shown in Fig. 8. It will be noticed that the negative, or zinc, terminal of series unit 1 is connected to that of the series unit 2 by the connector *a*, while to the negative terminal of the series unit 3 there is a separate connection *b*. All the carbon, or positive terminals, however, are connected to one conductor *c*. Ordinarily sufficient current is supplied by series units 1 and 2, but when an increased output is desired the reserve is brought into use through a suitable switch or by connecting *b* directly to *d*.

Note that, whatever may be the scheme followed in making connections, the cells must always be wired so that the direction of flow of the current in every part of the external circuit shall be from the carbon (positive) to the zinc (negative). This should be borne in mind in following out the path of the current in all electrical circuit diagrams, wherein the carbon and zinc plates of the battery cells are conventionally represented by alternate light and heavy straight lines of different lengths. In all such diagrams the light line is used to represent the carbon plate, the short, heavy line indicating the zinc plate.

To facilitate the work of wiring the cells and at the same time to obviate trouble due to imperfect electrical connections, it is generally considered advisable to use special battery *connectors*, several types of which are illustrated in Figs. 9 to 12 inclusive. Fig. 9 shows a common type of connector made up of a well-insulated heavy wire *a* soldered to corrugated copper terminals *bb* at the ends. In Fig. 10 is shown a connector with rubber washers *aa* to one side of the copper terminals, which are folded over the wire soldered to them at *bb*. Under pressure of the binding post nut the rubber gasket, or washer, serves to hold the terminal tightly in contact and at the same time to prevent the connection from jarring loose because of vibration set up by the engine. Fig. 11 shows a popular type of battery connector having split spring-brass terminals adjustable to any size of binding post and with sufficient spring to bind the terminal tightly enough to prevent loosening under the influence of vibration. A spring-clip binding post attachment for making battery connections without using special terminals at the ends of the wires is shown in Fig. 12, which illustrates the method of attachment. Heavy, well-insulated single wire connectors should be used with this device.

Primary dry-cell batteries require no attention other than occasional testing to determine what their condition may

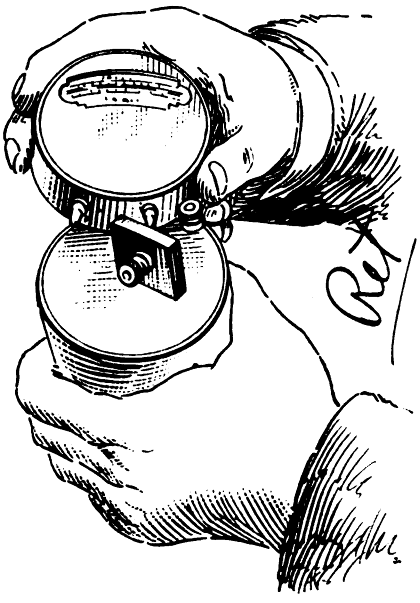


FIG. 14.—SHOWING THE VOLT AMPERE-METER IN USE

be, as indicated by the volt amperemeter, one type of which is shown in Fig. 13. This instrument, which is really two instruments in one, representing a combination of voltmeter and ammeter, is of such size that it may readily be carried in one's pocket. It indicates the voltage of the current when the terminal *a* rests on the positive, or carbon, plate of the cell and the terminal *c* is connected to the negative, or zinc, plate terminal by means of the insulated conductor *d*. To determine the strength of the current in amperes the terminal *b* is placed in contact with the positive terminal of the cell, and the terminal *e* is placed in momentary contact with the negative terminal of the cell. The contact should last but for an instant—just long enough to get a reading,—because the cell, which is short-circuited through an instrument whose resistance is very small, would be ruined quickly in case the contact were prolonged for any considerable length of time. As a matter of fact, it

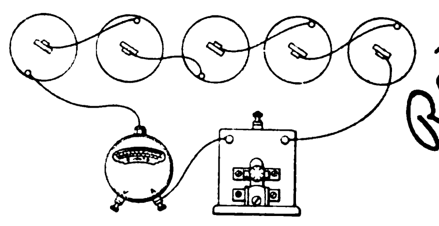


FIG. 15.—AN AMMETER CONNECTED WITH BATTERIES AND SPARK COIL

is not good practice thus to test cells frequently, because excessive ammeter testing is injurious to the cells. No sane person familiar with electrical apparatus would think of deliberately short-circuiting a dynamo, yet the act of short-circuiting a cell by testing it with an instrument interposing little resistance in the circuit involves the same principle and produces an equally undesirable effect. Protection against ruination of a dynamo by short-circuiting is afforded by "throwing" of a circuit breaker or the "blowing" of a fuse, but the primary battery cell, lacking such safeguards, can be protected only by obviating in every possible way the probability of a short circuit.

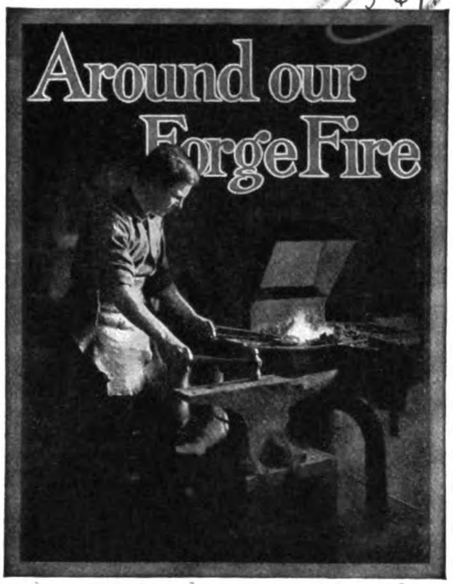
Generally speaking, a cell registering a very high amperage is comparatively short-lived, the voltage being low, whereas, a fresh cell of lower amperage will usually last longer and give better service. When the voltage is high the required ampere rate of current discharge is correspondingly low, and the cells give efficient service until they are more nearly exhausted.

Fig. 13 shows that the terminals *a* and *b* are marked respectively *volts* and *amps.* to indicate which one must be in contact with the positive, or carbon, plate terminal of the cell in order to secure the desired reading, the terminal *c* being brought into contact with the negative, or zinc, plate terminal of the cell through the use of an insulated conduct or orextension cord *d* and terminal *e*. Terminals *a* and *b* are insulated from the metal case of the instrument, but terminal *c* is not. Hence, as indicated in Fig. 14, it is not necessary to use the cord in testing dry cells, but the conductor *d* is required when the voltage of storage battery cells is to be determined by test. The cells of a primary dry battery, and of a secondary, or storage, battery, as well, should be tested *one at a time*.

Primary battery cells are sometimes tested by means of an electrical buzzer or bell, the tone of which is depended upon to indicate roughly whether or not the cell is in good condition.

The number of primary dry cells necessary to generate current of the required strength, or amperage, and tension, or voltage, depends on the character and condition of the cells and on the winding of the *coil* through which the current must pass before the igniting *spark* is produced. Some spark coils are wound for a higher voltage than others, and some have a higher internal resistance than others. In either case the available E. M. F. of the battery may not be sufficient to insure satisfactory results with maximum economy, the spark being too weak to get good results. Coils are usually wound for use with six-volt batteries, but it is well to learn what voltage is required directly from the coil manufacturers. One cell for each one and a quarter volts of coil voltage should be used, a six-volt coil requiring not less than five cells. It is a mistake to make a smaller allowance, because, in order to overcome the effect of inadequate voltage, the strength of the current, or ampere rate of discharge, must be made so much higher that the cells are quickly exhausted. If to produce a satisfactory spark a current of one and a quarter amperes is required, small batteries will be exhausted in such a short time that the service given will be very unsatisfactory. Under right conditions the current required should be somewhat less than an ampere.

The necessary ampere rate for a given coil in service may be determined by connecting an ammeter in series with the batteries and spark coil, as indicated in Fig. 15. Since the coil offers quite a little resistance to the flow of current, the cells will not seriously be injured by such testing. If the spark coil is of the induction type, having a secondary as well as primary winding, connections are made to the primary winding only, as shown. For the use of automobilists a special form of current-consumption indicator is made for the purpose of providing a means whereby the spark coil may be adjusted for a given consumption of current with a greater degree of accuracy than is possible when the sound of the coil vibrator is depended upon to give an indication of the strength of the current passing through the coil.



"Hello, Mr. Editor," exclaimed Benton, bursting into the Editor's sanctum.

"Well, Benton, old man," returned the Editor, "haven't seen you for some time. How are the boys down round Fordham? Heard you were down on a visit."

"Yes, I called on several of the boys while on a visit to Will's, and say, I want to tell you about it." And Benton lighted his pipe and made himself comfortable.

"Fire away," replied the Editor. "I'm all ears, and I'm sure it must be something interesting."

"Well, you know," began Benton, "I always carry a copy of the paper with me when I go on a jaunt into the country, and, as usual, I had several copies when I went down to see brother Will. Well, I had been down there about a day when I thought I'd look up some of the boys and if there were any who didn't read the paper I'd try to get them interested. There's a new shop—a real spic and span place—right across the road from the flour mill up the river, and upon inquiry I found the chap that ran it didn't read Our Journal."

"Yes, he had heard about it, and had read a copy which was handed to him by Jim Blake, but he really didn't see how the paper was going to help him. He said he very seldom did the actual work—left everything to the boys. And I saw four of them, all busy around the place. Well, to make a long story short, I saw that to get him interested, I would need to show him how we could help him.

"I chanced to see one of the boys trying to repair some sort of machine. He said it was for the factory up the river. He wanted to drill a hole in the center of a heavy plate that was too large to get under the drill press. Of course, I took my copy of the February paper and showed him how to do it. That stunt, explained by Mr. Swartz in February, was just the thing, and I came away with three orders for the paper. However, before leaving I gave the men a little talk on making their papers of practical use."

"Well, that was very good, Benton," said the Editor, "but the men certainly knew that they would need to read the paper and try the recipes and methods to get the full value out of it?"

"No, they didn't," returned Benton. "It seems very funny, but some men think they can get all there is in the paper, simply by reading it and doing nothing more. I was quite surprised myself. I got right at these fellows, took one of my papers and worked out some things right there in the shop. And then I told them that to get all there was in the paper, they should use the stuff in it."

"It was a good idea to do so if they thought that they could get all there was in the paper by simply reading it every month." Then, continuing, the Editor said, "A man can't possibly remember all he reads in the paper, and a very good idea for a smith is to keep a memorandum book and just jot down under the proper heading just where he will find the articles that interest him. By doing that a man will get a good many times more out of the paper than the real cost."

"There's no mistake about it," returned Benton, "a man can get little or much out of his paper, according to how he goes at it. A smith can make his paper bring much more into his pocket than it takes out in cost. For example, there's an old chap I ran across up around Georgian Bay some little time ago. He had as neat a little shop as I've seen in some time—keeps it shipshape and in apple-pie order. Well, I happened in, and when asked if he read Our Journal he said, 'Bet your life I do,' and his eyes seemed to brighten right up. I introduced myself and had a very good chat with the old fellow. He told me that he used a memorandum book to get all there was in the paper, and he said, too, that at times when he hasn't anything else to do he just experiments—trying the recipes and other stunts spoken of in the paper. And I don't believe a price of five dollars a year would keep that man from taking the paper. And it is simply because he uses the paper as it should be used. He says a man can't possibly get out of it what he should if he doesn't put the things he reads into actual practice."

"I guess that's right, Benton," put in the Editor; "a man can't get anything out of his journal by reading it as he does a newspaper. He must think and use what the paper tells him to make good on the investment. And then the subscription price will come back to him time and again."

The Village Blacksmith.

A REVISED VERSION.

Under a spreading chestnut tree
The village smithy stands.
The smith, a mighty man is he * * *
—Now prepared to meet demands
For prompt repairs to auto cranks,
Magnetos, sparkers, chains, hoods, tanks;
New parts for every known machine;
Full stock of oil, graphite, carbid, gasoline—
* * * And the muscles of his brawny arms
Are strong as iron bands.
His hair is crisp, and black, and long,
His face is like the tan;
His brow is wet with honest sweat,
He earns whate'er he can * * *
—Vulcanizing, riveting, brazing, repairing,
Of vibrator, clutch, cylinder bearing;
Inner tubes for sale, cement, patches, tires,
Battery coils, spark plugs, coils, wires—
* * * And looks the whole world in the face,
For he owes not any man.
Toiling—rejoicing—sorrowing,
Onward through life he goes;
Each morning sees some task begun,
Each evening sees it close. * * *
—Tires recoverd, relined, retreaded; sectional and tube patching; aluminum brazing; repairs to radiators, mud guards, sprocket cones; overhauling and adjustment of every description; on hand day, night, and Sundays (residence third house to right, behind schoolhouse); prices reasonable; all work guaranteed; patronage of automobilists resp. invited—
* * * Something attempted, something done,
Has earned a night's repose.—*Life.*

Contributed by D. FOSTER HALL, Massachusetts.

A smile for everyone—a good motto for the smith.

Many men show their sound sense by keeping quiet.

'Tis well to aim high, even if one is hammering on an anvil.

"Well, I'll be blowed," said the forge fire, as the smith tried his new blower.

We learn to walk by walking—learn to do good work by doing good work.

The deer is always swifter before the dogs; therefore, be glad of a lively competitor.

The seeds of good advertising always produce a crop of good business. Spring is the time to plant.

The business of shoeing, to be successful, requires as much care and attention as the successful shoeing of horses.

The "good customer" without references who is offended at your refusal to grant credit is a good customer to offend.

A good business deserves good care—if you haven't a good business good care will develop it. Good care is good in any event.

A horse's mission in life is to pull, but he can't do it on poor feet. It's up to the shoer to see that the horse has feet to carry out his mission.

You can't saw wood with a screwdriver, nor can you file horseshoes with a hammer handle. You must have proper tools to do proper work.

Lots of room will there be for good shop pictures in the coming shop number. A photograph of your business place will be welcomed by the editor.

A good way to renew your subscription is to send us two new subscription orders for one year each. We'll then give you one full year's subscription free of charge.

Now's the time—it will carry the big loads for you—it never goes on strike—it never spoils any jobs. Let us repeat—now's the time to install a gas engine.

Every job you turn out is an advertisement—a good one if it pleases the customer, a poor one if it displeases him. Do you consider your jobs good or bad advertising?

No one can ever hope to learn more without venturing into what, to them, is new. A smith never knows how much better a blower is until he throws out the old bellows and tries one.

An angry crowd of teamsters gathered before Tom's Friday noon—the other shops in town being crowded. But they pounded on the doors in vain; Tom had heard that the fish were biting.

What side line are you adding to your list this spring? Surely there is some profit-increasing line which you can care for during spare time. And it's the first boy in the tree who gets the choicest apples.

Where would the craft be if all the craftsmen were like you? Are you doing your part toward raising the standard of the trade? Are you boosting every chance you get? Is the craft better off for your being in it?

Are the smiths in your county hanging together, or can the "dead beat" and the "slow pay" hang you up separately? They couldn't do it if you had a county branch association to smooth over the rough places. Write to the secretary today for easy plans.

A straw clock was recently completed by a German shoemaker. It is entirely of straw and weighs but seven ounces, though it is sixty-six inches high and twenty-five inches square. It has no springs and is wound and set by pressing a button. The maker was fifteen years at work on it during spare time.

If you haven't done so, get the boys and girls interested in a garden. One smith we know has a neat lawn and several flower beds right next the shop. A few minutes at morning and at noon, with a fine sprinkling by the children at night after school, keeps things green, fresh, and bright. Try it on the spare plot.

Says an agricultural exchange: "More than half the horses in this country are lame. mostly in the feet. Shoeing is to blame for much of this trouble. Never submit your horse to a man who knows nothing about his business except to charge a big price for what might better never have been done." The moral is obvious—will you heed it, readers?

Friend Tom landed another gold brick the other day. He received a call from a seedy-looking individual, who before he departed had two dollars of Tom's money, while Tom had a little box of "Peter Porter's Patent Welding Powder," which upon examination proved to be nothing but a very poor grade of borax. Doesn't pay to trade with any but reliable business people, Tom.

"An energetic young man can he his own boss and own his own business establishment, as a farrier, with a small outlay of money, and can earn more cash from the start than he could in many professions. The young man who learns farriery will be busy from the hour he opens his establishment and will have a snug bank account by the time his friend who spent several years preparing himself for the practice of law has opened his office and begun the long, grinding wait for clients," says W. L. Carlyle, of Colorado Agricultural College.

The leader in the New York to Paris race consumed just forty-one days, eight hours, and fifteen minutes in its journey from New York to San Francisco. It spent five days in crossing New York State, reached Chicago on the fourteenth day, after fighting its way through the worst blizzard that Indiana has seen in years, arrived in Omaha in six days from Chicago, passed Cheyenne in four days, crossed Wyoming in six days, and ran into San Francisco in eight days from Ogden. The best day's run by any of the contestants was 332 miles, made by the Thomas car. The entire distance traveled by the Thomas car when it arrived at San Francisco was 3,832 miles.

Crow's-foot elm as a substitute for American hickory is urged by the director of forests in Queensland, Australia. Consular Agent Asbury Caldwell, of Brisbane, has inspected some splendid logs of this timber, which are being cut up to order for a firm of wheel and carriage manufacturers in Brisbane, who have started a factory for the making of wheels, shafts, spokes, etc., of this timber. Expensive machinery has been imported for the purpose. The director of forests reports that, with the hundreds of millions of feet of crow's-foot el n existing in Queensland, an export trade should be established with the United States for the benefit of the enormous carriage and wagon manufacturing business. It is assured that the supply of this timber can scarcely be exhausted by any demands which may be made upon it by such export trade for at least a generation to come.

The Nebraska Blacksmiths' and Wheelwrights' Convention at Fremont.

T. H. CHADWICK.

Every blacksmith and wheelwright should organize locally and adopt the prices needed and abide by them. They should elect thir local officers and pay all membership fees to him and dues to become members of the State association. The membership fees should be used for incidental expenses of the association, and quarterly dues should go into the legislative fund to be used to secure the protection that the blacksmiths are in need of. We had a lawyer to speak to us at the convention at Fremont, and he pointed out to us that blacksmithing is not labor, but contracting, and that we could collect our bills only as such.

We had in all about two hundred and fifty present in the two days, and some came as far as three hundred miles to join the association. We also had visitors from Colorado. We were a little disappointed in the number that joined at this meeting, but, nevertheless, we took in a good number. It is so hard for some to understand how we are to get the protection we are in need of. But since the convention the wide-awake members have returned home and sent out invitations and called local meetings, and are sending in large lists every day of new members, with the State fee of $2.00 and their quarterly dues paid up to January 1, 1909.

Our tool exhibit at the convention was good. We had four different makes of power hammers in operation. We had gas engines, the latest thing in the disk sharpener, and the local jobbing houses throughout the State had a good tool exhibit of all kinds of small tools.

If you are located in Nebraska, brother, and haven't the advantages of an association, write me at Syracuse and learn of the advantages of becoming a member of the State organization. Nebraska is being organized as fast as we can admit members, and we want every smith in the State to be with us hand and heart.

American Association of Blacksmiths and Horseshoers.

Have you, Mr. Reader, read the report from Mr. Chadwick, of the Nebraska convention at Fremont? Can you think of any reason why you can't help the movement in your State, by being an active, hustling worker in your county? Just think, some two hundred and fifty smiths present! Ask the boys in your vicinity what they think of organizing—question them on the matter of prices—about protection against "dead beats" and "slow payers." Then send for my easy plans for the formation of a branch association in your county. Remember, I don't ask you nor expect you to do all the work alone. The American Association of Blacksmiths and Horseshoers stands ready to help and assist the craft whenever and wherever it can. Space this month does not allow me to tell what has been done in the various sections of the country along organization lines, but I am hoping to get enough space at a near date to detail at least part of the many successes that have perched on our shoulder these past few months. The association is growing and expanding every day, and individual effort is the keynote. Your help is needed, Mr. Reader. If you think enough of the craft to be a member of it, surely you are sufficiently interested to help us on to that ideal—an American Association reaching from ocean to ocean. You can do your part by asking for my easy plans. P. O. Box 974, Buffalo, N. Y., is my address.

THE SECRETARY.

The Failures and Successes of an Apprentice.—2.

BY AN OLD-TIMER.

Let me mention here one valuable lesson which my life at sea taught me. It was this: to keep my place. Although I appeared as though I had no "sand," I was there just the same at the inspection "with a short tap and a strong weld." If you want to get along well, no matter how much you know, never try to know more than your boss.

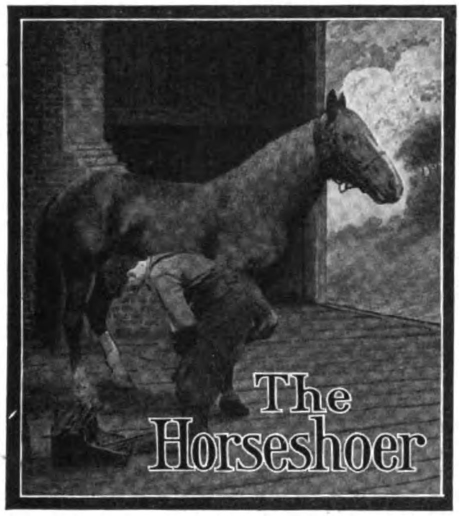
My first experience in blacksmithing, as given in my first article, was a failure. I did not know the difference between a shop that was sound and solid and one that was on the bum. I reasoned that if all shops were like the one I had been in, I wanted no part of them. I therefore began preparation to go to sea again, when a chance was offered me in a machine shop. Here I got along very well. I was put to work with a man who showed me what to do and how to do it. In this way, I learned rapidly. I presume one reason why I felt at home in this place was that, after scraping and polishing iron and brass fittings, the fine dust gave me that squirmish feeling at the bottom of my stomach something like what I experienced the first time I crossed the Gulf Stream.

One day, while I was at work cutting some gears, the boss and two men were trying to wind a coil spring of tempered wire. When they stopped the lathe the wire would spring off from the arbor. They tried several times without success, but could not draw the wire hard enough to make it set. Just then, the boss was called away. I went over to the men and said, "Do you want to know how to wind that spring?" One said, "Yes, if anybody can tell me." Then I explained to them the serving mallet we used on shipboard and how to use it. One man said, "I see the point," and they rigged up something that answered the purpose and got a good spring. The boss came back at this time and said, "Where did you get that idea?" One of them pointed to me and said, "Sindbad, the sailor." This was the first mention I got as an apprentice.

The shop here was a small one, and the blacksmith had no regular helper, but when he was obliged to have someone, an apprentice was sent out from the machine shop. One day the job fell to me, and this was really the beginning of my trade. I soon found that things in the blacksmith shop were run similar to those in the machine department. I began with the sledge. The smith showed me how to up-hand, and taught me the swinging blow, the hammer signals, and head motions. After the first lesson I was pleased to hear him tell the boss that he wanted me whenever he needed a man. After this I worked in the blacksmith shop about two days in the week, and the good man never seemed to tire of showing and giving me lessons in the craft.

There is often some fun to be found in the machine department. Men who are bright and intelligent will sometimes do things in the shop so silly, that if they were outside they would be the first to condemn such foolishness. On one occasion the owner was going to be away for a day. The boys worked awhile, then they thought they would "play bear." Suiting the action to the word, they got down on all fours and began going around behind the machines crying "woof, woof" and "ugh, ugh." When they got well to going, they happened to look up, and there stood the owner. He was a very stern man and hardly ever smiled, but the ridiculous position the men were in and the look on their faces happened to hit him queer. He looked at them a moment and then sat down on a stool and laughed and laughed until the tears rolled down his cheeks. When he did speak, he said, "Boys, when you have another game of bear, don't forget to send for me."

(*To be continued.*)



Nerve Force in the Horse.

A. F. LIBBEY.

In contemplating the forms of horses and different shoes to promote their speed, it occurs to me there is something still lacking in many horses, which is mere force. A horse may be lazy, and yet trot fast when called upon. Another may be very spirited, always willing to do its best, yet not able to trot in four minutes.

Speed does not depend on either the strength or the spirit of the horse, although they add largely to his value. The main point is to have him step fast—that is, quickly. Speed, either at the pacing or trotting gait, depends upon the contractions and elongation of the muscles. The muscles of the horse's body are either attached to two bones at their extremities, or one part is connected to a tendon, being in turn attached to some bone. Bones, in turn, are connected to each other by capsular ligaments, forming movable joints.

When a muscle contracts, one or both bones must move. It would seem that if a horse desired to go fast—that is, if the brain is willing and his muscles are large enough—he could do so, but such is not the case. We have that point demonstrated plainly in horses that are slightly chest-foundered. The power to move lies not in the brain but in the spinal cord and the nerves. The will to move is in the brain, but unless the spinal cord and the nerves are fully developed speed is lacking.

The spinal cord does not fill the whole spinal canal through the vertebræ. Besides the cords we have the membranes, fatty matter, and cerebro-spinal fluid in which the cord floats. The spinal cord has nerves attached which run to all parts of the body. Other than this we have the sympathetic nervous system, which has its influence over absorption and the circulation of the blood. Speed, then, depends upon the spinal cord in connection with the sympathetic system, with that power to generate nerve force rapidly. A horse may have his brain developed to its fullest extent and yet be deficient in transmitting its power to the muscles in large quantities, and in a short time he will lose the ability to trot fast.

Nerve force is an inherited quality, and so is the capacity which the animal possesses for generating it rapidly and in large quantities.

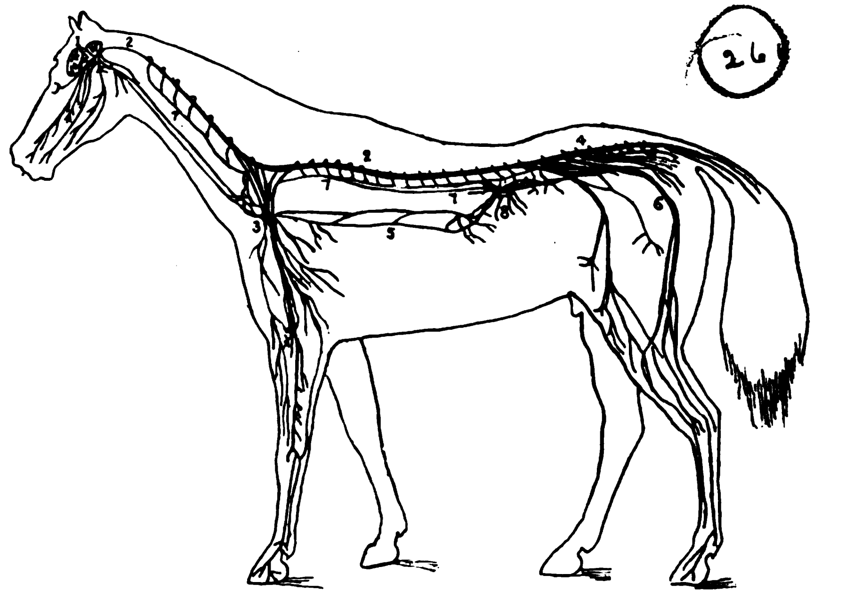
The Horseshoer and the Horse Owner.

C. A. PARTRIDGE.

In the February issue I notice a general talk on horseshoeing and some of its evils, by Mr. C. Craig. He writes: "In the first place, I argue that horseshoeing is injurious to the horse's foot, no matter how scientifically it is applied."

Now, I claim it is not the shoeing, but the care and treatment the horse gets by its owner after it is shod. The horse is taken from the farm to the city, where it is driven over hard roads and kept in a stall with a dry, hard floor to stand on, and with dry straw for bedding. If the animal is a driving horse, he is not taken out if it rains. Is it strange that the feet dry up under these conditions and get contracted? It is not the horseshoer's fault, but the owner's in not giving them proper care.

Take the horses that go wrong back to the farm where they can get into the mud and get off the hard roads. Most of them will go sound in a short time and work every day. If the horse owners would follow nature a little closer, the poor, abused horseshoer would not get so many kicks. There may be times when he deserves it, but it is oftentimes the owner who is at fault. I have been a veterinary surgeon for more than thirty years. I have made the horse a study for the last seven years. I have been running a veterinary shoeing forge where I have done most of the floor work, so I think I ought to know something about it. I have bred a good many colts and have had the care of colts on other breeding farms.



THE NERVOUS SYSTEM OF THE HORSE. 1, BRAIN; 2, SPINAL CORD; 3, BRACHIAL PLEXUS; 4, SACROLUMBAR PLEXUS; 5 PNEUMOGASTRIC; 6, SCIATIC; 7, SYMPATHETIC SYSTEM; 8, SOLAR PLEXUS

Quarter Cracks and Their Remedy.

E. H. MALOON.

We shoe about one hundred and fifty regular horses, besides the transients, and among my regular horses there is not a case of quarter crack and has not been for years, because I shoe carefully and use plenty of pine tar. If a horse shows the least sign of hard feet, on goes a bar shoe and the foot is packed in cotton and pine tar with linseed meal. I have had cases of quarter cracks brought, and my method of treatment is to prepare a very thin, sharp iron, about three quarters of an inch wide, heat it and then take up the foot and burn across the crack at the lower edge of the coronary band where the horn begins. The tissue above this burn will be sound. I have a shoulder on my burning iron so it does not enter the hoof more than a half inch. I now notch into the bottom of the hoof in front of the crack and then I lower the heel to that notch, taking out about one quarter inch lower than the balance of the wall. With a number five German gimlet bit, I now bore a hole across the crack as high up as the thickness of the hoof will permit; I next draw a horse nail thin and drive it through the hole already made and clinch both ends.

This is, to my mind, the best method, as it stops all motion of the edges of the crack, which is important. I use a flat bar shoe, a good pad, and plenty of pine tar and linseed meal, and I never have any trouble in making a cure. I believe a quarter crack can be entirely avoided if the owner will take proper care of the horse's feet. Have them shod every four to six weeks, and the blacksmith can then use tar when needed. This will insure a healthy condition. I am assuming that the shoer knows how to pare the feet and to shoe them. To my mind the hoof should be lowered to the safety limit, as a high foot is a weak one. I am now shoeing a doctor's horse that came to me about two years ago with a quarter crack in one foot and one foot contracted. This horse went sound in less than ten days from the first shoeing, and has never had any other treatment except what has been done in my shop at shoeing, and the quarter crack has been gone a long while. This horse wears bar shoes and pads, and the feet are packed in cotton and tar mixed with linseed meal, and this has been done at every shoeing. The horse is driven nearly to his limit every day. But this is only one of many I have had, and the result is always the same. They grow off sound, so I have reason to believe that my treatment of quarter cracks is correct.

The Blacksmith of Central Africa and His Work.—2.

The heating process used by the Central African smith is of the most primitive description. A continual and forced draft is produced by means of two clay vessels, the openings of which are covered by the Monbuttoo smiths with plantain leaves which have been allowed to simmer in hot water until they become flexible as silk; other tribes cover the openings with soft skins. To these flexible covers are fastened short light sticks. These sticks are then grasped by the operator, one in each hand, and worked up and down to literally push a blast into the fire.

One of the accompanying engravings shows this primitive bellows in use. The engraving is from a photograph of a wax group now in the American Museum of Natural History in New York City. The several examples of smith work pictured in connection stone for an anvil, they use miniature anvils of wrought iron, the largest being but two or three inches in size, all tapering downward with their sharp, wedge-shaped end imbedded in a beam firmly fixed in the ground. On these little anvils, each weapon is cut out

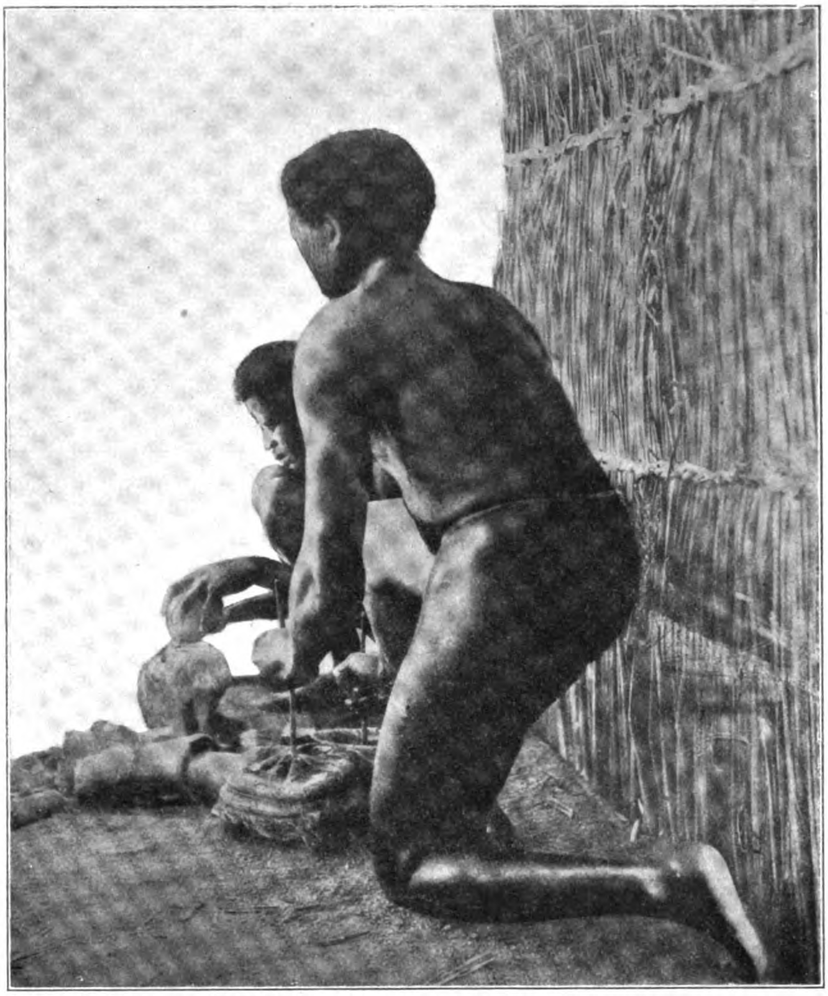


FIG. 1.—SHOWING THE AFRICAN SMITH AT WORK

with this series are also on exhibition at that museum. This collection is the gift of King Leopold, and illustrates the life and state of civilization of the Congo tribes. The collection occupies two floors of a new section of the museum, and is said to be the finest in America.

The smith tools used by some of the African tribes consist principally of stone. The anvil is usually a block of rock, the hammer is a stone firmly bound round with thongs or cords to give a grip, and the tongs are usually two pieces of bark or wood.

Although entirely without regular pinchers, tongs, hammers, and files, the Monbuttoo ironworkers have a set of implements of their own by means of which their iron work is more carefully worked and manipulated than any of their neighbors'. Instead of using a

with a chisel and then hammered until some degree of sharpness is attained. The edge is then brought to its finish with a piece of fine-ground sandstone, which answers the purpose of a file.

The hammers used by the Monbuttoo are in some instances wedge-shaped, exactly like the anvils, but smaller. A wooden billet is used for a handle. The wedge is forced into the handle, and the piece is then securely fastened with bands. Yet with these primitive tools the Central African smith produces the beautiful and diversely-formed knives, spears, and other iron and metal ware.

The dexterity of these smiths is described as wonderful by travelers, and the short space of time in which they convert the raw material into spades and lances is unrivaled. The

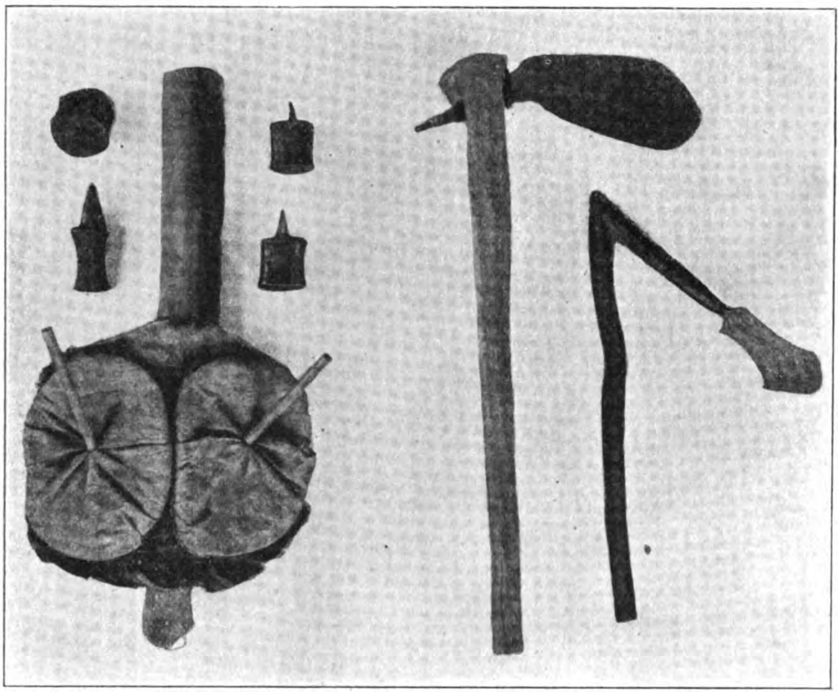


FIG. 3.—SHOWING THE AFRICAN SMITH'S TOOLS ON THE LEFT, AND A HOE AND ADZE ON THE RIGHT

masterpieces of the Monbuttoo smiths are the ornamental chains, which in refinement of form and neatness of finish are said to vie with our steel chains; in fact, some authorities assert that many of these specimens may well bear comparison with the productions of American and European smiths.

The process of tempering is, of course, quite unknown, the necessary hardness being obtained by the continual hammering. The materials used are singularly pure and homogeneous, qualities not acquired from any perfection of the melting apparatus but from the laborious welding of the separate particles of iron. The large amount of labor necessary to form a piece of iron of any considerable size is very evident, when one finds that the leaflets procured from the smelting furnace are perhaps no larger than a man's palm. These pieces are heated and hammered together until sheets of the desired size are procured. The knives and various other articles are then cut out with the chisel.

Still another method of forming articles of iron is used by some of the Central African smiths. While the Monbuttoo cut and forge their implements and knives as described, other tribes twist iron rods while red hot into a screw form and make pretty collars in this manner. Other rods are again twisted, welded, and then ground into axes and various other tools and weapons. The knives and axes are often pierced with punches in geometrical patterns, while others are engraved and damascened with copper.

An example of the Bongo smith's cleverness is what is called the "dangabor." This is an ornament consisting of a number of separate and distinct rings and is worn on the forearm. These rings are forged with a boss of such height and breadth as to correspond with the ring next to it. The rings themselves are made gradually larger in size as they proceed from the wrist to the elbow. The entire forearm is thus covered by a sleeve of iron, each ring of which can be removed or replaced at pleasure. A modification of this forearm ornament is a ring worn on the upper arm near the shoulder.

FIG. 2.—ANOTHER VIEW OF THE AFRICAN SMITH AND HIS HELPER

This ring usually carries from one to three sharp spikes or branches, and for that reason is thought to be a sort of a protection against close conflict.

The engravings Figs. 1 and 2 have already been explained. Here we see the smith using both a hammer and an anvil of stone. The helper operates the primitive bellows, which in Fig. 1 can be seen very distinctly. Here is shown one half of the bellows depressed, while the other skin is being pulled up. Another view of the bellows is shown at the left in Fig. 3. Here are also shown the little anvils used by the Monbuttoo. In the same engraving is shown a hoe and also an adz. This hoe is the only agricultural implement of the lower Congo tribes. The adz shown at the right is used by the Monbuttoo to roughly hew their wooden vessels, which are afterward smoothed with a one-edged knife.

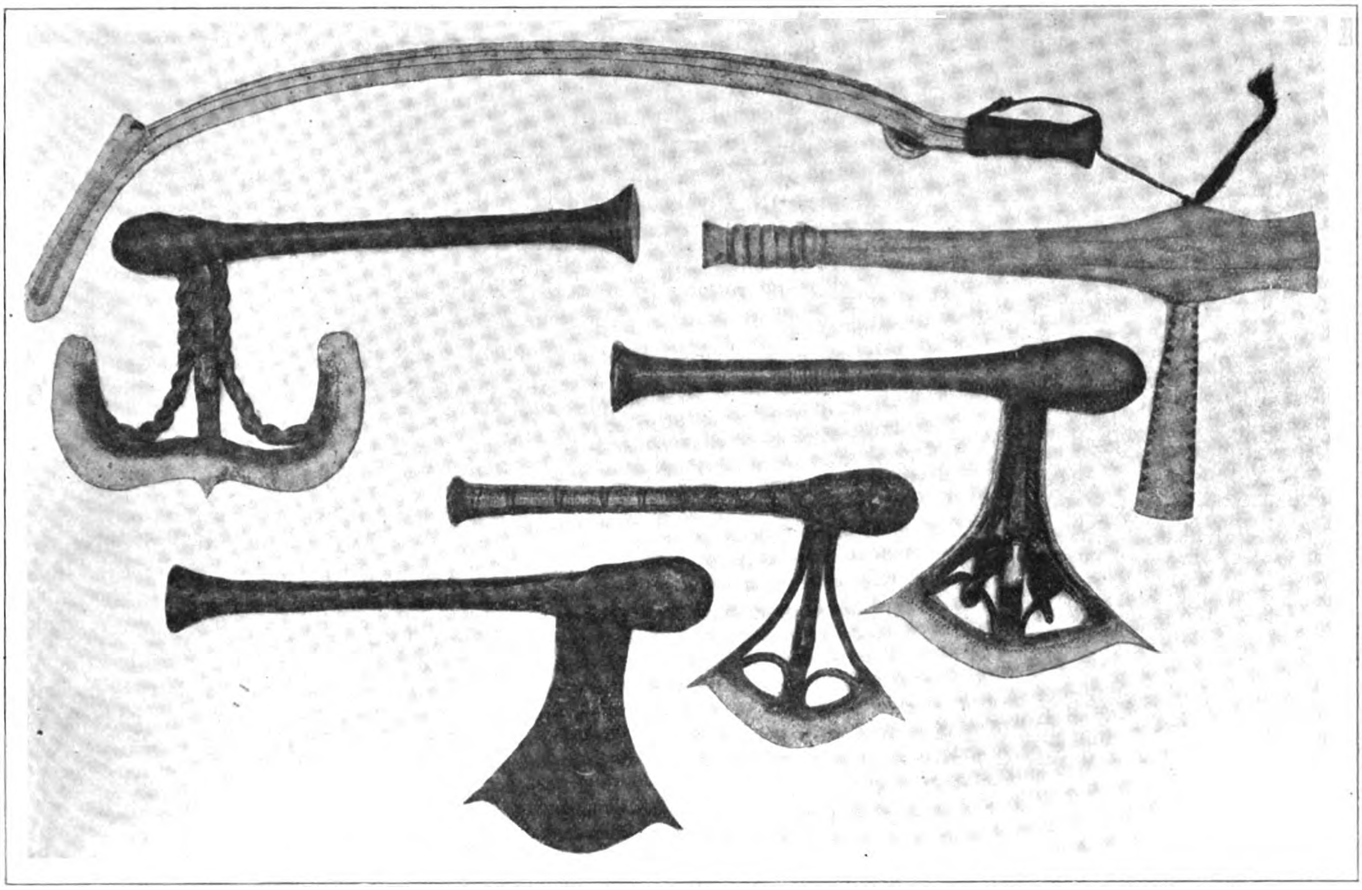


FIG. 4.—SHOWING SOME VERY GOOD EXAMPLES OF THE AFRICAN SMITH'S FORGE WORK

In Fig 4 are shown several very unique examples of the Central African smith's handicraft. The topmost weapon is probably also used as an executioner's knife.. The various axes are principally used as ornaments, though the hatchet shown at the extreme right is used by the Monbuttoo to fell the immense trees found in their territory. These trees sometimes attain a diameter of ten and more feet. The handle of the ax shown second from the bottom of the picture is covered with a snake skin, which serves not only as a most unique ornament but also as a very effective grip.

(To be continued.)

A Furnace for Heating Scrap Iron.

About the best and neatest kind of furnace for this class of work is shown in Fig. 3. It is made as follows: Have a cast-iron base A made of the required size, according to the amount of this class of work to be done; then take some boiler plate B, about one quarter inch thick, and rivet or bolt this to the base. Cut a hole in back plate for stack C. Now bolt on the standard D to top plate for pulley E to turn in. Use a wire cable with one end fastened to top of door F and the other end to counterweight G. Grooves should be arranged for door to slide up and down in. If the amount of work to be done requires a large furnace, two burners on each side should be arranged as shown at HH, which represent the oil pipes. At I are the small steam pipes. The steam, besides being the means of forcing the oil into the furnace, also burns with the oil, thereby making the best method for heating with a quick and high heat necessary to the successful welding together of scrap iron. Fig. 3, No. 1, is a rear view, and No. 2 is a side view of the furnace. The dotted lines J show the inside of furnace after filling in with fire brick and tile. Fig. 1 is a section through 2–2. Fire brick could be used on sides, and the wall should be about a brick and a half thick. Use very little fire clay between bricks. If too much is used it will dry and crumble, thus falling out and leaving an opening between bricks, and poor results will follow. Tile should be used for the top and bottom, of the size required to cover the entire top and bottom of fire

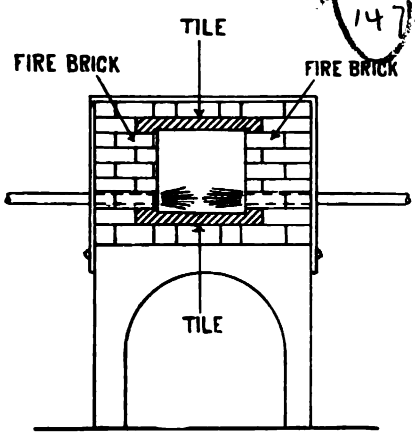


FIG. 1.—SHOWING SECTIONAL VIEW OF SCRAP HEATING FURNACE

box. These tile can be had from the manufacturers of casehardening furnaces. Brown & Sharpe, of Providence, R. I., make a good tile to order, any shape and size. The ones for this furnace should be at least three inches thick. A tile should also be in the door as in Fig. 2. This door should be made from cast iron and in the shape of a shallow box. The tile is laid in with fire clay. A slot should be cut in center of bottom part of door (see A, Fig. 2) to allow for the bar, which is welded to the bundle of scrap for convenience in handling. This bar is shown at K, No. 2, Fig. 3. The furnace should be

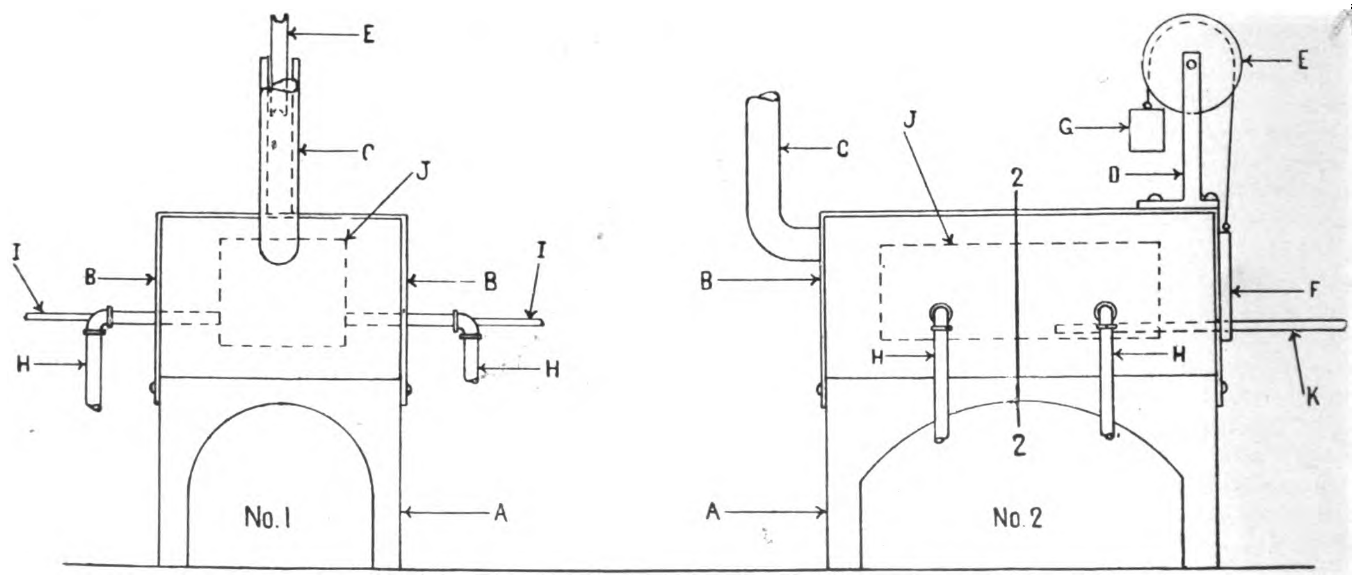


FIG. 3.—REAR AND SIDE VIEWS OF FURNACE FOR HEATING SCRAP MATERIAL

built close to the steam hammer, to do away with carrying this class of work any great distance, which is not the handiest thing to do, especially after the first heat.

A Center Bit for Boring Boiler Sheets.

L. R. SWARTZ.

The engraving shows a form of center bit for boring holes in boiler sheets, etc., particularly useful where one has to work in close quarters, and for use in a drill ratchet or drill press of moderate strength. This form of bit will cut a true hole for tapping in pipe connections, and, owing to the small amount of metal engaged by the cutting edge, large holes can be made with a common ratchet. Plates may also be channeled around a center to receive balls to form a bearing against the end of a shaft or collar with this tool. For making a bearing against a collar, the bearing channel is first cut by boring the small center hole just deep enough to permit the bit to cut the channel the proper depth to receive the balls. The bottom of the channel will be smooth and even if the guide pin is made to bear with some pressure on the bottom of the center hole. The hole in the center may then be bored to the proper size to admit shaft or spindle.

These bits are so easily made that it is not a serious matter to fit up a set of them for various kinds of work. The stock should be in proportion to the work for which the bit is intended. This also refers to the size of the guide pin and center hole. The dimensions given in the drawing are for a bit to cut 1⅝-inch pipe tap. I do not deem it necessary to give drawing of the kerf cut by the tool; that is apparent to anyone. However, it may not at first appear that it will run with about one half the power required to run a solid bit. Such is the case, because there is a 1⅛-inch washer of metal left in cutting a 1⅝-inch hole after a ⅜-inch hole. This bit will also cut a round hole in a curved sheet or plate. On a

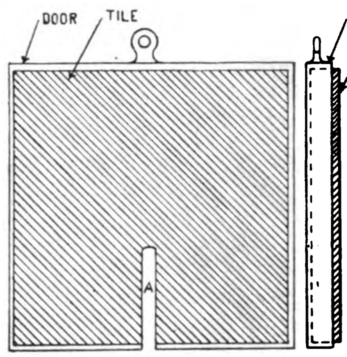


FIG. 2.—SHOWING CONSTRUCTION OF FURNACE DOOR

boiler sheet I use lard oil, or linseed oil with a little turpentine; a mixture of 25 per cent turpentine, as a lubricant.

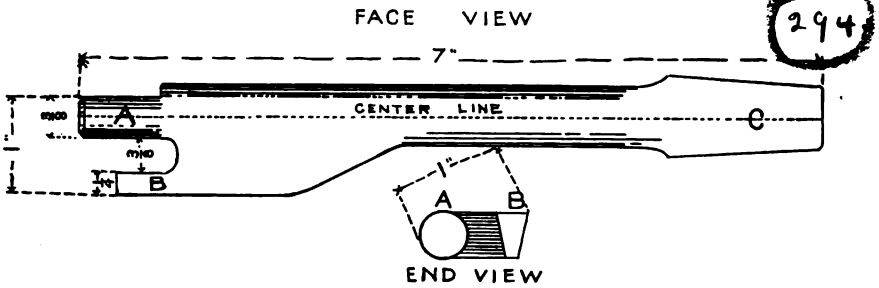
The stock used for the bit in the engraving is ⅜ inch by 1 inch tool steel, upset at ends and forged to shape. Make bit narrower at back, as indicated at B in the end view, to give clearance; also a little wider at cutting edge for same reason. Bore a ⅜-inch hole in the sheet or plate to receive the center guide.

Thornton's Letters.—18.

Being "Straight-from-the-shoulder" Talk from a Prosperous Self-made Smith to his Former Apprentice, now in Business.

Dear Jim:

It's all right, my boy, to feel good and prosperous and to hold your head up with your nose pointing at the sky like a telescope, but don't feel that way in the shop or on the street. When you



A CENTER BIT FOR BORING BOILER SHEETS

get an attack of chestiness sneak up into the garret and do all your strutting up there. If you do it in the shop or on the street you're more likely to chase trade away from the shop than you are to bring it into the shop.

It doesn't pay to get chesty to customers or those you want as customers. When a man tells you that he can get a job, for which you want two fifty, done at Brown's down the street for two, it's not your place to take a long breath, swell out your chest, put your thumbs in your suspenders and tell him that he knows what he can do about it. It's up to you to show him that the job can't possibly be done for less and be done right, and that you would like very much to do it for him but that you can't do it for less than your price.

This telling a man that he knows what he can do about it, when he objects to anything, is all right for stage talk, but the trade at Thornton's was not built up on that system. And I have good reason to believe that nothing very big with staying qualities was constructed on that plan. And you'll find, too, that orders pass right under the nose of the sky-gazing chap without his seeing them.

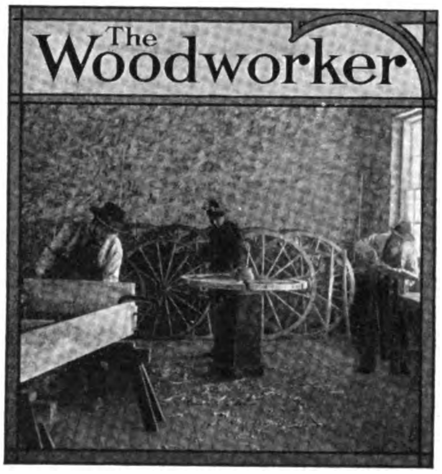
Of course, a man meets a lot of people that he doesn't like, but you must get one thing firmly fixed in your mind, and that is that you need them in your business. Treat the kicker, the man that's hard to please, and the crank, just as good as you know how, and then treat everybody else the same and you'll have no trouble in getting on with all your trade.

Don't travel along on the old moth-eaten, threadbare maxim that you "can't please everybody." But change cars and follow along behind the "please as many as you can" motto. Don't get into the habit of soothing your hurt feelings when a customer quits, by saying that you can't expect to please 'em all or by making excuses. It's not excuses that built up the trade at Thornton's. It was, and is now, and always will be the policy here to please everybody that has anything to do with the shop, from the shop kid to the biggest customer.

Now, I know, Jim, that you aren't the chesty sort, but I don't want you to develop into a sky-gazing, snobby sort of a cuss either. Neither do I want you to go around with a hangdog air making apologies to everyone for living. Keep a stiff upper lip, your nose straight forward, and, while your business may not be written up in one of the big magazines as a modern success, you'll be a bigger success than by getting chesty and too all-fired important.

Yours for success,

Thornton



Axle setting seems to occupy a great deal of attention in our columns. I believe if the wheels are properly built and ironed to the right dish (light or heavy) that the wagon will run nicely with the axle set (iron or wood) with an eighth of an inch gather to the foot of the spindle. I always make my axles straight on bottom, except on one-inch axles or less. There I set down at point of spindle as much as the common weight to be carried will spring the axle to make the bottom in a straight line when handled. The straight bottom is as near correct as we can get for a general rule. I have been a party to and have put out hundreds of jobs, and I never have anyone say my work doesn't run well. A wagon cannot run well if it is bound against either collar or nut.

A. B. Wilkinson, Pennsylvania.

A Handy Device for the Wagon Builder.

WILL O'GORMAN.

The accompanying engraving shows a very simple device which can be used to hold the panels on a wagon frame until they are fastened together by means of wood screws. It is constructed entirely of wood, with the exception of the bolts.

Procure two pieces of wood about four feet high, four inches wide, and two inches thick, and in one end bore several holes about three or four inches apart. Now, near the top of each standard bore a hole and fasten the clamps by means of iron bolts. When this is done, the next step to be taken is to construct two pieces of wood about three inches square and six inches long, with pegs projecting out on one end about two inches. These pegs should not be directly in the center, but a little to one side, or, in other words, a little off center, so that it can be turned in four different ways when regulating the length of the clamp, the holes in some cases not being close enough together to properly adjust every length. As can be readily seen, this is a very simple and convenient device for holding panels on the frames, and should prove very useful to the wagon builder.

A New Gear Shop.

The accompanying engraving shows the shop of The Gibson Gear and Manufacturing Company, of Illi The

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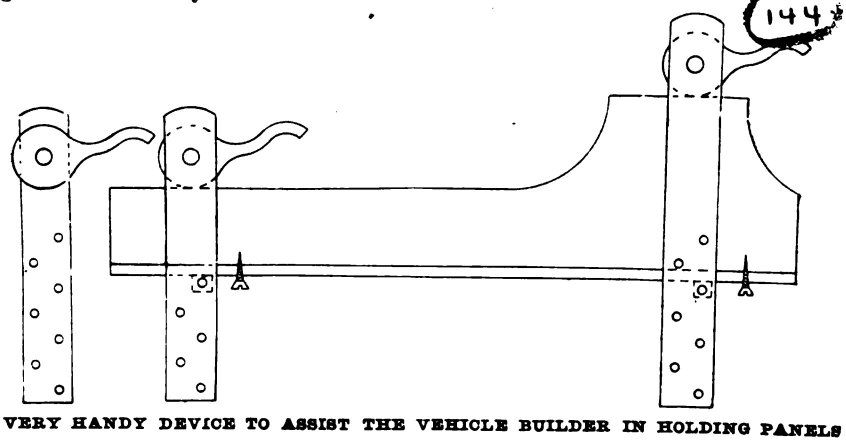
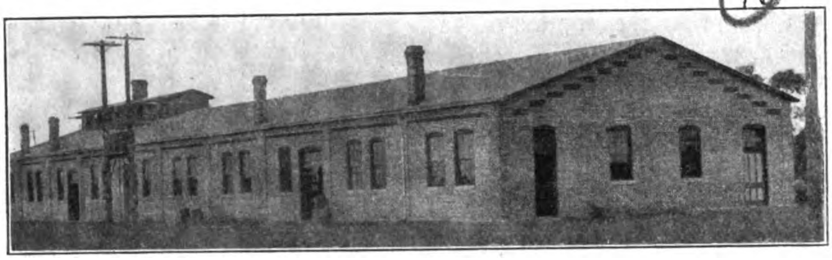


A VERY HANDY DEVICE TO ASSIST THE VEHICLE BUILDER IN HOLDING PANELS



THE NEW SHOP OCCUPIED BY S. A. GIBSON & SON

building is situated on several acres of ground and has ample room for expansion as well as for lumber yards. The structure is a substantial brick affair with large window areas and splendid ventilation. It is entirely

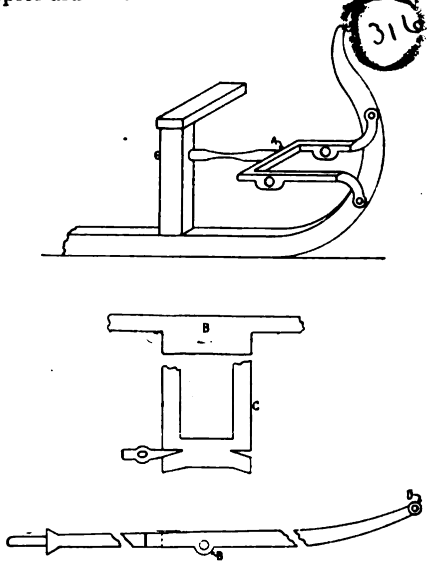


FIG. 1.—A GOOD SHACKLE FOR A CUTTER

new, and was erected according to plans and specifications especially prepared to meet the requirements and conditions of this company.

The smith shop occupies the western end of the building, and is equipped with a Buffalo fan system, Barnes drills, thread cutters, power hammer, circle rolls, heating furnaces, and a general blacksmith equipment. The wood shop is equipped with every machine necessary to the finishing of gear woods. The entire plant is operated by electricity, each machine having a separate motor drive, doing away with the usual line shaft and extensive belting. Taken as a whole the Gibson shop is thoroughly up to date, and it would appear that such an equipment should certainly spell success.

A Cutter Shackle, a Fifth Wheel, a Truck Brace, and Stock Calculation.

NELS PETERSEN.

In reply to the several questions on forgings asked by brother Long in the February issue, I submit the accompanying engravings with explanation for making these parts.

A good shackle for a cutter, that can be used for either pole or shafts, is shown in Fig. 1 at A as it appears when finished. To make the shackle, take a piece of Norway iron about two by one half inches, and forge the ends as shown at B. Then bend the ends and work down the corners till you have the desired width to fit the pole eye, as shown at C. Take a thin chisel, and cut in at both sides as shown and draw down to proper size for welding onto $\frac{7}{16}$-inch round on which a collar is made with bolt end for passing through the wood. Then weld pieces of $\frac{3}{8}$-inch round to the ends of the fork, and, when cut to proper length, turn an eye on each end as shown at D. Now bend and fit it to the cutter. Of course, there are cheaper ways for making pole or shaft couplings for cutters. For instance, you could simply run a straight brace from the knee to the runner. Have a flat space for taking a bolt through the runner and let the ends project about two inches in front of the runners, and cut a thread on the ends. Then take a wooden bar long enough to reach across in front, and bore holes to fit the end of the braces. On this wooden bar can be fastened ordinary shaft couplings, or jack clips, as they are called.

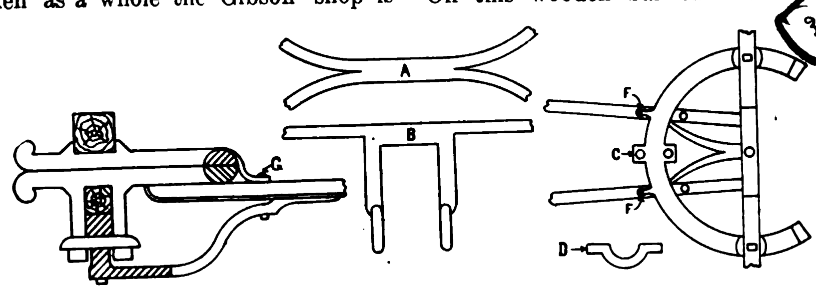


FIG. 2.—FEW BUGGIES ARE NOW FITTED WITH HANDMADE FIFTH WHEELS

To make a circle, or fifth wheel, for a buggy, take a piece of $\frac{7}{8}$-inch Norway square iron and split the ends, as shown at A, Fig. 2. Bend the ends and finish off the shanks as shown at B, then weld in $\frac{3}{4}$-inch half round to form the circle for the bottom part. The top half should have ears welded or forged midway, and back of the head block, as shown at C, and a clip yoke D to fit under the circle. Two tire bolts are then inserted to hold the two halves together and keep the lower half from wearing out the reach. Two lips, as shown at FF, should also be forged on

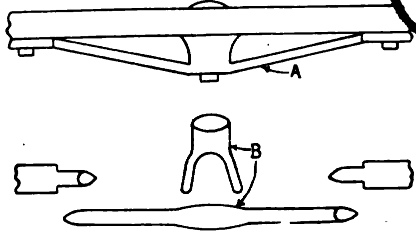


FIG. 3.—A GOOD HOUND BRACE

the top half. They are bolted to the reaches, as shown at G, if it is to be used on a double reach. If a single straight reach is used, these lips should be omitted, but a flat space should be left instead, to fit against the reach, and

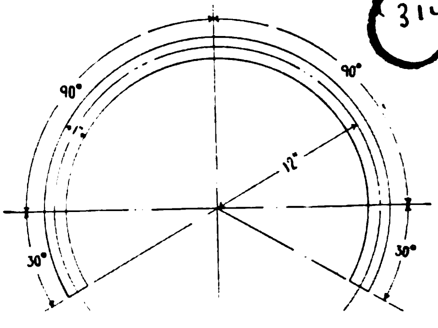


FIG. 4.—CALCULATING STOCK FOR A HALF CIRCLE

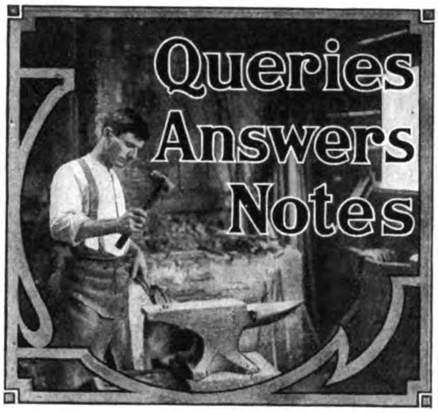
a circle guard, or keeper, made to hold the circle to the reach. There are few buggies with handmade fifth wheels now, as much better ones can be bought for less money than handmade ones would cost.

Brother Long also wants to know how to make a brace for the hounds on a truck. I presume he means a truss. These are made in a number of ways. A very good one, and one that is used to a great extent, is shown in Fig. 3 at A. To make this brace, take a piece of round iron, according to the size you want to make the brace, and upset it in the center. Take another piece of the same size, split it and cut it off short, as shown at B. Now, heat the two pieces and weld them with the split piece, straddling the other where the latter has been upset and work it down to shape as seen at A. Then take two pieces of flat stock, say two by five eighths inches, and offset the ends, scarf and then weld to the center piece which you have already made. Now, fit it to the hound. I refer to hounds on spring trucks, not lumber wagons.

Brother Long also wants to know how to calculate the stock for a half circle for a wagon, and have the circle come out three inches on the sandboard. Just what is meant by this question is rather puzzling, but to calculate the amount of stock for any circle, multiply the diameter by 3.1416. For example, you want to make a circle out of stock one inch wide, bent edgeways, the circle to be twenty-five inches in diameter outside measurement. Then twenty-four inches is the diameter to the center line of the stock, and twenty-four multiplied by 3.1416 equals 75.3984. This amount divided by 2 would give the amount of stock required for a half circle; or simply multiply the radius, which in this case is twelve inches, by 3.1416, which equals 37.6992 inches. It is not necessary to add three thicknesses of the stock when the center of the stock is taken. If it is desired to find the amount of stock required for a part of a circle, other than half circles, or, as it is termed, an arc of a circle, multiply the circumference of the circle of which the arc is a part by the number of degrees in the arc and divide by 360. For example, in Fig. 4 we have an arc of a circle whose diameter is twenty-five inches outside measure, or twenty-four inches to center line. The circumference at this point, as we have seen, is 75.3984 inches. There are 240 degrees in the arc as shown; therefore, 75.3984 multiplied by 240 equals 18,095.6160, and this divided by 360 equals 50.2656, or $50\frac{17}{64}$ inches, or about $50\frac{1}{4}$ inches, the amount of stock required for an arc of a circle made of stock one inch wide and twenty-five inches diameter outside measurement.

A Coming Number.

Ornamental work will be the feature of an early issue of "Our Journal." To make it the best number yet published, we want photographs of all kinds of ornamental hand-hammered work. Lots of "Our Folks" have been doing this work during spare time—we want to picture what you have done. Let us have your photographs and articles now.



The following columns are intended for the convenience of all readers for discussions upon blacksmithing, horseshoeing, carriage building and allied topics. Questions, answers and comments are solicited and are always acceptable. Names omitted and addresses supplied upon request.

Wants to Make a Brazing Torch.—Can some brother tell me how to make a strong brazing torch? I have a double jet, but it is not enough for heavy work. I want to use it with gasoline. I am in a small country town where it is impossible to get gas. J. D. HOVERMALE, Kentucky.

A Question of Profit and Loss.—If an agent sold two buggies at one hundred dollars apiece, on one he gained twenty per cent and on the other he lost twenty per cent, did he gain or lose on the transaction? and how much? Who can answer this? WILL O'GORMAN, Missouri.

Wants to Temper Plow Lays.—Can some brother blacksmith tell me through the columns of THE AMERICAN BLACKSMITH what to use to temper plow lays and lister lays. I have some preparations, but they don't work just right, and so would be pleased to get some information on this subject. S. A. PETERSON, Nebraska.

Wants It Oftener.—I wish to say a word in regard to "our paper." I am well pleased with it. I like Benton's talks and always look for them. The nine other questions which you ask in the December issue, I can answer them all by saying, "Yes." I find lots of help in the paper. The only thing that I don't like about it is that the paper does not come often enough. J. C. BAKER, Nebraska.

As Soon Do Without His Anvil.— I am very much interested in THE AMERICAN BLACKSMITH. I don't know how our fathers ran shop without it. I would almost as soon be without my anvil. I have a nice little business; more work than I can do. My shop is 20 by 30. I have few bad customers, don't lose five dollars a year on bad debts, and work alone most of the time. S. P. TEEPLES, Utah.

A Dunning Letter.—A letter recently used by one of our Canadian readers read as follows:

"While the enclosed account is small, we would request that it be paid promptly. The very fact that the majority of our accounts are under $15 has had a tendency in the past to make our collections very slow; but now we need money, and bring the account before your notice so that it may not be overlooked. It is only a small amount. Remit today; you may be too busy tomorrow, and forget by the day after. Anyway, there is five per cent discount if you pay it before the first."

The Mule is Nervous.—I would like some brother to tell me the best way to shoe a mule that is nervous. The one I have trouble with will not allow you to make any noise. If you go up to the mule and speak low to him you can pick up his foot, but the minute you tap on it, he will rip and tear as if he were going to tear the shop down, and if you rope him he will throw himself and might break a leg. The man who owns the animal will not allow the use of stocks. ALEX FRITZ, Pennsylvania.

The Tapeline and Overreaching.—I was very much interested in the articles by E. W. Perrin on overreaching. He writes on the same lines that I have worked from for the past five years, and he stops at the point where I stop. But we leave at this point a large number of horses that forge. Can he go no further on this line? Thirty years ago I was with a man who was buying horses. He used the tapeline and said he could tell by that why a horse overreached, also whether a horse could go fast or not. I have never seen anything written on that subject or seen a man do it since. Upon request I can describe special cases and trick shoes to meet same, but my specialty is lame horses. E. H. MALOON, New Hampshire.

Enjoys All of It.—I see by the December number that you want "Our Folks" to answer some questions. I think that is a very good method, to feature some branch of the craft in each issue. It gives a person more reading matter on that branch at a time, and he has a better opportunity to study until the next issue. As to Benton's talks and Thornton's letters, they are all right. To the other questions, I answer yes. I am interested in all lines of the craft. While I served my time in a horseshoeing and wagon shop, I drifted away from that to railroad smithing, then machine smithing, and ship smithing, which I am following now. But I am interested in horseshoeing and wagon work as much as ever, and in fact in all other lines of the craft. I. N. BOWEN, Washington.

The Mail-Order Houses.—I see a great deal in the papers about mail-order houses, and I feel like having my say. As long as the people can buy the same goods for less money and pay local freight from mail-order houses, they will do it. If we write to a factory about prices, they will, nine times out of ten, make the price higher than you can buy at other places. This may be all O. K. when the hardware people carry the goods in stock, but when you live a long way from the factory and have to wait until some small hardware company in your town can mix up a lot of stuff and charge you about fifty cents for ordering, it doesn't seem right. But I guess we will have to stand this or buy of the mail-order houses; so I buy from the mail-order houses. J. H. SACKETT, Colorado.

A Letter from New Zealand.—I should not like to be without "Our Journal." I should miss it very much indeed, as I have made an emery wheel stand out of a bicycle frame from information I obtained in the paper. I find it about as handy a tool as I have in the shop. In fact, I have worn but one wheel twelve by one inch in three months, and am about to rig up another. I have a good screw-cutting machine and press drill, but the emery wheel is as handy as the others. I have been at the game forty-six years, and never done anything else. My father before me worked at it all his life until he was seventy years old. And you know the old saying is, you can always learn something from a fool—that is, if you are willing to learn; but I have come across young men that had nothing to learn. I have just lately whitewashed my shop, and had I realized how much lighter it would make it I should have had it done years ago. It improves the light. W. B. ANDREW, New Zealand.

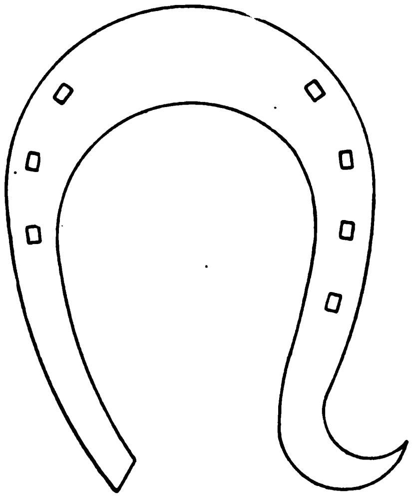
A Georgia Letter and Some Prices.—My shop is thirty by fifty feet. I have a two and one half horsepower kerosene oil engine. The other machinery I have consists of one power hammer, one rip and cut-off saw, one band saw, and two drill presses. I use my emery wheel on my saw mandrel. I have two Royal blowers, two tire setters, and one hub-boring machine. Here are some of my prices:

Horseshoeing	$.70 to $ .90
Old shoes reset	.50
Buggy tires, per set	4.00
Buggy rims	3.20
Buggy poles	4.50 to 5.00
Short arms	3.75
Shafts	3.50
Buggy painting	7.00
Wagon tongues	1.00
Front hounds	2.25
Hind hounds	1.50
Axles for skeins	1.50
Spokes	.10 to .20
Bolsters	.60 to .75
Wagon boxes	5.00 to 8.00
Plow sharpening	.05
Scrapes	$.05 to .10

I would like someone of the craft to tell me of a good make of gasoline engine of four or five horsepower as good as new that I can buy cheap. The one I have is too small. J. C. SPRUILL, Georgia.

A Short Talk on Corns.—I am a new reader of THE AMERICAN BLACKSMITH, and when my mail comes and your journal is among the list it is the first thing I look at. I do a general blacksmith business, such as horseshoeing, plow work, and general repair work, and, on such, your paper is a wonderful help to me. I have been constantly at the trade for twenty-three years, and find that we are too selfish a set for our own good. I surely enjoy having a fellow craftsman drop into my shop and talk trade, but as this is seldom done, I enjoy THE AMERICAN BLACKSMITH all the more. Now, I don't want to get tiresome with my first letter, but one word about corns. A customer says, "That horse has a corn that is hurting its foot." Now, he means all right, but the conditions are reversed, it's the foot that is hurting the corn. The wall of the foot is to the horse what the boot or shoe is to a man. If a man has a corn, he won't wear anything tight on it. But if the horse has a contracted foot he has to stand it if the smith doesn't help him out. And with this theory as a starter, I have been successful in relieving corns, and once you remove the cause, the disease is easily overcome. CHARLES BARNETT, Ohio.

How to Make a Horse Pace.—We see by the February number of THE AMERICAN BLACKSMITH that brother Pastorfield wants to know how to make his horse pace. This is our remedy for such cases: Shoe very light in front and as much iron as we can get on the hind feet. The hind shoe should be a kind of toe weight and an outside weight combined in one shoe with the outside heel of the shoe swung well out as shown. McGLADE & McBRIDE, California.



HOW TO MAKE A HORSE PACE

A York State Smith's Opinions.—The present method of featuring some article is a good one. If I do not enjoy some of them, some one else will. I am not much interested in machine shop work, but some other brother would no doubt enjoy just such articles. Articles on gas engines and power are instructive to anyone familiar with such power. Benton's talks always have a lot of meat in a small nut. I do enjoy Heats, Sparks, Welds, and the poem this month is a good one. The Queries and Notes department I enjoy very much, especially the horseshoeing queries and contributions.

How much better for both horses and blacksmiths—or, more properly, horseshoers—if there were more men who would look at imperfection in a horse's way of traveling, and, as brother Perrin says, use a little common sense instead of putting something on a foot that has but a small resemblance to a shoe. I am especially interested in this department.

Ornamental iron work would be worth studying, as well as articles on repairing. I should enjoy reading about smithing work on a battleship.

Our prices in this locality are much lower than they should be, but they will not be any better until some of the price-cutters take a long journey or change their minds. HARVEY LOCKERBY, New York.

A Jack-of-All-Trades.—I am not much of a blacksmith, never learned the trade, but am a jack-of-all-trades. I have built wagons from the stump. I have never had a fully equipped shop, and have always stopped my shop in the fall and winter to run machinery of some kind. I have run a four-stand ginning plant the last three falls and winters. We will undoubtedly close down early this winter, as the cotton is all picked; so we will only have a day once in a while.

In answer to your questions in the last paper, will say, I like all the things discussed. I am interested in all of the ten questions; although I am not a horseshoer, I do not think that that branch of the craft can be discussed too much. I agree with brother Benton on the rubber belt question. I have had quite a little experience with belts of one kind and another. I have one belt pulley in the cotton gin that runs 2,200 per minute. But this ginning doesn't interest the craft. Yet we sometimes have to make repairs that make the common clodhopper put on his thinking cap and experiment some. The engineer and myself do all our own engine and boiler repairing. We have two engines, one fifty-horsepower Fairbanks-Morse, and the other is a thirty-horsepower Nagle, with an eighty-five-horsepower Nagle boiler. This will do this time. JOHN R. SHOOP, Oklahoma.

Owes His Success to "Our Journal."—I started in the blacksmith business in 1896 with sixty-five dollars in money and about thirty-five dollars' worth of tools, and at that time I didn't know anything about iron work. I took a blacksmith into business with me and subscribed for THE AMERICAN BLACKSMITH. By careful study and hard work I mastered the iron work, and today I enjoy the reputation of being the best workman in the county. I can do almost anything I want to in the line of iron or wood work. Last year I organized The J. D. Murrel & Brothers Company, in which I own over half of the stock, and we have stock to the value of about twelve thousand dollars. Besides this I have a home worth three thousand dollars. And I am still to be found, most of the time, at the anvil or bench, and enjoy the work. I owe the greatest part of my success to THE AMERICAN BLACKSMITH. I have carefully studied every article and put all the good ones into use. This shows that a young man who wants to apply himself and will take good advice from others can learn without a tutor in person. I am now thirty-seven years old and have never worked under a blacksmith in my life. I know some boys could never learn that way, but I know they could greatly improve themselves by studying good papers and books. J. D. MURREL, Louisiana.

Grinding and Location of Forges.—In reply to Mr. Edmund Schumaker, of Illinois, on the grinding of mower sickles, would say for him to arrange a stand on his emery wheel so that he can get a little keg or vessel of some kind fastened upon it. Then bore a hole in or near the lower end of the vessel and connect a small pipe in this hole to convey the water to the desired spot. Arrange to have a stopcock so you can regulate the flow of water. A gaspipe arrangement similar to those jointed in the middle would be just the thing for this contrivance, and it would cost but very little. Keep a small stream playing on the emery wheel just above the knife blade that is being ground, and I think that you will have very little trouble with your knives heating while grinding. If there is a water supply in the shop, the water can be piped to the machine, doing away with the keg or vessel. I would also suggest the use of a wheel with a fine grit. Coarse wheels are apt to heat faster than the fine ones.

As to the forges, I would suggest placing them away from the wall at least five feet, and then not to have them parallel with wall, but to have them placed at an angle with the wall. He will find it a great advantage in working everything, and especially in working long or heavy material. W. H. NORRIS, Pennsylvania.

Wants Lots of Information.—I intend to build a new shop on the plan shown in the accompanying engraving. The shop is to be twenty-two by forty feet with a nine-foot wall. If any brother can improve on my plan any I should be glad to hear from him. I am going to install two forges, and want to know if it will be well to make the front stationary and get a good portable one for the second one. Will some reader also recommend a good forge for general work? I believe in power, intend to install an engine, and would be pleased to get some information on this subject. Will some brother also tell me how to build a forge that will not smoke? My shop is to be of wood. E. H. CAYSE, Indiana.

Brazing, Tire Setting, and Other Things.—I have now been reading THE AMERICAN BLACKSMITH for four months, but I already realize that I could not do without it. I find many good recipes and plans for different kinds of work that come up every day in my shop. I also found a diagram of a bulb for andirons by Mr. T. G. Googerty. Thanks to him, it was very practical. I built the bulbs and then completed the andirons. I am sending photo of same.

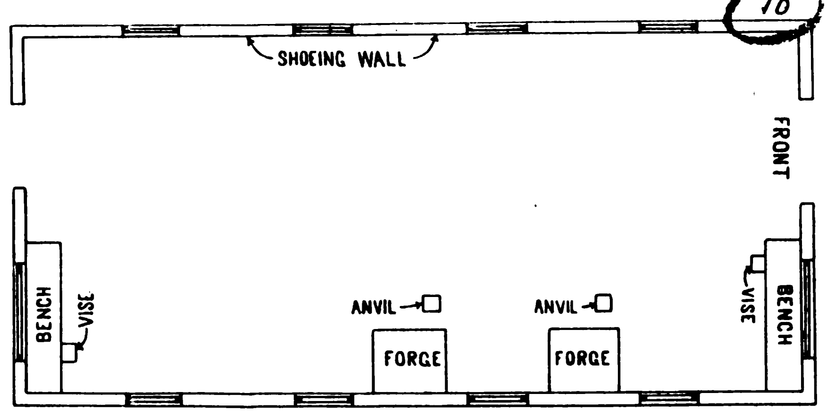
I am running a wagon and blacksmith shop. I do lots of brazing in repairing guns, and also do considerable with cast wheels and pulleys. I mean to try brother Benton's plan in the near future. I have been in the shop for twenty-eight years, but I can still learn. I would like to ask Mr. L. Van Dorin, who had an article in the latest issue, what he would do with a wheel that had been thrown out of dish. Would you cut out the rim or put the tire on tight? I have seen good wheels repaired that were dished the wrong way.

I find that there are lots of smiths that do not know how to set a tire, but they do know what to tell the wheelwright. This is my rule to set a tire: I first see that the wheel is tight, then if the rim is too long I take my saw and cut out one or two cuts, then I run the wheel or rim, and then I shrink the tire until it is three eighths to one half inch smaller than the rim. Then if the wheel is solid it will be a good job. T. C. SILSA, Kentucky.

An Interesting Pennsylvania Letter.—I am located in Fulton County, the only county in this State without an almshouse, a rural route, a brewery, a stillhouse, or a saloon other than a hotel bar, and our county court sometimes convenes and adjourns in one hour. Can any other county beat this record? We have no public works at all, but we have a grand farming community.

I have a very comfortable shop, twenty-five by sixty feet, with shed annex twelve by twenty for stock use. I have a Boss trip hammer, a Silver band saw (the first machine of this kind ever brought into this county), a power drill press, an emery stand, and a power blower. I run them all at once with a two and one half horsepower Quincy gasoline engine that costs me about thirty-three cents a day to run. It never has given me any trouble in the year's run. There is no snap or noise about my engine to scare a horse, and my exhaust is inside the shop. There is no more noise about it than a sewing machine would make, and, best of all, no stench.

Brother Pastorfield asks how to shoe a pacer that wants to trot. I would suggest that he shoe him in front with a plain plate (if he is straight), of about four ounces, and behind with a little toe and heel calk on a shoe of ten ounces. If this doesn't catch him try about one and one half ounces of side weight behind. I have used this method very successfully, but all remedies fail at times.



CAN YOU IMPROVE ON THIS SHOP PLAN?

My prices are as follows:

Four shoes	$1.00
Bar shoes, each	.50
Neverslips	$1.50 to 2.00
Tires reset	1.50 to 4.00
Axles, wood	2.50 to 4.50
Tongue	1.50 to 2.50
Spokes, each	.20 to .30
Buggy rims, as to quality	4.00 to 5.00
Wagon rims, as to size	6.00 to 8.00
One shaft	1.00
One crosspiece	.75
Shovels, each, five-inch	.35
Corn planter blades	3.00 to 3.50

I do some auto repair work and weld lots of auto springs. I hope to get some useful hints from Mr. Sallows. As I am located between two mountains, nine miles from one side to the other, hence a lot of breaks. AMOS B. WILKINSON, Pennsylvania.

A Few Words from Oklahoma.—In the February number is a reply by Mr. P. M. W., of New Hampshire, to "Subscriber," whose letter appeared in the November number. Now, I agree to most of what P. M. W. says. In the first place, we are not all of us "engine struck," but neither is Tom Tardy. We pay our money (as little as it is), for THE AMERICAN BLACKSMITH and not exclusively for a paper for horseshoers.

Thornton's letters are excellent reading for those to whom they are addressed—the young blacksmith who is starting out in life in his own shop. They give the beginner advice such as he needs. All he has to do is to read them carefully and put on his thinking cap and think hard.

Benton's recipes are good. I know of a great many recipes myself, but, after being a blacksmith some thirty-odd years, I find Benton knows some I never heard of. And, what is more, they are good, as I have found out by trying them.

Referring back to horseshoeing and gasoline engines, I will say if I see nothing in the paper but horseshoes and horse's feet it would be monotonous to me.

Mr. Thomas Long, of New York, asks information about a great many things in the February number. Will he understand all the information he will get in THE AMERICAN BLACKSMITH? Mechanical skill and practical experience are only to be had in general shops, which have plenty and a variety of work to do. The best information I can give Mr. Long is to close his shop and hunt for a job in some good, big, busy general shop. He will get more information in a shop of this kind in a month than he will in a year from books. Not only Brother Long, but a good many others, should remember that a good three-years apprenticeship and a few years' journeyman's work, besides a love for the good old trade of blacksmithing, with attention to duty, are the essential adjuncts to our trade. A young man should, first of all, serve a proper apprenticeship and a few years of journeying, and during that time he should buy books relating to his trade. But buying isn't enough; he should read the books, besides reading some good trade journal. By that time he ought to be able to understand the information given in the journal. FRANZ WENKE, Oklahoma.

The Same Kicker.—Since the November number of THE AMERICAN BLACKSMITH, several answers to the kick on page forty-eight have appeared in these pages. I would like to call the attention of my brother blacksmiths, especially to the one who signs his name "A Massachusetts Subscriber." In writing the kick of November, I failed to see where I criticised any brother in any way. I was kicking about THE AMERICAN BLACKSMITH and THE AMERICAN BLACKSMITH only. Whether the kick has done any good or not, time will tell. The editor of this paper seems to appreciate the kick, as he acknowledged it in the November paper. A man has not got to be in business long before he appreciates a kick, providing he has not got a swelled head. A customer, if he has a kick coming, will generally complain to outsiders instead of the one that has done the work. He could rectify the mistake and guard against it in the future, and any man with good judgment and common sense will appreciate a kick.

Now, in regard to the brother who signs his name "A Massachusetts Subscriber," I would like to say that I have not been in the business quite as long as he has and very likely do not know nearly as much as he does about the business, but am willing to learn. His advice may be good, but I think he is rubbing it in a little hard when he says, "Sell out and go finish learning your trade." I should hate to sell out my one-horse business, as he calls it, for I have the finest shop in New England, and as nice a business for its size as there is in this State. When a man can clear better than a thousand dollars above all expenses in one year, he had better keep his one-horse business. I would also say, for his benefit, that I served my time with a first-class mechanic, although I have not learned my trade yet, and I think there are a few others that haven't. We can always learn, and I am willing to take a few lessons from our brother in Massachusetts, providing the lessons are not too expensive. It seems dead wrong to me for one blacksmith to criticise another, especially when he does not know whom he is criticising. In closing, would say, I should like to have my brother in Massachusetts visit me, as I am in the upper part of Connecticut and would be glad to show him around my one-horse business at any time he may desire. A. L. BASSETT, Connecticut.

Agreed Price List of the Cavalier County Branch of the North Dakota Association.

Horseshoeing.

	Cash Price	Credit Price
New shoes, each	$ .50	$ .60
Setting shoes, each	.25	.30
Bar shoes up to No. 5, each	.75	.85
Bar shoes over No. 5, each	1.00	1.10
Neverslip shoes, each	.75	.85
Neverslip calks, each	.06	.07
Hand-turned shoes, each	.75	.85
Side and toe weight, each	.75	.85
Air cushion pads, each	1.25	1.35
Banner rubber pads, each	1.00	1.10
Leather pads with packing, each	.25	.30
Stallions, each shoe	1.00	1.10
Paring horses' feet, each horse	.25	.30
Shoeing bronchos and fractious horses, extra	1.00	1.10

Plow Work.

	Cash Price	Credit Price
New shares, 12 inch	$4.00	$4.40
Each 2 inches additional	.25	.25
Sharpening shares up to 16 in.	.35	.40
Sharpening shares over 16 in.	.50	.55
Pointing and sharpening shares	1.00	1.10
Polishing shares, each	.10	.10
Long landsides, each	2.00	2.20
Landside plates, each	1.50	1.65
Landside plates, each	2.00	2.20
Setting gang beams, each	2.00	2.20
Setting gang beams, each	3.00	3.30
Setting walking beams, each	1.00	1.10
Plow beam breakers, each	4.00	4.40
Plow handles, each	1.00	1.10
Rungs in handles, each	.20	.25
Coulter sharpened, hammered	.75	.85
Coulter sharpened, ground	.35	.40
Coulter clamp with tie	.75	.85
Coulter clamp without tie	.50	.55
Gauge wheel irons, per pair	1.00	1.10
Push grader shares sharpened and polished, per pair	4.00	4.40
Round coulter shank, each	1.00	1.10
Fork coulter shank, each	2.50	2.75
Disk sharpening, per blade	.25	.30
Drill shoes sharpened, each	.25	.30
Drill shoes plugged, each	$ .50	$ .55
Drill shoes polished, each	.10	.10
Harrow teeth:		
Sharpened, per 100	1.50	1.65
Taken out and put in, per 100	1.50	1.65
Three-horse Hicks evener	1.25	1.35
Four-horse Hicks evener, 6-ft.	1.50	1.65
Four-horse Hicks evener, 7-ft.	1.75	1.90

Buggy Work.

	Cash Price	Credit Price
Axle stubs, 1 inch and less, each	$3.00	$3.35
Axle stubs, per set of four	10.00	11.00
Setting axle, front	2.00	2.20
Setting axle, hind	1.50	1.65
Welding axle, extra	.50	.55
New axle boxing	1.00	1.10
Set boxing in new wheel	1.00	1.10
Set boxing in old wheel	.50	.55
Setting tires, per set	4.00	4.40
Welding buggy spring, 1 leaf	1.00	1.10
Each additional leaf, extra	.50	.55
New fifth wheel	3.50	3.85
New fifth wheel	5.00	5.50
New clip kingbolt	1.25	1.40
Shaft shackles, 1 inch and less, each	.65	.75
Shaft shackles, 1⅛ and 1¼ inch, each	.75	.85
Shaft eyes, each	.75	.85
T-head singletree bolt, each	.20	.25
Repair shaft iron, each	.50	.60
Repair pole brace, each	.50	.60
Buggy step, malleable, each	.75	.85
Singletree clamp and bolt, ea.	.25	.30
Axle clips, each	.25	.30
Top bow socket, each	1.00	1.10
New top prop put on, each	.40	.50
Top prop nut, each	.15	.20
Bow rivet put in, each	.10	.10
Shaft end socket, each	1.00	1.00
Cart shafts, each	2.50	2.75
Buggy shafts, old iron	2.00	2.25
Crossbar in shafts	1.00	1.10
Buggy pole, old irons	3.50	3.85
Circle in pole	1.50	1.65
New pole, 2¾ or 3 inches	4.00	4.40
Buggy whiffletrees, each	.60	.70
Buggy whiffletrees, sword point, each	.50	.60
Buggy eveners	1.00	1.10
Buggy neckyoke	1.25	1.40
End spring bar	1.00	1.10
End spring bar	1.50	1.65
Head block	1.50	1.65
Head block	2.00	2.20
Buggy reach, each	1.25	1.40
Buggy reach, pair	2.00	2.25
Spokes, each	.25	.30
Rims up to 1 inch, each	2.00	2.25
Rims from 1 to 1½ inches, each	2.25	2.50
New wheel complete, C grade	5.00	5.50
Side in piano box	2.50	2.75
Side in piano box	3.50	3.85
End in piano box	1.00	1.10
End in piano box	2.00	2.25
Side in seat end	.75	.85
Back in seat	1.00	1.10
Bottom in seat frame	2.00	2.25
Bottom in seat, plain board	1.50	1.65
New seat complete, old irons	5.00	5.50
One new spring	3.00	3.30
One new spring	4.00	4.50
New spring clip, put on	.35	.40
Buggy dash, put on	3.00	3.25
Buggy whip socket	.50	.60
Wood bows put in, each	2.00	2.25
New irons on pole	3.50	3.85
New piano body	10.00	11.00

Wagon Work.

	Cash Price	Credit Price
Setting tires, 2 inch, and under:		
Each	$1.00	$1.10
Set of four	3.50	3.85
Over 2 inches, straight, each	1.00	1.10
Truck tires, straight, each	1.25	1.35
Putting on new tires, additional to material	2.00	2.20
Wagon axles, each	5.00	5.50
New skeins, each, put on	$2.50	$2.75
Setting boxing in wheel	.50	.60
Setting boxing in wheel	1.00	1.10
New iron on wagon pole	3.00	3.30
Wagon pole put in, old irons	3.50	3.85
Pole hound put in, each	1.50	1.65
Pole hound iron, each	.75	.85
Reach hounds, each	1.50	1.65
Circle hound, each	3.50	3.85
Sway bar	1.75	1.95
Sandboard	3.00	3.30
Wagon reach, 10-foot	1.50	1.65
Wagon reach, 12-foot	1.75	1.90
Bolster wood, old irons	3.00	3.30
Bolster stakes replaced	1.00	1.10
New bolster, complete	5.00	5.50
Bolster plates, one	.75	.85
Bolster plates, pair	1.25	1.40
Pole cap put on	.50	.60
Hammer strap	.35	.40
Tongue bolt	.40	.45
Wagon wrench	.50	.55
Wagon kingbolt, 1 in.	.50	.55
Wagon kingbolt, 1¼ in.	.60	.65
Box rods	.25	.30
Neckyoke woods	.75	.85
Whiffletree woods	.50	.60
Whiffletree woods	.75	.85
Eyebolt in neckyoke	.25	.30
Coldshuts in neckyoke	.15	.20
Whiffletree hook and ferrule	.25	.30
Whiffletree center clip	.25	.30
Seat spring, 2-leaf bolts, extra	.75	.85
Seat spring, 3-leaf bolts, extra	1.25	1.40
Wagon rims, 1½ to 1¾, each	2.00	2.20
Wagon rims, 2 to 2¼, each	2.25	2.50
Wagon rims, 2½, each	2.50	2.75
Wagon rims, 3-inch, each	3.00	3.25
Spokes, each	.25	.30
Sawed felloes, each.	.40	.45
Evener woods, each	.60	.65
Evener woods, each	1.00	1.10

Cutter Work.

	Cash Price	Credit Price
Beams put in	$2.50	$2.75
Knees put in	1.25	1.40
Runners put in	3.00	3.30
Runners put in	5.00	5.50
Draw bar, each	1.25	1.40
Grocery bob runners, each	2.00	2.25
Grocery bob runners, each	3.00	3.40
Grocery bob shoes, each	1.50	1.75
Cutter shoes, pair	3.50	4.00

Sleigh Work.

	Cash Price	Credit Price
Pole replaced	$3.50	$4.00
Roller replaced	2.00	2.25
Bench beams, each	3.00	3.50
Reach or short tongue	1.00	1.15
Bolsters	2.00	2.25
Runners, up to 2-inch, old irons, each	3.00	3.50
Shoes, new, put on	2.50	2.75
Sleigh rods, each	.75	.85
Sleigh start pins, each	.75	.85

Mower Repairs.

	Cash Price	Credit Price
Weld axle	$1.50	$1.65
Weld axle	2.00	2.25
Weld pitman	.50	.55
New hook on pitman	.75	.85
Putting straps on wooden pitman	.25	.30
Weld sickle	.75	.85
Piece sickle	1.00	1.10
Odd work per hour (stock extra)	.75	.80
New section, each	.10	.11
Put sections on, each	.04	.05
New guard plates, each	.05	.06
Putting plates on, each	.05	.06
Taking off guards and put back on, each	.04	.05
New mower tongue	3.50	3.85

Miscellaneous.

	Cash Price	Credit Price
Chain hooks	$ .50	$ .60
Chain links	.10	.10
Chain links	.25	.30
Stone hammer dressed	.75	.85
Stone hammer dressed	1.50	1.65

VOLUME 7

THE AMERICAN BLACKSMITH

NUMBER 9

A Practical Journal of Blacksmithing and Wagonmaking

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N.Y. U.S.A.

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Forty-Two Years.

A man who has worked at the smithing trade in four countries, and in his forty-two years of active service has become acquainted with nearly every smithing paper published, should know something about smith shop magazines. This is what a Connecticut friend says: "On April 16th, 1866, I commenced blacksmithing. Since then I have worked constantly at the trade in Ireland, England, Scotland, and America. In my forty-two years of active service, I have become acquainted with nearly every blacksmith trade publication, but none of them touches the spot like THE AMERICAN BLACKSMITH, and I hope to be a subscriber as long as I live." It touches the spot because it gives to the blacksmith just what the blacksmith wants—just what he needs—what he cannot get elsewhere. A man with forty-two years of active anvil service should know—he signifies his intention to become a life subscriber. Do you see the moral?

An Easy Saving Plan.

If you bought a gas engine, used it for a week, and then decided that it wasn't large enough for your particular needs and wanted to sell it, it would be secondhand. It may, perhaps, be a better engine than when new, for it has proved its worth, and the one week's running has taken the "stiffness" out of it—yet it is secondhand, and you cannot expect to get as much for it as you paid. Suppose the same thing of any other machine, tool, or shop fixture—it means a saving for the purchaser—a machine, tool, or fixture as good as new at a reduced price. It's not necessary to go without any item of shop equipment simply because you do not feel that you can afford a new article. If you want to save money, read or advertise in our want column. The cost of making your want known is so small as to fade almost into nothing when compared with the number who will read it.

Contents, June, 1908.

That Fifty Thousand.

Are you keeping the fifty thousand mark in your mind's eye? Somebody said at some time: "Drive a stake, work up to it, and then drive another still farther above you." Suppose you start your stake-driving by sending us one new subscriber. If you will do this, and every one else does the same no other stake driving will be necessary, for we'll have our fifty thousand and more too. One of "Our Folks" when sending his renewal the other day said, "Mr. Frank James has just started a shop in the next town. I think he would be interested in 'Our Journal.'" That's the way to get him on our list of subscribers if you can't call personally. We will send sample copies anywhere in the world, and the names of blacksmiths anywhere in the world are always welcome. Keep the fifty thousand in mind—if you will do it, and every other member of THE AMERICAN BLACKSMITH family does it, the fifty thousand will soon be a reality.

Our New Current Price List.

For some time we have been wanting to publish a list of current prices that would be of real help and value to you. A price list to which you could turn when you wanted to make a purchase. And we have now made arrangements whereby we are able each month to quote prices that are correct and right up to the minute of printing, and as reliable as a system of correspondence in the larger business centers can make it. This price schedule will give you a pretty good idea of what to pay for your supplies, and is just as complete as space will allow. We earnestly hope that you will make regular use of this new feature of our satisfactory subscribers' service, and if at any time you can suggest anything to improve or enlarge the usefulness of the quotations under the head of Current Heavy Hardware Prices do not hesitate to writeus.

Returned

A NEATLY ARRANGED YORK STATE SHOP WITH A MODERN FORGE AND ELECTRIC LIGHT. MR. STACY IS A GRADUATE OF A COLLEGE OF FARRIERY

The Ideal Smith Shop

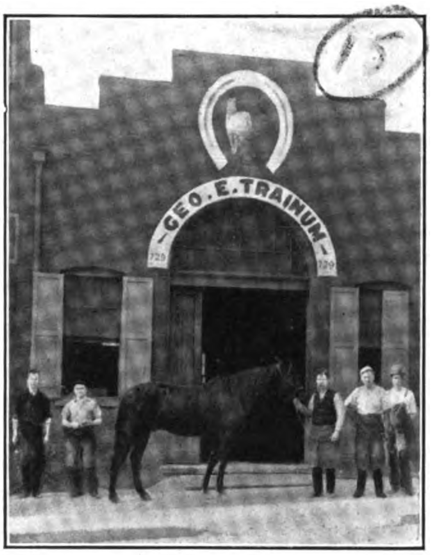
THORNTON

SUALLY I play ball with the boys at noon until the whistle blows, but yesterday I thought I'd have a quiet smoke after lunch. I was pulling away peacefully at my briar, and feeling generally good, for we had had a good run that morning, when—I must have dozed, for I was startled to find myself before a strange-looking shop. Glancing up at the sign I read "The Ideal Shop. Shoeing and Vehicle Work." This sounded inviting, so I entered and looked about. But I was puzzled by the appearance of the interior. There was a familiar atmosphere about the place, and yet things were strangely unreal. Everything was so shipshape. There were four or five horses along one wall, and against the other were placed two forges. The air of the shop was strangely clear and pure, and in looking for the reason I found that the forges swallowed their own smoke in a way. Of course, this kept the air pure and clean, and the walls, tool racks, and vise stand were not soot-covered, as they generally are. I noticed, too, that the men at the fires had no blowers to turn, and one man whom I was watching simply pulled a lever and the dull-red coals instantly burst into a glowing, bursting mass.

I then watched one of the floor men, and was nearly taken off my feet with surprise at finding a shoer's box in such perfect order. This man had a convenient place for every one of his tools; the rasp, hammer, knife, and all he kept in place when not in use. I thought this man's box an exception, but upon inspection I found every shoeing box in the shop was the same. I then looked for the storage place for shoes, expecting, of course, to find disorder there. But here also was I surprised, for I found the shoes neatly hung on a rack, and each group marked for style and size. This rack was between the first two fires, and held a considerable quantity of shoes.

AN OLD SHOP OF NEW YORK STATE

Before going any farther on my inspection tour the fact that the owner of this shop paid a good deal of attention to little things was impressed upon me. He paid attention to the tool boxes, the anvil blocks, the forges, the stock rack, the benches, and each part of his shoeing shop, and then he let the shop generally take care of itself, knowing that it could not be otherwise than as neat as the proverbial pin.



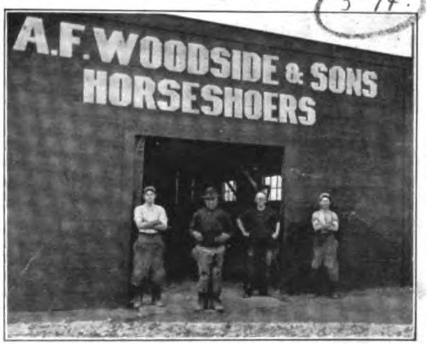
A SHOEING SHOP OF VIRGINIA

After going all over the shoeing shop in an effort to find disorder, and failing, I went into the vehicle department. This department consisted of two medium-sized shops — one for woodwork, and one for iron. Here also the orderliness of the establishment was impressed upon me. The stock was all neatly piled in racks and shelves, and every machine was located just where it should be. Those machines that were used in groups were placed near each other so that a workman lost no time in walking from one machine to another. In the forge room or ironwork room two modern forges were placed back to back in the center of the room with sufficient space on all sides of the forges to accommodate the largest gear or wagon. By this arrangement the forges were always convenient, no matter where the vehicle happened to be located. One of the men was working on a gear when I came in, and had all his tools neatly arranged on a tool table. On this table he also carried bolts, nuts, clips, and other supplies, and as the table was mounted on casters he pushed it around to wherever he needed it.

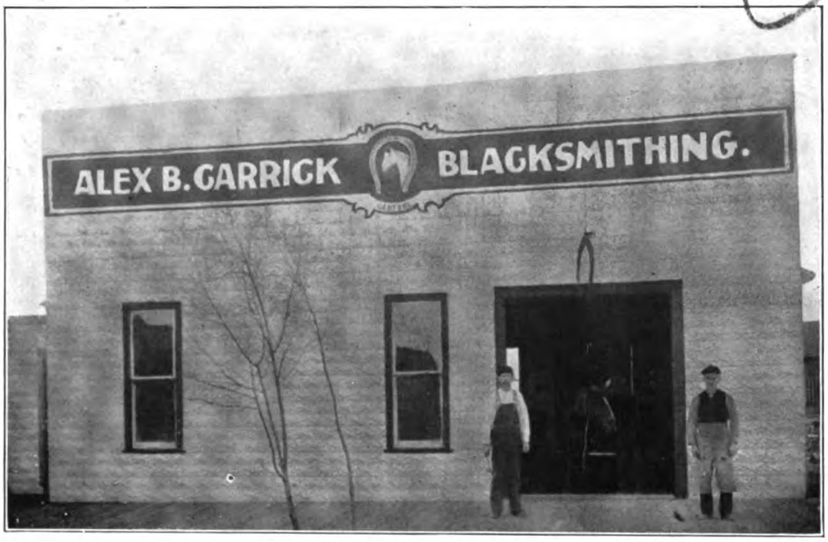
A MODERN YORK STATE SHOP RUN BY MYRON RICHARD

I now asked one of the men where I could find the boss. He replied that there was no boss, but that I would find the proprietor in the office, and he directed me to the front of the building. On my way to the office it occurred to me that I hadn't seen any old shoes about. Upon questioning one of the shoers I learned that the removed shoes were kept in a sheet-iron bin at the side of the shoeing shop until called for. This little device takes care of a very troublesome problem for the shoer.

Upon entering the office I found



A CALIFORNIA SHOEING SHOP



A GENERAL SHOP OF OKLAHOMA, MAKING A SPECIALTY OF GAS ENGINE REPAIRING AND REBUILDING

myself in a very neat but plainly furnished room containing a desk, several chairs, a safe, and a bookcase. There were a number of pictures on the wall, but the floor was bare. A very pleasant-faced man motioned me to a seat, and upon inquiry he told me that his name was Ideal, and that he owned the shop. I asked how he managed to keep things shipshape in his shop. "It was difficult at the start," he replied, "but I don't have to say much about it now. The men are proud of the shop, and they keep it neat and shipshape of their own accord now. When a new man comes, they soon teach him to be neat and orderly, and it is seldom necessary to speak to a newcomer twice about neatness and order. But then we very seldom have any new men unless one of the old hands dies. The men get the right treatment, and I think they enjoy working in a clean shop. I have little trouble with help, for they know what they have to do, and how it's to be done, and any man who doesn't feel like living up to our rules here must either show a good reason or get out.

"My equipment is the best I could possibly make it. All my machines are motor-driven, the forges are of the latest improved style and design, and everything about the whole shop is just as up-to-date as I can make it. It was necessary for us in many instances not only to make but to plan little labor-saving helpers and assistants. Those shoers' tool boxes, for instance, and the wagon-makers' tables, were planned and made right here. We couldn't get anything like what we wanted anywhere."

This brought me to a realization of the fact that I didn't really know where this shop was, or where I myself was at that moment. In questioning the proprietor of the shop, he said, "Why, this is Idealville," and then he disappeared. I awoke to hear the one o'clock whistle blowing, and to find the boys marching into the shop to begin the afternoon's work. While but a dream, the Ideal shop left an impression, and some day I'm going to make it a real shop, a modern shop, with modern tools, machines, and equipment—and it's not merely a dream either.

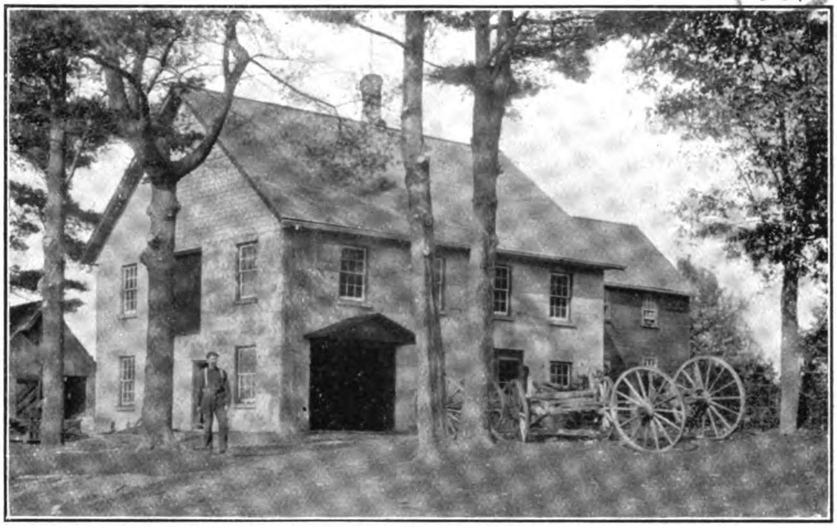
AN INTERIOR VIEW OF THE WOODSIDE'S CALIFORNIA SHOEING SHOP

An Old York State Shop.

A. ROSKAMP.

The accompanying illustration shows my shop, which is the oldest in this town. The sign shown above the door was painted in 1832, but the date does not show in the picture, time having made it almost invisible. I am a green hand at the forge, thirty-five years being all the experience I have had, but I am improving every day, thanks to THE AMERICAN BLACKSMITH, which has given me much valuable information. Your paper is worth its weight in gold. I hope the man with the recipe book will call often. His article on brazing in the January number ought to be of value to a good many blacksmiths. I do

A CHICAGO SHOP MAKING A SPECIALTY OF VEHICLE BUILDING AND REPAIRING



A MODERN CONCRETE SHOP OF ONTARIO, CANADA. MR. W. J. LILLICRAP DOES GENERAL WORK, WOODWORK, AND PAINTING

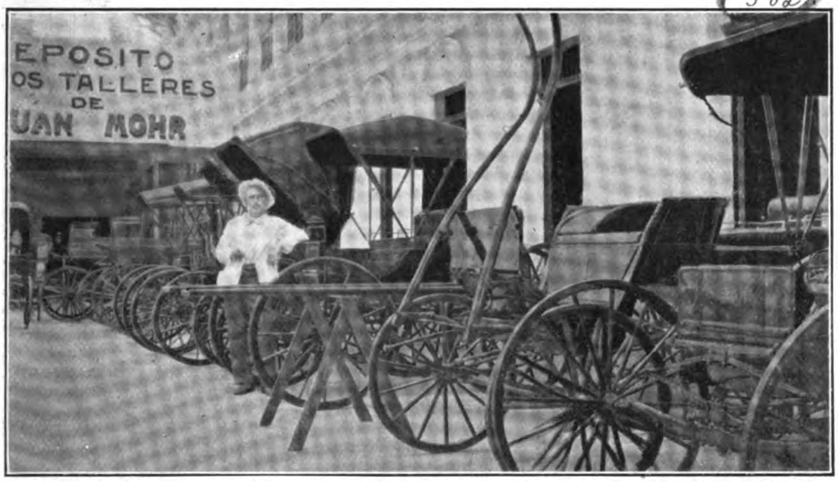
a little brazing myself, and find that a good substitute for borax as a flux is powdered glass, which I find is easier to clean off than borax.

A General Shop of Oklahoma.

A. B. CARRICK.

The accompanying illustration shows my shop, situated in Oklahoma. My shop is 34 feet by 50 feet, and is equipped with power. I have three forges of my own make. I also have three hand-blowers and one power blower which blows my three fires. I have a Brook's cold tire setter that I have used three years and it still does fine work. I also have a Mole hot shrinker, one Western Chief drill press, one Easy trip hammer, a small turning lathe, a rip and cut-off saw, and an Easy shear. I also have one set of full-mounted Little Giant screw plates, one tire bolter, one emery wheel, and a disk grinder which I myself made. This fastens to my emery wheel. To make it I procured a shaft long enough to run from one wheel to the other and put two boxes on it to fasten to the rests on the emery stand. I then took a cog large enough to get a slow speed and forged a bar for it to run in so as to let the disk run straight up and down. I then threaded the top end and put a nut on it to tighten down on the disk. This device does fine work. I have three iron vises, a wood vise, and one Green River foot vise, a full set of pipe tools, all kinds of small tools, and three Trenton anvils.

I do horseshoeing and all kinds of general repairing. I make a specialty of gas engine work, repairing, and rebuilding, and buy and sell secondhand engines. I have three of my own now.



A CENTRAL AMERICAN CARRIAGE REPOSITORY CONNECTED WITH A SHOP WELL EQUIPPED WITH MODERN TOOLS AND MACHINES

A Power Shop of Illinois.

A. L. ERICSON.

I see that a great many smiths are putting in power. I have run my shop with steam power since I have had a shop of my own—fourteen years ago. I have put up an overhead trolley track with which to handle heavy weights, and have also made a swinging crane with which to load and unload heavy articles to and from wagons. I find these two contrivances are great labor-savers, and I would advise every brother smith who does heavy work of any quantity to equip his shop in this way. Blacksmiths and small manufacturing concerns with power will do well to be on the alert to see what large factories and plants are doing. We must imitate them as much as possible if we would be successful.

The installation of power, power machines, and labor-saving devices is but half the problem. We must keep our machines going continually. Idle machinery does not pay interest on the money invested. It is what we do with our machines that pays the dividends. The longer our tools are busy the bigger the returns. When our machinery is not busy with job work, other work should be found for it if we are to get a maximum return for our investment.

During my slack time I build iron

AN EXTERIOR VIEW OF MR. STACY'S SHOEING SHOP. THE INTERIOR IS SHOWN IN THE FRONTISPIECE

Ret.

fences, stock water tanks, and cisterns. I also do lathe work and machine work, and thus I manage to keep my shop tools going most of the time. I have a twenty-four inch by ten foot iron lathe, and I find it the best machine for bringing in work. Besides the regular lathe work, I also do my disk sharpening on this machine.

A Handy Tire Holder in a York State Shop.

J. B. HARRIS.

The accompanying engravings show an exterior and an interior view of my shop. In the interior picture you will see that I have a tire gripped in what I call my helper. All of it is to be seen except a ⅜-inch rod about three feet long with a hook on one end and a loop on the other for the hand. One light pull down on the lever holds the tire better than any helper can hold it, and one push up releases the tire instantly. It will hold any tire from seven eighths to four inches, and as I cut down hundreds of wheels and have to cut a piece out of every tire, I think it is a great help as it is always there when I want it. When not in use, I loosen one nut near the top and swing the device out of the way. There is a spring, made from an old buggy spring, between the two jaws, and on the left-hand jaw there is an A-shaped piece of half-inch iron with a thread and easily turned nut that can be run up and down with the fingers. This allows the jaws to open for a wide or narrow tire. If any brother smith cannot get a good idea how to make one from the picture, I will send a drawing of all the parts or a small working model on request.

I have picked up a good many ideas from "Our Journal," and would not think of running my shop without it. All the fault I have to find is that it doesn't come often enough. I wish it came every week. There are a great many things in it that do not agree with my experience, but that does not prove that it doesn't agree with some one else's ideas and opinions.

A GENERAL SHOP OF ILLINOIS, OPERATED BY ELECTRICITY

MR. HARRIS'S HANDY TIRE HOLDER

My shop is twenty-four by thirty-two feet, but it is not long enough. It ought to be twenty feet longer. My equipment consists of one blower, one Hay-Budden anvil, one seventy-pound vise, one No. 3 Mole Tire Shrinker, one No. 12 Advance drill, one tire bender, one Reynolds tire bolting machine, one emery wheel grinder, and one set of Lightning screw plates. I also have a number of small tools. When I buy a new tool, I make it a point to buy the very best I can get, regardless of cost, and I think it pays to do so, as I have been in business but eight years and have made a good success of it. I have all the work I can do the year around.

AN EXTERIOR VIEW OF MR. J. B. HARRIS'S GENERAL SMITH SHOP

An Electrically Operated General Shop of Illinois.

JOHN ARMSTRONG.

The accompanying engravings show two views of my shop, the interior view showing the shoeing department, while the other shows a general outside view. The shop is twenty by sixty-seven feet, two stories high, and has a concrete floor and forge. Just over the forge, and on the upper floor, is a coal bin that holds one half ton of coal. A galvanized pipe allows the coal to feed down to the forge just as it is used. I run all of my machinery with electric motors. I have a five-horsepower motor with which I run an emery wheel, a polishing wheel, a rip saw, a disk sharpener, and a grinding stone. A one-half horsepower motor runs a lever-feed drill, a horse clipper, and a small emery wheel for grinding tools. I have just installed a new Kimble electric blower for my fire, and I think it is a very fine thing. In the upper room I have my paint shop, which I think pays fairly well. We painted over seventy jobs last year and two automobiles. The cut shows what we put out one Saturday last summer, including one of the automobiles, which can be seen at the side door. I have about one hundred and seventy-five

A VIEW OF THE SHOEING DEPARTMENT IN MR. ARMSTRONG'S SHOP

dollars' worth of painting in at the present, and the prospect is good for this coming season.

The question is so often asked, Does power pay in the shop? I can say that I think it does, as we are thus able to turn out much more work and better work. My bill for electric power averages about three dollars per month.

A General Shop of New Zealand.

GEORGE DASH.

The accompanying engraving shows my shop, with myself and motor car meeting a team of oxen. As may be seen, my establishment consists of several buildings. My equipment consists of a Henderson cold tire setter, an American rubber-tiring machine, a Green River screw-cutting machine, a band saw, a circular saw, a drilling machine, and also a combined cutting and punching machine.

In this country there are many things which differ very much from American styles. For instance, the bulk of our hauling is done with two-wheeled vehicles. These carts have wheels five feet high, and are drawn by from two to four horses. Nearly all of our two-wheeled vehicles, dog carts, business carts, and drays are on wheels five feet high. The ox has almost disappeared from our roads, the hauling falling to the lot of the Clydesdale, and such other heavy draft stock, with which all the farm work—plowing, reaping, etc.—is done. It always amuses us to hear American visitors comment upon the hauling of a two or three ton load on a two-wheeled dray. The visitor usually endeavors to prove that the shaft horse is too busy balancing the load to be able to pull very much of it.

The motor car is here as a pleasure convenience, but for freight purposes is making slow progress. The traction engine is used a great deal for wool and grain hauling.

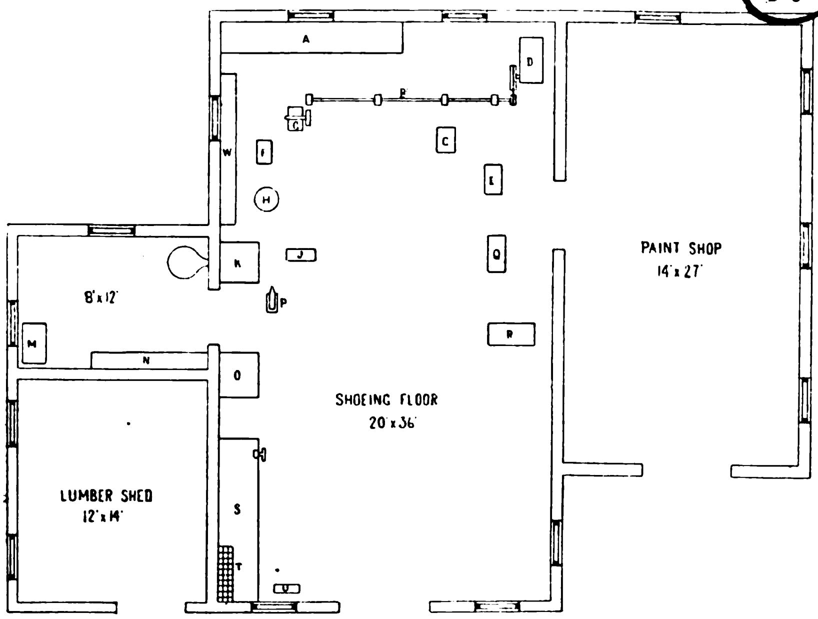
The conditions of labor here differ from yours materially. The rate of wages, the number of apprentices, the hours of labor, the holidays, etc., are all fixed by the Arbitration Court. My men get a minimum wage of thirty cents per hour, and work forty-five hours per week; that is, five hours on Thursday, and eight hours on other week days. No piece work is allowed. If the men wish a raise or an altered condition it is generally taken up by the Cancellation Board. Both the employers and employees give evidence, and the board, after due consideration, gives out a recommendation. If this is not accepted, the case goes before the Court of Arbitration, evidence is heard again, and a decision given which is agreed upon and lasts for—in our case—two years. This decision holds good with every employer named, and as a general rule all are mentioned. The penalty for disobeying an order of the court goes up to $500. Other things being equal, we are compelled to give preference of employment to a member of the union. Our apprentices here start at fifteen years of age, receiving one dollar and eighty cents per week. The work an employee may do is duly specified in the contract made with him by the employer.

A Very Up-to-Date Power Shop of New York State.

A. L. OCHAMPAUGH.

We have a power shop the dimensions of which are twenty-six by one hundred feet, and two stories high. We do general blacksmithing and horseshoeing, and also build new work. Our machinery and tools consist of one six-horsepower I. H. C. gasoline engine, one twenty-inch surface planer, one twelve-inch jointer, one saw table with a twelve by fourteen inch saw, one twenty-six-inch Silver band saw, one eighteen-inch swing wood lathe, one Dole & Deming's spoke-tenoning machine, one power hub-boring machine,

A GENERAL SHOP OF NEW ZEALAND, WHERE ALL KINDS OF WORK IS DONE, FROM THE SHOEING OF OXEN TO THE REPAIRING AND BUILDING OF MOTOR CARS



THE FLOOR PLAN OF A WELL-EQUIPPED GENERAL SHOP OF WISCONSIN

one large Western Chief power drill, one Little Giant drill for hand use, one emery stand, one power blower, one Samson tire shrinker, one Mole tire shrinker, one calking vise, one toe calk machine, one Reynolds tire bolter, and one block for forming cultivator teeth. We have two fires, and all the other tools used in an up-to-date shop. We have three men working steadily, and also think of installing a two or two and one half horsepower engine for running the blowers, and other small machinery. Our shop is heated in the winter by a big hot-air furnace, and we also have a telephone, which is very convenient. We also intend to add to our machinery an engine lathe and power hammer in the near future.

A Well-Equipped Shop of Wisconsin.

GEORGE F. KRETLOW.

The accompanying engraving shows a floor plan of my shop. As indicated, my shop is operated by power. I do general smithing, horseshoeing, and wagon work. My main shop is twenty by thirty-six feet, the paint shop is fourteen by twenty-seven feet, the lumber shed is twelve by fourteen feet, and a small room off the main shop is eight by twelve feet. This is where I have my desk. The letters following correspond to those in the engraving, which shows the location of the various machines. A represents the wood-work bench; B, the line shaft; C, the drilling machine; D, the gasoline engine; E, my shop-made band saw and table; F, the tire bender; G, the emery stand; H, the stove; I, the shear; K, the forge; M, the desk; N, the rack for horseshoes; O, the tool table; P, the anvil; Q, the cut-off saw; R, the tire shrinker; S, the vise bench; T, the bolt rack; U, a grindstone; W, an iron rack.

The Blacksmith of Central Africa and His Work.—3.

If you think that the Central African is not harassed by fashions as is his white brother, you are mistaken. While his white brother takes pride in displaying a wealth of gold and precious stones, the native of Central Africa bedecks his person with iron in the form of chains, necklaces, and arm rings or bracelets. These ornaments are fastened "for keeps," as the

FIG. 1.—SIGNAL BELLS MADE AND USED BY THE CENTRAL AFRICANS

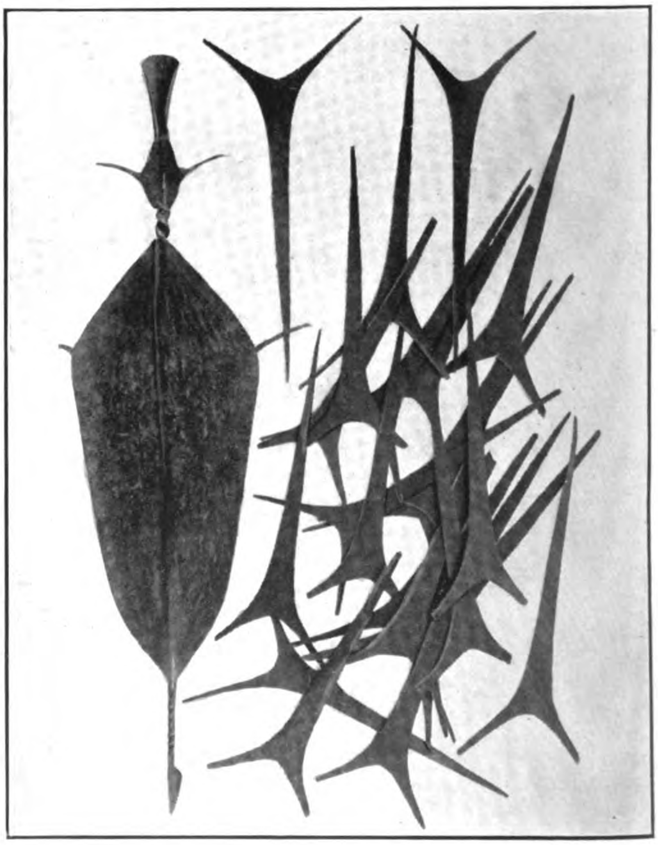


FIG. 2.—THESE PIECES REPRESENT COINS. THEY ARE GENERALLY OF IRON

small boy would say, and can be removed only by decapitation. The circles, necklaces, and rings are welded into place on the neck, arm, or ankle by placing a piece of wood under the joint to be made so as to protect the flesh from being injured during the soldering operation.

In some sections of Central Africa, one authority says, "Rich men's wives are often so overloaded with iron that, without exaggeration, I may say that I have seen some who were carrying nearly half a hundredweight of it in rings and trinkets."

The Bushmen in the southern part of the Dark Continent, unlike their brothers of the central section, are not given credit for smelting and working iron. It is generally believed that they have simply used such of the metal as was brought into the country by the travelers and explorers from other countries.

Copper and brass also play a part in the life of the smith of Central Africa. Bars, wire, and rings are formed from both these metals, and it also serves as a medium of exchange with both the Niam-Niam and Monbuttoo tribes. Among the Niam-Niam, or Zandeh, spears made entirely of copper are found (of course, as ornamental weapons), and the smiths are fond of damascening copper upon iron in very tasteful designs. The Monbuttoo draw the metal into wire, with which they bind bows, spear shafts, knife handles, and the like. The Babubo smiths coat wooden articles such as ax handles with sheet copper beaten thin. Shields and the little sticks worn in the ears are studded with copper, and the same metal holds the ring of buffalo hides together and is found on the tongues of belts. Daggers are also embellished with woven copper wire. On the equatorial Congo both copper and brass are used in great quantities. So it may be easily understood from this that the demand for copper is not small.

So much for the metal-working abilities of the Central African. In woodworking they are quite as adept. The Monbuttoo tribe is skilled in wood carving, and is the only African nation which uses a graving-tool with a single edge, an instrument which, by supporting the forefinger, enables the worker to give a very superior finish to his productions. The wood used for carving is generally that of the stem of one of the rubiaceae, the soft, close texture of which closely resembles poplar wood. These trees are giants in size and vary from six to eight feet in diameter, while they often attain a height of forty feet without throwing out a single branch. The Monbuttoo fell these immense trees with their little hatchets,

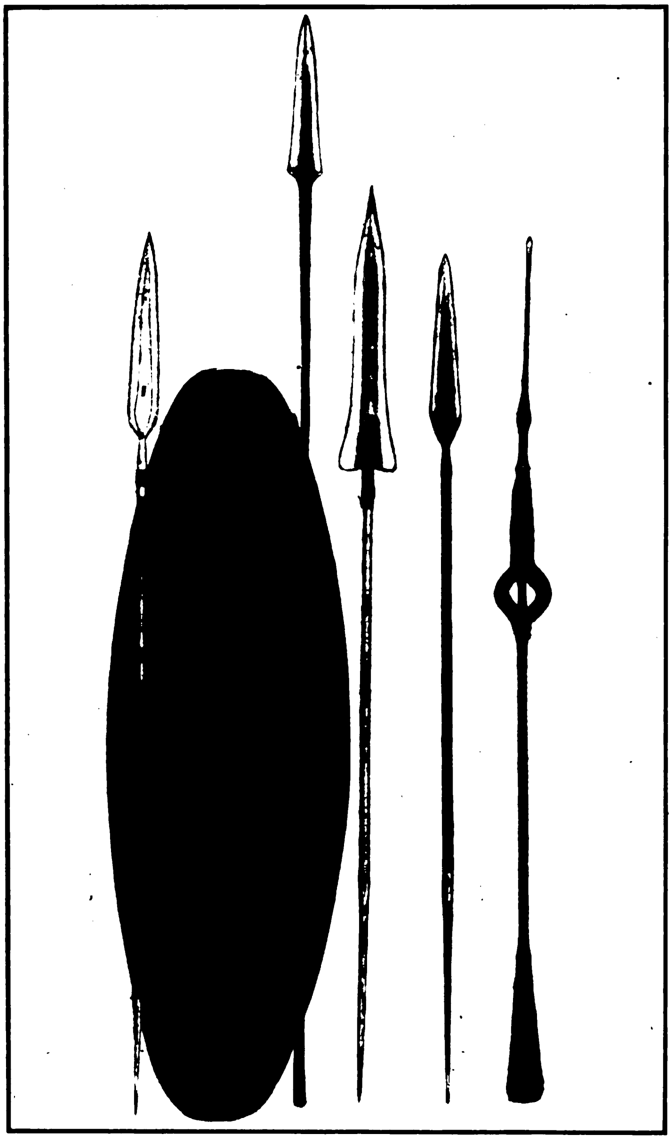


FIG. 3.—SHOWS A WOVEN SHIELD AND A NUMBER OF SPEARS

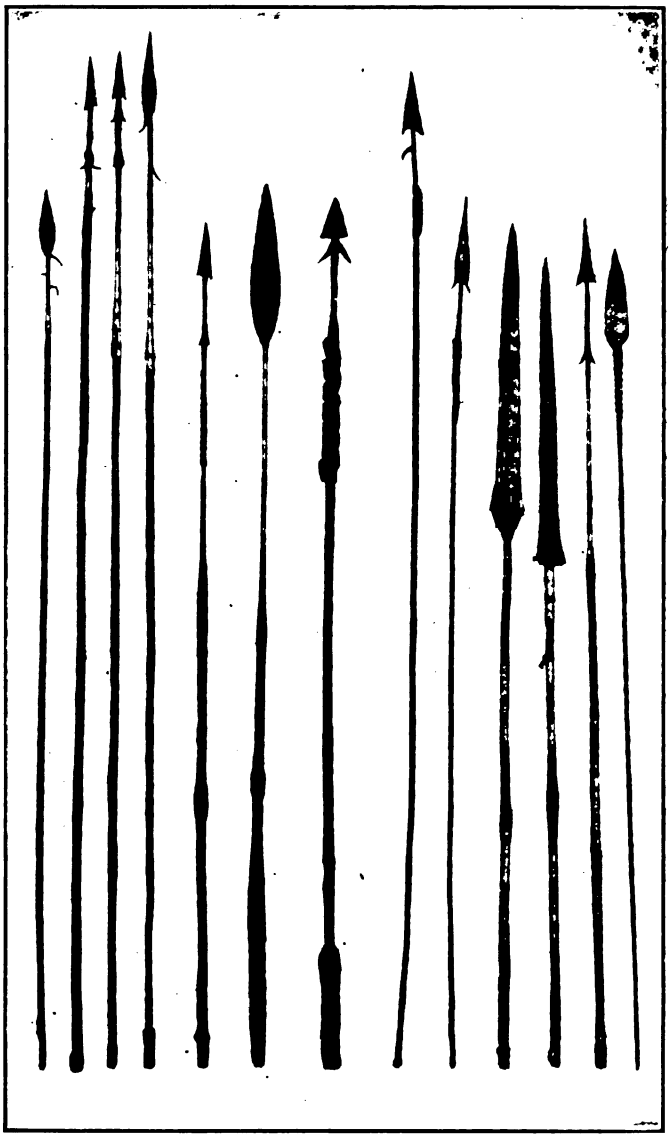


FIG. 4.—SEVERAL HARPOONS AND SPEARS TYPICAL OF CENTRAL AFRICA

which must, of course, mean a tedious amount of labor. The hatchets consist of a sharpened iron wedge inserted through the thick end of a knotted club. The number of blows necessary to fell one of these forest giants must amount to several thousands, yet stems of these trees which have been cut down appear as smooth as though cut with a knife.

A peculiar method of making the benches used by the men of Central Africa may be of interest. The women, by the way, sit upon the ground; they are not allowed the use of the benches, or seats, which consist of a top of several long poles resting on crosspieces at each end, which crosspieces in turn rest on short legs. These benches are about five feet long and of a corresponding width, but they are of such lightness that one man can without apparent exertion carry six of them easily. Instead of using nails or pegs in joining or fastening these benches together, they are sewed together with fine split Spanish reed, which by its unyielding texture holds the bench solidly.

Wooden shields are hewn out of the thickest trunks by means of an ax, and consist of perfectly smooth rectangular boards not more than half an inch thick, but long enough to cover two thirds of the person. These shields are often bound with bands or braces of iron or copper to prevent their splitting or breaking.

The Central African, like his brother the world over, is given somewhat to superstition. A passing reference to two of his superstitious beliefs will, no doubt, interest readers. Whenever a horse or donkey is ill in any way, the animal is compelled to swallow pieces of pork. This is considered an infallible cure, and in some parts of the heathen Negro countries where tame pigs are unknown wild hog flesh is used as a substitute. Another of their superstitions is even more revolting. The horse being an exceptionally strong animal, the natives believe that it will give them strength to apply the sweat of their horses to their own bodies. After a ride they scrape their horse's back, and rub the sweat about their own bodies much as they do with their greasy ointments.

The engravings this month show in Fig. 1 bells used for signal calls and the like. They are made by hammering sheets of metal very thin, and then rolling or turning it in the shape shown and welding. The two little bells shown below the double bell are tied about the necks of the native dogs. In Fig. 2 are shown some coins. As a rule, no special form is given to the iron used as money. There are also no plates or special forms of iron, the smith having to work everything from lumps of metal as large as the fist.

A careful examination of the arrows and lances of the Monbuttoo and the Niam-Niam tribes shows that the symmetry of the various barbs, spikes, and prongs is always perfect. In Figs. 3 and 4 are shown several spears and harpoons typical of Central Africa. The shield in Fig. 3 is woven, and is not the kind spoken of as being hewn from the solid timber. The weapons of the above-mentioned tribes are generally provided with blood grooves or gutters. The shafts of the Monbuttoo arrows are made of reed grass, and are winged with pieces of genet's skin or plantain leaves. The bows for driving these arrows are somewhat over three feet in length. The shafts for the spears and harpoons are sometimes of wood, while in some instances the blade is a continuation of a shaft of metal.

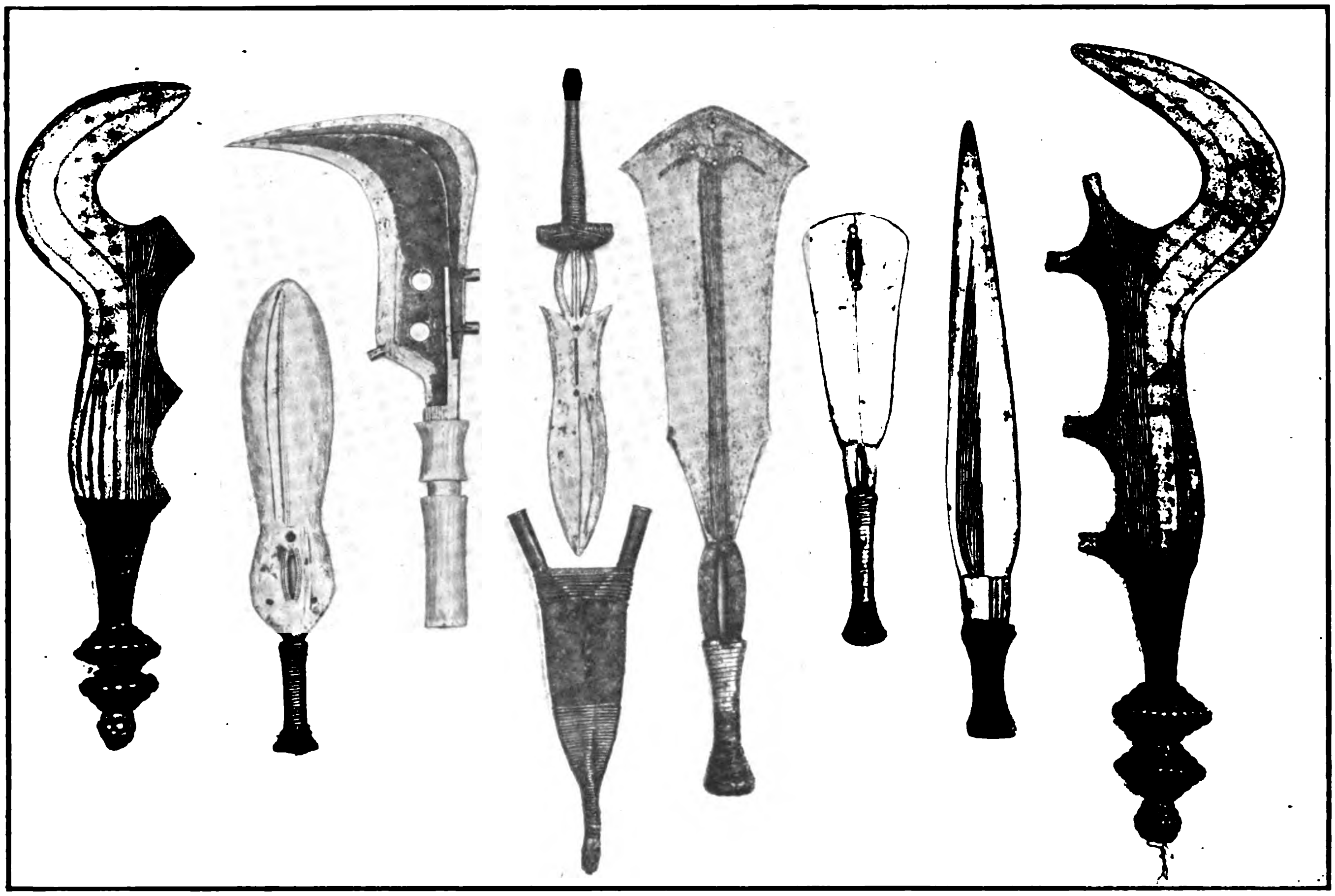


FIG. 5.—SHOWING SEVERAL STYLES AND SIZES OF KNIVES AS FORGED BY THE CENTRAL AFRICAN SMITH. NOTE THE BLOOD CHANNELS

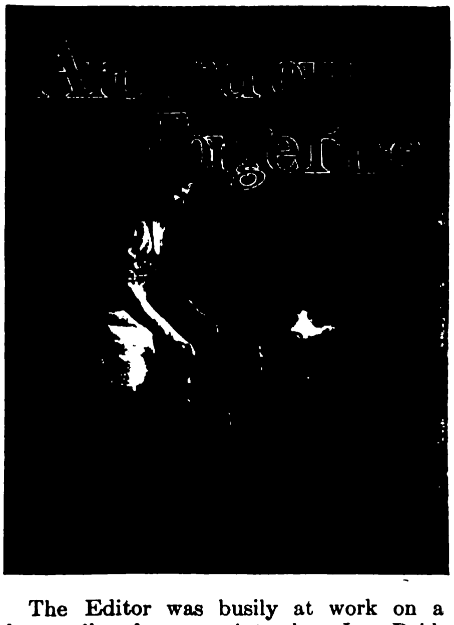
The spear farthest to the right in Fig. 4 is an example of this construction, the central part of the shaft being twisted for some length.

The several examples of the Central African smith's handiwork shown in Fig. 5 are execution knives and weapons of defense. All of the knives, with the exception of the third one from the left, have wire-bound handles. The knife in the exception noted has a handle of ivory. The knife to the right of the one with the ivory handle is shown with a sheath. The two large knives at each end of this group are execution knives. All of the knives in this engraving show the characteristic blood channels referred to above.

A Handy Iron Support.

G. NABLO.

The accompanying engraving shows a very handy support for forge use. It is made of half-inch round stock and can be very easily fashioned by using the engraving as a guide. The brace holding the T piece is attached to the forge by means of a staple in which it hinges loosely. The brace also rests in a socket on the floor. The top of the T bar is welded to a shank of ¾-inch gas pipe, the lower end of which fits into a collar, as shown at A, and is held in place by a set screw. When not in use the device may be swung flat against the forge and is thus out of the way. The rest when in use can, of course, be raised to any convenient height and held by the set screw.



The Editor was busily at work on a large pile of manuscript when Joe Reid, the blacksmith at Barton, came in. Joe said he'd been in town to see his jobber, and thought he would drop in for a short chat till train time.

"Glad to see you," said the Editor. "How is everything down your way?"

"Well, trade is very good now," returned Reid; "fall was rather slack, though we're making up for it now. I would never have gotten away, but it was simply a case of go to town or turn away work for lack of the proper supplies. I've got four men now, and we find it pretty hard to get everything done on time at that."

"That's good news," said the Editor. "I suppose you've tackled the automobile repair business?"

"Yes, we've had considerable of that work, and from what I can learn I'm pretty sure that we'll have plenty of automobile work all the coming season to keep our hands more than full." Then, continuing, Reid said, "By the way, I've heard that it is possible to use old dry batteries for a time after they become exhausted the first time. Can you tell me anything about it?"

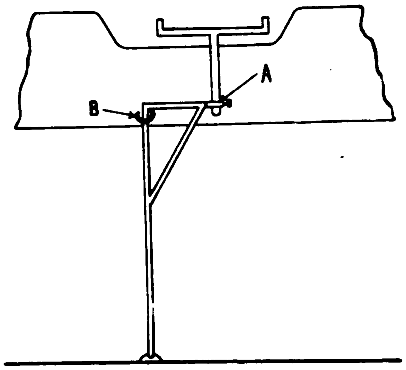
"Yes, there are several very simple methods of treating old dry cells by which they can be renewed to a certain extent." Then, continuing, the Editor said, "It is also possible to recharge dry batteries, though it is impossible, of course, to make the old cells as good as when new."

"Well, do you know? I had quite a scare the other day," returned Reid. "A chap came up to the shop, and looking up at my auto sign asked if I had any dry cells in stock. I said I had an extra set in reserve for my gas engine but that I would gladly accommodate him if he needed some. He said his auto was stalled up the road about a mile, and that he had exhausted his reserve cells. Well, I sold him my reserve battery at a pretty good price, and when he returned he stopped his big car long enough to call me out and give me a couple of good cigars. From the looks of the machine I imagine he was on a long trip. He had another chap with him, and enough bags, boxes, and luggage for a New York-to-Paris trip."

"What was it scared you, though?" put in the Editor.

"Yes, I was coming to that. Well, after the auto chap had gotten out of sight my gas engine suddenly stopped, and no amount of turning would start it. I looked at about everything, when it suddenly occurred to me that it would be just my luck to have the battery run out. I could hardly get my fingers to work quick enough—a shop full of work, machines and men ready to do it, but the only good dry cells within twenty miles, perhaps, putting distance between them and the shop at the rate of an express train. When I finally settled down I found my batteries O. K., and that the reason the engine didn't run was because of lack of fuel. This deficiency was quickly made up, and things have gone smoothly since. But it set me to thinking," continued Reid, "that had my batteries failed me, I would have lost half a day before new ones could be had."

"A simple way to use old dry cells, and one which will solve the problem should you ever have the misfortune to be caught with a depleted battery and no reserve is this way": and the Editor explained that sal ammoniac could be purchased at any drug store, and as drug stores were more plentiful than electrical supply stores it was easier to get than new batteries. Continuing the Editor said, "Make a sal ammoniac solution, put enough in as many jars as there are cells to your battery to go up about two thirds of the dry cell. Now cut the bottom out of each cell, punch four holes near the top, and place each cell in one of the jars. This will give you



A HANDY SUPPORT FOR THE FORGE

a good battery that will last at least long enough to enable you to get new cells."

"That is a very simple scheme, and I'll keep it in mind," said Reid.

"Then another method is to punch a hole near the top of the cell and pour as much of the sal ammoniac solution into the cell as possible, sealing the hole with cement or wax when you've poured in all the solution you can. A strong salt solution," continued the Editor, "may also be used in the same way, but it is not quite so good as the other, though it will renew the cells for some little time."

"You mentioned something about recharging dry cells—how is that done?" questioned the other.

"For recharging old cells," replied the Editor, "you'll need several small glass or earthenware jars slightly larger than the cells in diameter, and about three fourths their height. Place a half ounce of powdered sal ammoniac in each jar and pour in sufficient water to bring the solution almost to the top of the jar when the cell is placed in it. Now remove the cells from their cardboard boxes, drill six small holes through the zinc casing about one inch from the bottom of the cell. Now you need as many cells of a gravity battery as you have old dry cells. Connect the gravity cells in series; that is, copper to zinc. The dry cells are connected in multiple—the zincs together, and the carbon posts together—by means of insulated copper wire. Now connect the zinc elements of the dry cells to the zinc binding post of the gravity battery, and the carbon elements of the dry cells to the copper binding post of the gravity battery. The cells are now allowed to stand for from twelve to fifteen hours, after which time the dry cells will be found to be almost as good as new. After recharging, the holes in the dry cells are sealed, the cells wiped dry, and then replaced in the cardboards ready for use."

"If a man happened to have good gravity cells, that would be simple." Then, looking at his watch, Reid exclaimed, "I've got to hustle—got just fifteen minutes to make my train. Good-bye, Mr. Editor; come in when down my way, and I'll try to entertain you in return." And after a hearty handshake he was gone.

The Blacksmith's Joy.

JOHN DONNELLY.

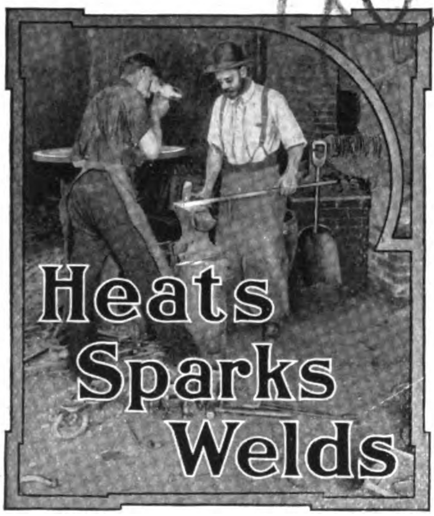
Your humble servant, Bill Malone,
Heard this upon the telephone:
"Come home at once, and hurry—run—
The stork is here—he's brought a son."

With raptures and delirious joy,
I first beheld my baby boy.
But later on, I must confess,
My joy was not so rapturous.

He used his lungs with all his might,
With him I walked the floor each night.
For months he kept it up, forsooth,
At last his kidlets cut a tooth.

And now, when he begins to yell,
I grab my hat and say, "Oh Nell,
Sweet wifey dear, my heart's delight,
Our 'sociation meets tonight."

Written expressly for THE AMERICAN BLACKSMITH



Much better to do things than to plan to do them and stop there.

A live competitor will skin you alive if you're not alive every minute.

Many automobiles coming your way? Of course, you are prepared for them.

"Now for a continuous grind," said the emery wheel as the gas engine was started.

Give both your old and your new address when advising us that you have moved.

New shop in your neighborhood? Tell the smith about THE AMERICAN BLACKSMITH.

Not too late even now to organize. Write to the secretary this very minute, and get his easy plans.

The kicking horseshoer is as bad as the kicking horse. Every horseshoer knows how bad that is.

Be full of business and have a shop full of business. More attention to business means more business.

Common sense in business usually means common cents in profit. Price cutting never did nor never will pay.

The man working for his salary alone and nothing else, usually gets what he's working for—and nothing else.

Conditions may get so bad that they must improve: but don't wait until then to organize; get busy right now.

Ever notice that the fellow who doesn't have some troubles doesn't, as a usual thing, have much of anything else?

A good time right now to brush up shop a bit—you'll find the load a great deal lighter with neat, clean surroundings.

When in doubt, read THE AMERICAN BLACKSMITH. Chances are you'll find out all about it if it's anything about smithing.

Ask your neighbor today. Take a copy of "Our Journal," and call on him now. Don't come away without his subscription order.

The price end of a job is not always to blame for the customer's failure to come again. The deciding point is usually quality.

A first-class horseshoer will find an opportunity awaiting him by communicating with Mr. J. H. McPeek, Warwick, N. Y., Box 331.

Cutting prices means cutting profits. If your profits are too big, then cut prices. How many smiths find their end of the selling price too big?

Do you read them every month? There's something of interest and value to you every month under the title of "Timely Talks with Our Subscribers."

'Tis said that a certain oil company now manufactures forty-four distinct by-products of petroleum—a kind of butter for table use being one of the latest.

Wireless telegraph rates from Tsingtan, China, to ships at sea is about two and one-half cents per word in addition to a regular charge of forty cents per message.

Twenty-six thousand gasoline-driven boats are said to be operated in the United States. The largest is a 4,000-ton boat running between New York City and a Maine port.

Men who have been studying smithing ever since they could walk are still studying—and learning. It's the man who has banged iron for three months who thinks he knows it all.

Somebody walked away with several of Tom Tardy's tools the other night. Tom broke the lock on the rear door about four weeks ago and has been too busy since to fix it or get a new one.

Every fairminded smith knows that poor work is profitless, yet some go on year after year disregarding past experiences, and then, like Tom Tardy, they wonder why success is not for them.

The pink buffaloes have been hurrying and scurrying across the country for several years, and are more popular now than ever. Are you using them freely? Ask for more if your herd has stampeded.

The difference between civility and incivility often decides between your doing or not doing a good many jobs. A smile, a hearty handshake, and a cheery greeting always will secure more business than a frown and a gruff response.

Automobiles are being advertised in the farm papers, and farmers are buying them. These machines, when in need of repairs, will be brought to your shop. Are you prepared to handle them? Read the articles in the auto-repair department.

Thomas Davenport, a blacksmith of Brandon, Vermont, is credited with having first suggested the electric railway. In 1834 he ran a toy motor mounted on wheels on a small circular railway. The following year this was publicly exhibited in Boston and Springfield.

Lots and lots of ads are there these days that should not be answered. You'll not find 'em in "Our Journal" though—our pink stamps and honest dealings paragraph guarantee it. For fear you've missed some good chance for profit go through the ad pages again.

Just think what a lot of cheer a dollar greenback will bring if used rightly. We'll send "Our Journal" for one year to anyone you name, give you six months on your own subscription, and feel mighty thankful for your help toward the fifty thousand—and all for one dollar. Do it now.

"Vehicles left for repairs, and remaining longer than thirty days after completion, will be charged for at the rate of $1.00 per month for two-passenger and $1.50 per month for four-passenger and freight vehicles." This is the way one vehicle repairer deals with a well-known abuse.

A concrete pole one hundred and fifty feet tall was recently erected in a Canadian town. The pole tapers from thirty-one inches at the base to ten inches at the top. It was built on the ground, and then raised in one piece. It is said to be the tallest reinforced concrete pole in the world.

The automobile is making marked progress in Australia, and the coach builders of that country are making strenuous efforts to keep the new business in their own hands. The tariff is very much in favor of the regular carriage builders, as on bodies and carriage work a duty of thirty-five per cent is imposed, while chassis are admitted with but five per cent duty.

Chinese iron dealers, according to a consular report, purchase old horseshoes in large quantities, a recent steamer bringing some three hundred tons of this old iron into the country. The Chinese claim that the temper of this class of iron is the best obtainable for knives, cutlery, and tools. The constant beating beneath the feet of the horses is ascribed as the reason for a peculiar temper unobtainable in any other way. The Chinese knife and tool makers claim that tools made from old shoes are superior to all others. Have any of "Our Folks" experimented along this line?

Wild horses, according to a government report, are to be found in great numbers in the forests of Nevada. The devastation of the fields of the settlers and ranchers by these animals has become a great nuisance. Within the past few years the wild horses have increased in number so rapidly that they are now considered common prey to every man with a rifle. Fences are no barrier to these wild droves, and when in force they not infrequently attack and kill cows and calves. Another grievance against them is that they toll off the domestic horses, which appear to lose their domestic training very quickly and revert to the wild state. It is probable that the government's forest rangers will be authorized to cooperate with the ranchmen in disposing of these animals, but so far no effective solution of this really perplexing problem has been put forward.

American Association of Blacksmiths and Horseshoers.

I have just received word from Secretary Arthur L. Simon that the horseshoers, blacksmiths, and wheelwrights, of Door County, Wisconsin, held their meeting at Jacksonport on April eighteenth. I am also advised that every blacksmith and wheelwright in the northern half of the county has joined the association, and that the entire county, without exception, is expected to join hands with the boys in the north by fall. The business already accomplished by the association indicates that the Door County men are going to make a success of it. A schedule of prices has already been agreed upon and a system of dead-beat protection established. Read over their price list, read about their protection system, and then if you haven't similar advantages ask for my easy plans for the formation of a branch association in your county. But do it now—today, before you forget it. There's no reason in the world why you cannot lay the foundation of a big, growing organization in your county. Ask for my easy plans today. A penny postal is all they will cost you—my plans and help are free. Just let me know that you are interested, and I will send the plans by return mail. But now is the time to write me—not tomorrow or next week. Today is the day. P. O. Box 974, Buffalo, N. Y., is the address, and the name,

THE SECRETARY.

Recommendations for Protection and Price List of Door County, Wisconsin, Association.

First.—We recommend that we extend credit for thirty days, subject to the judgment of the party extending credit; and at first of each month the members of the association shall render statements to patrons, and if settlement is not made in thirty days of first charge, the same shall be reported to the secretary of the association. Furthermore, all credit to such parties shall be discontinued, until the claim has been settled satisfactorily to the creditor.

Second.—That it shall be the duty of the secretary of the association to notify each and every member of this association of the party or parties failing to pay their account in said time.

Horseshoeing.

New shoes, Nos. 0 to 4	.40
New shoes, No. 5	.45
New shoes, No. 6	.55
New shoes, No. 7	.60
Resetting	.25
Bar shoes, common	.75
Bar shoes, hand-turned	1.00
Half-bar shoes	.75
Hand-turned shoes, toe weight and balanced, per horse	4.00
Factory weighted shoes, each	.50
Rubber pads put on, per pair	2.25
Leather pads with packing, per pair	$ .35
Neverslip shoes for light or livery work, each	.60
Neverslip shoes, Nos. 5 to 7, each	.70
No. 7 or larger common shoes, each	.60
Neverslip calks, add per hundred to net price	.50
Replacing Neverslip calk, above prices for calks and add per hour for labor	.75

Wagon Ironwork.

Irons on front bolsters	$ 1.00
Irons on hind bolsters	1.00
New bolster end irons, each	.30
New bolster stake irons, each	.50
One pair bolster plates	1.50
One new sandboard plate, put on	1.25
Four light wagon tires, reset	2.75
Four heavy wagon tires, reset	3.00
One heavy wagon tire	1.00
Four 4-inch tires, reset	6.00
One 4-inch tire, reset	1.75
One hayrake wheel tire, reset	.50
One new rub iron, put on	.50
Old tongue iron, replaced	.75
One new hound plate, hind	1.00
New hound iron braces, each	.50
New circle post, each	.25
New pole cap	.50
New tongue rod	.50
New tongue plate	.25
One new wagon wrench	.35
King bolt	.50

Wagon Woodwork.

Bolsters, front	$ 2.25
Bolsters, hind	2.50
Bolster stakes, each	.50
Sandboards, each	1.50
Wagon spokes, two-inch or larger, single spoke	.50
Wagon spokes, two-inch or larger, two or more, each	.30
Reaches, each $1.25 to	2.00
Wagon poles, old irons	2.75
Wagon poles, new hounds	4.00
Axles, common cast skeins 2.75 to	3.00
Axle, truss rods	3.50
Tongue hounds, per pair	1.50
Tongue hounds, each	.75
Front hounds, per pair	2.25
Front hounds, each	1.25
Hind hounds, per pair	2.75
Hind hounds, each	1.50
Bent hounds	3.50
New spring seats, three-leaf springs	4.00
Delivery wagon shafts, 2 by 2½ inches, each	2.50
Dump end gate	1.25
Plain end gate	1.00
Setting box, new, each	.50
Setting box, old, each	.25
Setting box skein	.50
Cutting down wheels, 3 x 1¾ inch rims, 3 x ⅜ inch tires, job complete, per set	17.00
Cutting down wheels, 3 x 1¾ inch rims, 3 x ½ inch tires, per set	19.00
Cutting down wheels, 4 x 2 inch rims, 4 x ½ inch tires, per set	22.00

Buggy Ironwork.

New buggy axles, common, put on, job complete:	
⅞-inch, per set	$ 6.50
1 -inch, per set	7.50
1⅛-inch, per set	8.00
1¼-inch, per set	10.00
1½-inch, per set	12.00
New buggy tires put on and bolted:	
⅞ x 5/16 inch, per set	6.50
1 x 5/16 inch, per set	7.00
1⅛ x ⅜ inch, per set	7.50
1¼ x ⅜ inch, per set	8.50
1⅜ x ⅜ inch, per set	9.50
1½ x ½ inch, per set	10.50
Resetting buggy tires, per set	2.50
Resetting buggy tires, each	.65
Setting axles, each	1.00
New shaft ends, each	.75
New shaft ends, surrey size, each	$ .85
Buggy springs welded, per leaf	.75
Shaft irons welded, each	.35
Shaft shackles, each	.40
Shaft eyes, each	.50
Pole irons replaced, each	.50
Pole brace welded, each	.50
Pole eye, each	.50
Axle clip	.20
Saddle clips, each	.25
Steel bow sockets, each	.75

Buggy Woodwork.

Buggy shafts, complete, ironed and painted:	
1⅜-inch, per pair	$ 4.00
1½-inch, per pair	4.50
1¾-inch, per pair	5.00
New buggy shafts old irons, each	1.50
New buggy crossbar, broken irons extra	1.00
Heavy crossbars, broken irons, extra	1.25
New pole only, single bend	2.75
New pole only, double bend	3.00
New surrey pole	3.25
Buggy pole circles	1.25
Heavy pole circles	1.50
Patent spokes, single, 1 to 1⅛ inch, each	.30
Patent spokes, two or more, 1 to 1⅛ inch, each	.20
Patent spokes, whole wheel, each	.10
Buggy rims, ⅞ to 1 inch, per set	5.00
Buggy rims, ⅞ to 1 inch, whole rim	1.50
Buggy rims, ⅞ to 1 inch, ½ rim	1.00
Buggy rims, 1⅛ to 1¼ inch, per set	6.00
Buggy rims, 1⅜ to 1½ inch, per set	7.00
Buggy rims, 1⅝ to 1¾ inch, per set	8.00
Axle bed, each	1.50
Reach single, each	.75
Reach pair	1.50
Head block	1.00
Spring bar, scrolled	1.00
Spring bar, plain	.75
Buggy pole complete, neck yoke, whiffletrees, and painted	9.00
Light wagon box, old irons, one coat paint	12.00

Cutter Shoes.

¾ x 7/16 inch, per pair	$ 2.50
1 x ½ inch, per pair	3.00
Bob sleigh or delivery sleighs, per set of four shoes	4.50

Sleigh Shoes.

Set 2 x ⅜ inch, flat	$ 6.00
Set 2½ x ⅜ inch, flat	7.00
Set 3 x ⅜ inch, flat	8.00
Set 2 inches, concaved or convexed	7.50
Set 2½ inches, concaved or convexed	8.50
Set 3 inches, concaved or convexed	9.00

Sleigh Woodwork.

Sleigh runners $2.50 to	$3.00
Sleigh pole	3.00
Sleigh beam	2.50
Sleigh reaches, new keys	1.50
Sleigh reaches, iron braces	1.00

Plow and Mower Work.

Welding sickle bars	$ .50
Welding pitmans	.50
Replacing wood pitman	.50
Replacing drag beams, each	.50
Sharpening spring teeth	.05
Sharpening spring teeth, taking out each and replacing	.10
New plow point and sharpening share	1.00
Sharpening point and share	.50
Laying share and sharpening	.75
New steel plow points	3.00
Straightening steel plow beam	1.50
Plow clevis	.30
Evener staples, each	.40
Odd work, per hour, stock extra	.50

Failures and Successes of an Apprentice.—3.

BY AN OLD-TIMER.

I got along well in the machine shop, but I liked the blacksmith department better. After a time I began making bolts and doing simple forgings, and became so interested in the work that I decided to learn the trade. I got a job with a country smith, an elderly man, who did not want to be tied up to the shop all of the time. Any jobs which I did not dare to tackle, I could keep until he came in. The principal part of the work was shoeing cattle and horses. There was quite a contrast between this place and the spick and span floors, benches, and tools of the machine shop. I was homesick at first, but as often as I could get a chance I would clean and fix things up. This pleased the old man so much that he often related some of his experiences, which were not only amusing but in many instances instructive.

One day, when he was away, a man brought in a sled to be shod with old tire iron, and he said that he would stay and help me do the job. I had helped the smith shoe sleighs, and I supposed that all there was to do was to heat the shoe and bend it to the runner. I cut the iron the right length and made the end, then took a long heat, but when I tried to bend it to the runner, one part would fit the work and the other part would hump up. After working about three hours, I felt relieved when the man said, "Well, we won't bother any longer; it fits part of the way, and that will do."

At another time a man drove in and said, "I want you to try your skill on this horse. The old man never shod him without his interfering, and I want you to try and see what you can do." On examination, I concluded that the horse struck with the inside heel. I cut the inside of the shoe off short with the foot and welded a short calk on the side. The other heel I left full length and rolled the end out. I then welded a piece of iron on the outside for weight. The next time the man's wife brought the horse to be shod she told the smith that the horse had not hit once and she wanted the same man who shod him before, to shoe him this time. "All right," the smith said to me, "You can shoe the horse." After the woman had gone, he said to me, "Where did you get that idea?" I said, "Out of a book." "Well," he said, "I don't believe in toe weights and side weights; nothing but plain shoeing for me." This man was a little cranky about some things, but I have never yet met the man that could beat him in having a good fire, and he seldom, if ever, missed making a good, solid weld.

We had one customer who was very disagreeable. The smith, however, did not mind him very much. He would reply, "Yes, yes," whether he believed him or not. One day this man brought a pair of oxen to be shod. As soon as I had started on the job, he began talking and bossing so much that if I had acted as I felt I should have kicked him out of the shop, but I held my temper and the man departed. I heard the next day that one shoe came off before he got home and I did not know whether to be glad or sorry.

My employer had plenty of money, so he thought he would rent the shop and not have the care and trouble of keeping things straight. Although he was willing to rent to me, he advised me to work one year longer before starting for myself. I thought his advice good, so engaged my services to another man through the busy season. I learned some new things here. One was a different way to wring a nail. Another lesson came through the following experience: One day I had to fit some iron to a wooden form. The smith told me when I was ready to bend it not to go any farther at one time than my heat went. Then I remembered the time I had so much trouble trying to shoe the sled, and I felt like going out behind the shop and kicking myself for not knowing any more. In two heats I had a good job.

This smith had a great deal of tact. He had a way of making a customer think that he was getting the best material and the best service that could be had. On one occasion, however, he came near getting caught. While he was telling one man what an expert I was and where I had worked, I happened to be doing a job for the same person, and was having some trouble. The smith noticed that I was bothered, and he began to take the man's attention. After a while, I got the work into shape and finished the job. When the man had gone, the smith said, "By Jove, I don't know what I should have done if you had not got to going just as you did. I showed that fellow everything in the shop and told him every story I could think of."

(To be continued.)

To clean mica windows, which are very often found in automobile aprons, hoods, and the like, first dampen the mica with vinegar and then wash it off with clean water. A. R., Ohio.

Kerosene oil squirted into the compression pet cocks will dissolve the hard deposit formed by the burning of the lubricating oil in the cylinder. This deposit often causes pounding in the cylinder of an auto engine. A. T., New York.

When taking down a motor or when taking apart any section of the horseless vehicle take care to mark each part so that the machine can be assembled correctly. A misplaced part may do a considerable amount of damage, and extreme care should be exercised to prevent any mistakes in assembling. H. O. K., Ohio.

Emergency Automobile Repairs.—2.

F. J. C.

Having ascertained that the batteries are in working order and that the circuit is not broken, determine in the same manner that the current is carried as far as the coil by again connecting the wires leading to the coil and testing them, after disconnecting the coil end of the wire, either by putting them on the tongue or on the file. Should you find that there is no current here, a rapid survey will locate the break. Should you, however, discover that the current is there and yet be unable to get a buzz in the coil, the adjustment of the trembler springs should be tried, slowly turning the screw first in one direction and then in the other until the buzz is heard. Stop it where the most intense buzz (not necessarily the loudest) is found. Should all efforts to obtain a buzz be unsuccessful there is undoubtedly a break in the primary winding of the

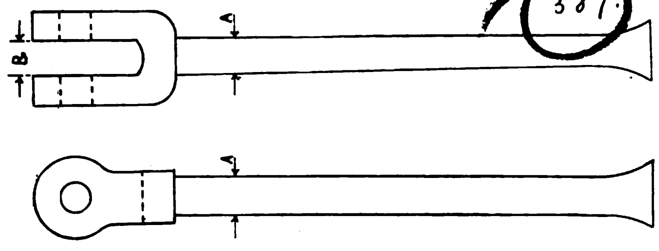


FIG. 1.—A MUCH-NEEDED ARTICLE IS A YOKE END

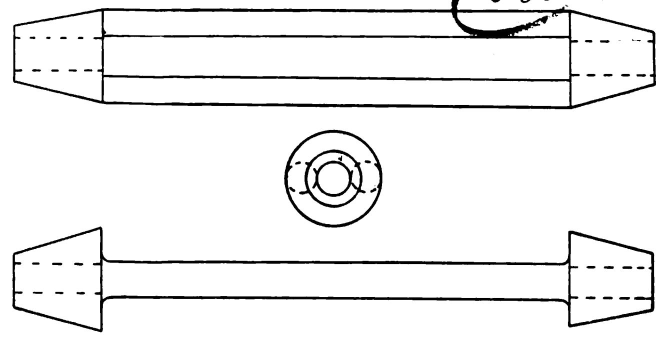


FIG. 2.—TURN-BUCKLES ARE ALSO NECESSARY ITEMS

coil, and the services of an expert electrician must be secured.

Should a buzz be obtained and yet no spark obtained in the cylinder, the ground wire, an extra wire running from the coil to some part of the mechanism and grounded, should be examined. If it seems to be tight at both ends, attach an extra wire along parallel with it to determine whether there is a break beneath the insulation in some part of this wire.

Should a spark be found in some of the cylinders, but not in all, the trouble will be discovered between the plug of the cylinder which does not spark and the coil, considering, of course, that the spark plug is in good condition. Before any of these things are done, the spark plug should be washed in gasoline, and an attempt made to discover if there is any leak between the metal and the porcelain. This may be done by placing a plug in the mouth and attempting to blow through it.

If the ignition is found to be in working condition, the trouble may be with the gasoline system. First, examine the tank and be sure that there is gasoline in the car. Next, remove the top of the carburetor and be sure that there is gasoline in the float chamber. In some carburetors, it will be necessary to cut off the supply of gasoline before doing this, in order to keep the gasoline from running away when the cover is removed. Next, see that the small overflow in the air chamber is clear and that the gasoline flows through this easily. Next, carefully examine the intake manifold and see that there are no leaks by which air can be sucked in without being combined with gas.

An important thing to remember in repairing automobiles is that they are not so complicated as they appear. Nearly every smith has had some experience with gas or gasoline motors of either one or more cylinders, and it should be remembered that an automobile is nothing but a gas engine connected mechanically to the driving wheels of the car. The automobile motor differs but in its details from any other motor, and its troubles and repairs are similar to those of any other

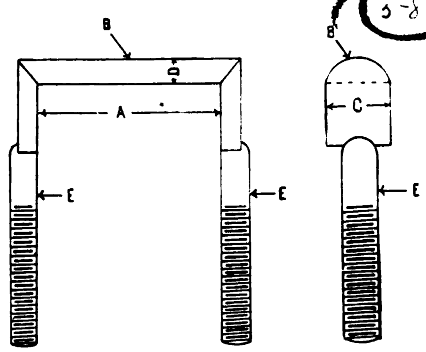


FIG. 5.—SPRING CLIPS OF HEAVY DESIGN ARE ALSO NEEDED

explosive engine. The machinery, too, is simple and not nearly so hard to understand as it at first appears.

Lastly, do not think because a car is a "great, big car" that it is necessarily complicated. The highest-grade cars are in reality simpler than some of the small ones, or two-cylinder machines, which are found around the country, and are much easier to repair. This is assured by the fact that they are made by men of experience who have found that simplicity is the keynote of success, and every part and portion has been simplified as much as possible.

Finally, it should be said that a common fault among amateur repair men is to do so much fussing with the car that they are unable to reassemble it. It should always be borne in mind that the assembling is much harder than the dissembling, and each part removed from the car should be carefully labeled, so that no trouble will be experienced in returning it to its proper place. Again, many times much needless work is done by taking the car apart before the trouble has been located. This is seldom necessary, and in almost every case the trouble can be located before the work of removing the broken part is attempted. In other words, if the blacksmith will first discover what he is trying to do and then do it, rather than first doing something and then trying to discover why he did it, he will be much more successful in making a rapid and successful repair.

Tools and Parts Used in Repairing Automobiles.

The tools and parts shown and described should be on hand in every general shop. There should be a lathe, a drill, and a shaper. One very much needed article is the yoke end shown in Fig. 1. A stock of these should be on hand at all times, and you should not wait until called on to use one before making them. Nearly all the parts about to be described here can be forged by the smith during his slack time, and if he cannot find time to forge them he can buy them, as they are a standard article. The yoke end referred to should be kept in different sizes, the

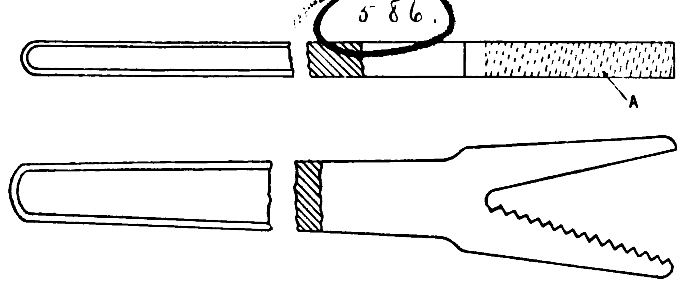


FIG 3.—SEVERAL ALLIGATOR WRENCHES SHOULD BE INCLUDED

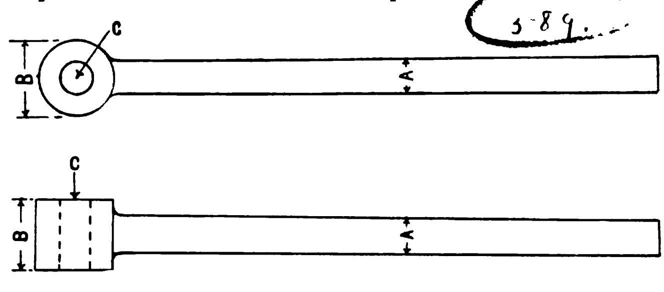


FIG. 4.—ROD ENDS OF DIFFERENT SIZES WILL BE FOUND HANDY

5-90

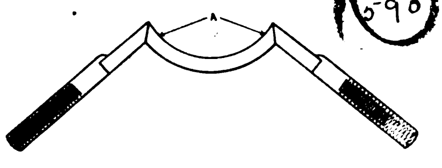


FIG. 6.—SHOWING HOW TO THREAD THE SPRING CLIPS

shank A being $\frac{1}{4}$, $\frac{5}{16}$, $\frac{3}{8}$, $\frac{7}{16}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, and $\frac{7}{8}$ of an inch, while the slot B should be of different widths from $\frac{1}{4}$ to $\frac{7}{8}$ of an inch. The length over all does not matter, as the smith will be called on to either weld to proper length or perhaps thread and use a turn-buckle as in Fig. 2. These should be kept on hand in various lengths and sizes. They can be bought already threaded, right-hand thread in one end and left-hand thread in the other; so you see it is necessary that the smith should have right and left-hand threading dies, and taps of a variety of sizes.

5-92.

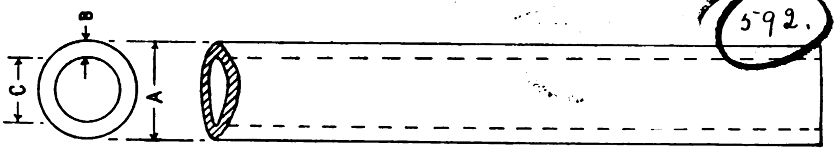


FIG. 7.—A SUPPLY OF SEAMLESS TUBING OF DIFFERENT SIZES SHOULD ALSO BE KEPT ON HAND

The parts shown here are used to a certain extent in automobiles of every make, and as the automobile repairing season is fast approaching it will be poor policy to wait until the autoist calls before getting in shape to "fix him up." A very useful tool which every automobile repair man should have is shown in Fig. 3. Any smith can make it. This is an alligator wrench, and is almost indispensable in taking automobiles apart. It will remove or tighten up a nut of any shape, and it will also take hold of the pipes which are exposed when the body is removed from the frame. When filing the teeth in this wrench, do not make them straight across but have them at a slight angle, see dotted lines A, Fig. 3. If you do this you will find they will work much better. The rod end, Fig. 4, is another part used in repair work, and can be made by the smith. It should be on hand in different sizes, as follows: The stem A, should run from $\frac{3}{16}$ to 1 inch, and the end B should vary accordingly. The hole C should not be drilled except as wanted, as we cannot tell just what size will be required for each separate job; the spring clip, Fig. 5, is something nearly all general smiths have used in repairing buggies, but for this line of work they should be a little heavier, and vary in size. For instance, they should run from $1\frac{1}{2}$ to $2\frac{1}{2}$ inches at A, while part B should be half-round, from $\frac{5}{8}$ to 1 inch wide at C, and from $\frac{1}{4}$ to $\frac{1}{2}$ inch thick at D. The round parts E should also vary in size, and be left quite long when forged. They should be threaded, because after the clip has been put in place, and the nuts tightened, the ends can be cut off, and a neat, strong job will be the result. Fig. 6 shows how the spring clip should be spread apart for threading. After forging, heat red hot and cool both ends up to A, then with a pair of tongs in each hand, pull the ends apart. After threading, heat again and cool as before, then bring back to shape as in Fig. 5. A supply of seamless tubing of different sizes should also be kept on hand. But short lengths will do, and these can usually be bought from scrap dealers at a very small cost. Tubing is measured on the outside instead of the inside as gas pipe is, and the walls are of different thickness. You can get seamless tubing that would be 1 inch at A, Fig. 7, and $\frac{1}{4}$ inch at B, thus leaving the hole at C but $\frac{1}{2}$ inch. Then again you can get it with an outside diameter of $1\frac{1}{4}$ inches, and the wall B, $\frac{3}{8}$ of an inch, leaving the hole $\frac{1}{2}$ inch, the same as the first. Now the use to which this tubing may be put is as follows: Suppose a job comes in with a worn bearing (see Fig. 8), which is usually made from cast or malleable iron. The hole is worn oval as at A. This is very annoying to the autoist, and the chances are he does not care to wait until you forge a new one, even if it was of such a shape as to be forged. The best thing to do in this case is to get a piece of tubing that will fit the shaft neatly, and cut it the same length as the bearing from B to C. Then caseharden the inside of the tubing with cyanide, and drill the bearing out to fit the outside of the tubing (drive fit). You will now have a job that cannot be beaten by any of the large factories, and will

5-94.

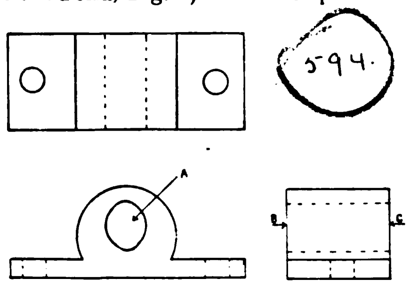


FIG. 8.—A WORN BEARING MAY BE REPAIRED WITH A PIECE OF TUBING

5-91

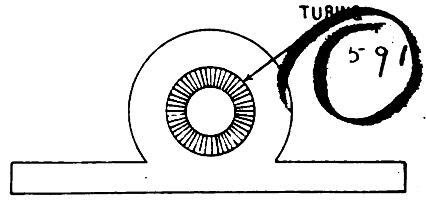


FIG. 9.—SHOWING USE OF TUBING IN REPAIRING WORN BEARING

perhaps be the means of your having to enlarge your shop, as good work is bound to bring its reward. Fig. 9 shows an end view of the bearing after the repair job is complete. In Fig. 10 is shown a lever which should be on hand complete in various sizes and lengths from $\frac{1}{2}$ to $1\frac{1}{4}$ inches at A, and from $\frac{3}{4}$ to $1\frac{1}{2}$ inches at B. These are easily forged but don't drill the holes until you know what is wanted. Leave the shank C plenty long enough. When you have a call to use one of these parts you can cut off, and form boss D on small end. Sometimes these levers are offset in different ways so the only thing to do is to forge and leave about as shown in Fig. 11, and you can finish according to requirements when needed.

Another article the repairer of automobiles is called on to use very often is the coil spring. If you have a lathe you can buy the spring wire and coil it yourself, but if not, it is better to lay in a stock of coil springs of various sizes in 24 or 36 inch lengths, as you will have to cut to required length as wanted. This can be done by filing a nick on one side of wire and break off. Then heat a pair of tongs red hot and hold on end of coil. This

5-93.

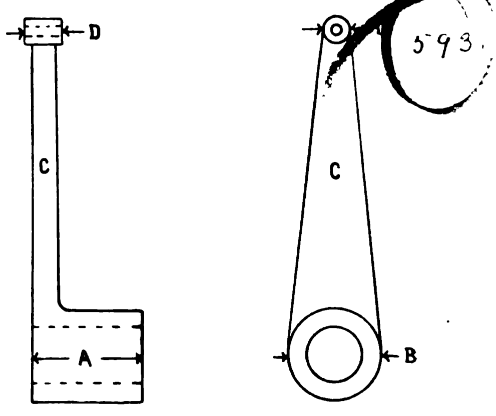


FIG. 10.—A LEVER WHICH SHOULD BE ON HAND IN SEVERAL SIZES

will enable you to turn hook or eye on each end of spring, which is always necessary when used in auto repairing. The size of wire should run from $\frac{1}{16}$ to $\frac{1}{4}$ inch, and the size of coil $\frac{1}{4}$ to $1\frac{1}{4}$ inches outside measurement. When completed the spring should look as in the engraving, Fig. 12.

The engraving Fig. 13 is the reproduction of a photograph taken in an up-to-date automobile repair shop in Michigan. It shows a number of the parts spoken of in this article.

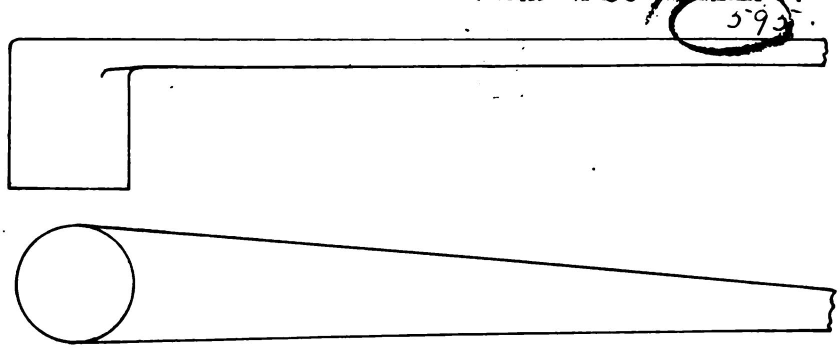


FIG. 11.—THESE LEVERS MAY BE ROUGHLY FORGED, AND THEN FINISHED AS NEEDED

Pounding in Automobile Engines.

BY AMOS HARDY.

Pounding, or knocking, in an automobile or marine engine, a trouble that should be remedied at once, may be caused by too early ignition. Whether or not such is the case may be determined readily by delaying or retarding the ignition a little and noting the effect. If the pounding is thereby lessened or ceases altogether it is evident that the trouble is due to preignition, which produces a metallic sound very hard to distinguish from that due to a loose connection somewhere about the engine. Preignition seldom takes place in engines in which the compression is comparatively low, or in those with which an abundance of circulating water is employed. Preignition is usually caused by particles of carbon that gather on the inner surface of the cylinder, and, becoming incandescent, ignite the charge as it is being compressed. The deposit of carbon is usually due to imperfect combustion of cylinder oil, which is either of too high fire test, has animal or vegetable oil in it, or is used in excessive quantities, the first and last being the two principal causes of such deposits. Animal and vegetable oils are decidedly unfit for gas engine cylinder lubrication.

Preignition in automobile engines may occur simply from the overheating of the cylinder head, piston head, or exhaust valve, but when these are adequately cooled it may still occur from the deposits of carbon. It is also caused by projecting metal points formed in the combustion chamber by some accident in the casting and left there by neglect instead of being cut away. These projections, especially if they are in the path of the hot exhaust gases, are very likely to get overheated or to accumulate carbon deposit, a very small amount of which in such a position will fire the charge. Preignition is extremely objectionable, not only because it reduces the power of the engine by producing the maximum pressure before the piston has reached the dead center, but also because it is very liable to damage the piston, connecting rod, or crank shaft by the violent shocks it produces. Preignition imposes very severe stresses on the bearings and all the working parts, and, hence, should be avoided by any means available. It may be stopped when hill climbing by changing into a lower gear, and it may be reduced for a time by increasing the richness of the mixture, thus causing slower combustion.

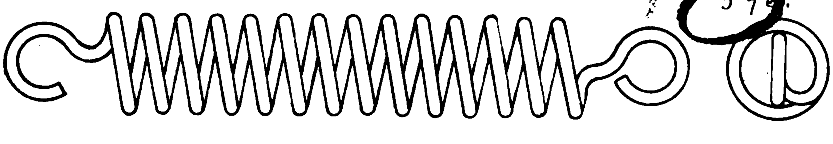


FIG. 12.—COIL SPRINGS WILL ALSO BE FOUND OF MUCH USE IN THE AUTO REPAIR SHOP

Perhaps the most frequent cause of pounding is a loose fly wheel, the remedy for which is to fit the key so that it bears on all four sides, otherwise the trouble will again appear. In case the fly wheel is fastened at its web to a flange on the crank shaft, it may be necessary to ream the holes in the web and the flange on the crank shaft and put in larger dowels or bolts.

The pound that causes most trouble is due to loose connecting rods. Trouble from this source will be experienced sooner with a four-cycle than with a two-cycle engine, for there is little wear on the caps of a connecting rod on the side of the bearing farthest from the crank shaft in a two-cycle engine. In operation the pressure applied to the top of the piston on the down stroke is communicated at the foot of the connecting rod to the crank pin, while the pressure due to compression of the charge in the crank case on the up stroke is applied to the pin against the connecting rod cap, reducing wear to a minimum. In a four-cycle engine, on the other hand, there is pressure outwards during the latter part of the

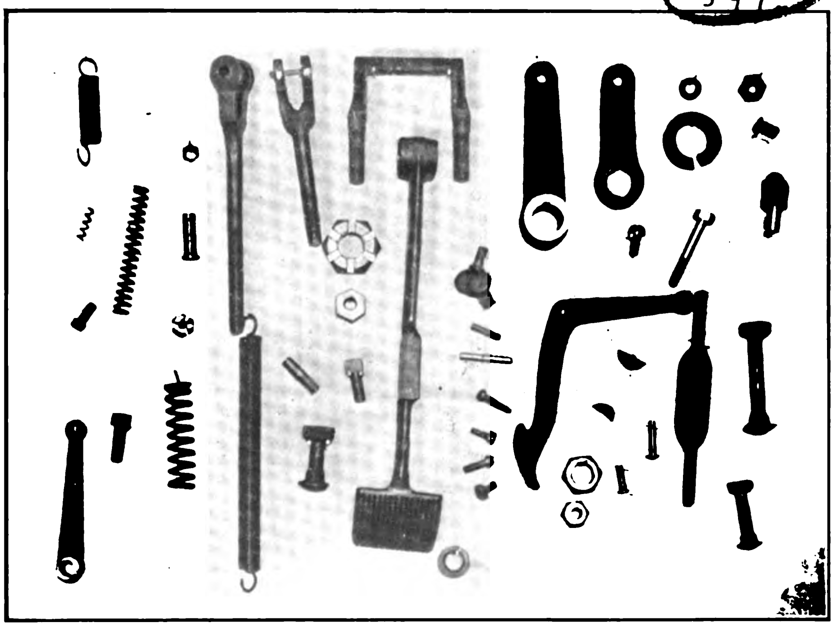


FIG. 13.—SHOWING SEVERAL ARTICLES FOUND IN THE EQUIPMENT OF AN UP-TO-DATE MICHIGAN SHOP.

exhaust and suction strokes, and when trouble from pounding is experienced there will be noticed a slight amount of lost motion which, if not taken up, will increase rapidly, with the possibility that the connecting rod cap studs or the brasses may be broken or otherwise injured.

In taking up lost motion to obviate pounding it may be necessary to renew the bushings and connecting rod as well, but this is an expensive job. If liners are used, it is a simple matter to take out two or put in thinner ones, then screw the cap down, metal to metal, and do not otherwise change the bearing; but if the cap has to be planed or filed off the chances are, unless the work is done with extreme care, that the cap will bear harder on one end than on the other and the operation of filing or planing will have to be repeated until the cap is true ; hot and cut bearings cannot otherwise be avoided.

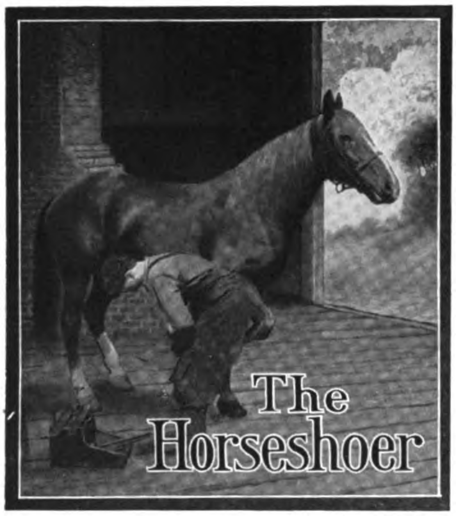
For the purpose of taking up wear in bearings it is a good plan to keep on hand for liners a stock of thin copper or brass, .003, .005, .010, and .025 inch thick, and with combinations of these almost any thickness can be made. When it becomes necessary to take up a bearing the cap should be planed down more than enough to take up the wear, space for liners thus being secured. Then, after running the engine for a time, it becomes a simple operation to take up the wear by removing one set of liners and substituting others of the required thickness.

In some engines excessive wear in bearings is due to the use of improper materials, inferior machinery, poor alignment, imperfect lubrication, or to the presence of sand or grit. High-speed engines very naturally require a better quality of bearing metal than slow-speed engines. When the alignment of an engine is found to be good and there is no grit present, as might be the case if the core sand were not carefully removed—and oil grooves will not remedy trouble from excessive wear,—it may be found expedient to use some other kind of bearing metal.

Bearings and bushings should be neither too tight nor too loose, and they should be lubricated properly if satisfactory service is to be obtained from them continually.

The outer main bearings of two-cycle engines are usually bushed with bronze, babbitt, or Parsons's white bronze bushings, the wear on which cannot be taken up, and hence to prevent loss of compression in the crank case they must be replaced with new bushings. The intermediate bearings must necessarily be made in halves in order to get them into their places.

When poor alignment is found—that is, when it is found that the crank shaft and connecting rod are not at right angles to each other, and the crank and wrist-pin bearings are not in line—the services of a competent machinist must be secured in order to correct the fault before satisfactory service can be obtained and excessive wear of bearings obviated.



The Bar Shoe.

W. O. JULIUS.

Before a horse is taken to the farrier, before an iron touches the foot, before a nail pierces the horn, the pedal extremities are as nature made them. The frog is broad, soft, and flexible and touches the ground at every step, easing concussion, and giving the animal an elastic step. It expands and contracts with the application and withdrawal of pressure, and is in a generally healthy condition. The walls of the foot also receive their portion of the weight of the animal, and the entire foot is flexible rather than hard and brittle. The foot is broad rather than narrow, the heels are wide, and every part of the foot has a healthy, growing appearance.

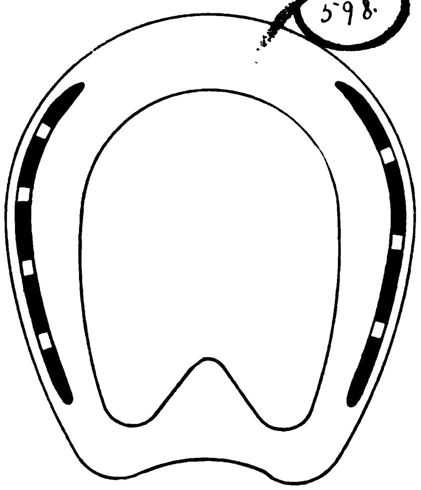


FIG. 1.—A FULL-BAR SHOE

Isn't it reasonable to suppose that the best method of shoeing a healthy foot is that method which more nearly conforms to nature? If frog pressure is demanded by nature, should it not be at least attempted in shoeing? The bar shoe is by no means a cure-all for shoeing ills, but it is about as near as we can get to nature, and for that reason, if for no other, the bar shoe should be in more frequent use. If made correctly, the bar shoe will give the foot more natural advantages than are possible with any other style of shoe. The bar presses upon the frog, and if the foot is not raised off the ground, the frog and entire foot will maintain its natural form.

The use of bar shoes on healthy feet with good flexible frogs is simply an application of natural shoeing. However, the use of the bar shoe on a foot in which the frog has received no pressure for some time, and in which it has dried up and become hard, may be attended with bad results, and with anything but the result aimed at. It is therefore necessary to soften the frog before applying pressure by means of the bar shoe. This softening may be accomplished by soaking the feet in warm water, and then applying poultices made of flaxseed meal. These poultices should be applied quite warm, and until the foot is in the proper condition. When the frog is soft and flexible it will easily stand all the pressure you can apply by means of the bar shoe, but when the frog is hard and dry the pressure of the bar will make the foot worse.

The bar shoe is an excellent means of curing contraction of the hoof, and by gradually spreading the heels proves the only correct method of curing contraction. It is necessary in shoeing for contraction to fit the shoe to bear on the frog and not on the heels. This is usually accomplished by rasping the heels slightly, thus allowing the frog to project below the heels. A full-bar shoe is shown in Fig. 1.

The double half-bar shoe shown in Fig. 2 is very similar to the full-bar except that the bar is divided. This bar shoe is preferred by many shoers because, as they say, it allows for free expansion at the heels. It can be used in practically every case where a full-bar shoe is desired. This style is very good for use on feet with corns on both sides. It should in every case be fitted with frog pressure.

The shoe shown in Fig. 3 is used on feet in which but one side is affected or diseased. The half-bar should be bent and fashioned so as to press upon half the frog. When a corn is found in but one side of the foot this shoe will be found excellent for relieving the heel pressure on one side. The branch of the shoe without a bar is shaped in the usual way.

In Fig. 4 is shown a bar shoe with a side weight. This is shown simply to demonstrate that the bar shoe can be forged with any of the special weights and devices to remedy faulty action. Toe weights, heel weights, side weights, rolling motion, extended toe calks, concaved surface, plates for hoof packing, and most any combination of these special features may be applied to the bar shoes. They may also be used with calks, but it is always well to remember that the nearer the horse's foot is kept to the ground the better for the health of the foot, and the sooner a diseased foot will show improvement. If calks must be applied make them as short as possible.

In conclusion, just a word about cutting the frog and "opening the heels." All anybody can say on this subject is, *don't do it.* The frog seldom, if ever, needs trimming, while the practice of "opening the heels" has no excuse at all. Either practice injures the foot very materially, and should under no circumstances be allowed.

A Short Talk on the Subject of Corns.

GEORGE W. HUGHES.

My idea, after a good many years of close observation and experimenting, is that a corn is caused by an injury to the foot at the coronet from being

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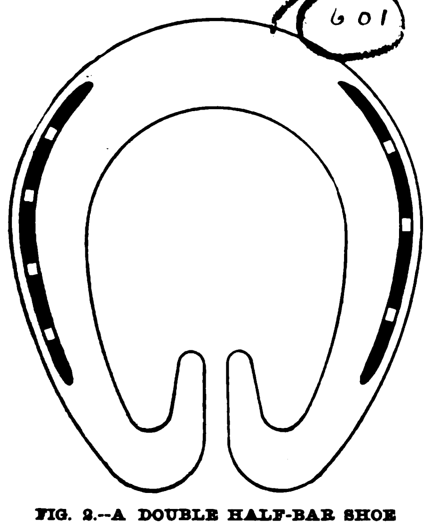

FIG. 2.—A DOUBLE HALF-BAR SHOE

struck by the hind foot. Ninety-five per cent of the corns are found in the front feet. The front feet are constantly being struck by the hind ones in trotting, in pacing, and in going through mud. I find that a greater percentage of pacers than trotters have corns, because the pacers crossfire more. The injury starts at the coronet and goes down, and the farther down it goes the worse it gets. I have found corns in the toe of the hind foot of horses who were bad forgers and hit high. They were not very sore, yet they were true corns.

Now, as to the shoe causing corns: I do not agree to this. I have removed shoes that have been on for from two to four months, and had originally rested on the toe and heel, not touching the quarters at all, yet there was no sign of corns. I have seen horses that were shod by boys, farmers, and other

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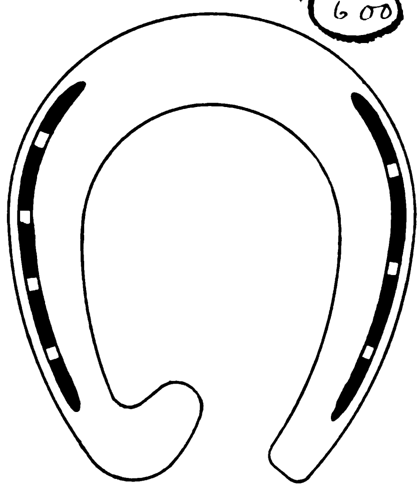

FIG. 3.—A SINGLE HALF-BAR SHOE

inexperienced persons. The feet were not properly fitted; the shoe was either too short, too narrow, or too wide, and yet they did not produce corns.

My brother smiths tell us that in order to prevent corns the foot must be perfectly level, must slope to the right degree, that the heels of the shoes must be just the same thickness, and that they must not bear too hard on the heels, and must be a little wider than the heels. All well and good, but how about the hind foot of the interfering horse with his inside or outside heel from a fourth to a half an inch, and sometimes three fourths of an inch, higher than the other, and turned in so that it is almost under the middle wall? Do they say anything about corns here. No, because ordinarily there is nothing to hit the coronet of the hind feet, and he has no corns. I know shoers who have a certain style of fitting shoes and

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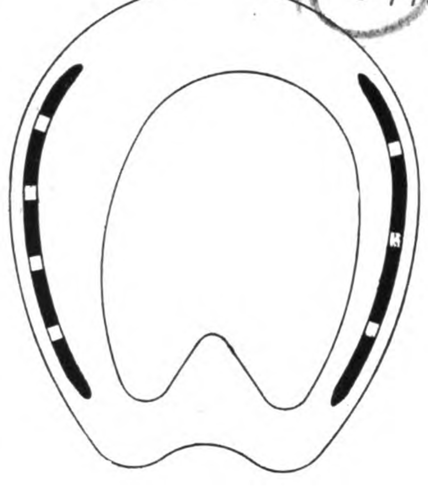


FIG. 4.—A BAR SHOE WITH A SIDE WEIGHT

who fit all alike, front and hind. They fit the inside very close and a short inside heel. Some of their horses have corns in their front feet. Why not their hind feet also? My theory is that the horses were not struck on the hind heels.

The Origin of the Horse.

A. F. LIBBEY.

In tracing the history of the horse, fossil bones were discovered, which show that the animal was very much smaller than at the present time. The size is said to be that of a large dog. Fossil specimens of the foot which I have seen consisted of the canon and splint, upper and lower pasterns, and the pedal bones. Each splint bone had three digits in perfect form, that is, the large and small pasterns, and the pedal bone. These bones were shorter than those which were attached to the cannon bone, the bottom of the pedal bones being located about halfway down the large pastern. This was one of the hind feet. The front feet were said to have five toes, which were about two thirds the size of the toes at the present day.

The first record of the horse being used by man was 1650 B. C. by the Egyptians. Two hundred years later there were records of the animal being used in chariot races. Fossils of horses of more than one species and varying in size are found throughout the whole of Europe and Asia.

The wild horses of America are said to be descendants of those which were left in Mexico by the Spaniards in 1519. Columbus also brought over horses, which he left at Santo Domingo on his second voyage in 1500. There are said to be no aboriginal wild horses in any country. The so-called troops of wild horses are descendants of those

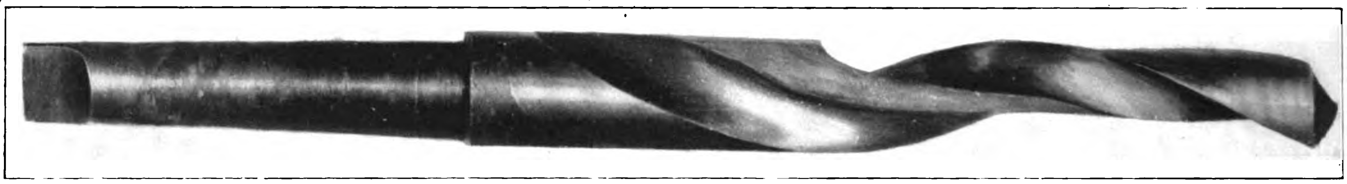


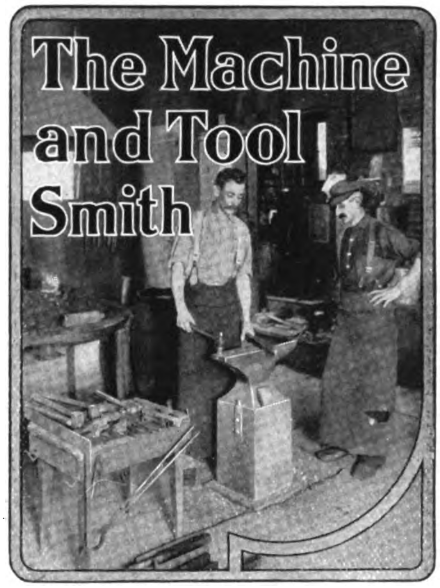
FIG. 1.--A HIGH-SPEED DRILL THAT HAS BROKEN AWAY FOR HALF ITS LENGTH

which have been domesticated, and have obtained their liberty under varied circumstances. Importations of horses were made to New York in 1625, and to Massachusetts in 1629, while the French people sent horses to Canada in 1647.

Having given a brief history of the horse, we now come to a point on which there has been, no doubt, many discussions, namely, how far the foot extends. From a zoölogical standpoint it extends to the knee. The knee being the same as the wrist in man. One of the principal points which confuse the average reader on anatomy and physiology of the foot of the horse is the various names used for the same parts by different writers. Here I give a list which may be of benefit to some: The pedal bone is the same as the os pedis, the coffin bone, the foot bone, or the third digit. The navicular bone, which lies back of the pedal bone, and is connected to it in its work, is the same as the shuttle bone, or the cross bone. The lower pastern is the same as the coronary bone, the second digit, or the second phalanx. The upper pastern is the same as the first digit, the first phalanx, or the suffraginous. The canon bone is also called the metacarpal, while the splints are also known as the small metacarpal.

This list carries us up to the carpal bones of the knee. The branches of the nerves, the arteries, the veins, and the ligaments of the foot derive their names largely from this list.

(To be continued.)



Tools for the Machine Shop.

Some men have an idea that high-speed steel is adapted for all uses in the machine shop. This is not so, by any means. Like many other articles, it is all right in its place. It is used to a great extent in lathe work by using tool holders and by inserting a square piece of high-speed steel of the required size, after it has been ground to shape and hardened. About the best method for hardening is to heat to a flowing or lemon heat and cool in kerosene oil. The following tools do not give satisfaction if made from high-speed steel: Punches and dies for punch press work, drills, chisels, taps and dies, small reamers, and springs of any kind. In Fig. 1 is shown a 1⁷⁄₁₆-inch high-speed drill split down the center. This is but one of a great many that fly to pieces under the slightest strain. You cannot get a mild temper on this class of steel. It has to be extremely hard all the way through or it will not harden at all.

Now, let us take up the question of punches and dies for the punch press, one of the greatest money-making machines in a factory. It is not at all necessary to use at all times a high-carbon steel for tools of this class. Instead, we can use common machine steel. This is cheaper and more easily machined. By carbonizing in a furnace for six hours at 1600 degrees F., and then cooling in cold salt water, we have a punch and die that will wear for a great length of time, with no danger of breaking or cracking at any time. Of course, for some jobs on the punch press it is advisable to use tool steel of medium carbon. For instance, if the work to be done is to be made from heavy stock, then a deep, stiff temper is required, but for thin punching and blanking or bending it is much better to use common machine steel and treat as before stated.

We might here state that bone-

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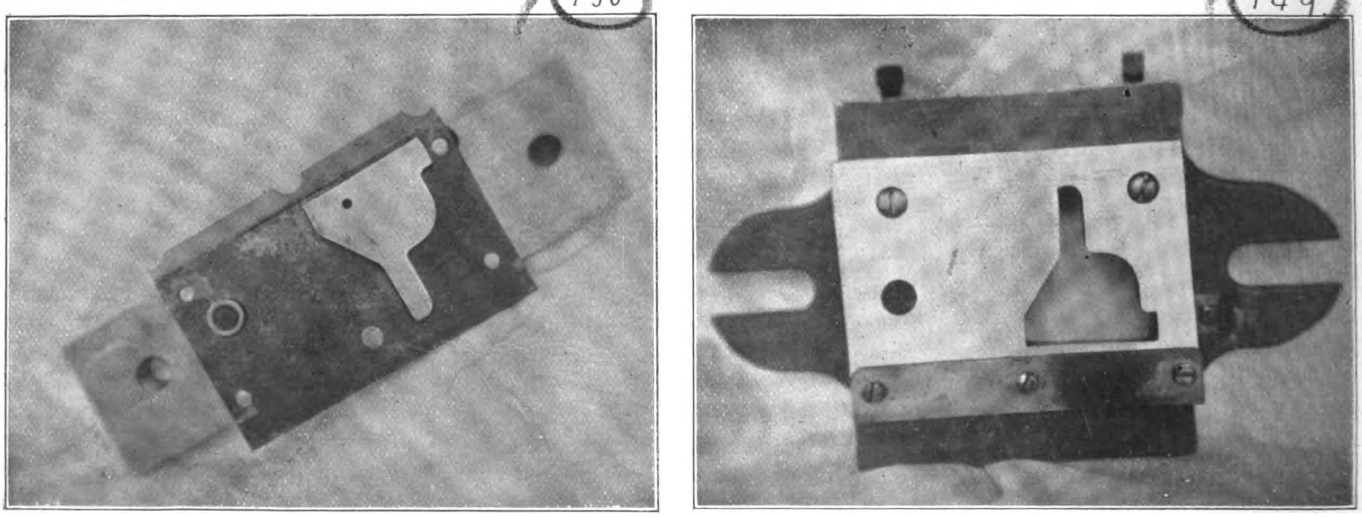


FIG. 2.--A LARGE PUNCH AND DIE, MADE FROM MACHINE STEEL, FOR PUNCHING AND BLANKING LINERS.

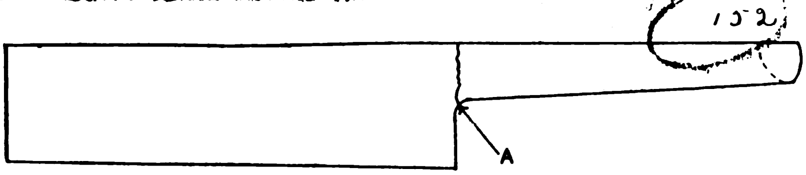


FIG. 3

SHOWING HOW BORING TOOL WILL BREAK IF MADE OF HIGH-SPEED STEEL

black is a very good carbonizing substance. Raw bone and wood charcoal mixed about two thirds raw bone and one third charcoal is also good. In Fig. 2 is shown a large punch and die made from machine steel. It is used for punching and blanking fiber liners of ⅛-inch thickness and thin sheet-steel liners. Thousands of these liners have been made, and the punch and die are none the worse for wear, in fact, they look like new. A variety of lathe and planer tools can be made from high-speed steel and used to good advantage. A boring tool is better made from tool steel, as it will break at the shoulder if made from high-speed steel. If much of a cut is taken the tool will always snap off, as at A, Fig. 3. A cut-off tool is a profitable one to make from high-speed steel if it is made and ground as it should be. But the trouble is, a great many tool smiths put the clearance on the wrong side and some allow no clearance at all. The lathe hand, if he is not an expert, will then grind it so as to cause the tool to bind and break at the first operation. Fig. 4 is an end, side, and top view of a correctly made cut-off lathe tool. If for a planer or shaper it should be about as shown by dotted lines in No. 1. Note the fillet at A, No. 2; also note that the point B in Nos. 1 and 3 is a little higher than the bar. If the tool is for planer or shaper this is not advisable. If the toolsmith, when forging this tool, will leave plenty of clearance on side C, No. 3, the lathe hand can easily grind clearance on side D. If the tool is forged as in Fig. 5 the results will be bad. Note the sharp corner at A, No. 2, and that the end B is thinner than the heel C, this causing the tool to bind when started into the work, and it will always break off. It is no trouble at all to find this class of tool in a great many machine shops, although an up-to-date ~~machine shop~~ foreman would hardly believe it. The tool-smith and the man who grinds the tool are to blame. At another time we will take up other classes of tools and keep on until we have shown almost every style of tool used in an up-to-date machine shop, showing the kind that should be made from high-speed steel and the kind that should be made from tool or carbon steel. We will also give the reasons for not using high-speed steel exclusively, and consigning the others to the shelf.

At this time it will perhaps be well to talk a little on ~~system in~~ the handling of the tool question. Too much system is bad, but no system at all is a great deal worse. About the best thing yet worked out by the writer is a small book of blue prints. This can be furnished by the draughting room. Have all the tools used in the machine shop and tool room shown in this book, and number them from one upward. A book of this kind is shown in Fig. 6. It should be about 4½ by 8 inches, and, of course, the thickness is governed by the number of tools in use. The leaves are held together by two brass fasteners, so that changes and additions can easily be made. The drawings should be in two views, top and side, and all clearance and dimensions given in a plain manner. One of these books should be given to the tool smith and

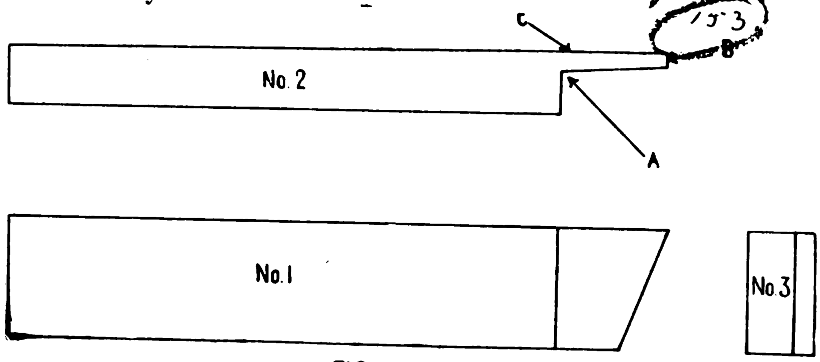


FIG. 5

SHOWING POORLY MADE AND INCORRECTLY PLANNED CUT-OFF TOOL

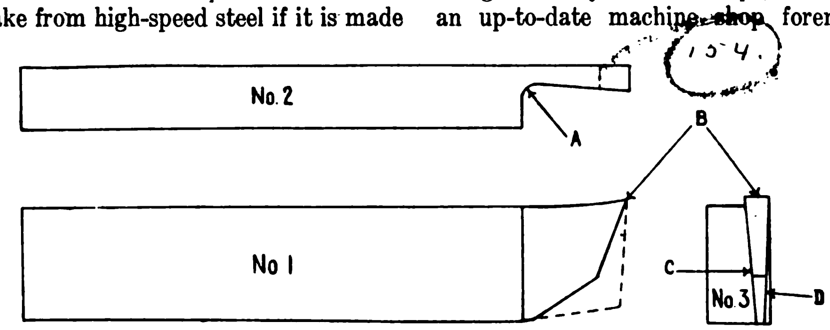


FIG. 4

SHOWING END, TOP, AND SIDE VIEW OF A CORRECTLY MADE CUT-OFF TOOL

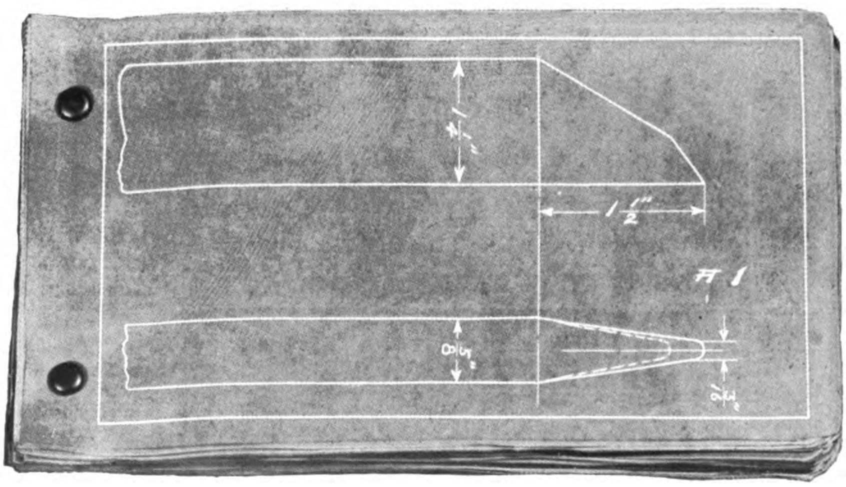


FIG. 6.--A BLUE-PRINT BOOK WITH WORKING DRAWINGS OF THE MACHINE-SHOP TOOLS

Direct

one to the foreman of each department. The errand boy is then given an order for a new tool as follows: "Please make tool No. 36." The foreman's name is signed, and this order is taken to the toolsmith. If a tool is worn down an order can be given thus: "Please dress tool No. 36." This does away with the lathe men running around the factory, and also gives the toolsmith a chance to do his work to the best advantage. Where there is no system, conditions are ridiculous: the workmen are allowed to leave their places and go all over the factory; they will go to the smith shop under the slightest pretext. The writer has seen as many as twenty men standing around the tool-room window, some wanting to have a drill ground, others to get a new drill, and the greater number wanting nothing but a chance to kill a little time and have a friendly chat. Of course, they could not get into the tool room, as large tool rooms usually have a wire partition around them and the door is locked. The tools are handed out through a window or small door. But the toolsmith in the blacksmith shop is the one who suffers under the no-system plan. He sometimes comes very near to blows with his unwelcome visitors. Each man wants to know when he can get his work done, and the toolsmith cannot do justice to the tools, the men, himself, or his employers. If he leaves the place in disgust and gets a position with another firm the report goes around that "he is no good."

The following columns are intended for the convenience of all readers for discussions upon blacksmithing, horseshoeing, carriage building and allied topics. Questions, answers and comments are solicited and are always acceptable. Names omitted and addresses supplied upon request.

To Make a Rock Drill.—What is the proper way to make and temper rock drills? What kind of bath is used, and how is it prepared? IGNORANT ONE, Canada.

Upsetting a Tire.—I would like to know about upsetting a tire cold when the wheel is rim bound. Will upsetting pull the bolts in the rim? Who will answer this for me? MYRON RICKARD, New York.

To Shoe a Horse That Overreaches.—I would like some brother smith to tell me how to shoe a horse that overreaches or strikes his front shoes with the hind feet or shoe; also why is it that light-hardware dealers can buy and undersell blacksmiths? I have a few small articles, such as buggy fixtures, which they sell at the same price that I pay. Do we get the net wholesale price given the dealers? Who can tell me? W. H. LEHMAN, Texas.

To Rethread a Vise Screw.—I will tell you how I put new threads on a vise screw. I took a piece of ¼-inch round steel, and bent it in the shape of a spiral spring and screwed it on and then brazed it on. I have been using it every day for eight years, and it is good yet. Brothers, get a typewriter, and do your writing with it. I would not take twice the cost of mine, because I could not now do without it, although I have had it only a short time. It is just the thing. C. F. HEINE, Illinois.

How to Make a Buffer.—I am not a blacksmith, but a woodworker, and find much that interests me in your paper. I keep a driving horse so that the articles on shoeing interest me. I also have a gas engine, a small three-horsepower upright, and would not be without it for many times what it cost me. They call me a "gasoline crank" here, but it don't hurt much, and sometimes puts a dollar in my way.

I see something about a buffer; someone wanted to know how to make one. I took an old rubber belt, glued four pieces together, turned the rim true, applied glue and emery dust, and it works fine. I have two so that I can always have one ready to do business. ALEX JACK, Manitoba.

Drilling Moldboards.—I see several of the craft giving their experience on drilling the moldboards of chilled plows, and I wish to give mine. I use a very heavy brace. For the first moldboard that I drilled I used a lever under the corner of the house. I made several drills before I got one that would drill to suit me. The way I made my drills was to first select a good piece of steel, and my next step was to get the right bevel on the points. The outside of my drill point was thick while the center was thin. I then put on all the pressure the drill would bear, turning slowly, and the drill went through without any turpentine or brimstone. I now have a large screw to do my pressing with. If any of the craft can improve on this, let us hear from them. R. C. WAITE, Tennessee.

Some Pennsylvania Prices.—I will give you some of my prices:

Four shoes, plain		$ 1.00
Four shoes, steel toes		1.20
Four shoes reset		.50
Hooping four light wheels		1.50
Hooping four heavy wheels		4.00
Four new tires, ⅞-inch		5.00
Four points on axle, ⅞-inch		5.00
Welding shaft irons		.25
New singletrees		.90
Crossbar		1.00
Shaft		1.00
Spokes		$ .20
Rim on the light wheel		1.20
Painting	$ 6.00 to	16.00
New tops, from	15.00 to	50.00
New top buggies	110.00 to	175.00
Open wagons,	60.00 to	100.00
Handy wagons		60.00

Other work accordingly. We are the only ones that get these prices; all the others work much cheaper, but I get my share. Most of them charge 80 cents for four plain shoes and $1.00 for shoes with steel toes. H. M. BROWN, Pennsylvania.

A Letter from Kansas.—I have been in business at one place for thirty-three years, and I am good for, and liable to stay, ten years more. A few of our prices are as follows:

Pointing six small cultivators	$2.00
Pointing plow lays	.75
Sharpening plow lays	.25
Making plow lays, 16-inch	3.50
Making plow lays, 14-inch	3.25
Making plow lays, 12-inch	3.00
Setting tires, wagon or buggy	2.00
Over 1½ inch size, per inch	1.00
Putting in spokes	.20
Putting in felloes	.25

These prices I give you are universal among first-class shops in Kansas. Yet, I will admit that there are parties who quote lower prices. They are the ones whom we have to contend with. Like the poor, we always have them with us, and at low prices we always will. I have had my share of this class to contend with, but I have always had faith enough in the business to believe that good substantial work would command a reasonable and fair price. I have no reason to complain in regard to business and prices at the present time. GEORGE C. LYON, Kansas.

A Well-Equipped Nebraska Shop.—I am not much of a writer myself, but am more than pleased with the letters from the brothers. I have been over a good many of the States west of the Mississippi River and find the paper more help than my travels. I have a shop 24 by 36 feet full of machinery, and will say I would not try to conduct a general repair shop without it. The machines I have are as follows: a disk sharpener, a power hammer, a grindstone, a saw and emery stand, a spoke-tenoning and felloe-boring machine of my own make, and a power drill. I also cut threads on spacing bolts on my disk sharpener. Each bolt contains ten or twelve inches of threads when complete.

I started here almost three years ago, and now I have all I can handle with help. I put on thirty-eight new lays last spring, besides other work, without having any complaint made. My trade has learned that when I set a price that is the price without change. I think setting a price high with intentions of coming down, is a drawback to the betterment of prices. H. A. GATEWOOD, Nebraska.

Has Followed Craft Nineteen Years.—My father and myself, being constant readers of "Our Journal," I take the liberty of answering the queries in the December number. Our joint answers to them are as follows: One, two, and three, yes; as for number four, we would not miss Benton's talks for the price of the magazine. I have followed wagon-making and general blacksmithing for nineteen years. I believe in repairing everything that comes along, and

I get a pointer from Benton's talks in nearly every issue. And Thornton's letters we like immensely. The marine smith work we would like, if only out of curiosity. Our opinion of "Our Paper" is that you could not beat it as a trade journal. We notice that you have some kickers. The way I look at it is this: If one article does not interest me, it may be just what my neighbors are looking for; so I just look at the next page and find something that will interest me. I am much interested in recipes for brazing cast iron, but have not found one yet that works to suit me. Have failed to find one that makes the brass flow properly, but am searching every issue for one that works my way. RICHARD NEEDHAM, New York.

EDITOR'S NOTE.—Benton gave his views on brazing in the January issue. If brother Needham, or any other of "Our Folks," wants more information, don't hesitate to ask questions.

Wants Information on Lathe Work.—I wish that the brothers would write more on the lathe question, and how they do some of the difficult jobs that they have done. I have a large screw-cutting lathe with a ten-foot bed which is a fine machine, and I don't see how any smith can get along without a good lathe. I also have a twelve-inch Crescent wood planer, a twenty-six-inch Crescent band saw, a Little Giant trip hammer, a power thread cutter, a power blower that blows two fires, also two hand blowers, a cold tire setter for setting buggy tires, a punch and shear, a level drill on which I bore rims and tenons as well as iron. But the best of all is the six-horsepower Waterloo gasoline engine that does all the work. I also have a Perkins 1½-horsepower engine that I use to run the lathe and band saw. By using the small engine I save lots of oil, and the little thing is very easy to start. It saves me lots of time. When I am in a hurry, and want to saw out some felloes, I can have the band saw running in two minutes.

Don't be afraid to put in machinery, brothers; it will pay for itself in a short time. When you buy an engine, buy at least a five-horsepower, and it won't be long before you have enough machinery to keep it busy. When I bought my engine, I just had an emery wheel to run. Everybody thought that the engine was too large, but now they have changed their minds, and think it too small for the work I do. J. H. TAYLOR, West Virginia.

An Emery Wheel Shield.—I have seen a lot of shops throughout the country, but I have never seen one in which the smith had a shield on his emery or polishing wheel. I am satisfied to say that if they had one they would not want to do without it. There is one thing sure, and that is, it will protect your eyes and keep a lot of emery and dust out of your face. The way I put mine on is to take a piece of sheet iron eight or ten inches wide, and curve it over the wheel within about two inches of the top of the wheel and let it run straight in front, and down quite low behind and quite a little ways off behind, so it will catch the sparks and dust that fly off. I was bothered a lot with emery and steel in my eyes before I put this on but I have had no trouble with my eyes since I put on this shield. JOHN TOUTGES, Minnesota.

A Western Smith's Opinion.—My answers to the December questions are as follows:

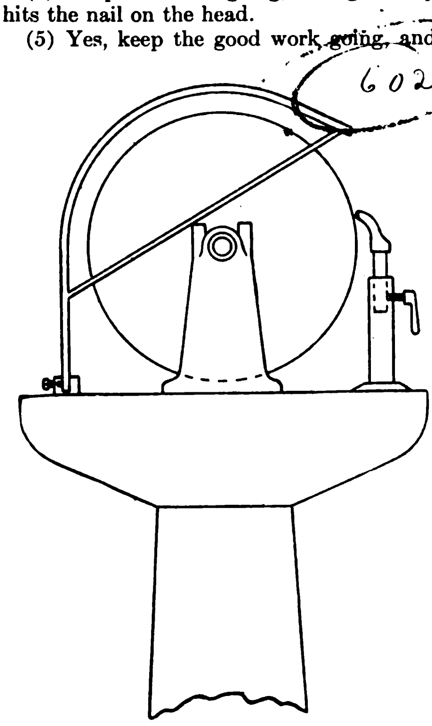
(1) Do not turn any number over to any one subject during one month. Rather give the different branches each a corner.

(2) By all means continue the articles on gas engines and power. Both are coming more and more into use, and your enlightening articles will do a lot of good to some of us.

(3) Machine shop work talk is good, although I do not think it of much benefit to the majority of us readers.

(4) Keep Benton going, he generally hits the nail on the head.

(5) Yes, keep the good work going, and



AN EMERY WHEEL SHIELD WILL PROTECT THE EYES

especially give the rider of "Pegasus" his corner.

(6) Thornton's letters are good reading, and no doubt make many a fellow put on his thinking cap.

(7) Sure, the department of "Queries, Answers, Notes," is too valuable to be left out of "Our Paper." I am 32 years at the anvil now, but with almost every issue see some new kink.

(8) Certainly, articles of that kind are always welcome to anybody and everybody.

(9) Repairing guns, six-shooters, typewriters, and other "gimcracks" comes in handy to the smith in the country, and articles thereon should be profitable to a good many of us.

(10) Articles on large turbines or battleships should be interesting reading. They would show us something more besides the "prairie schooner and locomotive power." FRANZ WENKE, Oklahoma.

Some Comment from Canada.—I wish to answer a few of the questions in our last number. To make a long story short, will say I think our paper all right, and I will bet a good cigar that the last critic could not do as well. I am sure I could not, and I get my money's worth every month. I do not think it is wise to turn our paper into a practical engineer or an electrician journal, because those trades have journals of their own. But "Our Journal" has just enough of those things to let folks know that we know something about it. Some of the letters on horseshoeing are amusing, and I have no doubt but what each one has a cure of his own for interfering. I have shod horses every known way, and find that lowering the outside is good for some horses and lowering the inside is good for others. I find that it is easier to stop horses from interfering that come from other shops, than it is to stop a horse that I have been shoeing, but which starts to strike. Some people are always harping about filing above the clinches. Few men like rasping well enough to file any more than is necessary. A good hoof does not need it, and a big rough hoof does.

Then that yarn about making the shoe fit the foot, and not the foot fit the shoe: if you made the shoe fit the foot of every horse that came to my shop, you would be ruined in two months. First make the hoof right, then make the shoe to fit it. If you use plates you may turn the heels in towards the frog, but calked shoes should be made to fit the foot all around as far as the foot rests on the shoe. The heels projecting beyond the foot should be turned out. G. G. BENNETT, Ontario.

A Letter from a New Zealand Subscriber.—I am really a new subscriber to your journal, and like it very much. I can get a great many useful hints from it. I like reading Thornton's letter, he gives some real good advice to us smiths. I have also been greatly interested in the controversy that has been going on in regard to power in the shop. I have no power in my shop, except that which goes by the name of elbow grease, and that we don't spare. I might say that I learned the trade in a large power shop where they had a steam hammer as well as a steam-driven blower. In fact, all the machines were driven by steam. I would like very much to have some sort of engine in my shop, but am of the opinion that where machinery is used it must be busy continually, for it would be a loss to pay interest on an idle machine, notwithstanding that when at work, it can turn out work at great speed.

I am also pleased to see that smiths generally are facing the problem of raising prices. I feel sure that if they will only combine it can be done easily enough, and after the first few months they will wonder how they put with up low wages so long. We started an association about eight months ago at which time we adopted a price list and also our rules, but there was a bit of an outcry at the time, and the horse owners talked about starting a coöperative association, but nothing has been heard of it for some months, and I think it must have fizzled out. There is one thing to say, the smith, wherever he is found, is a very independent man, which he should be. He should not forget, however, that he can be too much so when by a little coöperation he could very much improve his position. It is the man who charges well for his work that is the most thought of, and if he does good work he will never be in want of a job—in fact, will always have customers waiting for him.

The "cheap-jack" may beat a customer for one or two jobs, but when good customers find that they have been imposed upon, they will look around to see who is doing the work in a satisfactory manner, and then it is that "quality" will get its reward.

WALTER R. MORGAN, New Zealand.

A Word from South Carolina.—The accompanying engraving shows my shop. I started six years ago. As to my success in business, it is very good. I am prudent in my buying, and have very little dead stock. I buy what tools I can, and do not fret because other craftsmen have better. I am doing more work each year. I have built a cottage for myself and one for my helper, and have bought three lots. I now have two good shops, a blacksmith shop that is 20 by 46, one story, and the paint shop is 22 by 45. I use power for running a rip saw, a turning lathe, an emery stand, and a grinding stone. I also have a grist mill. I am pretty well rushed all of the time. My prices are as follows:

Shoeing, four new shoes	$1.25
Shoeing, four old shoes	1.00
Setting tires, each	.50
Front hounds, per pair	3.00
Back hounds	2.00
Wood axles, each	3.50
Bolsters	1.75
Tongue	1.50

I painted thirty-six buggies last year, and have made a good start this year. I agree with brother Thornton, and quality is the foundation of my business. I enjoy his letters very much. We have a good journal. J. E. RHODES, South Carolina.

A Southern Smith Shop.—The accompanying engraving shows my shop, where I do all kinds of general work. My father was a machinist smith. He first worked under a smith in Scotland for six years. He then moved to America and worked in the Buffalo Steam Engine Works for eight years, and then moved south to western Tennessee and opened a shop here. During the Civil War he had five shops burned, but he still kept trying. Six years ago he had the name of being the best smith near here. After my father died, my mother rented the shop, and I started to work under the smith. He did not put me to picking up nails and taking out old bolts, but I nailed on shoes the first day. The first tire I tried to shrink was a buggy tire, and he told me that I made a good job of it. I worked under this man for two years and bought him out the first of October, 1907. I am only seventeen years of age, and am trying to make a good smith of myself. My shop is twenty-five by fifty feet. I first used a bellows, but it tired me more than all the rest of my work; so I bought a blower, which is easier. CHARLES O'NEILL, Tennessee.

A Few Words from Missouri.—As I have never seen anything in our paper from northwestern Missouri, I thought I would tell you what we are doing in the garden spot of the United States. I have every copy of THE AMERICAN BLACKSMITH since it was published, and I learn of something new in every issue. I am one of those gas engine cranks, but I don't want the paper all engine. I think that Thornton's letters are all right. Tell him to keep them coming, and Benton's recipes are just the thing, and so is everything else. I think the publishing of price lists is a good thing for all of us. It lets us know what the other fellow is doing. Here is my price list:

New shoes	$ .50
Old shoes reset	.25
Toe weights	.75
Side weights	.75
Neverslip shoes	.75
Plow lays, 14-inch	3.50
Plow lays, 16-inch	4.00
Lister plow lay	4.00
Plow shovels	2.50
Sharpening 15-inch lay	.35
Sharpening 14-inch lay	.25
Sharpening lister	.50
Sharpening shovels	.50
Setting buggy tire	2.50
Setting wagon tire	2.00
Wagon tongues	3.00
Buggy tongues	3.25
Buggy spokes	.25
Wagon felloes	.30
Wagon axletrees	3.50
Wagon bolsters	2.00
Plow bearer	2.50
Sharpening and pointing plow	1.00

This is just a partial list of our prices. I will try and give you some idea of my shop and equipment. My blacksmith shop is twenty by thirty feet, and my wood shop is sixteen by thirty and two stories high. I have a Weber gas engine, an emery stand, a Champion disk sharpener, a number fourteen Western Chief power drill, a grindstone, and a sixteen-inch saw—and, by the way, it is a dandy. One of my customers brought in a dry pine log that was nine inches through and wanted it ripped in two, and the way that saw waded into it was great. It runs 2,875 revolutions per minute. CHARLES B. WOOD, Missouri.

An Iowa Letter.—I read in the February number of THE AMERICAN BLACKSMITH what Mr. H. C. Heithecker, of Indiana, says about the farmer doing his own work. I think this ought to be stopped some way. This is the way I did it. There was a man came to me last winter and asked me how much I would charge him to reset four shoes. I said one dollar. He said he would not give it, and would go some other place and get it done for eighty cents if he couldn't here. I said, "You go out in the country to get your horses shod, and when you want a plow or something else repaired that the farm shop can't do, then you come here." I think there ought to be a way to stop this. Now, brother, don't go to sleep, but wake up some of the large city shops. Some shops will let the country shops do their work; they don't care. They will try and sell them tools to help them along. They don't think of the small country town shops. It makes it hard for them. Now, if all the small country shops would move to the larger cities and start a shop, the city smith would not like it. I think the city smith ought to help, along with the small one. Another thing: I think the blacksmith association is all right if they keep up the prices. I went into one last November, and it has kept up the prices. Large cities have a way of cutting prices, so we don't see that they are doing so, but I can see them. They are afraid they will lose a penny at their trade if they don't lower their price.

When a man comes in to get a horse shod, do you charge him the new price, which is one dollar, and when he hands you a dollar, do you thank him and hand him back twenty cents, and tell him to keep still about it and to come again? Now, brother, do you think this is fair to the other smiths? Try to hold up the new price; don't go back to the old one. Keep up the new prices, and all join hands. Now, let us hear from some other brother.

I will tell you how I keep my papers. I take two pieces of stock one half by three sixteenths and as long as the paper, and drill a hole at each end and one at the center. Then I put my papers between these pieces, drill holes in the back of the paper, put strong bolts through them and run nuts on and screw down tight. This keeps them together. W. J. BROCKWAY, Iowa.

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A GENERAL SMITHY OF TENNESSEE

89

A SMITH SHOP OF SOUTH CAROLINA

VOLUME 7 NUMBER 10

THE AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

BUFFALO N.Y. U.S.A. JULY, 1908 $1.00 A YEAR 10c A COPY

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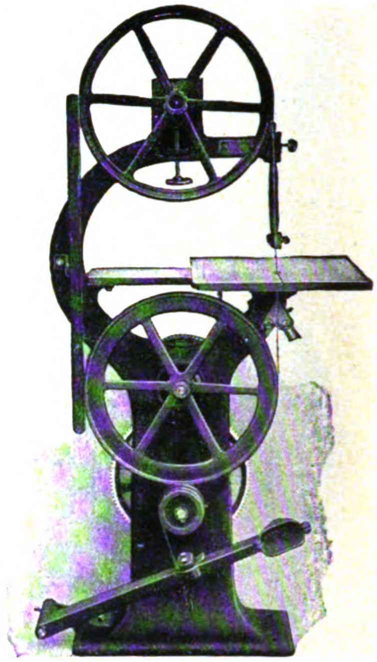

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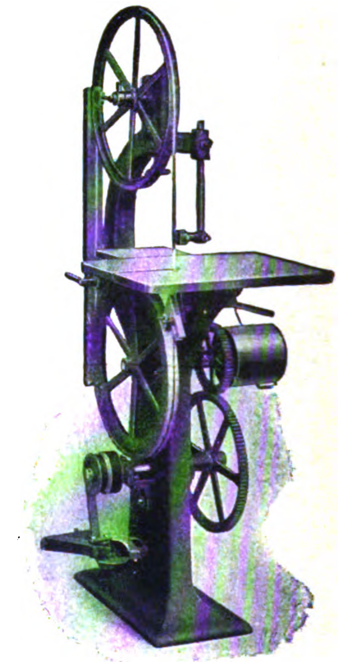

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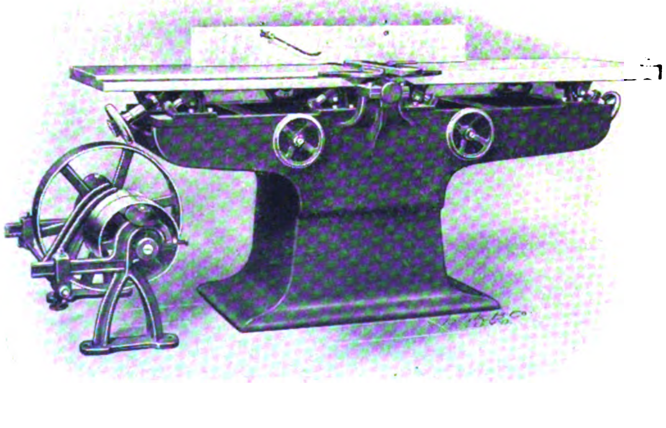

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The Real Spirit of the Craft.

Since the beginning we have always talked, written, and preached loyalty to the good old craft. Recently we suggested the Booster's League, and just the other day we received a letter that makes our heart beat double time in its gladness. This letter comes from the great big Lone Star State, and we are certain that it was written by a great big-hearted smith. Just read what our Texas brother has to say: "I received the first copy of THE AMERICAN BLACKSMITH three days ago and must say that since its arrival I have enjoyed the shop and its work more than ever. It seems to put new life into me. I am fifty-seven years old, with some twenty years of shop experience. I like the shop work better than any other work that I have ever done. I do an honest day's work and lay me down to sleep, and oh, how sweet it is! Yes, I would rather be an honest American blacksmith than be a crowned head of Europe." Of course, our Texas brother is a member of the Booster's League. If we were a duly organized body we would make him president. He certainly has the true spirit of the good old craft if any one has, and such loyalty makes us feel like cheering and throwing our hat into the air. There are few trades that offer so much for true, honest work as the good old trade of Tubal-cain. Let us all coöperate to make the craft still better. Make the load lighter for our brothers. Help and assist wherever we can. Give freely of our hints, our short cuts, our methods. Look upon the craft through larger eyes and with broader thoughts. Think not with the pessimist that the trade is going o thet dogs and then help it go. Read our Texas brother's letter, and then boost the good old trade for all you are worth. Join hands with your brothers for harmony and protection. Put into the craft the best that is in you, and get out of it what you deserve—a good, honest living, fair, honest profits, a just and fair success. Read and reread this letter from the Lone Star State, and then resolve to do your loyal best for the good old trade.

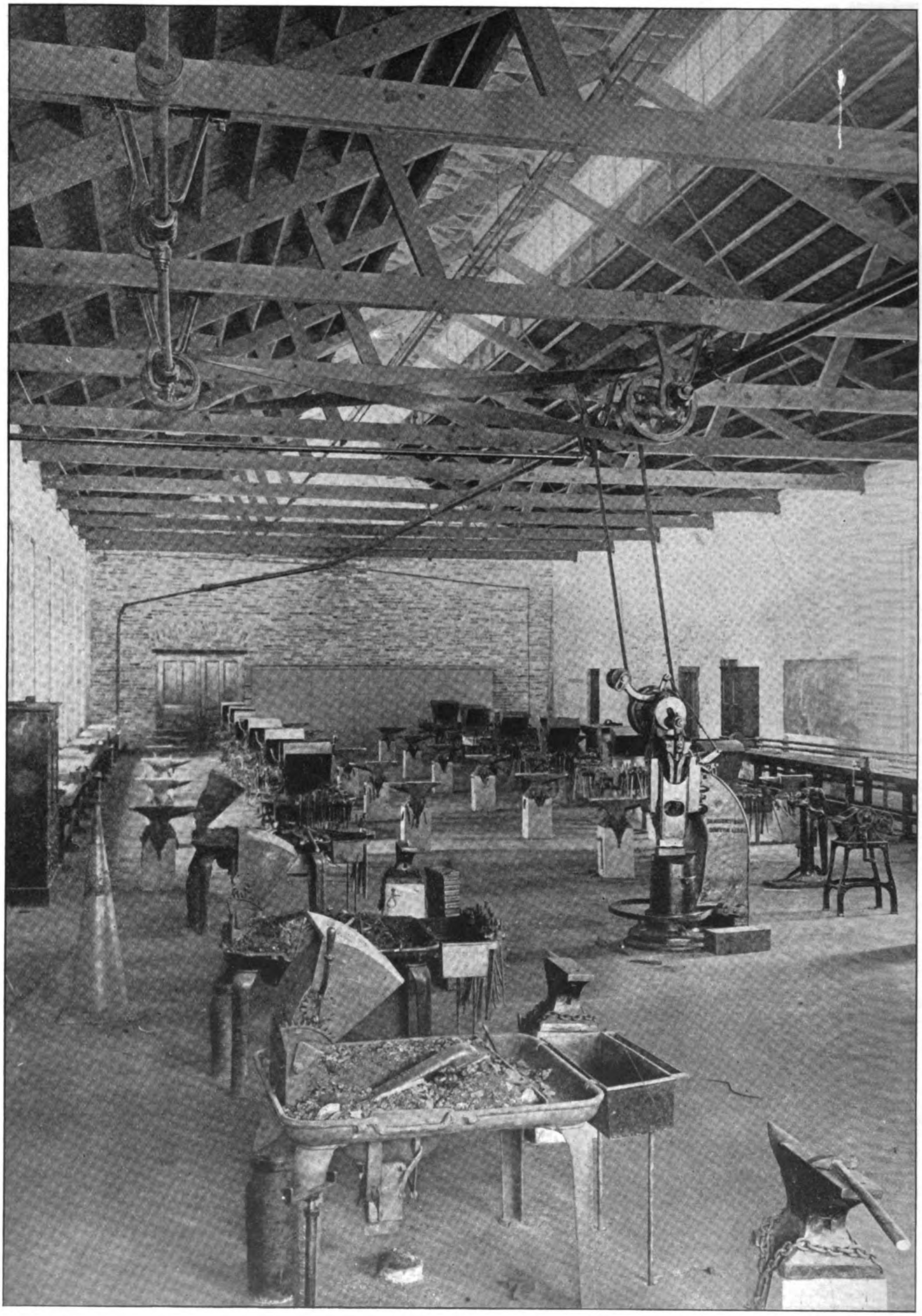
Contents, July, 1908.

The Opportunity Bureau.

Quite a number of smiths have, during the past few months, taken advantage of the opportunities announced in our columns and have changed their locations. And credit is due, not alone to "Our Journal," but to "Our Folks" as well. For you have helped us to pass the tips along—you have assisted us in getting these brothers into other opportunities. And we want to keep up the good work. We want you to keep on the lookout for future opportunities. We want every one of "Our Folks" to consider himself a reporter of opportunities. If there is a good location anywhere, without a smith, and you don't happen to want it yourself, pass the tip along to us and we'll see that the man who desires a change is advised. Perhaps you can tell us of an opportunity right now.

A Rubber Stamp Free of Cost.

Can you suggest a more helpful or useful office help than a rubber stamp bearing your business card? You can get one free of cost—simply ask your neighbor about becoming a regular reader of "Our Journal," get his subscription, and we'll send you a rubber stamp outfit free. An Indiana reader says: "I received my rubber stamp this morning. To say I am well pleased does not express it at all." The rubber stamp is the latest improved knob-handle cushion stamp. The bottom is flanged to admit a piece of cushion rubber upon which the reading matter or die is cemented. If the surface upon which the stamp is used is not perfectly smooth, the rubber cushion permits the die to stamp perfectly. The inking pad supplied with the stamp is self-inking and is enclosed in a handsomely ornamented tin box with hinged cover. The color used is bright and lasting, and when delivered to you the pad is good for several thousand impressions. The stamp itself may have three lines on it: your name, business, and address. Can you suggest anything more useful to an up-to-date smith? Get a brother smith to subscribe and we will give you a rubber stamp outfit free. Help us toward the fifty thousand mark today.



THE POWER HAMMER IN THE COLLEGE SHOP.—THE FORGE SHOP AT THE AGRICULTURAL COLLEGE OF UTAH

Power Hammers and Power Hammer Operations

JOHN D. WOODFORD

POWER hammers as used in the smith shop today are performing a large part of the smith's hardest work. The power hammer is being used not alone for disk sharpening and plow work but for every style and description of forge work that can be performed under it. Little, by way of commendation, can be said to those readers who are already familiar with the power hammer and its work. To those unacquainted with the work of this labor-saver, a few words of explanation may be of interest.

The size of a power hammer is usually determined by the weight of its ram, or hammer, and the die—an eighty-pound hammer meaning that the combined weight of the falling parts, the ram and the die, is eighty pounds. The size of hammer required depends, of course, upon the work to be accomplished by it. A twenty-pound hammer may be sufficient for one shop, while another may require a hammer of much larger size. It may be well to mention, however, that it is better to get a hammer slightly larger in size than is absolutely necessary than to get one that hasn't sufficient range to perform the heavier work that comes to the shop.

Power hammers for general smith shop work range in size of ram or hammer from twenty pounds to five hundred pounds and in a great variety of weights for the entire hammer and frame. One can be purchased to occupy almost any sized floor space, while the power necessary to operation depends, of course, upon the weight of the ram. Comparatively little power, however, is required to operate a power hammer, and with a medium-sized engine it is by no means necessary to stop other machines when desiring to use the hammer. For some hammers with a 200-pound ram, two horsepower will be found sufficient to operate perfectly.

The dies generally used on the power hammers are made with flat faces. These have the widest range of use and are generally included in the power hammer equipment. For special work, and for the making of a number of pieces of the same size and shape, special dies are made, the faces of which are shaped somewhat to the work to be forged.

While the regular flat-lipped tongs may sometimes be used for holding and manipulating work under the hammer, special tongs to hold the work solidly and to keep it from moving sideways are best. In Fig. 1 is shown a pair of tongs of this style. They are, of course, fitted to the work, and when so fitted will hold the work solidly and firmly. The method of making tongs of this style is identical with the making of ordinary flat-lipped tongs, except that the jaws are grooved by placing the lips, one at a time, on a swage.

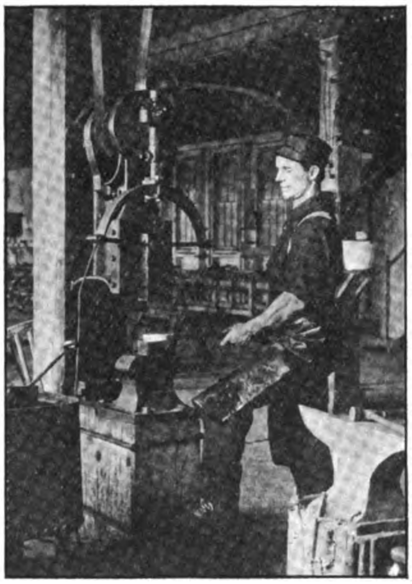
The need of a link on the handles of the tongs is very evident. It is necessary that the work be held solidly and firmly, and that the work be easily and quickly turned. For the handling of heavy work it may be of greater convenience to fit the link with a handle at each end, similar to the links used by the smith in the large shop using a steam hammer.

The cutters used under the power hammer may be the same as those used on the anvil, but if special cutters are made for power hammer use, fewer handles will be broken than if the regular anvil tools are used. Cutters for power hammer use are usually made of tool steel with a handle of wrought iron. One of these is shown in Fig. 2. The cutting edge is made blunt rather than sharp, as the force of the blow will make for the dullness of the edge. The flattened portion of the handle at A is to allow the handle to give to a certain extent. This will prevent its being broken or snapped off when struck by the ram. It is not always possible to hold a cutter under the hammer in just the exact position in which the ram will strike it squarely, and it is, therefore, well to allow some spring or flexibility to the handle.

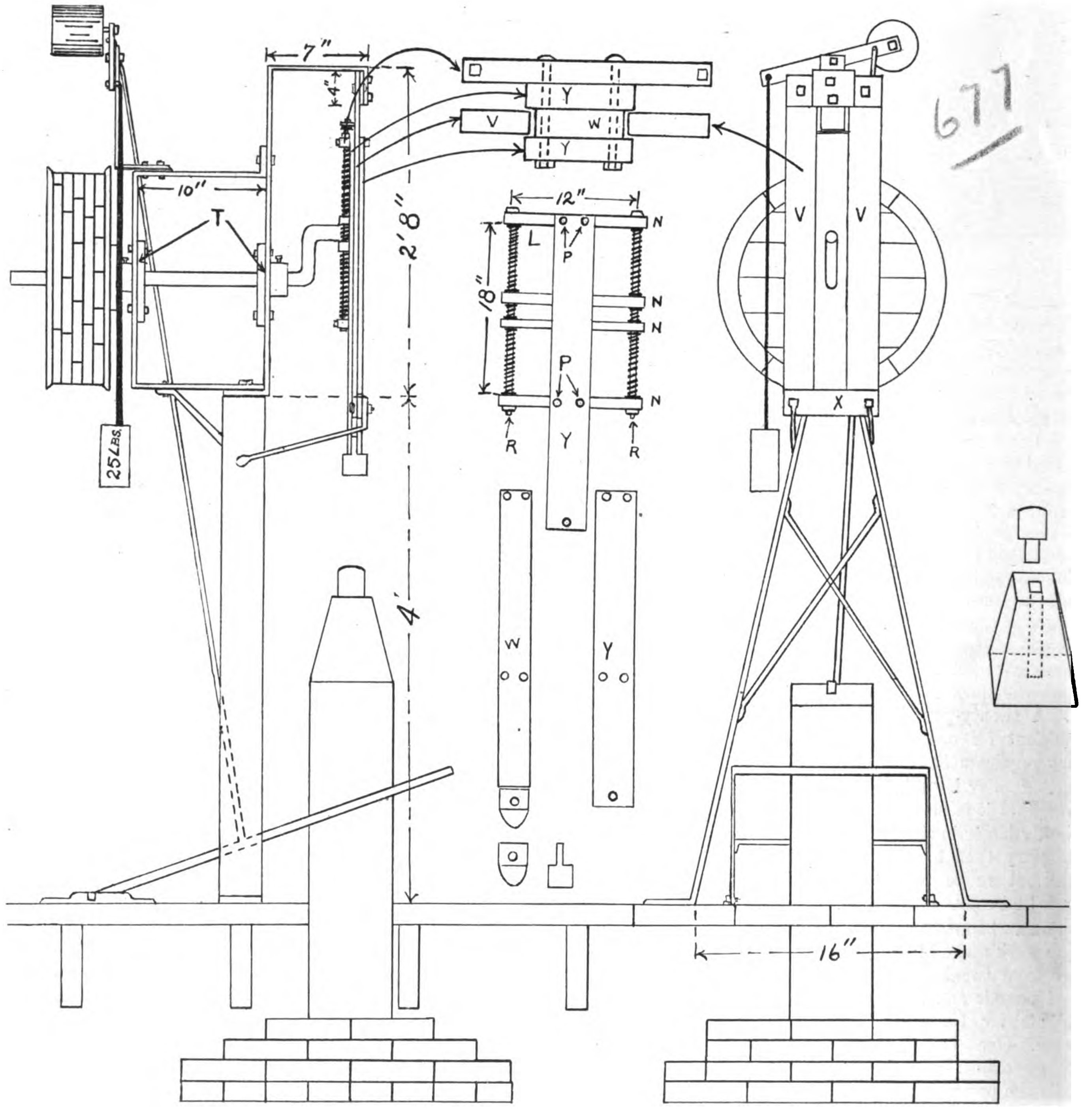
The number of cutters required depends, of course, upon the work to be done. A hot cutter is necessary, while a cold cutter similar to the one shown in the engraving, Fig. 2, at X, will be found of great convenience in nicking and cutting heavy bars under the hammer.

When manipulating work under the hammer, see that your material is resting flat and solid on the anvil of the machine. It should be in such position as to bring that portion of the material to be worked directly beneath the center of the hammer die. No attempt should be made to work stock under the edge or corner of the hammer. This will strain the hammer, and if persisted in will cause the ram to run out of true.

When forging stock under the power hammer, the same precautions should be borne in mind as when working stock with the hand hammer; that is, strike blows that are heavy enough to work the metal through the entire piece. If light blows are struck, the metal on the outside of the bar will move or slide over the interior portion of the bar, and hollows will form in the center of the stock. It is, therefore, important, when working stock under the power hammer,



POWER HAMMERS PERFORM A LARGE PART OF THE SMITH'S HARDEST WORK to use blows sufficiently heavy to work the piece clear through. This may be easily determined by the appearance of the side of the stock. If the blows are not heavy enough, the side or end of



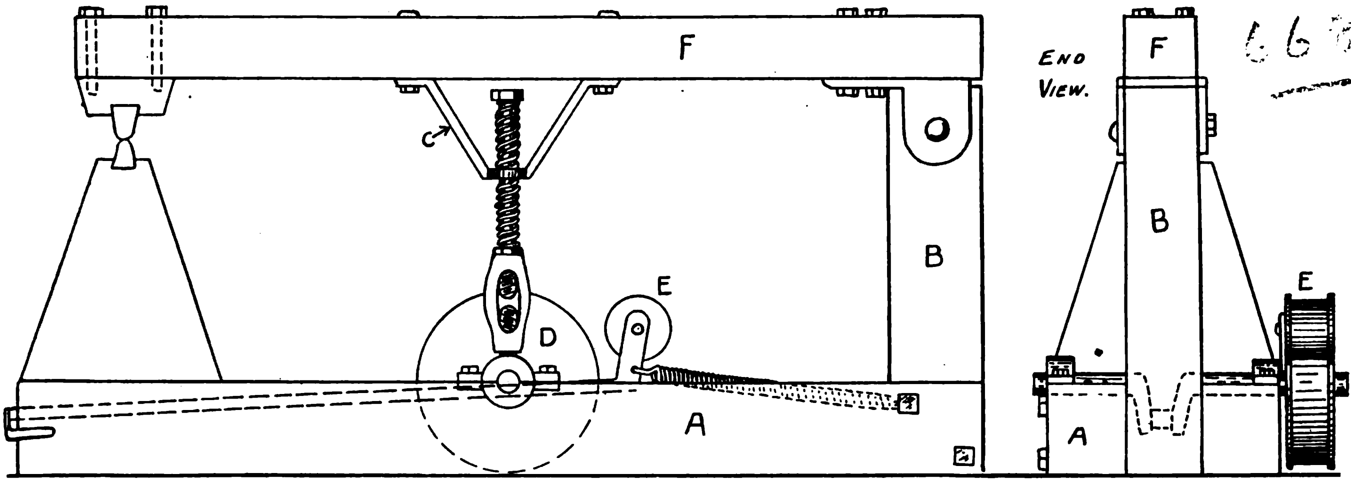
A PRACTICAL POWER HAMMER THAT CAN BE BUILT BY ANY SMITH AT A VERY SMALL COST

the stock will be convex, as shown at D in Fig. 2. If the piece is being worked properly it will appear as at E.

In using tools under the hammer, care should be taken to see that when the ram descends it will hit the tool square. Should the tool be hit on the side or edge it is liable to cause injury not only to the machine but to the smith as well.

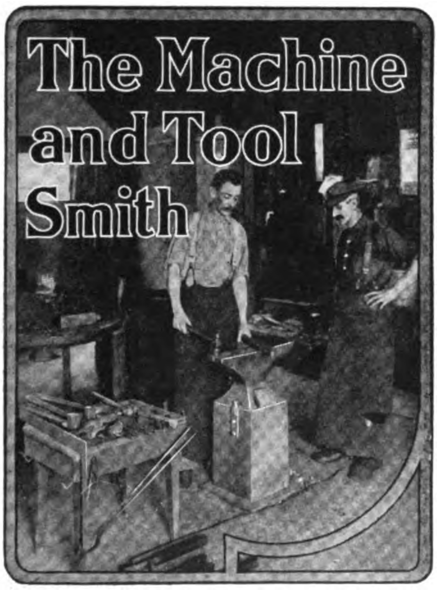
Beside the hot and cold cutters, swages for finishing work are also used. In Fig. 3 at A is shown a swage of this kind. The two blocks are held apart by a long, flat spring, which also serves as a handle. At B is shown a very convenient tool for tapering work under the power hammer. The faces of the dies of the power hammer and anvil being flat and parallel, it is, of course, impossible to forge tapered work satisfactorily without some tool. The tool shown at B is used with the curved side on the work in fullering or drawing out, and with the flat side on the work when smoothing or finishing up tapered work.

The number of tools and dies which the smith can devise for quickly doing the work under the power hammer depends upon the smith himself. There is practically no limit to the special devices which the smith can plan and make for doing work quickly and well under this labor-saving machine. The punching of a certain number of holes in a number of pieces of stock can be easily and quickly accomplished by making a punch to make all of the holes at one operation. Then again, pieces



A TRIP HAMMER OF SIMPLE DESIGN WHICH WILL BE FOUND OF SERVICE ON HEAVY SMITH-SHOP WORK

that are to be similarly bent in any quantity may be formed by placing between blocks of the required shape, and quickly and easily bent under the hammer. From the bending and forming tools used under the power hammer it is but a short step to the use of the power hammer in drop-forging. It is, of course, impracticable to attempt the forging and forming of articles by means of dies unless the product is desired in some quantity or unless the dies would be used frequently. The reason for this is the cost of making the dies, which is considerable, especially if made in a machine shop.



In dipping tools into a bath it is well to remember that the warm water always comes to the top. For that reason dip your tools straight down and to the bottom of the bath. This insures uniform hardness. If the tool is moved sidewise in the bath the temperature of the water touching the tool is by no means uniform and the degree of hardness cannot, of course, be uniform. T. B. G., Michigan.

Charcoal is unequaled for use in heating steel for hardening and tempering at the forge. There is no special equipment necessary to its use. It can be used in the regular forge, or a special forge or oven can be used. The charcoal fire can be started at a moment's notice and in a very short time sufficient heat can be generated for most any hardening and tempering work. Use charcoal and be sure of your tempering results. T. O. B., Pennsylvania.

How to Make a Practical Power Hammer.

E. A. LINDNER.

The accompanying engravings show a front view, a side view, and several details of a practical shop-made power hammer.

The frame is six feet eight inches high, in three sections. The first section, or base of hammer, is made of one half by four-inch stock, four feet high, bent as shown in illustration. This base is four inches at the top and sixteen inches at the bottom. The second section is made of the same sized stock seventeen inches high, and sets on top of the first section and is bolted to it with ½-inch bolts. The third section is thirty-two inches high of the same stock, but running down, and bolted on top of the first section, taking same bolts as the second section. At the top this piece extends out seven inches, and down four inches. To this four-inch section the slides, on which the hammer runs, are bolted. They are two feet six inches long. The inside of hammer W is the same size; three inches wide by five eighths of an inch thick, but two feet four inches long; two inches shorter to allow for die. The outside or slide plates VV are of three eighths by four-inch stock. They are bolted together at the bottom as at X with one half by two-inch stock and braces run from this to main frame.

The spring arrangement of the hammer is shown at L. The bars N, N, N, N are square steel buggy axle stuff, eleven and one-half inches long fastened by means of half-inch bolts PP. In the ends of pieces N, N, N, N are holes to receive the bolts RR, five eighths by nineteen inches long. The bottom bar N is eighteen inches below the top one. The two bars in the center are two inches apart. In the spaces between the bars place coil springs, not too stiff or too limber, but something that will stand the strain when running. The crank from the main frame runs between the two center bars, and is of 1¼-inch stock two feet two inches long with a five-inch crank. On the inside

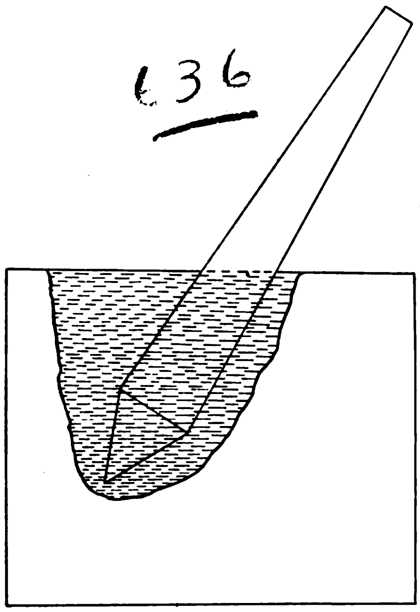


FIG. 1.—THE USUAL BUT INCORRECT METHOD OF DIPPING TOOLS

of the frame bolt a couple of pieces T, one half by four inches, with holes to fit the shaft. These will make good boxes.

Make sure that you have plenty of braces on the hammer, running in each direction to the ceiling and to the floor. The belt tightener can be easily made as shown in the engraving. Dies are made of $2\frac{1}{2}$-inch square tool steel. Make the bottom die like a heavy fuller. Use a four-inch leather belt. The hammer should run at least one hundred and twenty revolutions per minute. The drive wheel on shaft and on the hammer are the same size, fourteen inches in diameter, made of one-inch pine, or two-inch stuff may also be used, with the flanges on the outside of at least one inch. If you cannot get a block casting use an old anvil, but be sure and have the block down well and on good rock. I have a good foundation built under my block. This hammer can be made by any blacksmith at little cost, and it is worth more than any factory hammer on the market. Keep everything well oiled, and there is nothing to break. I run my hammer with a two-horsepower I. H. C. engine.

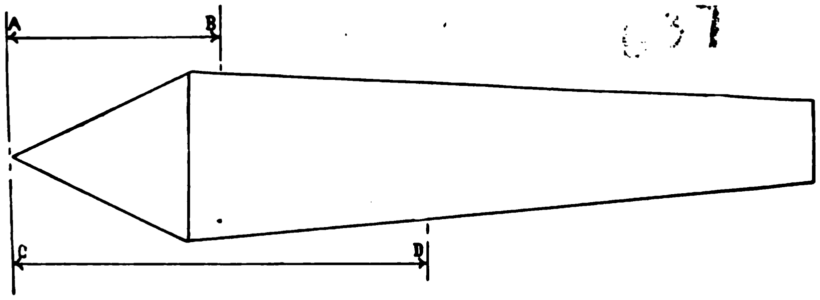


FIG. 2.—HOW TO HEAT AND HOW NOT TO HEAT A LATHE CENTER

How to Make a Small Trip Hammer.

WILLIAM F. MARTINEK.

We made the base A of our trip hammer of old railroad ties—sawed ties 6 by 9 inches. The upright B is 5 by 5 inches with a piece of 2 by $\frac{1}{2}$-inch 8 inches long set on each side for the hinge joint. The upper part of the hinge is made of $2\frac{3}{4}$ by $\frac{5}{8}$-inch plow bar. We cut one piece 12 inches long and one 8 inches long and welded the end of the 8-inch piece in the center of the 12-inch piece, making a T. We then turned down the ends of the 12-inch piece for 3 inches and drilled $\frac{7}{8}$-inch holes for the hinge pin. The crank is made of $1\frac{1}{2}$-inch steel forged in the regular manner. The lifting rod is a $1\frac{1}{4}$-inch turnbuckle, one end being fitted to the crank. The strap is $1\frac{1}{2}$ by $\frac{1}{2}$-inch with key and gib. The upper end is threaded on both ends, one end for the turnbuckle and the other end for a nut. This piece is 17 inches long. We made the coil spring of $\frac{3}{8}$-inch spring steel turned on a $1\frac{1}{2}$-inch rod. The spring is 6 inches long and tempered in oil. The yoke C is made of $2\frac{3}{4}$ by $\frac{5}{8}$-inch plow bar 24 inches long, bent as shown in the engraving. The flange pulley D was taken from a straw stacker, while the belt tightener E is made of wood. The tightener lever is $1\frac{1}{2}$ by $\frac{5}{8}$-inch and 36 inches long with a piece of old wagon tire bolted on to pass around anvil block. The anvil block and hammer head patterns were made of $\frac{3}{4}$-inch pine boards. Anvil and hammer dies are of $1\frac{1}{2}$ by 2-inch tool steel 6 inches long. The hammer beam F is $3\frac{1}{2}$ by 4 by 68-inch hickory. The hammer head is drilled and tapped for $\frac{3}{4}$-inch cap screws 5 inches long, which go through the beam. The other bolts are $\frac{1}{2}$-inch.

FIG. 3.—INSURE EVEN HEATING BY TURNING THE TOOL IN THE FIRE

Why Tools Warp in Hardening.

The majority of mechanics think that the warping of tools takes place when the tool enters the water. This is not so, especially with a lathe center, which tool is the most easily warped, and is very troublesome to get back to its former straightness. Now, we will discuss the lathe center, and the same rule will apply to all tools that require to be straight after hardening. Carelessness is the principal cause of warping. For instance, a smith who takes a lathe center, flops it into the forge fire, puts on the wind, and then turns to his helper, if he has one, and if not he will tackle the first man who comes along. By the time they have talked fifteen or twenty minutes, he grabs the center, and shoves it into the water about as shown in Fig. 1. The chances are that the lathe center was a bright red from C to D, Fig. 2, if not all over, and after plunging into water as shown, he will bring it out and rub it with a piece of grindstone or emery cloth, and let the color come to a "real nice straw" as he calls it. But you can bet, Mr. Smith, a center handled in this way will be returned to you at once for annealing, so as to be straightened and again hardened by a more careful method if not a more careful smith. A center should not be heated red for a greater distance than from A to B, Fig. 2. And from the time it is put in the fire it should be constantly turned or rolled over as the smith is doing in Fig. 3. Then

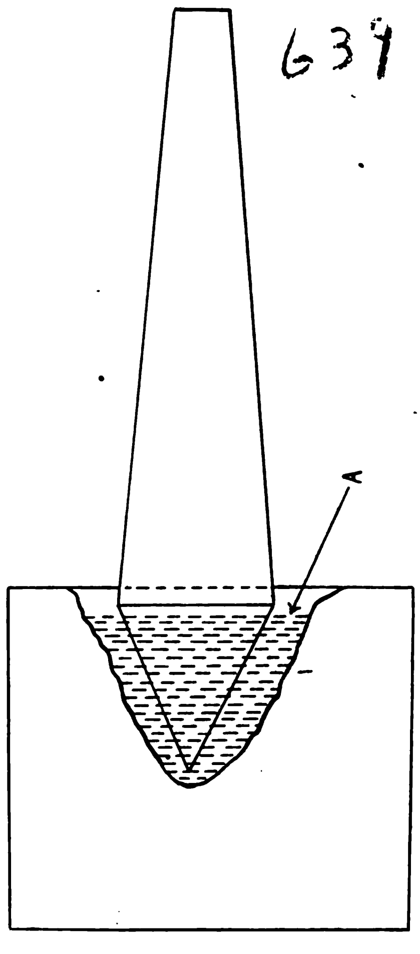


FIG. 4.—THE CORRECT METHOD OF DIPPING A LATHE CENTER

when the end is a dark red and, in the smith's judgment, hot enough to harden, he should dip it as shown in Fig. 4, the water line at A not coming above the shoulder of the center. The warping takes place in the fire, not in the water, as a great many suppose. The trouble is caused by putting the whole center in the fire and allowing one side to become red hot before the other or top side has begun to color at all, and smiths who handle valuable tools in this haphazard manner are looking for a job oftener than a job is looking for them.

There is nothing more important to the smooth, easy running of the motor than the timing of all the valves. Perfect running cannot result without perfect timing of the valves. A. T., New York.

Bolts are very often spoiled in driving them from their places. To prevent such injury, a piece of hard wood is best placed on the bolt end to receive the blows from the hammer. T. A. B., New York.

An easy way to replace valve springs is to compress the spring in the vise until it is short enough to go into place and to allow the key to be easily inserted. The spring is now tied with a piece of light wire, put into place, the key inserted, and the wire then removed. A. T., New York.

Small Drop Forgings for Automobile Repairs.

The following hints will be found valuable to those smiths fortunate enough to possess a power hammer, which can be used to advantage in drop forging all kinds of small pieces if one hundred or more are to be used. In the first place, make a machine-steel piece as shown at A, Fig. 1. Have it fit tight on steam hammer dies B and then weld on a piece of flat spring steel at X. This spring steel should be about one half by two inches and bent as shown at C. Then machine top of block A so as to hold tool steel die D. Any number of dies for different shaped forgings can be used in this same block at different times. The convenience and money-making qualities of this kind of tool cannot be fully appreciated until once tried out in the shop. The top die is simple, and can be forged from very low carbon steel side and face view is shown in Fig. 2. Flat

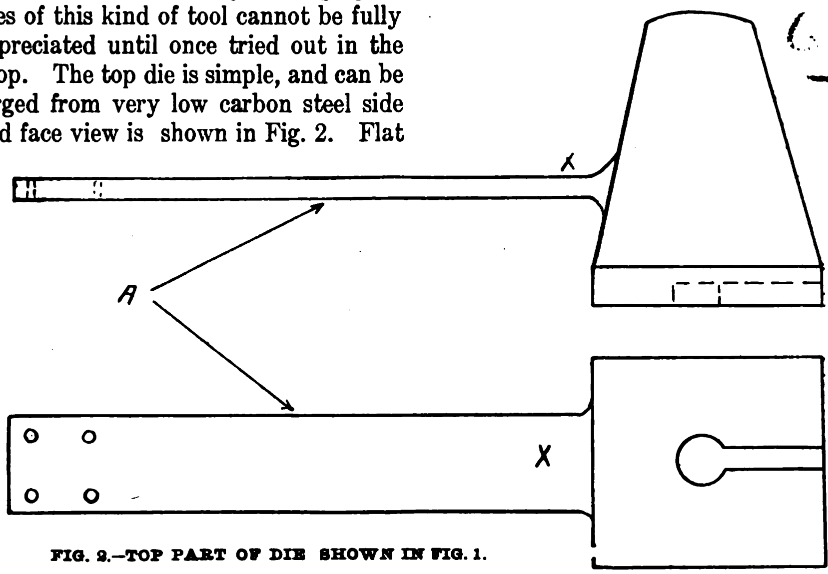


FIG. 2.—TOP PART OF DIE SHOWN IN FIG. 1.

spring steel should be welded on at X, the flat part A, Fig. 2, being made light enough to act as a stiff spring so that after the hammer strikes the top die will come up to place again. The flat part A, Fig. 2, should be fastened to flat bent bar of Fig 1 by four cap screws as shown by dotted lines E, Fig. 1. Fig. 3 shows a four-hundred-pound steam hammer and Fig. 4 shows a closer view of same hammer with one of these drop-forging dies in place. This hammer with this form of die has turned out thousands of drop forgings that could not have been made in the same shop in any other way fast enough to supply the demand, and would have to be made by a drop forge company at a large cost, as drop-forge dies are expensive, whether you order a large or small quantity of them. Then, again, it is generally necessary to make a large die, to remove the regular steam hammer dies, and put the newly made dies in their place, thus putting the steam hammer out of commission, as far as any other work is concerned, during the time the drop-forging is going on. With the dies described in Figs. 1 and 2 this is not the case, as they can be placed and replaced with ease, thus letting another smith use the hammer to work off a heat that would otherwise have to wait another day. Fig. 5 shows a few of the many forgings made with this class of die, and used in large quantities by an automobile firm. If the big, clumsy, drop-forging dies were used by this firm they would have to put up another hammer to do the ordinary work besides having another operator. Then, again, this class of forging die has another advantage, for we can use it on the anvil, and by having a couple of helpers with, say, fourteen-pound sledges, a smith can turn out quite a number of neat forgings in ten hours, that would otherwise take him a week to forge, and then would not compare with the

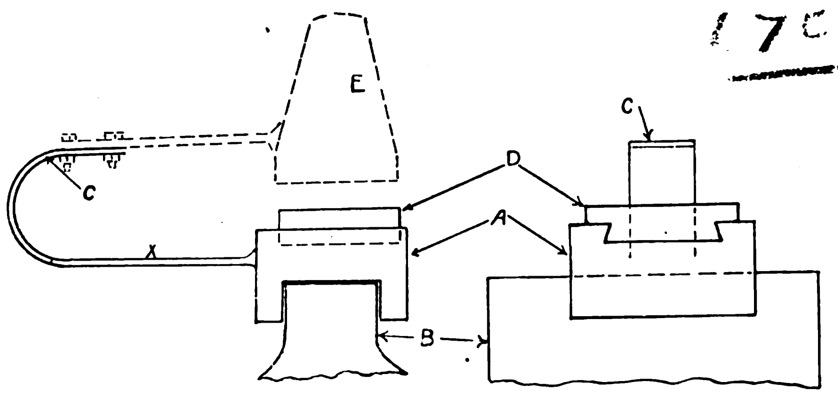


FIG. 1.—TWO VIEWS OF ONE STYLE OF DIE USED UNDER POWER AND STEAM HAMMERS

forgings made in the dies. Fig. 6 shows same die in position on an anvil. It is fastened to the anvil by having a ⅞-inch stud in the bottom of the die-holder, the stud going down through the square hole in anvil and tightened up with a nut. See Fig. 7. The stud must have both ends threaded, one end to screw into die-holder, and the other to accommodate nut at bottom of anvil. Fig. 7 shows end view of anvil A, and side view of die-holder B. C is the stud and D the nut by which the die-holder is securely held in place.

Now, about as handy, as well as the cheapest and quickest, way to prepare dies for this class of work in a small shop is to forge up a piece and file or machine it into the proper shape. For instance, if we are about to make a number of pieces, same as are shown in Fig. 8, which we will call a small brake lever. After finishing it take a block of machine steel of the required size, heat quite hot, and then drive the small finished forging about one half its depth into center of heated block as shown in Fig. 9. Then heat top die, Fig. 2, and perform the same operation. After this operation is completed the dies will require a little hammering on the four sides A, Fig. 9, in order to straighten block up again as it will naturally spread when the piece is driven into top. After hammering as stated and when cool, a little dressing up with chisels and a file will give you a first-class pair of dies for light work. All that remains to do is to send the block into the machine shop, and have it machined as at A, Fig. 10, so it will fit die-holder. See A and D, Fig. 1. If there is no machine shop connected with the shop where the die is being made, the smith can, with a hot chisel, cut away corners as at A, Fig. 10, and dress it up himself plenty good enough for the purpose. Of course, we take advantage of the best appliances at hand, but must not despair if the smith shop is not connected with one of the modern tool rooms. Some very fine smithing was done years before a tool room was thought of, and can be done today if the smith wishes to go about it, and he will win out in the "scramble for dollars."

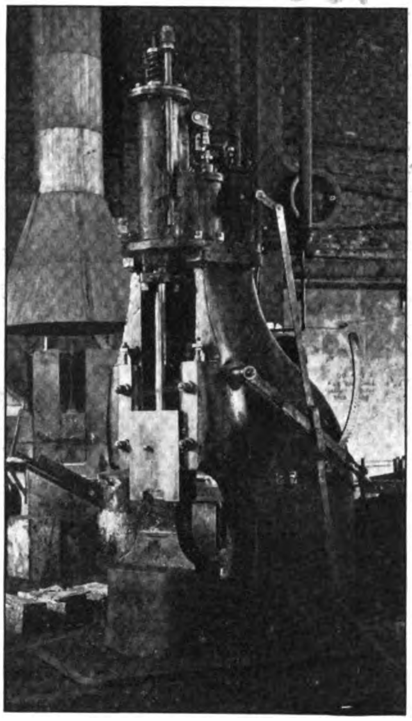


FIG. 3.—SHOWING A FOUR HUNDRED POUND STEAM HAMMER

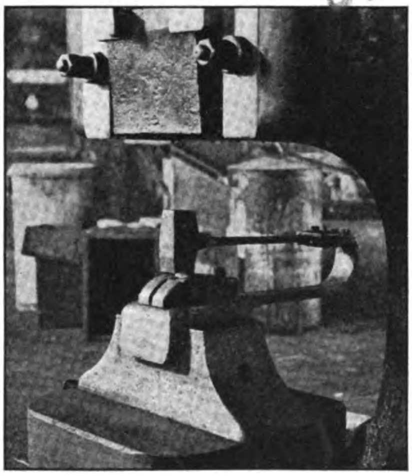


FIG. 4.—THE DIE IN PLACE ON ANVIL OF STEAM HAMMER

The Car or the Man—Which?

A Little Talk by a Shopman.

CADILLAC.

There are all kinds of automobiles—good, bad, and indifferent; but even the best of them require some intelligent care.

It was only yesterday that the owner brought in a four-cylinder car of one of the leading makes. He had been driving it only a few months and, was loud in his denunciation of it, saying that its makers ought to go into the wheelbarrow business.

I told him I was rather surprised, and that in my experience I had never seen any of such cars go wrong from any faults of their own. I immediately set about to diagnose the case. Such a mess! There were enough things wrong with this car to put half a dozen cars out of business, and the wonder is how any car could persist in going at all under such conditions; but this one did, and it speaks well for the car.

In the first place, one of the storage batteries had been removed, and the one remaining registered somewhat under the limit at which satsifactory results could reasonably be expected. Drivers and repairmen should not forget that a sufficiently hot spark cannot be obtained without ample strength in the batteries to produce it.

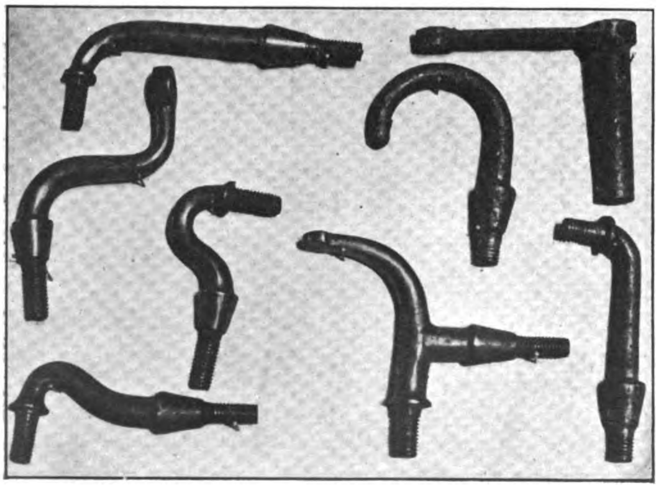


FIG. 5.—A FEW OF THE MANY FORGINGS MADE WITH HAMMER DIES

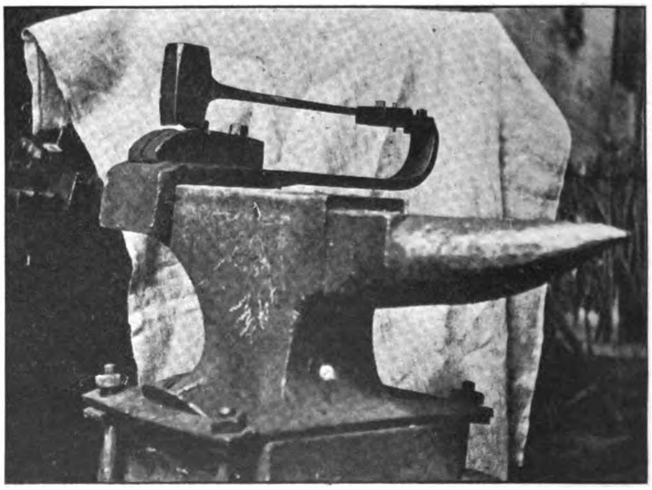


FIG. 6.—THE SAME DIES SHOWN IN FIG. 4 IN POSITION ON THE REGULAR ANVIL

Of the vibrators on the spark coils, two were set correctly, but the other two were badly out of adjustment, which caused two of the cylinders to fire late, if they fired at all, in either case causing a loss of power as well as causing the engine to pound. The platinum points on the vibrator screw were pitted and dirty, and it would not be unreasonable if they prevented any spark at all. Vibrator points should be examined frequently, and when bunches or knobs form on the platinum points they should be dressed down with fine emery cloth or fine file.

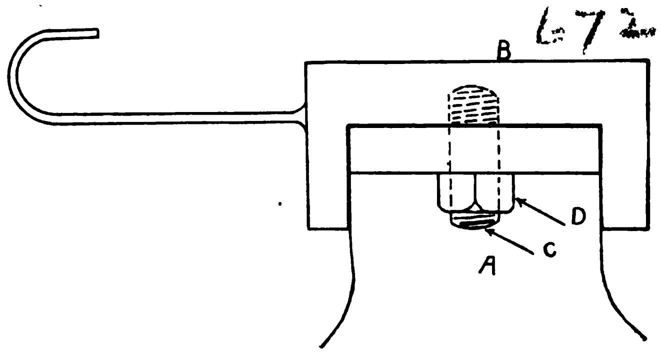


FIG. 7.—HOW THE DIE-HOLDER IS FASTENED TO THE ANVIL

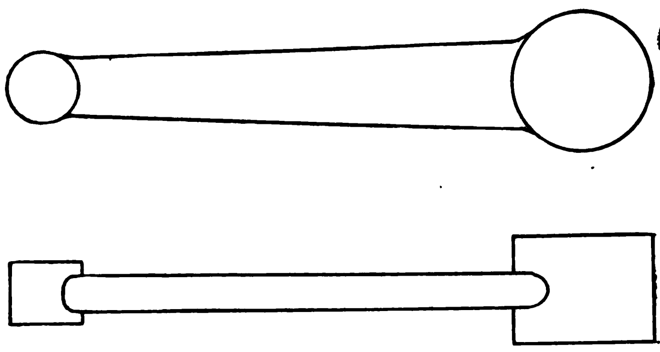


FIG. 8.—SMALL BRAKE LEVERS ARE EASILY DROP-FORGED

The strainer where the water enters the radiator through the pipe from the pump was clogged with dirt and lint to such an extent that the water circulation was almost entirely obstructed. This, of course, prevented a free circulation of the water, and the inadequate circulation permitted the cylinders to heat, and that in turn caused carbon deposits on the piston heads. When a heavy coat of carbon is deposited on the piston heads, it naturally becomes very hot in a short time and explodes the charge before the piston is on center—before the gas is compressed, producing the same effect as when the spark is advanced too far. This is not only very injurious to the bearings and causes the engine to pound, but greatly lessens the power, because the motor must first overcome the force of the explosion and the expansion of gas before it can commence on its working stroke.

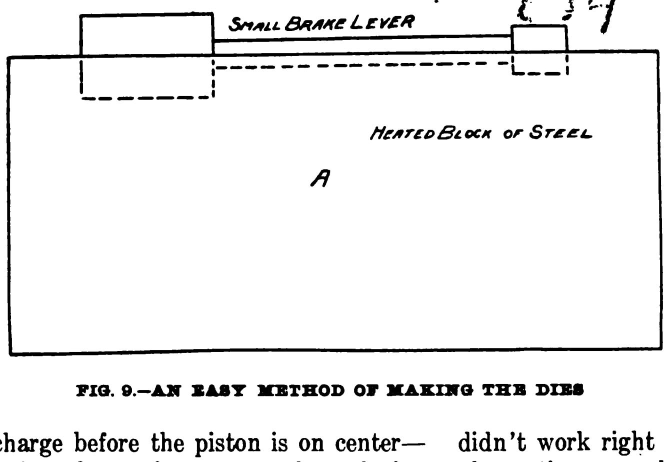


FIG. 9.—AN EASY METHOD OF MAKING THE DIES

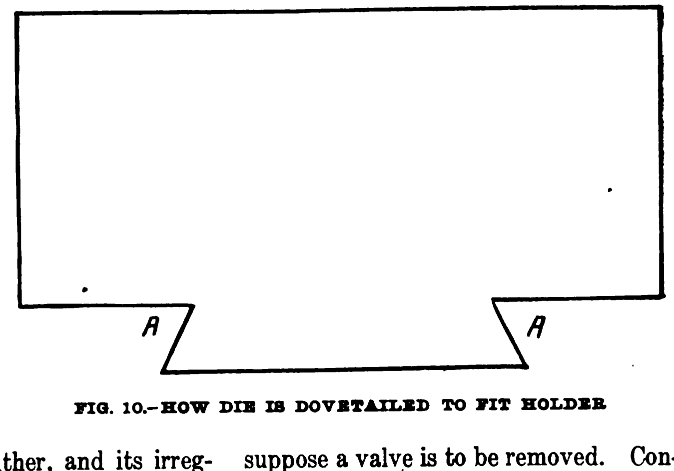


FIG. 10.—HOW DIE IS DOVETAILED TO FIT HOLDER

Three of the inlet and two of the exhaust valves were badly out of time. What effect this had on the running of the motor and its development of power can be readily imagined.

The owner also complained that the brakes refused to release, but an investigation quickly revealed that the bearings of the several joints had evidently never received a drop of oil since the car left the factory, and some of the friction surfaces had actually rusted. No wonder the brakes wouldn't release. It was not a case of "wouldn't," but a case of "couldn't."

He was unable to release the main clutch for the same reason—lack of oil. He said he didn't know it ought to be oiled. It seems strange that so many motorists cannot be made to understand that judicious lubrication is the most essential thing to the proper running of an automobile, and that wherever one surface moves upon another it must have oil—*oil*, OIL, OIL.

Next came the carburetor. That didn't work right either, and its irregular action caused the engine to miss explosions frequently. But the remedy was easy; the cause was nothing more nor less than a little dirt in the inlet valve. How it got there, I, of course, am not prepared to say, but probably because the gasoline was not strained when placing it in the tank. *Dirty gasoline will always cause trouble. Don't forget that.*

The foregoing is simply an outline of the main troubles with the car in question, but by no means all of them. It had simply been abused, and seemed to have received no attention or care at all since it left the factory. It required only a few hours to go over the car and put it in shape, and when it was again turned over to its owner it ran as smoothly and almost as silently as a sewing machine.

When you consider the average person who drives an automobile, and the care (?) he gives it, the wonder is not that the automobile gives so much trouble, but that it *causes so little.*

Several Helps for the Automobile Repairman.

G. B. CRANE.

There are a number of little helps which the repairman can make himself and which he will find to be time-savers and great conveniences. For example, suppose a valve is to be removed. Considerable difficulty will be experienced in attempting its removal without some such tool as is shown in the illustration, Fig. 1, to assist in removing the key. The tool shown is very easily made from any flat stock. Take a piece of the desired stock about thirty inches long and bend it exactly in the middle. This will give you a doubled piece fifteen inches long. One end of this piece is now formed into a fork, as shown, while

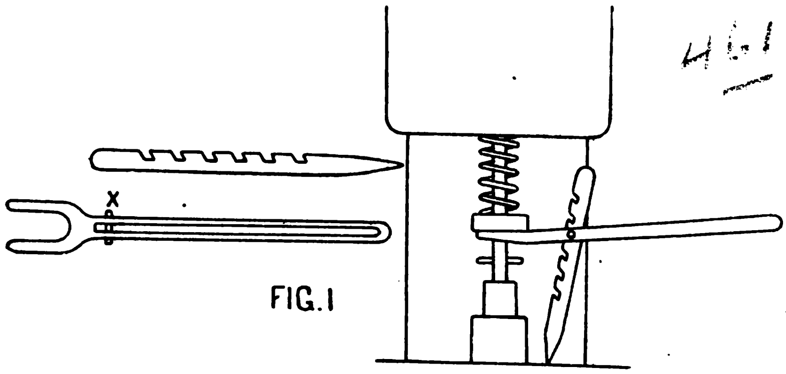


FIG. 1

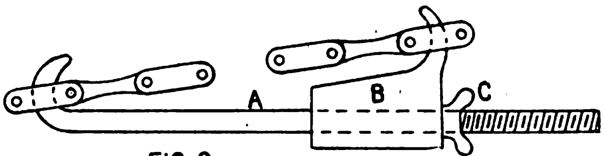


FIG. 2

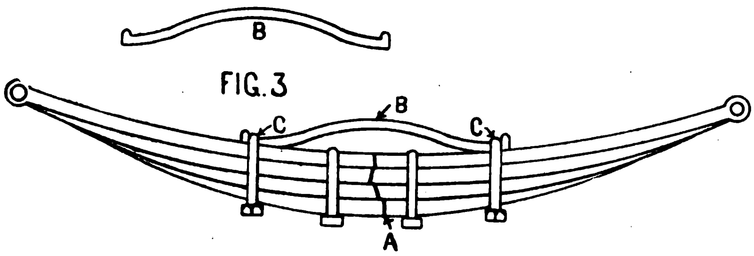


FIG. 3

SEVERAL HANDY HELPS FOR THE AUTOMOBILE REPAIRMAN

a rivet is inserted at X to hold the piece and also to serve as a support when the tool is in use. The only other part of the device is a notched piece of the same stock, pointed at one end. The fork and handle are supported by this piece in compressing the spring preparatory to removing the key in the valve stem.

Another very handy device is the chain tool shown in Fig. 2. This tool is for the purpose of drawing the ends of automobile chains together preparatory to fastening them. In the illustration A is a rod hooked at one end and threaded at the other end. The piece B is a piece of stock bearing a hook, and drilled as shown by dotted lines to receive the rod A. A thumb nut C allows for adjustment. The hooks on A and B must, of course, be in such position as to pull toward each other when the thumb nut is turned. It will also be noted that the sides of B are not exactly parallel. The side of B nearest the chain should slant, so as to bring the thumb nut away from the chain.

A spring repair that may interest my brother repairers was recently accomplished at our shop. The driver of the car wanted a temporary repair so as to have the use of the car while awaiting a new spring. In Fig. 3 is shown the broken spring, with the break at A. To repair it a piece of good stout steel was shaped up as shown at B. The knobs on the ends were for the purpose of keeping the clips CC from slipping off. The slight curve in the center was made so that the piece would pass over the clips on the spring. After forging the piece to the desired shape two heavy spring clips were used to fasten it to the spring, as shown. This simple device served effectively until the new spring was received.

Outline of the Work at Saint Charles School for Boys.

W. A. HISER.

Head of Blacksmith Department.

Our aim here at Saint Charles, Illinois, is to give what we call a "farm blacksmith course." This is given only to such boys as want to become farmers, and it teaches them to become handy about repairing farm tools, etc. Each boy is started by having him learn the nature of iron and steel. They then learn how to make a hook and staple for a door or gate, then a clevis, a ring, and the different kinds of blacksmith tongs, and so on until they have served about three months, after which they go back to the farm department, dairy department, and garden department. We also do all of our repairing and horseshoeing. The school farm consists of nine hundred acres. The boys are instructed in farming, gardening, dairying, cabinetmaking, tailoring, printing, engineering, laundering, poultry raising, and blacksmithing. The boys have a good home, with every advantage of learning and becoming good citizens. We aim to use all the articles made by the boys in learning. We are patient in explaining and showing them how to make the various things that are forged of iron. We hope to make useful men of them, although it is sometimes a very tiresome task, as some boys are below the average in intellect.

Thornton's Letters.—19.

Being "Straight-from-the-shoulder" Talk from a Prosperous Self-made Smith to his Former Apprentice, now in Business.

Dear Jim:

If Dan Williams wants to give trading stamps or anything else to his trade, let him do it. It's proper to treat your customers nice, but don't get so nice as to be soft. Your customers don't expect you to hand them a cup of hot chocolate and a bun every time they come into the shop. But the chap that answers the telephone as though the little bell had stepped on his pet corn is more likely to drive trade away than to bring it into the shop. Customers expect and deserve civility. A smile and a cheery greeting are better business partners, from the pocketbook viewpoint, than frowns and gruff replies.

But bribery isn't civility, old man. You can get some farmers to trade with you by buying them a good cigar—some will give you all their work for a drink. But I've never heard of drinking and smoking doing anybody any good.

This reminds me of Tim Helvey. Tim worked for old Branden, the grocer, down our way, and was the chap that always wore the first straw hat and clothes that could be heard above the noise in a blacksmith shop. In other words, Tim was a dude and very much of a ladies' man. Well, Branden caught on one day that Helvey was mighty popular. Everybody seemed to want Tim to wait on them, and it struck the old man, too, that Tim was bringing in trade that used to go to Brown's down on the other corner. 'Course the old man raised Tim's wages and then began to look around close to get at the secret of Tim's marvelous popularity. Branden found that he was paying for Tim's popularity right out of his sugar, molasses, vinegar, or whatever else the customer wanted. In other words, Tim was carrying on a sort of rebate system, charging even-measure prices for heaping-measure quantity. Course Branden wouldn't stand for it.

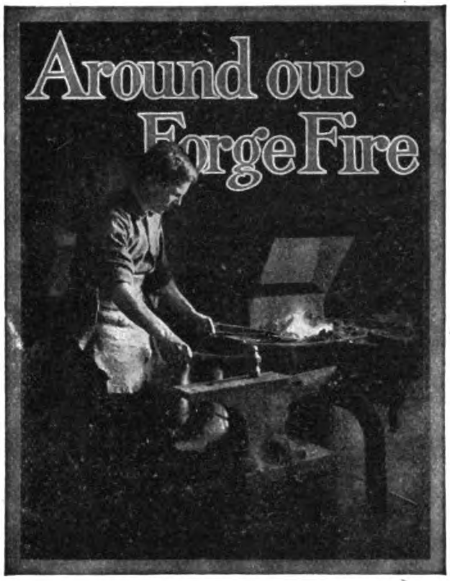
I'm just telling about this, not because I think that any of your men are making a bid for popularity at your expense, but I just want to point out that a man deserves a fair profit, and when he's getting it, he's worse than a fool to give part of it to some glib-talking trading-stamp company or other fake premium concern. There are so many other methods of securing and holding business that there is no excuse for a man giving over a part of his hard-earned wages to a faker.

No, sir, old man, there is no real economy in cheap help. Cheap men are usually the most expensive. I've not yet heard of one firm that gained its reputation for good, sound, honest goods with cheap help. There are concerns whose products are entirely made by machinery and who employ cheap help, but the help have no responsibility and are not paid for it. They are paid to watch the machines—the machines do the work. Where the men do the work—not as machines, but as thinking, living men—they must be paid. Cheap help isn't paid to think—solid business foundations are built with and upon thought. Cheap help can't build business pyramids. I don't mean to say, Jim, that it's necessary to employ experts on all of your work; but do get good men. You say Joe Newall pays a good bit less than you do for help. I don't doubt it. I always thought that Joe tried to beat his help some way. He's always having some trouble with his men; in fact, none of his men stay long enough to cool their feet. The good men can't afford to stick; and the poor men, while perhaps paid in proportion to the quality of their work, can't stand the fault-finding. There are lots of chaps in the trade who can talk taffy and mush but can't earn enough to pay for it.

Well, Jim, I didn't intend to write so much, so I'll stop right here.

Yours for fair profits,

Thornton



"Say, Mr. Editor," said Benton from his seat in the corner, "what's the feature of the July issue?"

"Power hammers," returned the Editor, handing Benton the advance proof sheets. "There are several corking good articles on power-hammer operations and on the making of dies. Then there's an article on the use of the power hammer in automobile work. The articles on how to build two different styles of hammers will be of vital interest to a good many readers. There have been quite a number of requests for information on power hammers, and this issue is a response to these requests."

"Are there very many power hammers in the general shops about the country?" asked Benton.

"Yes," replied the Editor, "several years ago one would have had difficulty in finding a shop with a power hammer, but today there are hundreds of these labor-saving machines in constant use. Those smiths who had foot-power hammers were, of course, the first to see the advantages of a hammer operated by power and have not hesitated long to install a big hammer when the gas engine was installed."

"What's the next number going to be?" asked the other.

"I don't, as a rule, like to say what succeeding numbers are to feature—I prefer to surprise our readers," replied the Editor, "but I don't mind telling you that horseshoeing will be the leading item for August. I expect to surprise 'Our Folks' in the August issue—several unique features are promised both in the way of illustrations and articles."

"I was about to suggest a number on shoeing," returned Benton.

"There would have been a shoeing number before," said the Editor, "but there were so many requests for other numbers that the shoeing number had to be postponed until August."

Jack Thorn interrupted further conversation by appearing at the door. "Say, Benton," said the newcomer, rather fiercely, "What kind of a joke are you trying to play on me?"

"No joke at all, Jack," returned Benton, seriously. "What's the matter?"

"Well, it's just this. I asked you how I could bend that pipe in the engine room without kinking it or breaking it, and you said pack it full of sand, heat it, and then do your bending. Isn't that what you said?" And Thorn stared at Benton for an answer.

"I guess that's right, Jack," returned Benton. "Didn't it work?"

"Work! Why, man, it nearly blew me up." And then for the first time Benton and the Editor noticed that Thorn looked as though he had been in an explosion.

"Did you get hurt?" asked both Benton and the Editor in chorus.

"No, not very much," replied Thorn, rubbing his right forearm, "but if it isn't a joke, will you please tell me why the pipe should burst?"

"Well, I guess we had better hear how you went at the job, first," said Benton. "I can't imagine why the pipe should blow up."

"Well, I got some sand out of the pile down there back of the mill, plugged up one end of the pipe, packed the sand in pretty tight and then stopped up the other end. Then I measured about where I wanted my bend to come and placed the pipe in the forge. Well, I hadn't had the pipe in the fire very long when, just as I was packing the coal around the pipe after turning it, the whole fire seemed to be lifted right out of the forge, and, of course, I caught it on my right arm. My face wasn't touched, as I turned away immediately, as a person naturally would. After the excitement I found that there was a hole as big as a fist in my pipe."

"Sure you didn't pack the pipe with gunpowder instead of sand?" queried Benton, with a smile.

"Here's a small sample of the sand which I had left after packing the pipe," returned Thorn, handing a cigar box to Benton.

"It's sand all right," said Benton, taking a pinch of it in his fingers and passing the box to the Editor.

"Did you heat the sand before you used it?" asked the Editor, after examining the contents of the box.

"No—what good would that do? The sand would be cold before you could get it into the pipe, and you couldn't heat it hot enough to bend the pipe anyway."

"The pipe has to be heated in the forge, Mr. Editor; you could never get the sand hot enough," said Benton, with a smile at what appeared to be a foolish theory.

"Who said anything about heating the sand hot enough to bend the pipe?" returned the Editor with emphasis. "Surely I didn't. Noticing that this sand is very damp I asked about the heating to find out if you had dried the sand thoroughly before using it. Any man with any kind of common sense at all would know that wet sand confined in a pipe that was being heated would surely blow up. The moisture, upon being heated, naturally turns into steam, and as you had no outlet for the steam it made one, with, of course, some inconvenience to both the fire and the operator."

Smiles gave way to looks of astonishment and chagrin upon the faces of Benton and Thorn. Neither spoke until the Editor asked if they were struck dumb.

"I guess you've solved it," said Thorn. "I can't imagine now how anyone could be so chuckleheaded as to try to blow himself up as I did."

"Mr. Editor," put in Benton, "I want to apologize for laughing, and if you'll excuse Thorn and myself I think we'll go out in the shop and have a couple of the boys kick us. That's the way I feel."

How We Beat the Favorite.

This poem, by Adam Lindsay Gordon, is believed by some to be the best description of a horse race ever written. The author, who was the son of an English officer, was self-exiled to Australia. He was of a melancholy temperament, like Poe. He was young and in the full tide of his literary success when he was found dead in the bush—shot by his own hand. He was himself an amateur steeplechase rider. The length of the poem makes its publication in two parts necessary.

"Aye, squire," said Stevens, "they back him at evens!
The race is all over, bar shouting, they say;
The Clown ought to beat her; Dick Neville is sweeter
Than ever—he swears he can win all the way.

"A gentleman rider—well, I'm an outsider,
But if he's a gent, who the mischief's a jock?
You swells mostly blunder; Dick rides for the plunder,
He rides, too, like lightnin'—he sits like a rock.

"He calls 'hunted fairly' a horse that has barely
Been stripped for a trot within sight of the hounds.
A horse that at Warwick beat Birdline and Yorick,
And gave Abdelkader at Aintree nine pounds.

"They say we have no test to warrant a protest;
Dick rides for a lord and stands in with a steward:
The light of their faces they show him—his case is
Prejudged and his verdict already secured.

"But none can outlast her and few travel faster,
She strides in her work clean away from the drag;
You hold her and sit her, she couldn't be fitter,
Whenever you hit her she'll spring like a stag.

"And perhaps the green jacket, at odds though they back it,
May fall, or there's no knowing what may turn up.
The mare is quite ready: sit still and ride steady:
Keep cool: and I think you may just win the cup."

Dark brown with tan muzzle, just stripped for the tussle,
Stood Iseult, arching her neck to the curb,
A lean head and fiery, strong quarters and wiry,
A loin rather light, but a shoulder superb.

Some parting injunction, bestowed with great unction,
I tried to recall, but forgot like a dunce
When Reginald Murray, full tilt on White Surrey,
Came down in a hurry to start us at once.

"Keep back on the yellow! Come up on Othello!
Hold hard on the Chestnut! Turn round on the drag!
Keep back there on Spartan! Back, you, sir, in tartan!
So, steady there, easy," and down went the flag.

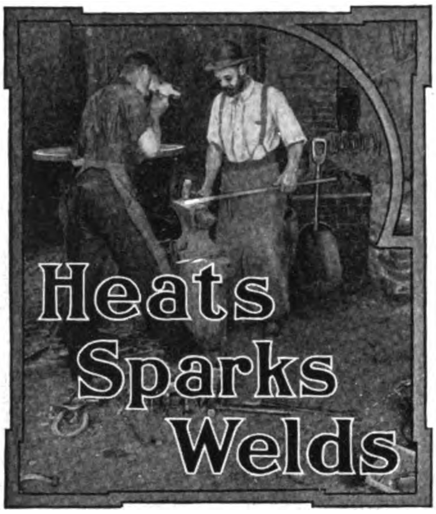
We started, and Kerr made strong running on Mermaid,
Through furrows that led to the first stake and bound,
The crack, half extended, looked bloodlike and splendid,
Held wide on the right where the headline was sound.

I pulled hard to baffle her rush with the snaffle,
Before her two thirds of the field got away,
All through the wet pasture, where floods of the last year
Still loitered, they clotted my crimson with clay.

The fourth fence, a wattle, floored Monk and Bluebottle;
The Drag came to grief at the blackthorn and ditch;
The rails toppled over Redoubt and Red Rover,
The lane stopped Lycurgus and Leicestershire Witch.

She passed like an arrow Kildare and Cock Sparrow,
And Mantrap and Mermaid refused the stone wall;
And Giles on the Greyling came down at the paling,
And I was left sailing in front of them all.

(*Concluded in next issue.*)



Experience is a good teacher, but don't experiment too long.

There's usually a place for everything, but how about everything in place?

Strange to say, the smith who takes things easy usually has the hardest time of all.

Who ever heard of the man succeeding who continually made the same mistakes.

Chalk on file and sandpaper will make both cut better. It prevents their filling up.

While there's need for the iron cutter at the anvil, there's no call for the price cutter in business.

There's no time like the present moment to form an association. Get easy plans from the secretary today.

A good general blacksmith and horseshoer will find an opportunity by addressing Mr. Irving N. Colby, Granville, Illinois.

'Tis poor policy to make price exceptions among your customers. Discrimination of any kind is poor business practice.

We want your help—what suggestions can you make whereby we can further improve the value of "Our Journal"?

If you are a good horseshoer and general smith and want to locate in Illinois, write to Mr. W. G. Flora, of Forreston, Illinois.

Blacksmith business booming in your parts? Kill the hard times bugaboo by pulling harder than ever for more business.

Use them liberally and ask for more when your supply is low. The pink buffalo protection stamps insure protection that protects.

A goodly number of photographs of ornamental work have already come in—but there's still room for more. Send in your photographs today.

A six-wheeled runabout is the latest in the vehicle line. This buggy is absolute proof against overturning and can be turned around in its own length.

Why is it that a smith will kick continually about the lack of business in his own locality, sell out, go to another State, and kick again, while his successor makes a success at the old stand?

Did it ever occur to you that you can further your own interests better, faster, and easier by coöperating, instead of fighting, with your competitors? Write the secretary right now.

Tell your brother craftsmen about it—that new machine, the shopmade tool, that new kink. Don't drop your ideas in a box and nail the lid down. Be broad and liberal to help the craft.

Are you a member of the B. L.? Are you helping the trade to a higher plane in the business world? Do your part for the good old craft. Again we ask—are you a member of the Booster's League?

The general smith deserves the profits of automobile repairing. Get interested in the new department and take care of the unfortunate automobilist, incidentally putting a liberal fee into your pocket.

'Tis said that a great transcontinental rabbit-proof fence has been recently completed across Australia. It is 2,036 miles long and took five years to build. It is furnished with traps which capture and destroy hundreds of rabbits daily.

'Tis poor policy to cut either. Both price and quality are important factors in getting and holding business. You can't afford to cut the price and raise the quality; neither can you afford to cut the quality and raise the price. Let price be an indication of quality.

The French capital has perhaps seen the greatest number of changes from horse to motor vehicles. Besides the regular pleasure vehicles propelled by motors, they have electric and gasoline cabs, immense gasoline busses, motor refuse carts, motor street cleaners, motor postal wagons, and motor street cars.

"Business — is — worse — than — bad," said Tom between puffs, lolling back in his chair. "Times are pretty hard—wish business would pick up." Why don't you roll up your sleeves and work for better times instead of wishing for them, friend Tardy? But then Tom always did have more wishbone than backbone.

Carefully read every paper you are asked to sign. A recent case of failure in this respect cost the smith a law suit and a neat sum for a tool he did not want. A man visited the smith shop, got permission to leave a tool suitable for some twenty or more uses, and induced the smith to sign what was supposed to be a receipt to show that the tool had been left on trial. The supposed receipt afterward turned out to be a promissory note. Again we say—carefully read and reread if necessary every bit of every paper before you sign.

Seasoning wood by the use of electricity is said to be successful in France. The timber is almost immersed in a tank of water containing ten per cent of borax, five per cent of resin, and a little carbonate of soda and rests on a lead plate connected with one pole of a dynamo. A similar plate connected to the other pole is placed upon the exposed surface of the timber. When a current is passed through the wood the sap appears to be removed, while the borax and resin takes its place. In a few hours the timber is removed from the bath and dried and the seasoning is completed.

The Thomas car—the leader in the New York to Paris race—carries, besides the articles carried by the usual touring car, two hundred feet of manilla rope, with pulley blocks; one ax and one hatchet, with extra handles; two shovels; two snow shovels; one crowbar; one pickax; soldering outfit and two pounds of solder; twelve files; twenty-four drills up to three quarters inch; one set of taps and dies; one breast drill; four screwdrivers; two jacks; four cans of smooth-on iron cement; one package of assorted packings; fifteen wrenches of various kinds; fifty assorted nuts and bolts; one hand lantern with extra wicks; one hack saw frame with four dozen saw blades; one wood saw; two ball pene hammers; two cans valve grinding powder; one hundred assorted cotter pins; one hundred assorted lock washers; two sets of Weed chain tire grips; two oil guns; ten rolls of tape; five cans of hand soap; one folding bucket; two sets of tire irons; one tire patching outfit; four extra tire shoes; eight extra inner tubes; twelve extra tire valves and parts; two rifles; three revolvers; supply of ammunition; two heavy-trussed boards for crossing ditches; leather covering for occupants of car; fur-lined coats; raincoats; thirty-gallon extra gasoline tank.

American Association of Blacksmiths and Horseshoers.

What Nebraska Is Doing.

The price list sent in by the South Dakota Association strikes me as the one that every association ought to adopt. Any good smith can see that when we charge or put our work on the books that we are only loaning money out on labor without interest and so may ruin our own credit. I know of some localities right here in Nebraska where well-to-do farmers expect the interest on their bank accounts to meet all their blacksmith bills. As they never get their interest until the end of the year, we are compelled to wait. I say let all adopt the South Dakota plan as soon as possible and have a little interest our way.

Brothers and neighbors of the craft, it would be almost impossible to do business without the banks or the Bankers' Association. Now, how could the country get along without the blacksmiths? Did you ever think that if every blacksmith in the United States would lay down his hammer for three weeks that it would tie up every railroad in the United States? I hope I never see it, but I would like to see, as soon as 1910, a national association of blacksmiths and horseshoers, i. e., every county in every State organized and a national meeting for 1910 to reach from coast to coast.

The Nebraska Blacksmiths and Wheelwrights Association is a little over five months old, and at present we have over forty counties organized and are holding local meetings every month in different localities. Brother Ed. C. Engle, of Norfolk, Neb., advises me of a meeting at Columbus on May 27th. A class of about seventy-five wanted to become members of the Nebraska Association and help out the cause for protection through legislation and to become better acquainted with each other. Brother Ed. Engle organized the Elkhorn Valley Association. Brother H. Feildhus, of DeWitt, sent out cards for a meeting for Saline County on May 16th. Brother McIntyre, of Kearney, sent out cards for a meeting of all the smiths of Buffalo and adjoining counties.

T. H. Chadwick,
Secretary Nebraska Association.

Just read what the smiths are doing in Nebraska State. Suppose each and every one of us pull for all we are worth for an association reaching from coast to coast. A strong, staunch association, which will include every member of the good old craft. If you haven't the advantages of an association in your county, address me, P. O. Box 974, Buffalo, N. Y.

THE SECRETARY.

The Failures and Successes of an Apprentice.—4.

BY AN OLD-TIMER.

How much different one feels toward a man who will not only show him but will help him out of difficulties than he does toward the man who gives him a job that he knows the apprentice can not do and then laughs at him and makes fun until the apprentice in anger and discouragement throws the work into the scrap pile. In the latter case, the boss sees what he has done and tries to fix the thing up; but he is too late, for the apprentice will never have much confidence in him again, and not only this, but he will mistrust others who would be honest with him. I have seen some good men spoiled in this way. That knowing look, that sidewise wink and the wise grin are some of the worst enemies in shop life.

The writer has seen the apprentice snubbed when the blacksmith was not to blame. For instance, a man has two jobs in the fire, and several men waiting for their work, while he is taking orders for more jobs, besides answering various questions. Then to have the helper shove up something in his face that amounts to nothing and ask questions is enough to make him answer rather short. Now the apprentice does not understand that the smith has more than he can do, and consequently is not to blame. Neither is the smith to blame because he has reached the limit of his patience. Are we to understand, then, that the apprentice gets some unpleasant words from the well-meaning and try-to-do-right smith? Yes, but not enough to discourage him if he is made of the right stuff.

But is working as an apprentice in a busy shop the best way to learn the trade? I answer, No. If we have sons or daughters to educate, we send them to a school where they are trained by instructors, whose duty it is to teach them not only language and other subjects, but to help them to become possessors of noble characters. Now, after giving them knowledge along one line, does it seem right to turn them loose and let them learn another subject any old way? We answer, No. Some may ask, What shall we do, then? Why not rise up and shout long and loud for the trade school? Do all you can to have one in your community. Then you will be doing something to solve the apprentice's problem. And, gentlemen of the forge and anvil, I believe the time is coming when the blacksmith will have to have a license to shoe a horse or dress a tool, and this will be given to all graduates of the school.

Now, to return to my story: I enjoyed working at the shop last mentioned. There were times, however, when we worked hard, but whenever there came a lull, the smith would say, "We had a hard day yesterday; now sit down and take it easy, but if you see anyone coming, get busy at once."

Well the busy season was soon over, and my employer recommended me to take charge of a shop where the smith wanted to go away for a few weeks. This man was trying to pick up the trade himself, which is a hard and slow way. While I was here I had a call from a man who had served as an apprentice in Scotland and also from another from Australia. It was a pleasure to talk with these veterans of the craft. Here, too, I was haunted by a Frenchman who had a pair of oxen to shoe. I did not want to touch them. I kept putting him off, telling him that the owner would be back in a few days; but he kept coming, and one day I told him to take them in and if I killed them he could sell them for beef. He said, "Yes, zat es so, but I vant ze shoe on him zat ez good." When the job was done, the man was so well pleased that he promised me a large cabbage head for a tip. When the owner returned, I had gained some new customers, and he wanted me to go into partnership with him, but I advised him to hire a first-class smith and learn of him. He did so, and is today one of the leading blacksmiths of that town.

(*To be continued.*)

A Steam Engine Utilizing Waste Heat.

A. W. LAMPLOUGH.

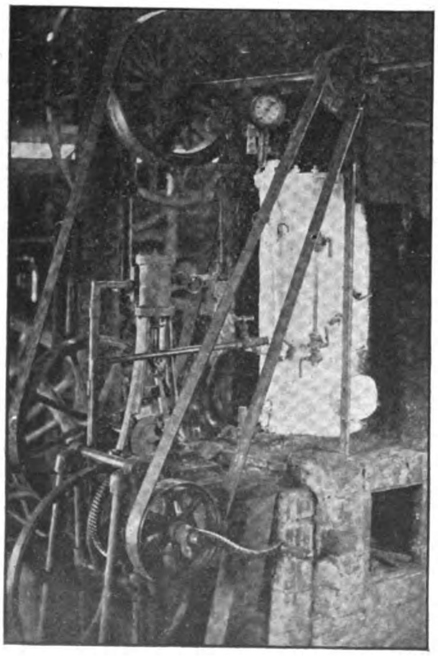
The accompanying engraving shows a small vertical boiler which I have in my shop which supplies steam to run the engine seen at the left of the picture. This, in turn, makes the shafting go round and gives power to run a Buffalo blower, drilling machine, a grindstone, a lathe, and a small circular saw.

The waste heat from the forge fire goes through the nineteen copper tubes in the boiler and easily generates a pressure of fifteen pounds of steam, and with the addition of a little charcoal or wood in the fire box of the boiler the pressure rises to sixty pounds to the inch. The boiler is about thirty inches high by eighteen inches and the cylinder three inches in diameter, four and a half inch stroke and runs about one hundred and fifty revolutions per minute with twenty pounds of steam.

The outfit does not cost sixpence per day to run, and is a good helper, especially with the heavy work of tire and axle welding. I have not seen or heard of anything of the kind being in use anywhere, so thought the readers would be interested in a brief description.

This is a country town, and I take in all sorts of work, from shoeing and general work to painting and plumbing and building water tanks ranging from eighty gallons to one thousand gallons in size. Also repair bicycles and sell sundries for same.

This town is located on the south-eastern coast of Australia in New South Wales and lies between Newcastle and Sydney.



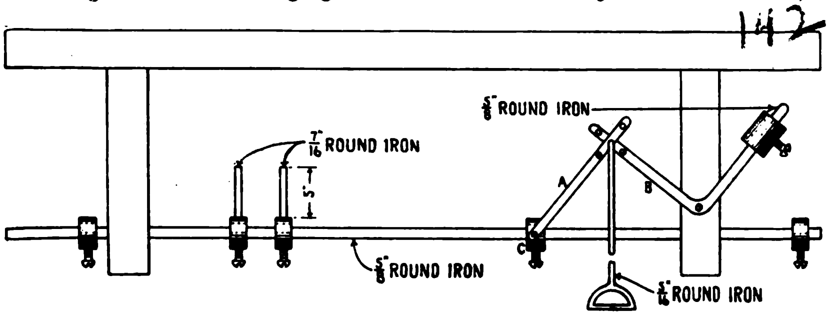
UTILIZING WASTE HEAT TO GENERATE STEAM

The means by which I turn the waste heat from my forge into profit-producing energy may prove to be a suggestion for a similar saving to some other reader of "Our Journal."

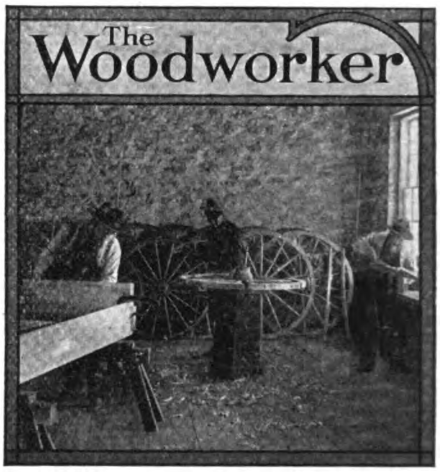
A Simple and Practical Belt-Shifter.

D. FOSTER HALL.

The accompanying engraving shows a belt-shifter of my own design. It is not only thoroughly practical, but it is simple and durable, and a device which can be made in a short time by any blacksmith. Every smith with power in his shop ought to be interested in this device, as it is one which has no springs to get out of order, and can be attached to any countershaft. The shifter rod is $\frac{5}{8}$-inch round iron, and may be any length to suit the job. The arms A and B are made of 1 by $\frac{1}{4}$-inch stock, eight inches long. The weight end of the angle arm should be about nine inches long, and is of $\frac{5}{8}$-inch round stock. Weld this to B at an angle of about ninety degrees. The holes in the ends of the arms, and the sliding collar at C are for adjustment for any width of belt. The weight is made of $2\frac{1}{4}$-inch round iron, three inches long. Drill a $\frac{5}{8}$-inch hole in this piece, and put in a $\frac{3}{8}$-inch set screw to hold it in place on the angle arm. The handle rod, of $\frac{5}{16}$-inch round iron, should be fastened to arms A and B with a stud eye with a nut on the back. Now, make five collars of $1\frac{1}{2}$-inch round iron, one inch thick. Put $\frac{3}{8}$-inch set screws in each of these. Two of these collars are for the ends of the rod. Now, drill a $\frac{7}{16}$-inch hole in each of two of the collars for the forks. The rods for the fork are of $\frac{7}{16}$-inch round iron five inches long. Another collar is flattened on one side, and used at C. The rod A is fastened to it with a $\frac{3}{8}$-inch screw. The weight on the angle arm travels back and forth over the center line of the angle arm as the handle is pulled down, and as the belt is thrown off and on the pulley, thus holding belt in place without the use of springs.



A SIMPLE, PRACTICAL BELT-SHIFTER THAT MOST ANY SMITH CAN MAKE



How to Make a Wooden Axle.

J. W. JEFFRIES.

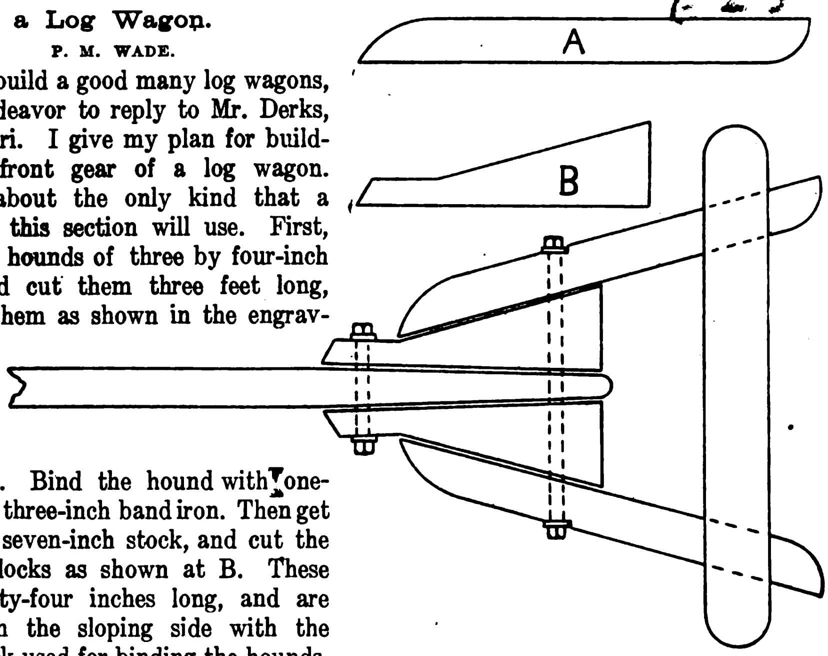
I proceed as follows: First, I get the length of my axle and square the ends. I then get the length of the thimble, or the distance between the thimbles, and then I get the center of the axle, or the rough stick. At that point I draw a line straight through so the line will mark on the dots in center and bottom of axle. Then I get the end measure or diameter of the point and suppose it to be an inch and three quarters. I set my compass so as to mark one inch on front of the line and three quarters of an inch on the other side, trueing off the bottom of the axle. Then I get the circle from this end of the axle and I cut the sides and top down to that circle. Never cut out the circle. After cutting down the bottom of the axle I draw my line straight through to the ends of the axle and never cut out the line. Then I get my thimble true onto my axle and at what I think is the right pitch. However, if, as I stated before, the thimble has lots of taper, I take five sixteenths of an inch off of the bottom, and if it has less taper, I take more off the bottom so as to make my wheel run as near a plumb as possible. Now, I fit the thimble very carefully all the way around. I then put a coat of red wagon paint, mixed with LePage's liquid glue, in the thimble, and heat my thimble a little, and then drive it home. I always leave the thimble off enough to make it very tight, say three eighths to half an inch, according to the taper of the sleeve of the thimble, and I have as good a running wagon as there is in the market. If any brother has a better way of doing the job. I would like to hear from him, as I know that I am not too old to learn.

How to Make a Front Gear for a Log Wagon.

P. M. WADE.

As we build a good many log wagons, I will endeavor to reply to Mr. Derks, of Missouri. I give my plan for building the front gear of a log wagon. This is about the only kind that a logger in this section will use. First, I get my hounds of three by four-inch stock and cut them three feet long, shaping them as shown in the engraving at A. Bind the hound with one-eighth by three-inch band iron. Then get three by seven-inch stock, and cut the tongue blocks as shown at B. These are twenty-four inches long, and are bound on the sloping side with the same stock used for binding the hounds. The tongue is twelve feet long, and at the hounds is three by six inches, tapering as may be desired.

Now take the hounds and tongue blocks and bolt them to the tongue in their correct position, using a bolt one and one fourth inches in diameter. To make the tongue stand level, make a hook bolt of ⅝-inch stock, and put it through the tongue seven feet from



HOW TO MAKE A FRONT GEAR FOR A LOG WAGON

the rear end, fastening one end of a chain here. Now make a staple of ⅝-inch stock, six inches long, each end of staple being threaded and fitted with a nut. Put this staple through the rocking bolster, one end on each side of the kingbolt. Now fasten the other end of the chain to the staple. This prevents the tongue from going below its level position. We find this gives general satisfaction. The object in hanging the tongue with a chain is that the tongue can be held up by these chains when the front wheels are on low ground. This prevents a strain on the neck of the team. This description applies to a 3½-inch wagon and can be proportioned to suit any size, larger or smaller.

Plans for Building a Concord Buggy.

NELS PETERSEN.

The accompanying engravings show a Concord buggy, a vehicle built for service rather than style. It is a business wagon and not a pleasure vehicle, in the sense that it is built to withstand rough usage in traveling over all kinds of roads in all kinds of conditions. Some pleasure may also be derived from its use, especially from the fact that it is not likely to consume much time at the repair shop for some time after it is built, if made of good material, and if good workmanship has been employed in its construction. Besides these lasting qualities, it will be found convenient

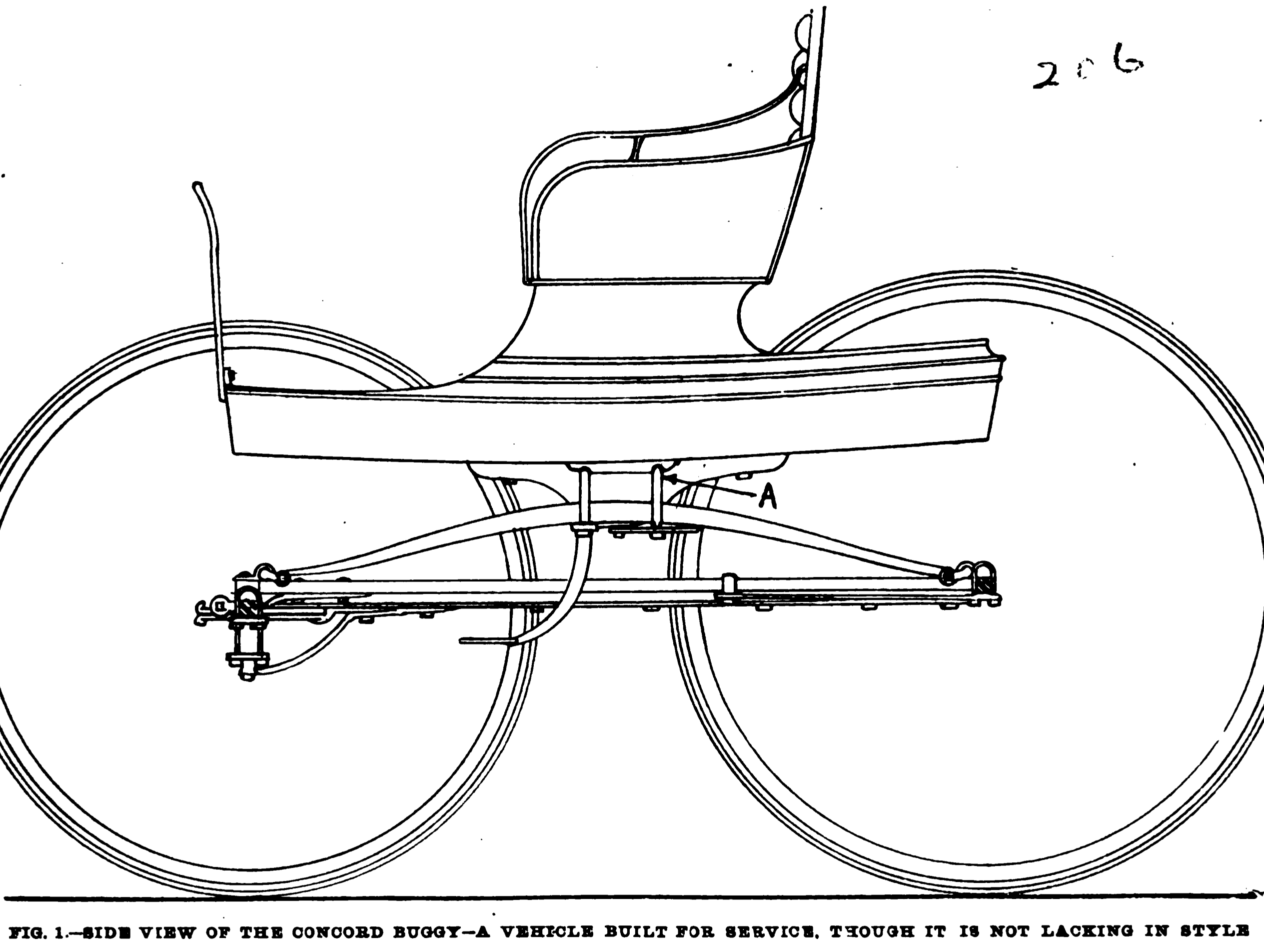


FIG. 1.—SIDE VIEW OF THE CONCORD BUGGY—A VEHICLE BUILT FOR SERVICE, THOUGH IT IS NOT LACKING IN STYLE

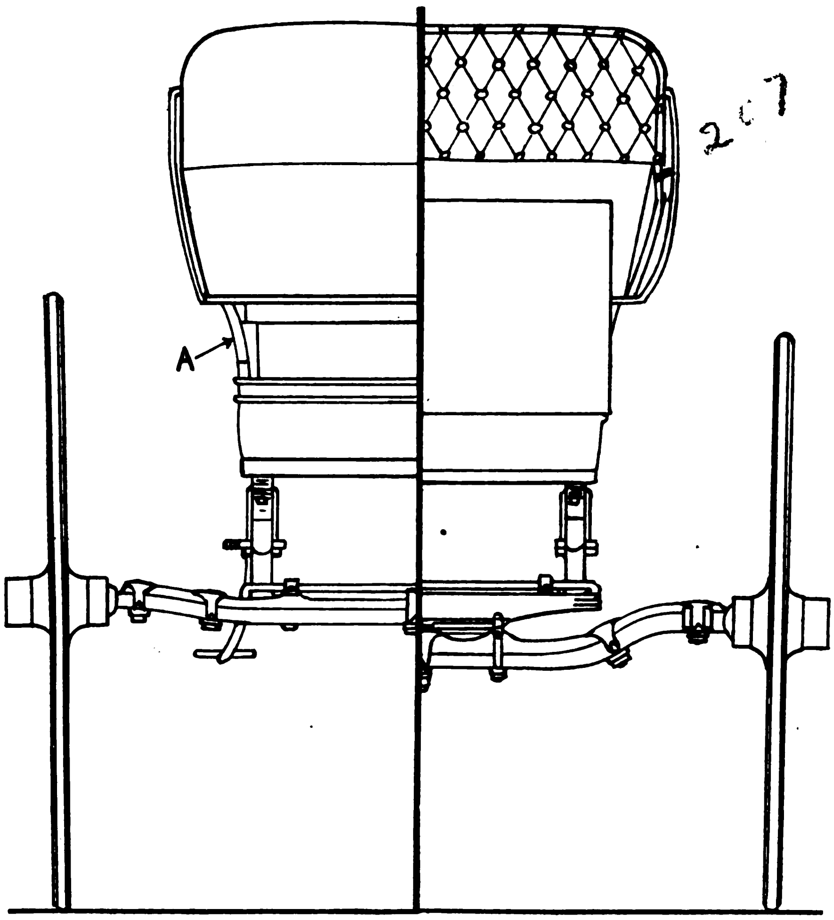


FIG. 2.—SHOWING A HALF REAR VIEW OF CONCORD BUGGY

FIG. 3.—SHOWING A HALF FRONT VIEW OF CONCORD BUGGY

for getting into and out of and for carrying light parcels.

The body of this vehicle is 5 feet long and 28 inches wide. The side panels will measure 8 inches deep back of the seat and 5 inches deep in front of the seat, and are ¾ of an inch thick, being finished off with molding, as shown. The panels for the seat risers are 6 inches high and slightly curved, as shown at A, Fig. 3, the pillars supporting the seat and center of the panels being cut in such shape as to cause the panel to bend slightly. The sills are 2½ by 1¼ inches, cut in such shape as to give a graceful sweep to the bottom of the body. The seat frame is 18 by 33 inches, with panels 9 inches deep on the sides and 10½ inches at the back, and a lazy back, 12 inches in height, no top being used. The seat is ironed off with a plain arm rail which also forms the seat handle.

The style of running gear used on this buggy is perhaps as strong as, if not a little stronger than, anything built for light work. The center reach is 1 by 1 inch in size, and the two sides ⅞ by ⅞ of an inch. The three pieces are mortised into the rear axle cap and also into the head block. A plate is run full length under the center reach and projects back of the rear axle sufficient to take the bolt end off. The head strap makes a solid joint at this place. The side reaches have short plates at each end and are fastened with the same bolts that hold the bearing for the equalizing bars, as shown at A A A A, Fig. 4. It is considered best to run the iron full length under the side reaches, because, if the hind wheel strikes something, there is quite a strain on this reach, caused by the connection made with the axle through the stay brace. The wood will thus have a better chance to spring than if it is hampered with iron.

The springs for this job are 1¾-inch, 4-leaf, 4 feet 3 inches long. A spring bar 2½ inches high and 26 inches long, on which the body rests, is clipped on top of the spring, as shown at A, Fig. 1. The same clips serve to hold the steps and rub-irons in place. The axles are 1⅛ inches with a 6½-inch spindle. It will be noticed that the front axle is dropped considerably more than the back one. This is necessary in order to have the reaches hang level, unless a much smaller wheel is used in front. The height of the wheels in this case is 42 inches in front and 46 inches behind, with 1⅛-inch spoke and the rim ironed off with channels, and rubber tires put on.

The painting is, of course, a matter of taste, and depends entirely upon the customer. A black body with green running gear or a dark green body and

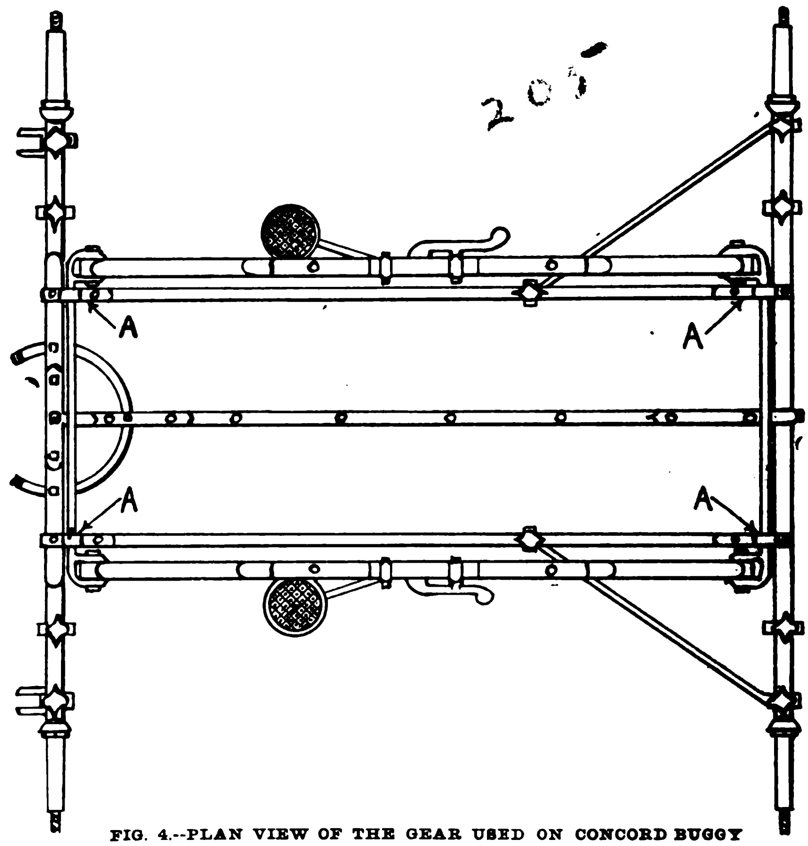


FIG. 4.—PLAN VIEW OF THE GEAR USED ON CONCORD BUGGY

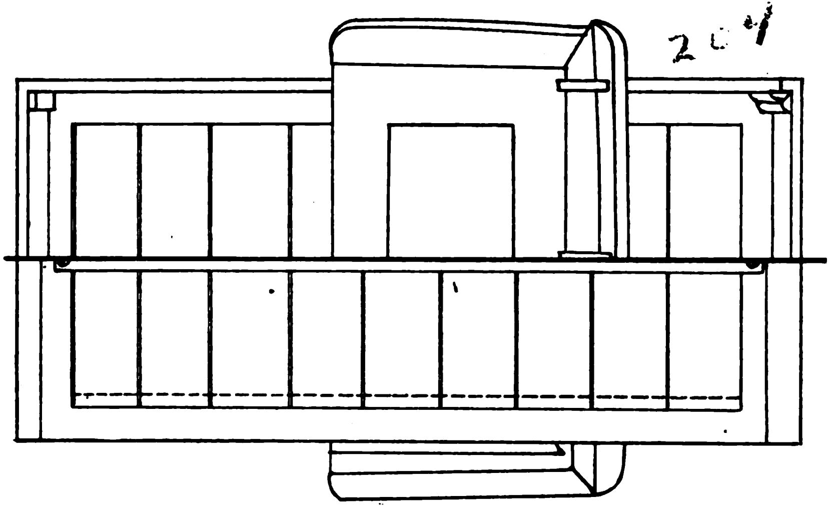


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FIG. 5.—SHOWING HALF TOP AND ALSO HALF BOTTOM VIEWS OF CONCORD BUGGY BODY

a red gear, either make a good combination. The only trimming used is on the seat, which can be either leather or cloth.

An American Industrial School in India.

W. H. FARRAR.

Manager of the American Arcot Mission Industrial School at Arni, India.

Our industrial work in India is designed more for our own Christian converts, who are mostly from the lower castes so far. For many generations they have been down trodden and have been practically the serfs of the upper castes, working as coolies, or, if in any degree independent, at farming, never at a trade. Hence it is difficult to teach them the manual arts, as they have no hereditary trait in that direction. But we succeed fairly well in getting them to master a trade well enough to be at least more independent than their fathers were of the high-caste landlord. Among the upper castes, the trade all follow caste lines. There is the carpenter caste, the metal worker, the blacksmith, the weaver, the potter, the washerman, the leather worker, the merchant caste, etc. For hundreds of generations, from father to son, the trades have thus been kept in these narrow circles, the son learning the trade from the father and following it as he did. For the son of a carpenter to be a blacksmith would be a sin against his caste. Hence, their methods are very crude. The blacksmith builds his fire on the ground, blows it with a hand bellows made of pigskin, and squats down at his anvil, which is also on the ground. His tools are crude, but often he turns out excellent work in spite of the crude methods and tools. In our school we attempt to improve on these methods to some extent, but, of course, realize that when the lad goes out for himself he must go back to crude methods, as he will not have the means to put a modern forge and drills into his hut. Still, he can learn to stand up to his work, at least.

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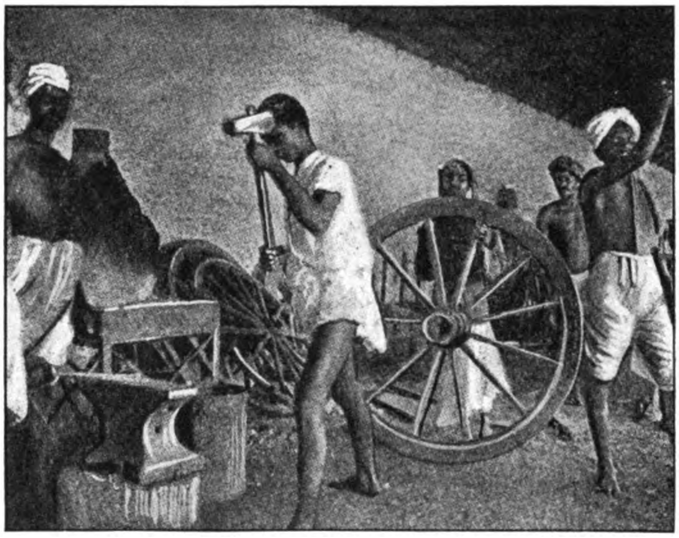

BLACKSMITHS AT WORK IN THE SHOP AT THE AMERICAN MISSION SCHOOL IN INDIA

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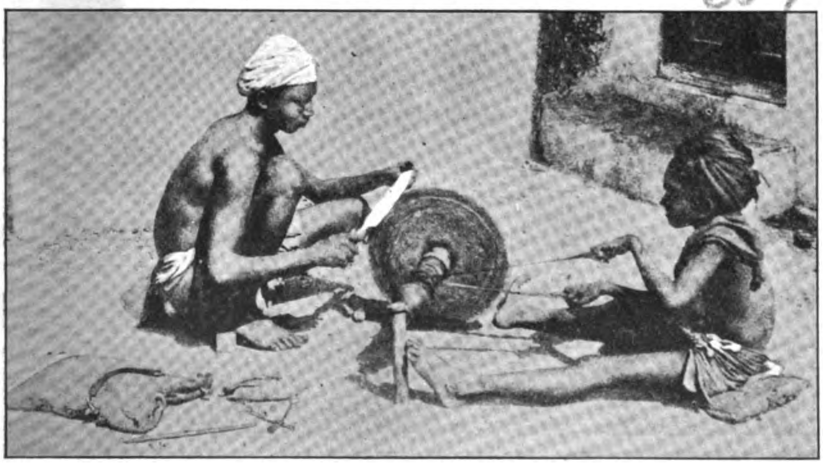
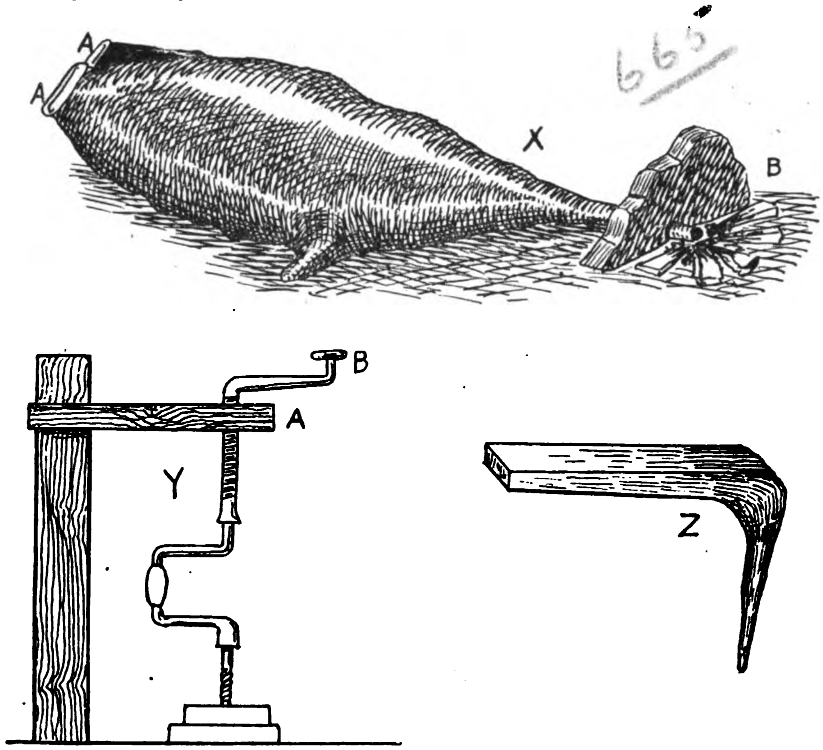


A KNIFE GRINDER OF INDIA. FROM POST CARD SENT BY MR. FARRAR

The bellows used by the native blacksmith is a skin, perhaps of a pig, split at the end, as shown at X. The man takes two little sticks (AA)at the split end between his thumb and fingers, and by alternately opening and closing his hand and squeezing or kneading the bag on the ground, he squeezes air out of the small end B into the fire. The fire of charcoal is on the ground, perhaps behind a little shield or guard of brick built to protect the boy from the heat. The hammers and bellows are all taken home at night. Sometimes he uses an anvil, more often a piece of iron or railroad rail. If he owns a drill, it will consist probably of a piece of post in the ground and an old carpenter's brace operated by a turn screw. There is a thread at A, and as the old brace is turned the turn screw (B) is turned to keep the drill moving down.

The country blacksmith's work is chiefly building (the iron work only) the heavy country bullock-carts or repairing them. Sometimes they do a better grade of work, such as iron gates for temples. But usually their work is of the coarser kind. It is not safe to trust a native blacksmith with the setting of our American carriage tires. They dish them to the run of the wheel. Even our men in our own school, whom we have trained to such work, are not always safely left to themselves to do this sort of a job. Horseshoeing is done by a man who has that as his chief work. The ordinary blacksmith doesn't do horseshoeing. The horseshoer comes to your house to shoe your horse. He brings a set of shoes ready made and an anvil of peculiar shape as shown at Z which he drives into the ground. He fits the shoes cold and puts them on cold, nailing them on with great, clumsy handmade nails which stick out from the face of the shoe like the hobnails in lumbermen's boots. There is no groove in the shoe for the nail heads hence a great deal of lameness and stumbling of the horses after the shoeing is done. Some of the blacksmiths are clever in other lines of metal work. One of our own Christians is not only a clever blacksmith but is able to repair any kind of a lock, a watch, or clock and to do brazing as well. He delights to have a job presented to him that is out of the ordinary, and he is quick at getting over difficulties. If he has not the right kind of a tool he will make it, or at least rig up some device that will answer the purpose. Many of the native methods, such as the carpenter's trick of holding his work with his toe, are of great use to them, and while teaching them to adopt our ways, we do not prevent their using such of their own methods as are of advantage to them.

In the engraving showing the native knife-grinder the wheel is turned by the little boy, who pulls firs on one rope and then on the other. The wheel turns back and forth. The operator either grinds when the wheel turns one way and lifts the knife when the wheel turns back or else he turns the knife and grinds according to the way the wheel turns. His position on the ground with his knees just in front of his shoulders is his most restful posture. The other engraving shows the smiths at work at the school.



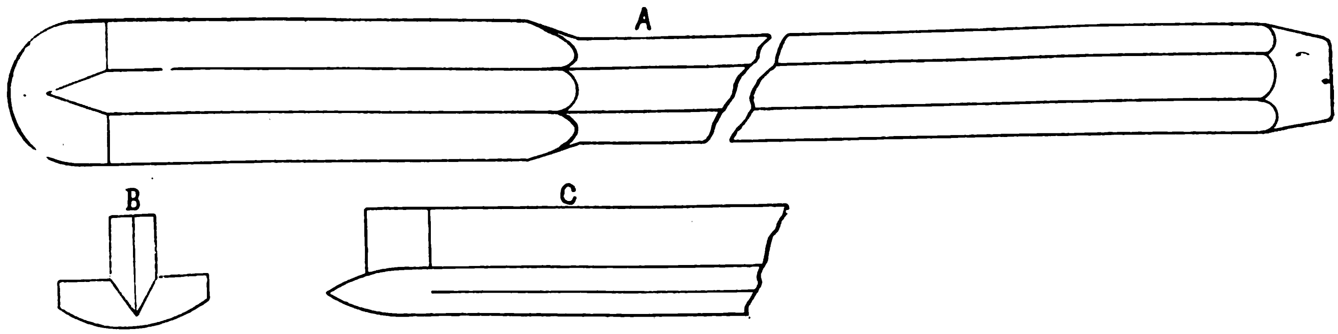
THE PRIMITIVE BELLOWS, DRILL AND ANVIL USED BY THE NATIVE INDIAN SMITH

Tool for Removing Boiler Tubes.

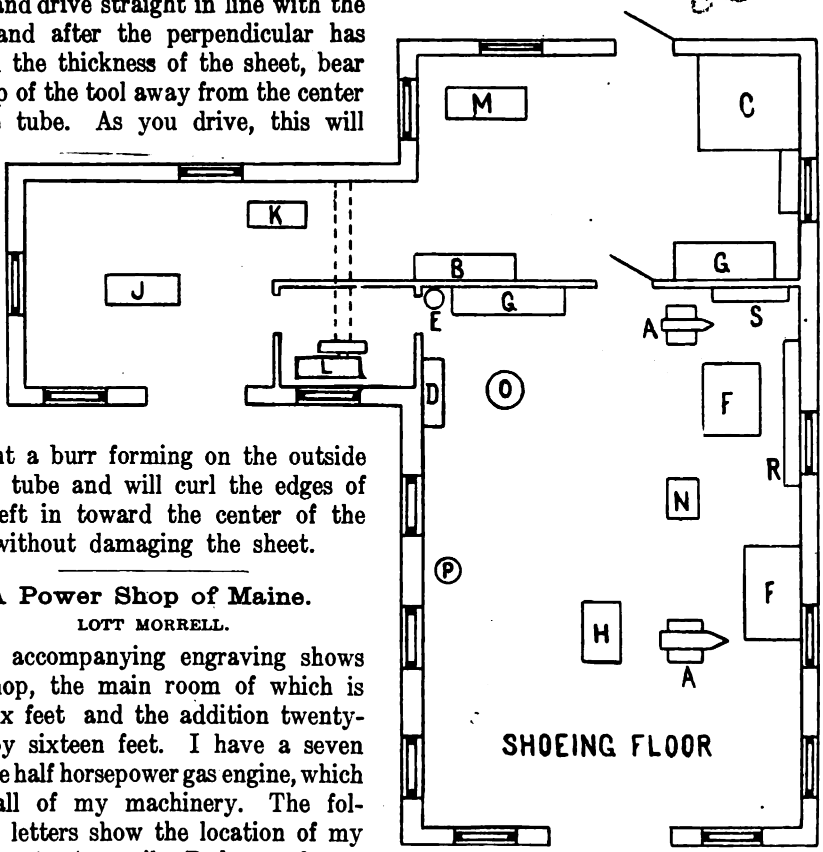
L. R. SWARTZ.

In getting out tubes with a cold chisel, one often has more or less bother. The tool illustrated here will lighten the trouble. A piece of ¾-inch square, octagonal, or round steel can be used for this, too. The cutting end is forged into a T-shaped bar for about three inches. The top of the T, or the bottom of the tool as shown at B, is rounded to the same curve as the edge of the hole in the flue sheet. The point, or spud, extends about three eighths or one half of an inch beyond the perpendicular edge, which is beveled a little from the back, but principally from the face. The face bevel extends a little above the cutting edge on the perpendicular. Temper the same as a cold chisel and draw the edge of the spud to a little lower temper than the edge of the perpendicular, so as to be tough enough to stand the side strain. The tool should be twelve or fifteen inches long, or even longer if you have room to use it.

If the tubes are beaded, cut the bead off with a sharp cold chisel, driving from the sheet toward the center of tube where you start. This will spring the metal of the tube away from the sheet and give you a chance to insert the point of the spud between the tube and the sheet. Set the tool with the perpendicular toward the center of the



THE REMOVAL OF BOILER TUBES WITH A COLD CHISEL IS ALWAYS ATTENDED WITH MORE OR LESS TROUBLE tube, and drive straight in line with the tube, and after the perpendicular has passed the thickness of the sheet, bear the top of the tool away from the center of the tube. As you drive, this will prevent a burr forming on the outside of the tube and will curl the edges of the cleft in toward the center of the tube without damaging the sheet.



A WELL-EQUIPPED POWER SHOP OF MAINE

A Power Shop of Maine.

LOTT MORRELL.

The accompanying engraving shows my shop, the main room of which is fifty-six feet and the addition twenty-four by sixteen feet. I have a seven and one half horsepower gas engine, which runs all of my machinery. The following letters show the location of my equipment: A, anvils; B, buzz planer; C, coal bin; D, drill press; E, emery wheel; F, forges; G, bench; H, tool box; I, band saw; K, rip saw; L, gas engine; M, surface planer; N, tire upsetter; O, wheel stand; P, tire bender; R, iron rack; S, shoe rack.

Here is a list of my prices:

Four new shoes, sizes 0,1,2,and 3	$1.00
Four new shoes, sizes 4 and 5	1.25
Four new shoes, sizes 6 and 7	1.50
Four new shoes, size 8	1.75
Resetting, sizes 0, 1, 2, and 3	.60
Resetting, sizes 4 and 5	.70
Resetting, sizes 6 and 7	.80
Resetting, size 8	1.00
Bar shoes, per pair, sizes 0, 1, 2 and 3	1.00
Bar shoes, per pair, sizes 4 and 5	1.25
Bar shoes, per pair, sizes 6 and 7	1.50
Plain bar shoes, sizes 0, 1, 2, 3, 4	.75
Plain bar shoes, sizes 5 and 6	1.00

Geometry Applied to Blacksmithing.

W. HUDSPETH.

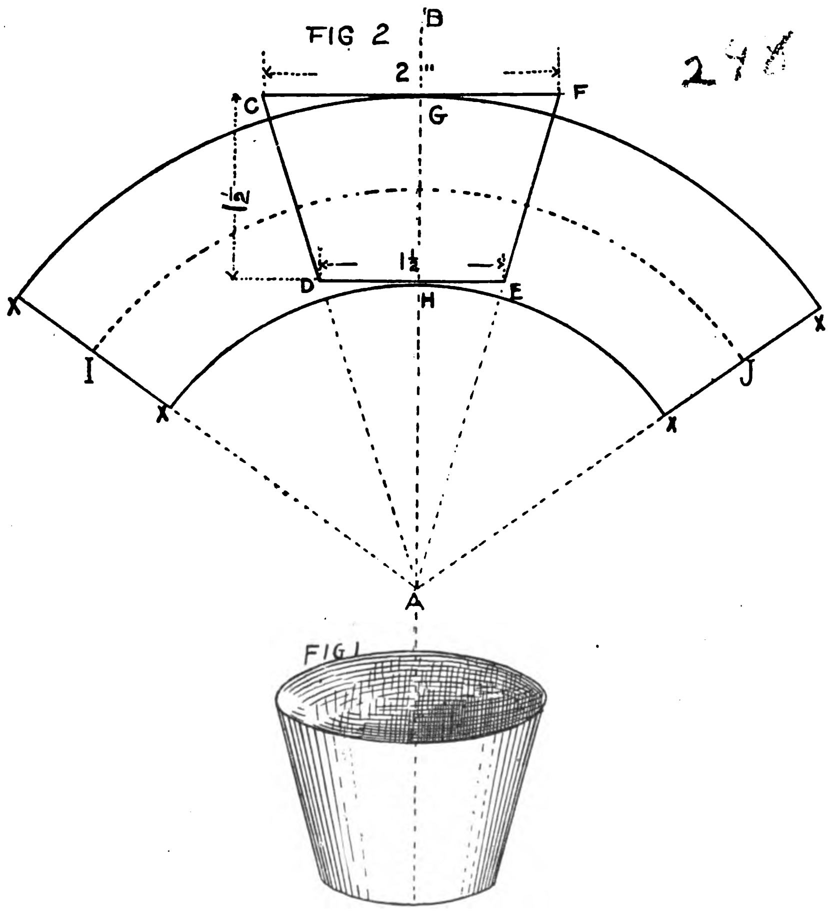
Every blacksmith should have a knowledge of geometry, as there are many jobs which come his way that cannot be done satisfactorily without the use of this branch of mathematics.

Take, for instance, a tapered cylinder which cannot be made properly without the use of a drawing. Fig. 1 shows a projected drawing of a band which is 1½ inches deep and which has a diameter of 2 inches on top and 1½ inches at the bottom. Draw the center line AB and mark off from it the elevated view of the band CDEF as in Fig. 2. Combine the lines CD and EF until they meet and cut the center line AB. From this point strike two segments of circles touching the band at G and H and a third passing exactly through the center. The band, which is 1¾ inches in diameter where the third segment passes through is multiplied by 3$\frac{1}{7}$ to find the amount of iron to make the same, as it takes 3$\frac{1}{7}$ times the diameter to equal the circumference. Therefore, 1¾ inches multiplied by 3$\frac{1}{7}$ equals 5½ inches. Now step along this center segment with the compasses 5½ inches and bring up lines from A to I and J, cutting the outside segments at XXXX. This piece of paper is cut out along the lines XXXX and when bent round will be found to complete the exact shape and size of the necessary cylinder.

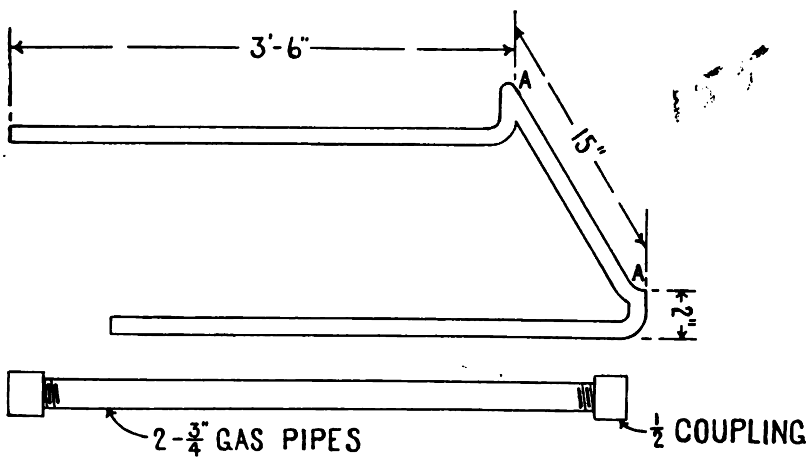
A Handy Iron Rest for the Forge.

WILLIAM ANDERSON.

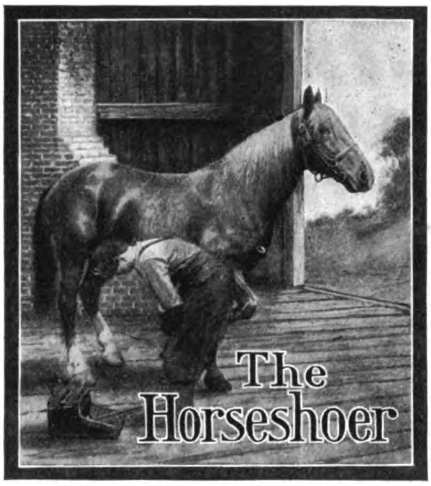
The accompanying engraving shows a very simple way of making a rest for the forge. Procure a piece of ¾-inch round iron and bend as shown in the engraving, making slight offsets at the corners AA. Now, cut two pieces of ¾-inch (inside diameter) gas pipe,



THE MAKING OF A TAPERED CYLINDER NECESSITATES THE MAKING OF A DRAWING two inches longer than the width of the forge, and thread both ends. Next, cut two pipe couplings into halves and put one half on each pipe end, to prevent burring while driving the pipe into its proper position. Drill two 1$\frac{1}{16}$-inch holes in the front side of the forge, 1½ inches below the top edge and 14½ inches between centers. Insert the pipes and run them through the forge parallel to each other and one on each side of the tuyère iron, with a grade of one inch to the foot. Cut holes in the opposite side to match. Having placed the pipes in position, insert the iron bar previously made, and the rest is complete. Its main features are quick adjustment for different lengths, and when telescoped it is entirely out of the way.



A HANDY IRON REST FOR THE FORGE



A Few Hints on Horseshoeing.

G. KOPPIUS.

When a horse is brought to a horseshoer he should thoroughly examine the horse's shoes and see if they have worn out straight, and if they are the same thickness all over. If this is not the case, something is wrong, and a way of remedying this should be discovered by the blacksmith. If the horse wears the shoe out on the outside quicker than on the inside, the mistake is generally made by the horseshoer who makes the surface level. In this case, cut down the inside and try to make the other side grow out. Should the horse wear the shoe on the inside more than on the outside, the outside wants to be cut down. If particular care is taken by the blacksmith to see that a horse wears his shoes evenly and straight there never would be any lame horses.

I also believe that a law should be passed compelling every horseshoer to take an examination which would assure the horse owner that his horse was being shod by a reliable horseshoer, and no harm whatever could come to the horse intrusted to the hands of such a blacksmith.

Interfering in Deformed Horses.

E. H. MALOON.

My former article applied to interfering in sound horses. We all know that many horses are deformed, and it is that class I am going to write about now. The burden of all instruction on interfering is to turn the ankle out. To my mind, this is all wrong. My reason for saying that, is this: We have a class of horses whose ankles turn out naturally. These almost always interfere and give me more trouble than any other one class, and I adopt any means to right these ankles. To do this lower his foot to the safety limit, leaving it level. Leave one side no longer than the other. My reason is to give him good frog pressure. I use dividers to level the foot of any interfering horse. Set one leg at the point of frog and one at the middle part of foot. I then take a light shoe, cut the inside off, leaving only one nail hole. Begin at center of toe and draw this inside tapering like a wedge, very thin at end, and fit close. Leave the outside long and fit the foot until the heel is sound. Then turn the heel out at about forty-five degrees and put on a standard calk. Put in two nail holes at the toe.

To my mind, the reason the horse hits is because he swings his feet on

A YOUNG WISCONSIN SMITH

the ground. To stop his swinging his feet in this way I put the calk on the outside. The weight of this foot is on the outside. The horse needs no protection on the inside of his foot, hence I set the shoe off and get it out of the way. It also gives the frog a better grip on the ground. The turned-out heel braces the ankle up and helps hold the foot where it strikes the ground. All this is theory, perhaps fact, but one thing is sure, a horse that turns his ankles out shod like this will go clear, provided he is not driven beyond his endurance. These shoes should not be left on more than three weeks, as in that time the condition will be nearly as bad as they were before he was shod. If this shoe has to be calked I use a light sideweight for strength and fit the outside the same as described. The inside I leave and fit close, with no heel calk.

And in putting a toe calk on any interfering horse I put the calk where the horse breaks over his toe, so the calk will be down as level as possible. I hardly ever try to brace a foot except to help weak ankles. If the ankles roll in I put a calk on the widest part of the shoe inside and a semipending calk on the outside heel, fitting outside close. What I have said covers the ground in a general way, but if I can help out at any time I am willing to do so. There are a few conditions that no shoer can successfully fight in interfering. One is a very thin horse and not properly fed whose muscles are shrunk and flabby. Another is a horse that is driven beyond his power of endurance. I try to explain to my customers why their horse cannot go clear. I am now shoeing fine horses as above described. These horses never went clear until I shod them. Their ankles are enlarged and calloused, but they are sound.

A Young Smith of Wisconsin.

LOUIS KRUEGER.

Replying to the invitation in the April paper, I send a picture of my brother Paul, who is but twelve years old, and, therefore, younger than either of the boys pictured in the April paper. My brother helps in the smith shop and is very strong. He is almost as strong as I am, although I am fourteen years of age. Our shops consist of three buildings, one being for blacksmithing, and the other two for vehicle work.

A YOUNG SMITH OF TEXAS

We have three forges in operation. Two of them are run by an electric blower. We also have electric power for running the blacksmith machines. We have lots of work, and at present ten truck wagons are being turned out. We have received much information from THE AMERICAN BLACKSMITH—I myself have been reading it since my ninth year, and, if I am not the youngest smith, I am, perhaps, the youngest reader and writer for "Our Journal." I've been in the trade since my thirteenth year, and can weld and handle the sledge as well as any helper.

ANOTHER YOUNG SMITH

My brother Paul can make some welds and can forge little articles. He does general apprentice work and knows how to handle his forge fire.

A Young Smith of Texas.

W. A. SHORT.

The accompanying engraving shows Mr. G. T. Ward's twin boys. They were seven years old at the time the picture was taken. Earl and Ernest are their names. The one with the horseshoe in his hand is Earl. He was seven years old when he made the shoe. He has made several shoes, and among other things he has made a pair of chain breast-straps, welding each link himself and twisting them. He is a natural blacksmith, his father never having taught him anything about the business. I saw him shoe a horse all round when he was eleven years old. He is now twelve years old and is a very intelligent boy.

Another Young Smith.

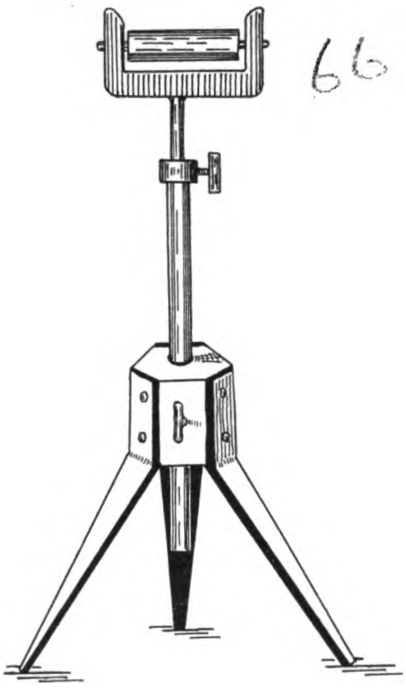
WILLIAM WILHITE.

In response to the invitation in "Our Journal" I send you a picture of my son, who, when he was nine years old, made the garden plow shown in the picture. He has used it ever since to cultivate my garden, and it still does good work. He makes clips and singletrees, and welded the shoes shown. These are the first he has made, and he is now eleven years old, weighs one hundred and eighteen pounds and is five feet four inches tall. I never tried him on shoeing a horse, but he is handy about helping to do all I put him to do. His name is Hazel F. Wilhite.

An Adjustable Iron Rest.

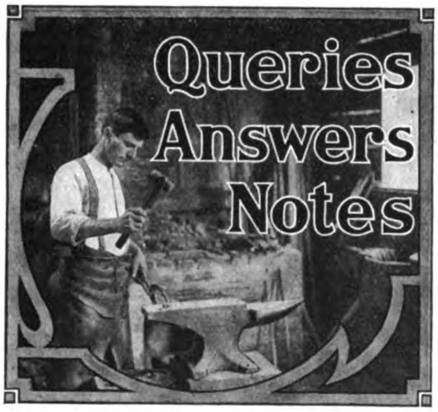
D. FOSTER HALL.

This sketch shows a valuable device for blacksmiths. This tool can be adjusted from two feet to five feet by turning two hand screws. It can be used at the vise, drill, forge, or anvil. The head is of the common roller type, the best for a tool of this class. To this is welded a piece of ¾-inch cold-rolled steel twenty inches long. This piece slides onto a piece of 1¼-inch steel pipe with a ¼-inch wall, and 20 inches long. This makes the hole just the right size for the ¾-inch rod. It is of importance that this pipe should be heavy so the hand screws can be tightened onto it solid without forcing it out of shape. The piece to which the legs are fastened



A VERY HANDY ADJUSTABLE IRON REST

is 2-inch hexagonal stock 3 inches long. This piece should have a 1¼-inch hole drilled through it lengthwise. The legs are made of ⅞ by ⅜-inch stock 20 inches long, and are fastened to the hexagonal piece with ⅜-inch screws. You will see by sketch that this tool has three legs, the best form, as it will then stand upon an uneven surface. The hand-screws should be about ⅜-inch with handle 3 inches long. This tool can be made in a short time by any blacksmith and it is one of the best and simplest tools found in the shop.



The following columns are intended for the convenience of all readers for discussions upon blacksmithing, horseshoeing, carriage building and allied topics. Questions, answers and comments are solicited and are always acceptable. Names omitted and addresses supplied upon request.

Wants to Braze Cast Iron.—I would like some brother smith to give me full particulars of how to braze cast iron. Will some reader help? T. McMahon, South Africa.

The Profit and Loss Problem.—In reply to the question which was asked by Mr. Will O'Gorman in the May issue of this paper, I find the answer is $8⅓ loss. Is this correct? Fred Bailey, Ontario.

That Buggy Problem.—In reply to Mr. O'Gorman's problem which appeared in the May issue of The American Blacksmith, I have found the loss to be $8.33⅓. Walter Rasmussen, Minnesota.

Wants to Oxidize Iron.—There is one question I should like to ask at this time—can any brother tell me how to oxidize iron? What process is it put through? and what is required? R. I. Randall, Virginia.

Wants to Make a Bell Socket.—Will you please tell me through "Our Journal" how to make a bell socket for end of cable for twisting, say three fourths or seven eighths inch cable? W. M. Swallow, Colorado.

The Best Engine and Hammer.—Can any brother blacksmith tell me which is the best gasoline engine and best trip hammer for general blacksmith work for use every day? H. E. Ruecker, Saskatchewan.

That Question of Profit and Loss.—Answering Mr. Will O'Gorman's buggy question about gain or loss on the sale, according to my figuring he lost $8.33⅓. If this doesn't prove satisfactory to you, call on me again. Edward Flake, Missouri.

That Buggy and the Mule.—I see by the May number a question of profit and loss. In reply I say that the man who sold the buggy lost $5.00. In answer to brother Alex Fritz, of Pennsylvania, let the man who don't want to have the stocks used shoe the mule himself. He'll change his mind then. F. C. Sacher, Kansas.

Wants a Vise for the Drill.—I would like to ask some brother of the craft to tell me how to make a vise for my drill press. I very often want to drill a hole lengthwise in a round rod or shafting, and if any brother can send sketch through The American Blacksmith I certainly will appreciate the favor. Gilbert Kettner, Missouri.

Shoeing the Nervous Mule.—I see by the May number that brother Fritz of Pennsylvania has a nervous mule that don't like shoeing a great deal. Now, my advice would be to put the twitch on him and not be afraid to twist it tight, and every time he jerks twist it tighter, and I have an idea that he will soon give it up. Try it, brother. J. W. Wagele, Kansas.

A Good Engine.—In the latest number J. C. Spruill, of Georgia, asks for a good make of gasoline engine. I would advise him to write The Temple Pump Company, of Chicago, Ill. Or if he will write me I will give him full particulars. I have one that I have run two years and have not had the least bit of trouble. Gas power for mine. E. Streeter, New York.

To Drill Cast Iron.—I wish some kind brother would tell me if anything can be done to soften a piece of cast iron that is so hard a drill bit will not go through it. It will break the bits every time. The cast iron is a piece of an old bell frame a farmer brought to my shop to have repaired. I never struck such a thing, and am at a loss to know what can be done, if anything. J. F. Morkert, Iowa.

In Reply.—If you will heat that portion, of the cast iron which is to be drilled to a cherry red and will place a piece of brimstone directly on the point at which you wish to drill and allow it to melt you will find that the metal can be very easily drilled when cold. T. A. B., New York.

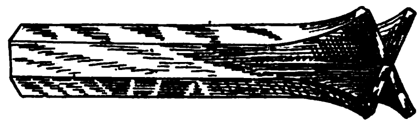
Tempering Cold Chisels.—A brother smith asked for a method of tempering cold chisels to cut cast iron. The following is my method: Work your steel up to the right heat, not too cold nor too hot, and then when you get the chisel dressed, get it red hot and plunge it into a piece of lard as far as you want the temper and let it stay until cold. The chisel will then cut any cast iron. A. C. Symank, Texas.

Who said panic?—The cash value of Uncle Sam's farm products alone for 1907 amounts to $7,412,000,000, showing a gain of $657,000,000 over the banner year of 1906. The exports of farm products alone amount to $1,055,000,000, showing a gain of $79,000,000 over the high record of 1906. The bank deposits show $13,000,000,000 for 1907, a gain of $207,941,747, and of 561,000 individual depositors over 1906, the most prosperous previous year.

A Very Handy Device.—I took a horse-clipping machine, and put a small arbor on the end of the flexible shaft in place of the clipper, so I can place on the arbor an emery wheel or buffer of one by five inches. I then placed the machine beside my disk sharpener, and here I use it mostly to polish the disks and to grind hard spots out of them. It is also very handy for a great variety of other work that cannot be done on the large emery wheel. It is very convenient. J. W. Banks, Iowa.

That Nervous Mule Again.—In reading our May number I find one short article I would like to answer. Mr. Alex. Fritz wants to know how to shoe his nervous mule. Believing that a man's life and limbs are of more value than an animal's' be it what it may, I should say put him in the stocks and shoe him. If the mule who owned him did not like that I should let him go where he could get him shod his own way, or he might try it himself. I never believe in ill-treating any animal, but I do believe in shoeing the easiest way and without danger. H. N. Pope, Connecticut.

A Question on Axle Setting.—Will some brother blacksmith, through The American Blacksmith, give a practical rule for getting the right length of an iron axle from out to out of collars on axle, so that the axle will be right length, and when axle is set so that it will be just the right length for a street car track? Take, for instance, a four foot eight inch track, which is the width of the Chicago street car track. I want such a rule that when box is set true in the hub the axle will set so that spoke from hub to bottom of wheel will be plumb on face of spoke. E. Cronin, Illinois.



THE CORRECT FORM FOR DRILL BITS

Making Drill Steels. — In answer to Andrew Stewart's question concerning the breaking of drill steels, will say that it is very probable that the steels are out of line. He should see that shanks are made round, smooth, and in perfect line, as a crooked shank throws drill piston out of line and causes binding and sticking of the drill bit. It is the cause of the breaking of more drill steels than anything else. Have the drill bits forged as small as possible so they will follow each other. This will help to increase the depth of drilling per day. Keep the drill sharp and give it plenty of clearance. A dull bit will cause the machine to stick. A set of drill steels just right will help to increase the rate of drilling from ten to thirty per cent a day. The engraving shows the correct form for drill bits. J. C. Lamons, Tennessee.

Repairing Improperly Dished Wheels.—In answering a question asked of me by Mr. T. C. Silsa on page 191 of the May number of "Our Valuable Journal," will say, just what I would do with a wheel dished the wrong way would depend largely upon circumstances. If there was much service expected of the wheel, and the other parts of the rig were good enough to justify it, I would pull the wheel down and build it over, that being the only way, in my estimation, to make a good job. But in case there was little required of the wheel, and one wished to economize, they could do so by forcing the dish back under a screw, and reset the tire tight enough to hold it for a while. As to cutting out the rim, I would have to examine wheel before giving an opinion. The wheel being dished back is no evidence that the rim is too long, as a straight wheel is larger in circumference than a wheel of the same size dished either way. L. Van Dorin, California.

Making Plaster of Paris Casts.—In regard to William Anderson's inquiry how to mix plaster of Paris for casts, would say the pattern must be coated either with oil, or get paraffin and heat it a in vessel of some kind and dip the pattern in it or spread on with a brush. He doesn't say what kind of metal he is going to cast in the old, but it matters little as to that. If I were doing the work, I should use molding sand, but if he doesn't know how to use that he would be up against it again. If he cannot get molding sand easily and can get yellow

A WELL-EQUIPPED SHOP OF COLORADO

clay, add to it one half as much clean sharp sand free from gravel. Then sprinkle water on it and work it together until when you pack it in your hand it will hold its shape on opening the hand. Then by rolling it between your thumb and fingers it will crumble up fine again. If there is further information desired on this subject I shall be glad to give my brother smiths their hearts' desire. C. W. METCALF, Iowa.

How to Temper Pitchforks.—In reply to Mr. George P. Holmes's inquiry in the April number—he wants to know how to temper pitchforks—would say, heat your fork and get it to its proper shape. He should have a furnace to heat them in, but if he hasn't he can arrange something that will answer the purpose for the small lot he has got, and heat them to a good cherry red. Bear in mind that they must be heated evenly, and he must use oil to temper in, as fork steel will not stand water. Make a vat, say about eight by sixteen by sixteen inches, and fill with oil just enough to cover the tines, as the shank doesn't need tempering. Now heat fork even to a good cherry red and stand with points down in oil and let remain until you can bear them in your hands; then take them out. To draw the temper, lay them in a hot oven or something of that sort so that you can heat them hot enough to burn the oil off. Then they will turn to a bluish color. Lay them out and let them cool off and you will find your fork the same as new C. W. METCALF Iowa.

A Well-Equipped Shop.—The accompanying engraving shows a front view of my shop. I have a good business—keep from one to seven men busy all of the time. My establishment is divided into an office, a shoeing and general shop, and a paint shop containing a painting room and also a finishing room. My equipment consists of a Brook's cold tire setter, two square forges and one large round one, a trip hammer, an emery stand, a five-horsepower motor, a Western Chief drill, a sixteen-inch swing lathe, a grindstone, a power blower, a rubber-tiring machine, a tire upsetter, a punch, and a Barcus shoeing rack. I do a general business. F. A. KARPE, Colorado.

Wants to Clean Horse Before Shoeing.—The accompanying engraving shows my shop and "yours truly" nailing a shoe on a horse that is twenty years old. The animal looks as if he was good for twenty years more. I have a two-horsepower International harvester engine, a Wonder disk sharpener, an emery wheel, a grindstone, a rip saw, a homemade trip hammer, an iron lathe, a wood lathe, and all other necessary tools, and, best of all, plenty of work. I work alone, and the engine is a big help. I don't see how I got along without it as long as I did. I can do almost twice the work I did before.

I would like to hear from some of the other smiths as to how they clean off a horse that is all mud when he is brought into the shop. We have some mud in this part of the country, and it is as big a job to get the mud off as to shoe them. The city shoer doesn't get any of that to contend with. I would like to get some of the plans used. I use a scraper first and then a broom and some old sacks to dry off with. Would someone explain why a new tire gets shorter after it is bent? If you lay it out and roll a wheel on it and mark it the same size as wheel, it will be too short. Why is it? SAWYER, Iowa.

Some California Prices.—I find the paper very interesting and of great help. I am somewhat amused at some of the discussions—for instance, the high and low wheel problem. This is so simple I should not think one would waste time writing about it. The articles on shoeing are especially good. I have all kinds to shoe here, and one has to study some. There is not a rush here, but all kinds of work comes to my shop. I do some business in secondhand rigs,

A POWER SHOP OF IOWA

fix them up and trade and sell them. In addition to shop work I paint signs, run a feed stable and a restaurant, and sometimes half-sole shoes. Can any of our brothers beat me as a sideliner? I also deal some in real estate.

I say, keep the prices up by all means. A price-cutter is always a botch. Guarantee your work and charge a fair price and look out for the beats. Price lists are all right if they are high enough. Material is high out here, and so is freight. Here are some of our prices:

Shoeing, up to No. 6	$2.00
Shoeing, above No. 6	2.50
Resetting or putting on old shoes	1.50
Buggy tires set, each	1.00
Wagon tires, according to size $1.00 to	1.50
Wagon singletrees, ironed	$1.50
Large hook for log chain	1.00
Welding link in chain $ .25 to	.50
Sheep shear wrench	1.50
Steel socket shaft ends	1.00

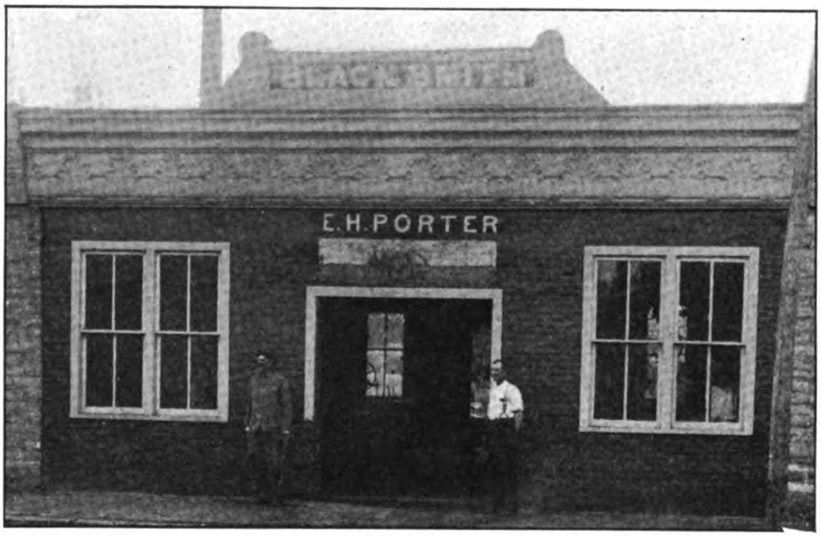
Other prices are in proportion.

We have an association here including Mendocino and Lake counties, and I think the members are living up to their agreement pretty well. J. N. SEARS, California.

Quittor or Seedy Toe.—I noticed a Mr. W. B. Mills, of Maine, inquiring as to how he is to cure a quittor in a horse's foot. In the first place, his question is very incomplete, but I would form an opinion from his question that it is a very bad case of seedy toe, or, in other words, a separation between the sensitive and insensitive laminæ, rather than quittor. Now, it may be a case that requires the services of a veterinary surgeon. If a veterinary is not available, I would say in a case like the one he speaks about, that the first step would be to remove the shoe, if any, and next remove all the separated parts of the wall as far as the disease has extended. As he said it seemed to be half rotten in the crack, I would poultice well with something rather mild and soothing, having the poultice nice and warm, as he will have to be careful after removing the sensitive part of the foot. Next, make a bar shoe with a good wide web and punch the nail holes where they will enter the sound hoof away from the sore. After driving the shoe on paint with pine tar or some good salve that part of the foot from which he has taken the wall and cover with absorbent cotton or strips of white cotton to keep it clean and keep tar or salve in place. If the horse has to be kept at work, the part or parts of foot deprived of protection will have to be protected with either a large band welded on the shoe at point required, or else with a neatly fitting leather boot or strap. No rule can be given whereby we can treat every case, therefore the horseshoer will have to use good judgment and deal with the case according to its severity. C. CRAIG, Ontario.

A Letter from the New State.—As I have never seen a letter from this part of Oklahoma, I thought I would write to let the rest of the boys know how the new State is progressing. Five years ago I purchased a few tools to do my own work. The neighbors wanted me to do theirs also. I was ten miles from town and I thought I could make a little by working for them. I built a small shop and bought a few more tools. That summer I had to hire some of my farm work done. The next summer I kept a man to do my farming, and also the next. I have now rented my farm out and am working in the shop all of the time. I do all kinds of work that comes to me. I make as high as eight and ten dollars some days, and some days only two and three, but all the time I am as busy as I want to be. I bought an emery wheel and feed mill, which I run by horse power. I also run a Brown corn seeder and a baler in season. I am going to sell the power and buy a gasoline engine. I believing in charging a fair price for all my work and doing it well. I am gaining more trade all the time.

My shop is sixteen by twenty feet. I buy all my supplies of a wholesale blacksmith supply house in Kansas City and have never had cause for complaint in my dealings with them. The local hardware men and myself have some warm discussions sometimes because I send away for my supplies, but I win in the discussion and in pocketbook also. I do all my shop work alone, except when my wife and children help me at such work as cutting heavy iron, setting wagon and buggy tires, and the like. Jacob W. Guthrie, Oklahoma.



A WELL-BUILT SHOP OF KANSAS

A Well-Built Kansas Shop.—The accompanying engraving shows the front of my shop. The man in shirt sleeves is your humble servant, and the other party is James Cleaver. My shop is fifty by thirty-three and built of stone. It is the best-equipped shop in the State. Every piece of machinery is of the latest and most up-to-date type. My son and I can turn out one hundred plow lays in ten hours very easily on the Little Giant hammer. My son, Frank, does the shoeing, and I want to say right here that we don't fit shoes hot.

I rather think Mr. Massachusetts Subscriber was a little off on his kick. As for the other boys, I just want to say, Don't be too hard on each other, brothers. We all make mistakes E. H. Porter, Kansas.

Prices in Northern California.—We wish to say a few words in our valuable paper about the prices we get for our work in Northern California.

Four shoes, all sizes, Nos. 0 to 5 ...... $2.50
Resetting, per set 1.50
One bar shoe 1.25
Special hand-turned shoes, per set 4.00

We have a notice stuck on the wall of our shop that reads like this: "Positively no old shoes put on." And we don't put any old shoes on, either. We will not run to our pile of old shoes, as some do, hunt out the best set of shoes, turn the heels on them and probably weld toes on them in the bargain, and then just get the same price for the shoes that they would get for resetting four shoes. Then the brothers howl about not getting anything for their work. When it comes right down to the fine point, there isn't anyone to blame but themselves. It makes me laugh to read the prices some brag about getting for their shoeing—forty cents and sixty cents for setting four old shoes. But perhaps that is more than the job is really worth according to some of the shoeing that comes to our shop. It is of no use to talk to such people about getting them to raise their prices. They are like the dog in the manger: they can't eat the hay and they won't let the horse eat it either. All they are good for is to keep some man that is a first-class mechanic from getting what his work is really worth.

We started to run our shop here in the autumn of 1903. We had a good opponent to buck against, but finally he sold out and another party took his place. All were price-cutters, working, you might say, just for fun. We tried to get them to stand in with us and have the same prices we had, but they wouldn't listen to us; so we went along with our prices and up to date we have frozen out five different outfits of cut-throats—I can't call them blacksmiths—and we own all the blacksmith tools there are in town. Here are some of the prices we get on standard jobs:

Sharpening and pointing plows $1.50 to $1.75
Four new R. E. steel buggy tires ¼ by 1⅛ inch, per set 10.00
Four R. E. steel tires ½ by 1½ inch 16.00
Four R. E. steel tires ⅝ by 1¾ inch 22.00
Four new stubs on buggy, 1 inch 10.00
Four new stubs on buggy, 1½ inch 16.00
One new buggy shaft 2.50
New cross bar in buggy shaft 2.50
New sword end singletree for buggy ... $ .75
Setting tires, per set .... $4.00 to 6.00
Putting in wagon bolster, old stakes and the old irons 5.00
Putting in spokes, each .... $.25 to .60

We never make a charge for less than twenty-five cents. We feel that if a job isn't worth that it isn't worth anything. McGlade & McBride, California.

An Interesting Letter from Virginia.—In answer to Mr. Will O'Gorman in the May number of "Our Journal" I will reply with explanation as I understand it. If the buggy which was sold at a profit of twenty per cent was sold at $100, $100 equals one hundred twenty per cent of the cost of that buggy. Therefore divide $100 by one hundred and twenty per cent and it equals $.83⅓, or one per cent. Multiply that by one hundred and it equals $83.33⅓, cost of buggy, or a profit of $16.66⅔. Now, if the other was sold at $100 with a loss of twenty per cent, $100 equals eighty per cent of the cost; therefore, one per cent equals $1.25. One hundred per cent, or the cost of the buggy, is $125. Therefore, the agent lost $25.00 on this buggy. $25 less $16.66⅔ is $8.33⅓, loss to the agent. If I am correct in my solution of this problem, I would be pleased to know. If any other brother has a simpler solution and I am not right I am open to conviction.

While I am writing I would like to say a few words about my shop and the work I am doing. The shop I am in is small, only twenty by thirty-five feet with an addition at one end of about ten by twelve feet. In this room I have my coal bin and engine and boiler which is a four-horse-power vertical. With this engine I run my grindstone, emery stand, drill press, and one blower. I have an apprentice and do all kinds of work that can possibly be done with the equipment which I have. Saw gumming and repairing, disk sharpening, lawn mower sharpening and repairing, horseshoeing, ironing new wagons and repairing old ones, overhauling and repairing engines and boilers, and such other jobs as come to a country shop. I have always made it a rule never to turn down a job of any kind that could possibly be done with entire satisfaction to the customer, and by so doing my trade increases rapidly. I have repaired broken castings and put cogs in wheels which others had turned down—I suppose because they had never been called upon to do that class of work, or, perhaps, because it is such a particular job and they are afraid they will not be able to make enough. Sometimes a customer will kick a little on the price, but they always pay me and I most always hear from it in the future, either through them or someone to whom they have shown it, and the next time they want something done they usually come back to me.

I could not get along very well without The American Blacksmith. It would be like eating bread without salt and I am somewhat of the same opinion as brother J. C. Baker, of Nebraska, who thinks "Our Paper" does not come often enough. Although, if we take it and study it when it does come, I think most of us will find enough to do until the next one comes. Mr. E. W. Perrin's articles on shoeing are very instructive to me, and they are worth while for anyone to study them carefully. J. I. Randall, Virginia.

VOLUME 7

THE AMERICAN BLACKSMITH

NUMBER 11

A Practical Journal of Blacksmithing and Wagonmaking

BUFFALO N.Y. U.S.A.

AUGUST, 1908

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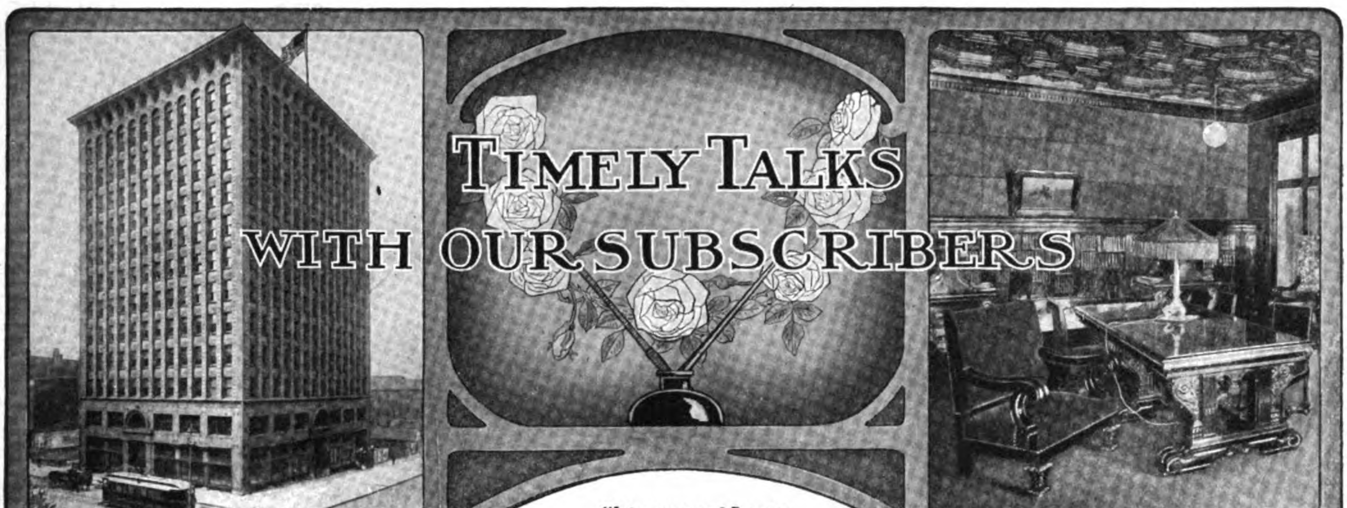

"Intercourse and Progress always go hand in hand."—Buxton.

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Getting Full Value.

Text-books are without doubt indispensable to the trade. But they cannot possibly cover everything, they cannot keep up-to-date, they cannot give proper attention to the proper thing at the proper time. This is where the trade periodical comes in. We do not desire, by any means, to belittle the text-book. It has its place, and together with the trade journal makes a success-winning combination. But does the reader get full value out of his journal by simply reading it every month and casting it aside when the next paper comes? No, decidedly not. To make the paper of the greatest value to the reader, the paper should be filed after reading and referred to as occasion demands. One man we know keeps an index of the articles in his copies of THE AMERICAN BLACKSMITH, noting where such articles can be found. When a problem comes up he glances at his index and—gets full value for his money. This man lists in his index every recipe, formula, kink, and hint as he reads the paper. Thus he turns his back numbers into a reference library of unlimited growth and opportunity. Don't skim through the paper—get full value.

Turn It into Money.

There are few shops in which you cannot find something for which the smith has no further need and which by holding is depreciating in value every day. There are very few things which increase in value as they grow older, and those few things are not found in a smith shop. If you are holding in the shop anything that is not bringing in some cash, dispose of it. Somebody can use it. If your business has outgrown certain machines, there is some other smith somewhere into whose shop those same machines will fit. You can reach the man who wants what you're ready to sell by advertising in our classified "Wanted" and "For Sale" columns. The cost is a trifle, the results—well, over 30,000 smiths, most of them shop owners, read these pages every month. Surely there is one smith in this large family of readers who is looking for what you have to offer. Turn now to the classified columns — try a classified ad yourself next month and turn that shop junk into money.

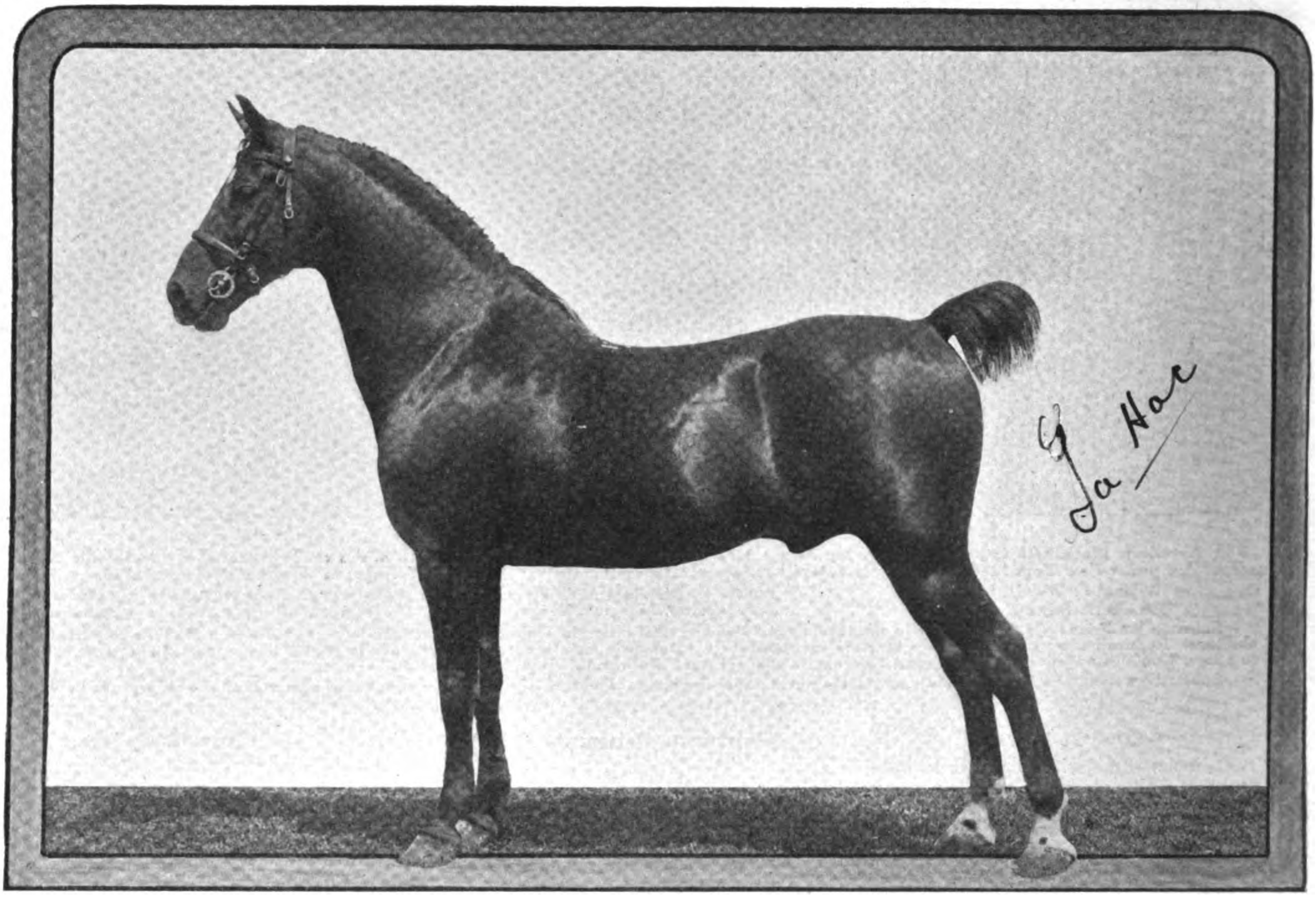
Contents, August, 1908.

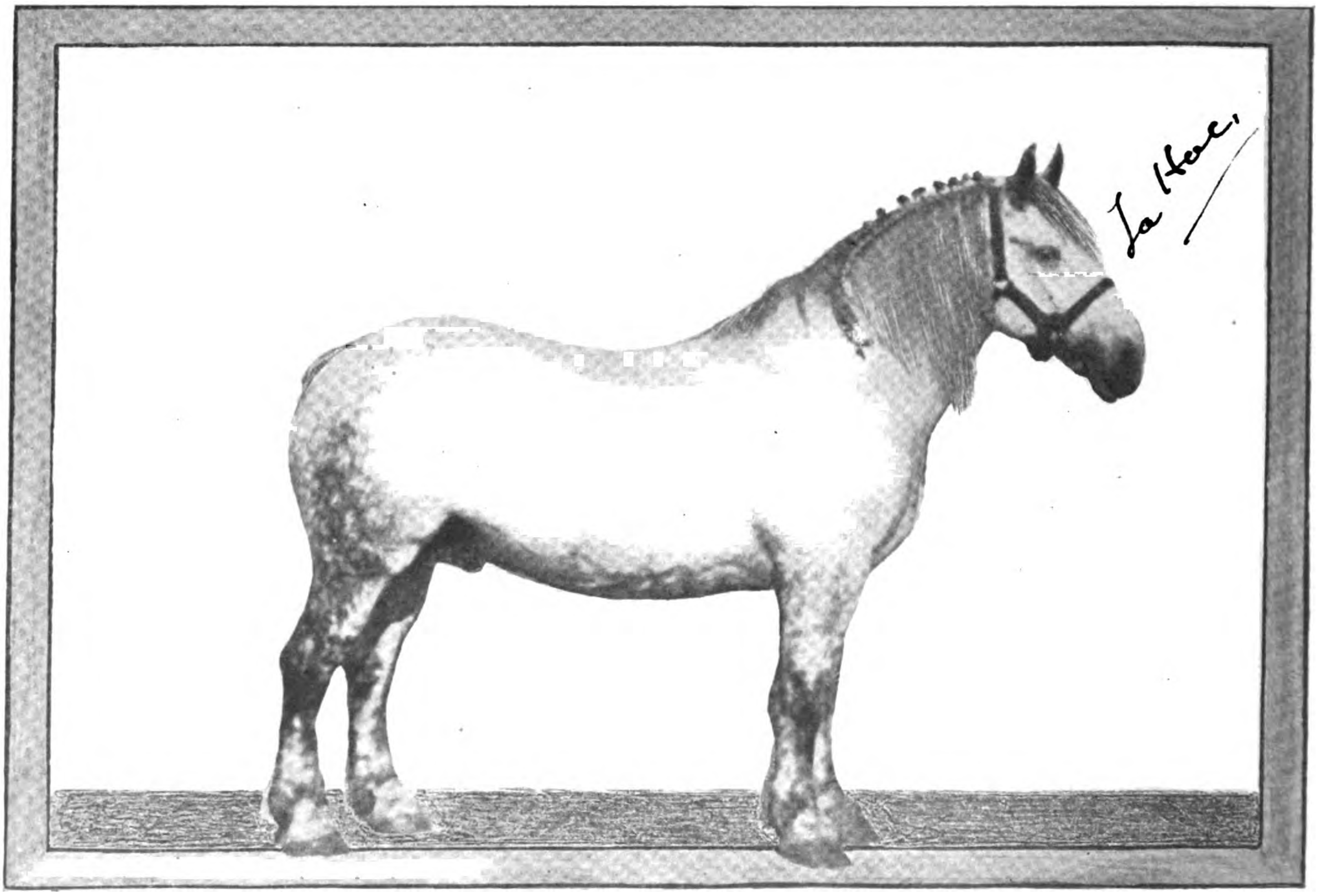
A Tom Tardy Idea.

When a smith gives as his reason for not taking a craft paper that "there is too much advertising in it," one is immediately made to think of our friend Tom Tardy. Of course, if a paper does not contain enough editorial or reading matter, a subscriber is justified in making this complaint. But in the case of THE AMERICAN BLACKSMITH, as a subscriber said just the other day; "If a smith will read 'Our Journal' as it should be read, he will find all the matter he can possibly take care of in one month." And a man is not "reading a paper as it should be read" when he complains of the amount of advertising it carries. If it were not for the advertisements how would you have learned that you could buy machines for making toe calks? How would you have learned of a thousand and one other modern devices for lessening labor? Then too, the subscriber who disregards the advertisements is missing much information that the advertiser invites him to ask for. If you doubt this write to a number of advertisers right now. There is lots and lots of advertising literature that is just as valuable as a text-book. And advertising matter in trade lines is bending more and more toward the valuable instead of toward the mere announcement of tools or machines. Consider the advertisements—they are valuable.

A Coming Issue.

Ornamental iron work is to be the feature of an early issue, and instead of publishing a lot of pictures of work turned out by the big ornamental iron shops, we want to show a good big grist of articles turned out by "Our Folks" right in their own shops. We want pictures of ornamental work of all kinds. We want just as many of "Our Folks" represented as possible. We want pictures of candlesticks, andirons, flower stands, gates, grills, furniture, and in short, anything that you have made in ornamental iron work. Just send in the photographs, and a short description if possible, and we'll do the rest. Can we count on something from you?





THE PRESENT-DAY SHOER MUST KNOW HOW TO SHOE THE STYLISH DRIVING HORSE AS WELL AS THE HEAVY DRAY ANIMAL

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IT IS OF VITAL IMPORTANCE THAT THE PRACTICAL SHOER CONSIDER THE LIMB ABOVE THE FOOT TO BE SHOD

The Foot and Limb of the Horse

W. O. JULIUS

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EVERY practical shoer knows that there are regular and irregular shaped feet and limbs, but how many shoers realize that the form of the horse's foot depends largely, if not wholly, upon the position of the limb above it. An irregular limb cannot by any means possess a regular or normal shaped foot. A regular or normal shaped limb of regular or normal position may possess an irregular shaped foot, but, as a rule, the foot will be of normal shape. It is, therefore, of vital importance that the practical horseshoer consider the limb above the foot to be shod.

It is almost unnecessary to point out that the position of the standing horse is in many cases no indication of how the same animal will use his feet in action. It is, therefore, necessary to watch a horse closely in action, and also to observe him minutely at rest, before a proper decision can be made to shoe him one way or another.

In Fig. 1 is shown an animal with limbs in apparently normal positions. A line has been dropped from the shoulder and in falling to the ground it cuts the limb exactly in two to the fetlock. Here the line drops to the ground immediately behind the heel. The axis of the foot forms an angle of approximately fifty-three degress with the ground. The line dropped from the hind quarter, would, were the near hind leg not back too far, meet the ground immediately in the center of the foot. This engraving illustrates the normal positions of feet and limbs, with the exception noted. The various irregular positions of the feet and limbs will be taken up in order.

Now let us consider the horse from in

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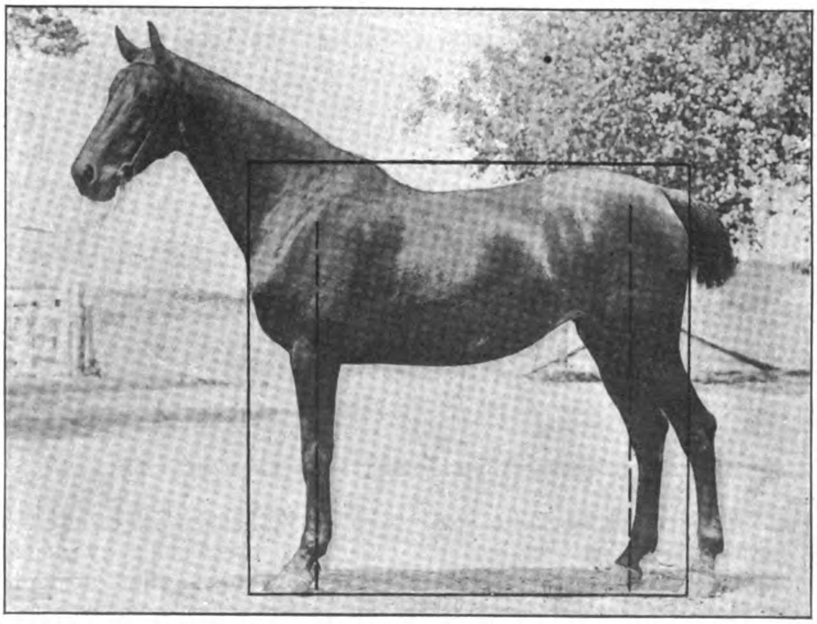

THE STANDING HORSE DOES NOT INDICATE HOW THE FEET ARE USED IN ACTION front. Fig. 2 shows the fore limbs, when viewed from the front, to be in the regular or normal position of shape, i. e., a line dropped from the shoulder passes down the center of the limb and equally divides it and also the foot. At B in Fig 2 is shown a knock-kneed position of the fore limbs. Here the knees are shown in too close proximity, while the feet are apparently in normal position, though the bend at the knees twists the foot so that the toes point outward and away from each other instead of directly forward. At C is shown practically the same foot position though the limb position is much different. Here, the limbs while apparently straight, fall downward and outward from the body describing part of the letter **A**, instead of the straight limbed **H**, as the example at A, Fig. 2. The position of the fore limbs at D, Fig. 2, shows a toe narrow condition of the limbs. This position of the fore limbs is often encountered in wide-chested horses. The limbs fall from the body just the reverse of the position illustrated in C. The foot position is also reversed—the toes pointing toward each other because of the twist in the limb. There are also other limb positions which produce the foot narrow condition. The bow-legged position of the limbs, in which the knees are too far apart, but in which the lower limb inclines downward and inward, also produces the foot narrow condition.

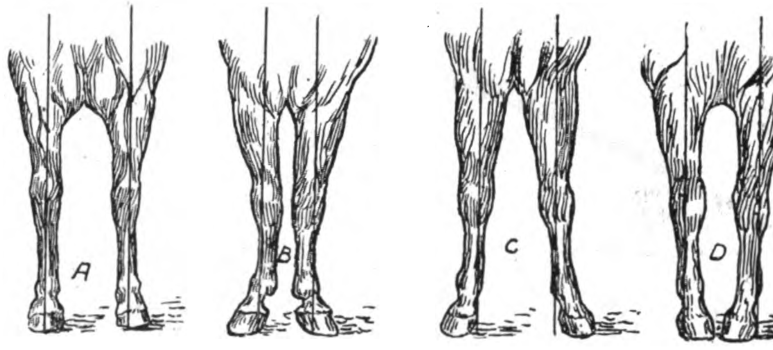

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FIG. 2.—THE POSITION OF THE LIMBS MUST BE OBSERVED CLOSELY FROM THE FRONT

In considering the front limb from the side let us look at Fig 1 and note well how the dash line cuts the fore leg exactly into two equal parts. The irregular position illustrated in Fig. 3, at A, shows the limb inclined too far forward. The line from the shoulder touches the ground too far behind the heel of the foot and cannot, of course, bisect the limbs as it does in Fig. 1. In B, Fig. 3, the knee is bent backward, which again throws the limb out of line, though the line dropped from the shoulder may touch the ground just behind the heel of the foot, as in Fig. 1. The position at C shows the limb to be "kneesprung," that is, the knee is bent forward, throwing the foot backward and behind the plumb line. Another condition in which the foot is thrown backward is shown at D. Here the limb is straight and entirely inclined toward the rear, the entire limb being out of line.

In viewing the horse from the rear, the plumb line is dropped from the buttock, and the line should, in the case of the normal position of the limbs, divide them into equal parts. In Fig. 4 is shown an example from life. The limbs are not, however, exactly normal or regular, there being present a slight twist in both limbs which turns the toes of the feet outward and away from each other. Abnormal positions of the hind limbs vary practically as much as the front limbs, and comprise conditions of bow-knees, knock-knees and twisted limbs.

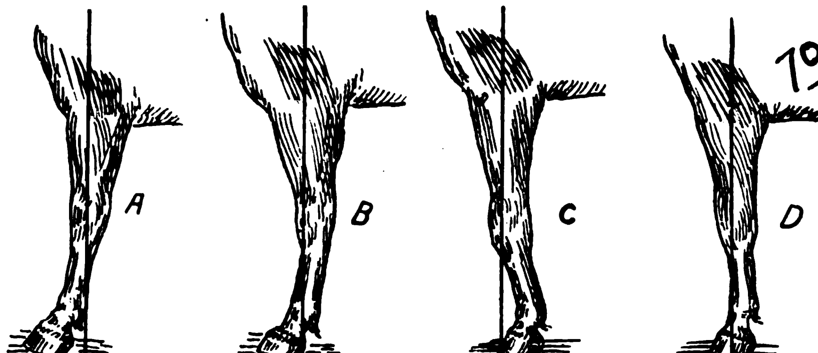

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FIG. 3.—THE LIMBS MUST ALSO BE VIEWED FROM THE SIDE

The hind limbs viewed from the side will, in abnormal conditions, show the limb sickle-hocked, i. e., bent too much, or too straight. How the limb should appear in normal position was explained in connection with Fig. 1.

The position of the foot resulting from an abnormal position of the limb above it has already been referred to. The true position of the foot is shown in Fig. 5. Here the axis of the foot, i. e., an imaginary line passing through the long pastern, short pastern and foot bones is seen to have the same slant as the front wall of the hoof and both are inclined at an angle of from fifty to sixty degrees. In the abnormal foot, the foot axis may be inclined to a greater or lesser degree, or it may be broken at the coronet. An abnormally long toe and short heel will break the axis backward, causing the axis of the hoof and the axis of the foot between the coronet and the pastern joint to cross at the coronet. Then, again, the foot axis may be broken forward by having an overabundance of horn at the heels, thus throwing the foot upward and forward.

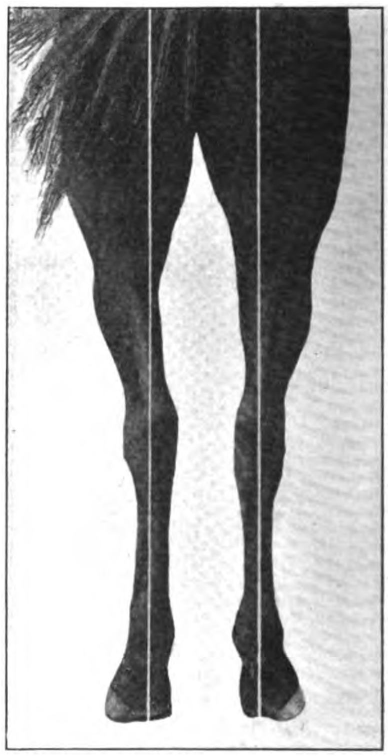

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FIG. 4.—THE HIND LIMBS ARE VIEWED FROM THE REAR

To the man who has made a study of the anatomy of the horse's foot and leg, it is easily understandable that there is always a reason—a cause—for the abnormally shaped foot. In a future paper the abnormally shaped foot will

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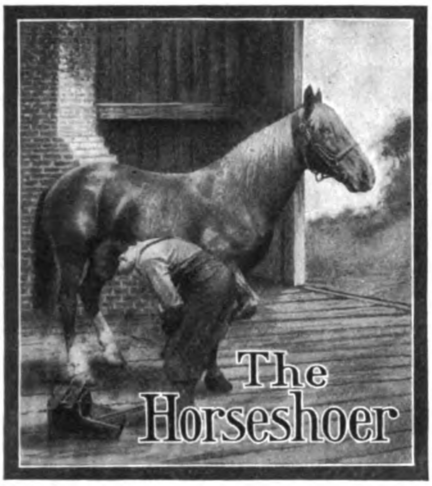
be considered. It is true that a knowledge of anatomy is useful and valuable to the practical horseshoer only in that it enables him to intelligently and practically shoe the horse. And if after gaining a knowledge of horse anatomy the practical shoer can do his work satisfactorily and with benefit to the animal, he can consider himself extremely well paid for the time spent in study. It is the shoers' mission to shoe the horse practically and to the best interests of the animal.



To protect horses from flies make a decoction of walnut leaves and apply it to the hair of the animal. Kerosene may also be applied in the same manner with good results. T. H., New York.

Cocked ankles may be treated by lowering the toe as much as possible, leaving the heels high and then apply a long-heeled shoe with calks. The shoe may extend as much as one and a half inches back of the heel. G. A. M., Michigan.

That no ironclad rules can be given for the guidance of the shoer is admitted by everyone. That knowledge of the anatomy of the horse's foot and leg, together with good common sense, must be the basis of all sensible, practical shoeing is also a fact. Yet why do some shoers persist in attempting to shoe horses according to rule and plan? B. W. J., Ohio.

To remove an old worn toe from an otherwise good shoe, heat the shoe and place it in the vise, heels down and calk toward you. Now put the shoe down in the vise so that by placing a square edge chisel bar between the vise jaw and the worn calk you can pry off the calk easily. This is much better than cutting off the toe calk and it also preserves the shape of the shoe. L. O. E., California.

Hot or Cold Fitting—Which?

P. J. KELLEY.

Did you ever watch a locksmith make a key to fit a certain lock? He usually blackens the key over a smoking lamp, then puts it in the lock carefully, turns it in the lock as much as he can, and then files out those portions on the key that show bright from contact with the parts of the lock that hold it. This little stunt is repeated until the key fits and operates the lock perfectly.

A careful shoer makes use of a very similar method in fitting the shoe to the foot. After getting the foot into perfect shape for the shoe, the shoe is shaped up, heated to a dull red, and applied to the hoof for just a fraction of a minute, or long enough to discolor the horn that comes into contact with the shoe. This discoloration shows the shoer just how to change the shoe until it fits exactly. And if done properly there is no danger whatever to the foot by the application of the hot shoe; in fact, this method of fitting has many advantages over cold fitting.

Before going farther on this subject, let me explain that hot fitting, as the term is used here, is not the holding of a hot shoe until it becomes imbedded in the hoof and fits itself to the foot. This, it can be easily understood, causes an almost irreparable injury to the foot of the horse. Hot fitting, as used here, is the holding of a shoe that is just dull red, almost black hot, to the foot for just a moment to char the horn. This is simply to act as a guide in fitting the shoe to the foot and not to make an artificial bearing for the shoe.

Now, take cold fitting—it is practically impossible for a shoer to fit the shoe to the foot perfectly by means of a true cold method. Every time he heats the shoe, the shoer must plunge it into the slack tub before he can touch the shoe to the foot. This takes time and when a foot is hard to fit, the shoer is sure to get careless because of the time being apparently wasted. Every fair-minded man will admit that that method, by means of which the best possible fit is secured, is at all times to be preferred. It is, therefore, plain

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FIG. 5.—THE AXIS OF THE FOOT BONES SHOULD PRESENT ONE CONTINUOUS STRAIGHT LINE

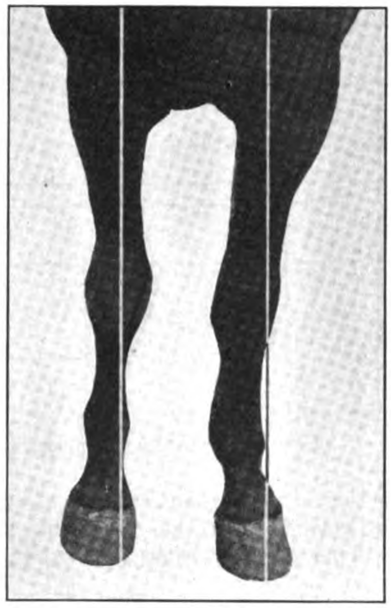

FIG. 6.—SHOWING IRREGULAR POSITION OF FRONT LIMBS

that the so-called hot-fitting method is the better of the two. In hot fitting, there is no time lost in cooling the shoe, except in rare cases when the shoe is red hot. The fit can be made perfect without the slightest injury to the foot. Another very excellent advantage in hot fitting is the fact that the slight charring of the hot iron seals up the horn tubes opened by paring the hoof. In an extremely hard hoof the hot iron softens the horn and allows for easier paring. Then, also, I believe that the hot iron expands the horn, which, after the nails have been driven, naturally contracts about the nails, holding and grasping them tightly.

If anyone can point out any advantages which cold fitting has over hot fitting, I should be very glad to hear from him. I admit freely that hot fitting when abused will do much harm to the hoof and foot, but in considering all points and sides of the two methods, hot fitting is to be preferred, and will give far better results.

The Value of Hardening Horseshoes.

While care is taken to harden the calks on horseshoes to prolong the wear, very little attention is given to hardening any other part of the shoe. Now, we will endeavor to show how a careful smith can give his patrons better satisfaction, and at the same time relieve the suffering of the animal, and how this hardening can be done at small expense. In the first place, take the horse with the contracted foot; all horse owners as well as horse shoers know what a painful thing this is to the horse, as well as a source of annoyance to the owner. When the writer was learning his trade nearly twenty-eight years ago,

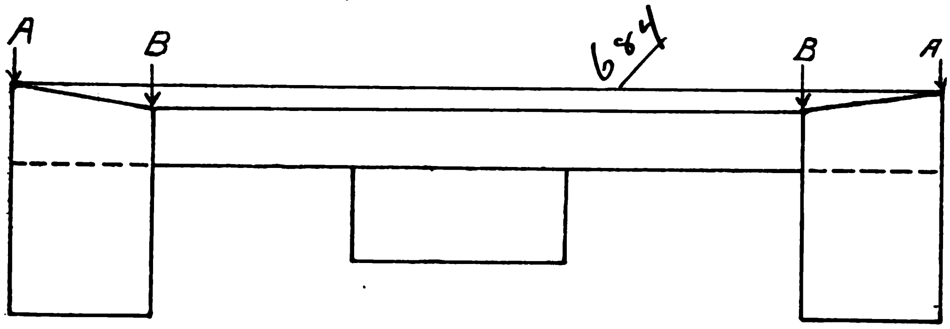

FIG. 1.—A STYLE OF SHOE THAT WILL CAUSE CONTRACTION OF THE FOOT

the smith with whom he was working had a wide reputation for curing this painful ailment of the foot. Figs. 1 and 4 show two shoes with the heels of each toward you. Fig. 1 is perhaps all right for a flat foot, being, as you see, higher at A than at B and beveled all the way around the shoe, high on the outside and low at the inside. This kind of shoe is, to a great extent, causing con-

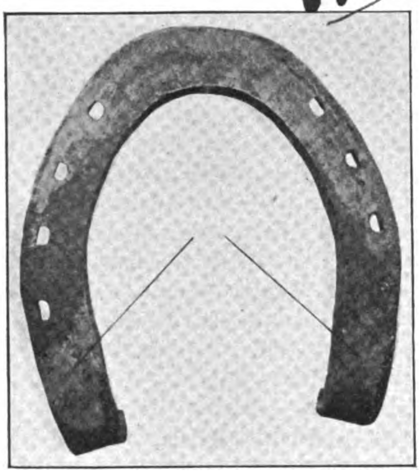

FIG. 1.—THE SHOE HAS A GROOVE WORN IN BOTH BRANCHES

tracted feet, and the hoof being hard and always inclined to turn or grow in towards the frog it wears a groove in the shoe. The shoe being soft, it, of course, does not resist, and if a shoe like this is allowed to remain on the foot very long the horse becomes lame, until the owner finally takes the horse to another smith. This man will, perhaps, remove the shoe, square up the calks and put a piece of leather between the foot and shoe, but does not change the mechanical construction of the shoe in the least. If this practice is continued very long the feet will become feverish and very sore. Figs. 2 and 3 show engravings of a shoe just taken from a contracted foot. It is built about as the one shown in Fig 1. The shoe has a groove (see arrows Fig. 2) worn along top of both inside and outside bar from the heel for about 1½ inches along the bars. When the shoe was removed the foot was very feverish and painful.

All horseshoers have, no doubt, noticed how a horse with sore contracted feet will stand with all his weight on one foot, the toe only of the other foot touching the floor. He will stand this way for a while then change about and relieve the other foot. This proves the horse is suffering great pain, in fact the horse can scarcely stand long enough on one foot to have the shoe removed from the other. This is, of course, unnecessary. for, if care is taken by the horseshoer and owner, the contracted foot can, not only be relieved, but, be cured. In the first place build the shoe as shown in Fig. 4, lower at A than at B all the way around. When the shoe has been properly fitted to the foot do not take a red hot shoe and burn the foot until the shop is full of smoke. This is a horrible practice. Pare the hoof as little as possible, get it level and have the shoe free from humps and hollows. Then harden the top part of the shoe to prevent the hoof from wearing into it. Do this if you have to make a shoe from tool steel. We used to weld a small piece of tool steel on top of each bar

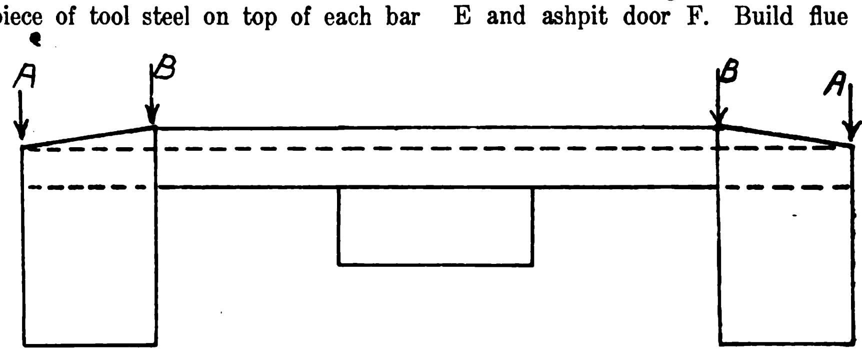

FIG. 4.—A GOOD SHOE FOR THE CURE OF CONTRACTION

about two inches long from heel toward toe and harden in this way. It will pay any smith to try this out, as you can can well imagine the reputation he will have by curing a bad case of contracted feet. The hoof will start down the incline of bar and a few weeks later, when removing the shoes for resetting, you will be surprised at the change that is taking place. In twelve months of this treatment you will have a complete cure.

A good way to get at the hardening part of this job is to construct a small furnace, about as shown in Fig. 5, Nos. 1 and 2, which is a side and front view. Any shop using power can put one of these small furnaces up in one corner of the room and carbonize the shoes, as well as lots of other things that require hardening for automobile and other repairing. When once in use the furnace will be found almost indispensable. The brick stays, A, can be made from old T rail secured from a railroad scrap heap. Eight of them, about ten feet long are required. Give them each

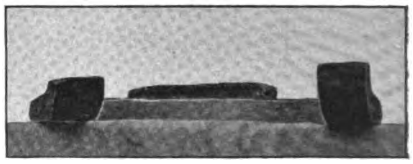

FIG. 3.—ANOTHER VIEW OF THE SHOE SHOWN IN FIG. 2

a heavy coat of paint. Now make eight small holes in the floor of your shop, about four feet deep and at the required distance apart, according to the size furnace you are to build. Set the T rails in the holes and set with cement after getting your guy rods B in position. Then secure some red brick and fire brick, using the red brick for the bottom and walls and the fire brick around all fire and heat passages. The brick stays in front can be placed so as to answer as a slide for the oven door C. The firebox door D can be arranged with hinges on the side. The same can be arranged with flue doors E and ashpit door F. Build flue to stack about twenty-four inches longer than furnace and attach stack G. Then arrange your standard H and pulley I with cable J to counterweight K and furnace door C. Fig. 6 shows how gases escape from firebox into furnace and down through four openings, one in each corner, into central flue to stack behind. This furnace can be run with hard coal and will require a slight blast when first lighted. For blast pipe use

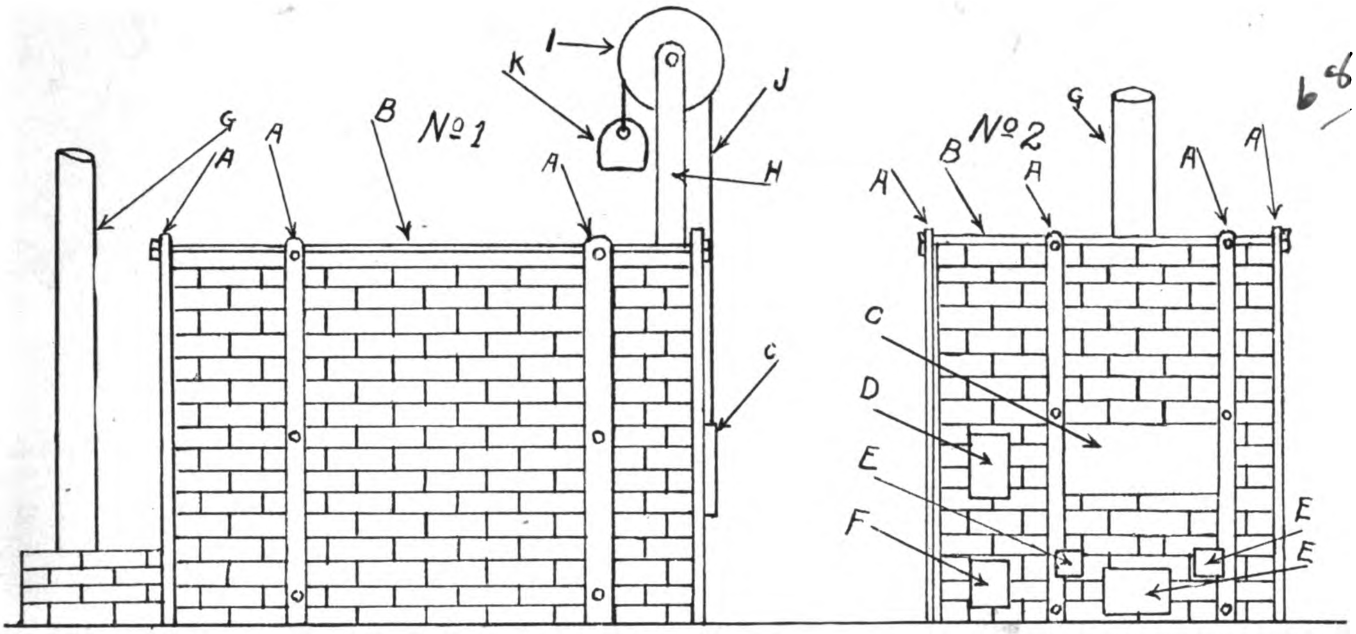

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FIG. 5.—THE FURNACE MAY BE BUILT OF SCRAP MATERIAL AND CAN BE USED FOR OTHER WORK BESIDE THE HARDENING OF SHOES

a piece of gas pipe the required length and drill a row of holes along one side the entire length. Place this in wall of ashpit just below firebox grates, leaving holes flush with inside walls. After building this furnace it should be allowed to dry out for about a week before lighting.

Now you can forge a number of shoes of different sizes, clean the scale from top side of shoes, and pack in cast-iron boxes, using bone black or raw bone and charcoal mixed, about one third of the former to two thirds of the latter. In packing, the shoes should be about three-fourths of an inch apart, and be left in furnace for six hours at a bright red heat, then set out and let cool off in boxes. You can then refill furnace and you can also take in a good deal of outside hardening, enough to more than pay expenses. After treating the parts as explained they will harden the same as carbon or tool steel. The depth, of course, is governed by the length of time they are allowed to carbonize in the furnace.

Handling Vicious Horses.

J. H. FULTON.

And by vicious horses is meant those animals that put up what really might be called a fight before they will allow themselves to be shod. The animal that is simply hard to shoe does not give the real horseshoer much trouble. A little patience is all that is required. Sometimes, and I have a particularly peculiar case of my own in mind, it may be necessary to apply the twist to an animal that is usually shod with little difficulty. This horse was a small animal and served on the delivery for a grocer, and I believe the horse was the best for the purpose in a large city that was full of good delivery animals. This particular horse, however, had some peculiar traits. He would not stand if tied, but would stay where you left him if not tied. When he was brought to the shop, he was as gentle as a lamb

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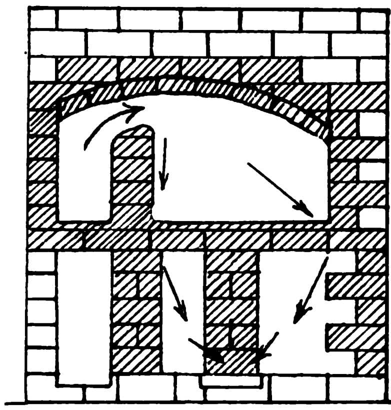

FIG. 6.—A SECTIONAL VIEW OF THE FURNACE SHOWING FIRE BRICK

when left alone, but if a stranger touched him, he would lay back his ears and get ready for action. Sometimes, when being shod, he would stand without a protest; at other times he would fight like a demon. At times, he would lean heavily on the shoer and seem very playful, and if, as sometimes happened with a new floorman, he was struck with the hammer, it became practically impossible to shoe him. As I said before, it became necessary sometimes to use the twist on this animal, which at times appeared to be a very gentle shoer.

And while we're on this subject of using the hammer on the horse instead of on the nail, just let me say that experience shows that the more you use the hammer on the horse, the harder time will you have in shoeing him. There is no call whatever for pounding the horse with the hammer. It simply puts the animal on the defensive, and if the horse is at all a fighter, it will make matters worse.

Perhaps the best device for shoeing horses that are difficult to shoe is a gentle-voiced shoer, with a firm grip and a patient, even temper. A man with such a disposition will succeed in shoeing horses that are born fighters, where another man will fail utterly. In using the following methods of tying and holding vicious horses, I want the reader to understand that a gentle voice and manner plays a most important part in overcoming viciousness. I don't mean by this a voice full of quivering cowardice, but a firm, medium-toned voice that has in it the ring that means what is says.

In detailing the devices for holding a vicious horse, we will pass over the twist or twitch, as some call it, as this has already been mentioned and is, no doubt, familiar to every horseman. A very simple, yet very effective, rig with which to make a horse submit to being easily shod is shown in the engraving,

Fig. 1. A strong, light cord, about eight or ten feet long, is doubled and, the center, thus found, passed into the horse's mouth. Immediately above the

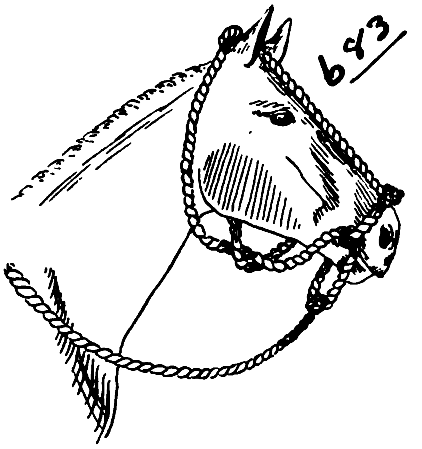

FIG. 1.--AN EFFECTIVE HITCH FOR THE VICIOUS HORSE

nose the two parts are knotted together and another knot made at the foretop, or between the ears. One end of the rope is now brought on each side of the neck, immediately behind the ears. The ends are then crossed under the head and brought back, and each end passed up and through the loop above the mouth. The two parts of the rope are now knotted just under the chin of the animal. If a long hold is desired, a rope may be attached to the end under the chin and held in the hand when working on the hind feet. Two or three hard pulls on this rope will usually suffice to bring the animal to his senses and take the fight out of him. In very bad cases one need not be afraid to pull good and strong on the rope, as it is impossible to hurt or injure the animal in any way, while the results of this treatment will be surprising in many instances.

Another rig which will in many cases be found to take the fight out of milder fighters is shown in Fig. 2. Pass a good, strong, light cord around the animal's neck and make a tight knot, leaving the cord very loose about the neck. Now pass the cord through the animal's mouth and back and through the loop about the neck. A man at the head of the animal can pull on the rope and cure the fighter pretty quickly, while you are shoeing. A modification of this arrangement for hard cases is shown in Fig. 3. The cord is here passed up over the head, just behind the ears, through the mouth, but above the upper teeth, and behind the rope as it passes up to the ears. A few pulls will usually suffice in making the animal entirely manageable.

In closing, let me say that whether or not you use a holding rig, go at the animal gently, don't lose your temper, don't get afraid of the animal, and use a gentle, soothing tone when speaking to the horse. Many horses, especially

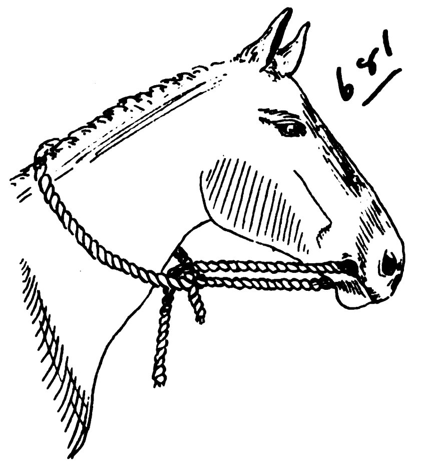

FIG. 2.--A SIMPLE TIE FOR THE RESTLESS ANIMAL

young animals, are afraid and nervous amid the noise, glare, and sparks in the shop. Such animals can usually be shod easily and quickly in the road or yard. In all cases, whether vicious or gentle, go at the animal gently. Speak

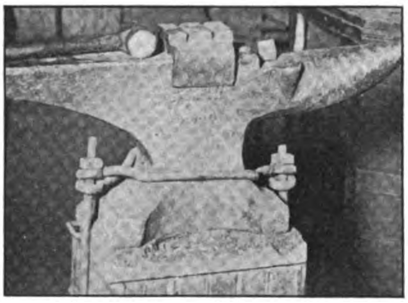

FIG. 1.--ANVIL WITH SMALL HARDY AND CALK DIE BLOCK

to him as you approach and instead of grabbing the foot as though you were afraid it would get away from you, touch the horse on the hip or shoulder, and gradually run your hand down the leg to the foot. Pick up the foot gently

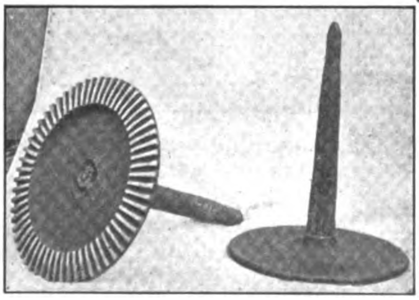

FIG. 2.--A VERY SERVICEABLE HOOF STAND

and easily, speaking to the horse at the same time. Let gentleness and firmness be your motto and success will crown your efforts with vicious horses. Don't lose your temper, for then you will be entirely unfit and unable to

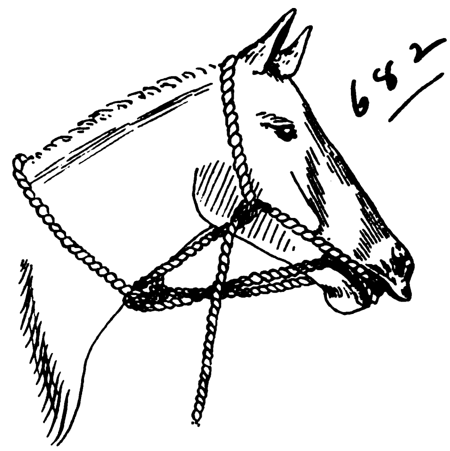

FIG. 3.--AN ARRANGEMENT FOR THE VERY VICIOUS ANIMAL

manage the animal at all. A cool head, a firm hand, and a gentle voice will succeed oftener than rough handling.

Improper Shoeing and the Injuries Resulting.

B. D. WOLFF.

643/ Call them accidents, or what you may, the careful shoer can usually swear to nothing but a hearsay acquaintance with the several injuries which I am about to detail. In other words, nail pricks, tight clips and injuries of like character are simply the results of carelessness. Take a tight clip for instance; if the clip is applied correctly, there is no need of it gripping and holding the foot as in a vise. This is especially so when side clips are used. Personally, I am not in favor of clips, but those shoers with whom they are a necessity will do well to apply them with caution. To hammer a clip down tight on the foot wall is nothing but injury and torture to the horse. It presses the wall against the sensitive foot, causing the animal to walk lame.

644/ Improperly driven nails are usually driven too close to the sensitive parts of the foot to be of comfort to the horse. The nail may not enter the sensitive portion at all, but may be so close as to cause acute pain and lameness. Usually both can be relieved by the removal of the offending nail. The injury should in no case be allowed to go unattended to, as negligence may result in serious and permanent injury and possibly in the death of the animal. If the sensitive parts of the foot are actually entered by a nail, the nail must be immediately withdrawn if injury is to be prevented. Where the nail is not withdrawn, the animal is in great pain and travels lame. Disregard of the offending nail in this instance is much more serious than lack of attention to the nail that has been driven too close. Serious consequences are very sure to follow inattention to an injury of this sort.

Perhaps the cause of improperly driven nails more often than not is improperly shaped and located nail holes. When a nail hole is not inclined at the proper slant, or if it is too far from the outer edge of the shoe, proper directing of the nail is practically impossible. Improperly made nails are also a cause of improper driving, so that it is up to the shoer to use nails of good, reliable make, and to punch his nail holes properly.

The injuries resulting from an improperly fitted shoe are all too familiar to the horse shoer to allow their full enumeration in this short article. Corns may be caused by the shoe, while cuts, treads, and various other injuries are generally the result of improper shoes, or the improper application of the shoes.

Prices and Business in Decatur, Illinois.

ETHAN VIALL.

For a town as up-to-date and as alive in most things as Decatur it is a shame to be so far behind in the matter of organization and uniform prices among the blacksmiths, wagon makers, and horseshoers. Not being any one of the three, but a machinist, I can throw snowballs at them, or hot shot, as the case may be, and get few in return, as I'm well acquainted among them.

Bloomington, Lincoln, Springfield, and scores of other towns in Illinois are pretty well organized, especially among the horseshoers, but Decatur —!! Horseshoeing prices here range from seventy-five cents for resetting and one dollar and twenty cents for new

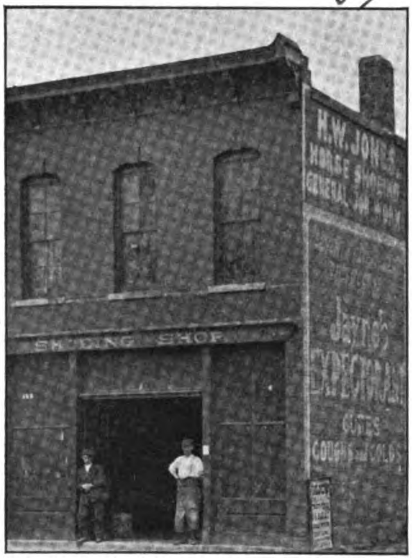

FIG. 4.—A SHOEING AND JOBBING SHOP OF DECATUR

shoes to one dollar for resetting, one dollar and sixty cents for new, and two dollars a pair hand made. Efforts have been made here a number of times to effect an organization of some kind, but while the smiths decry the throat-cutting business, they don't get into line. This is all the more strange when you consider that the town is practically a union town in other respects.

In spite of the varied prices, it is not the low-priced shops that have the trade, and I suppose they think that if they charged as much as the good ones do they wouldn't get any work at all. But instead of slapping out the work in a hurried, unworkmanlike way they could afford to take more time and turn out a good job, if they charged a fair price. This town has over 30,000 people all prosperous, and there is work enough and to spare for every smith in town to make a good living without trying to do a lot of work for little or no pay.

There are two shops in town which charge the highest prices ($1.00, $1.60, $2.00), and they probably do more work in the horseshoeing line than all the rest put together. Of these two, A. J. Dunston is probably the better known, being one of the oldest horseshoers in this section. His son is associated with him, and another horseshoer and helper are also constantly employed. Many of the greatest race horses in the United States have been shod by Dunston, and he has quite a collection of shoes of famous racers. Dunston was the first horseshoer in this part of the country who used an anvil with a small hardy set into the horn of the anvil, as shown in Fig. 1. He put one of these in his anvil over twenty-five years ago, and now most of the anvils here are equipped with them. The engraving also shows a very convenient form of calk die used among a number of the shoers here. Fig. 2 shows a hoof stand in common use here. Fig. 6 shows a view of Dunston's shop.

The other shop referred to is shown in Fig. 3. C. W. Curn, the "boss," is shown at the extreme left. The prices here are the same as at Dunston's, the size of the working force is the same and it is a "toss up" which shop

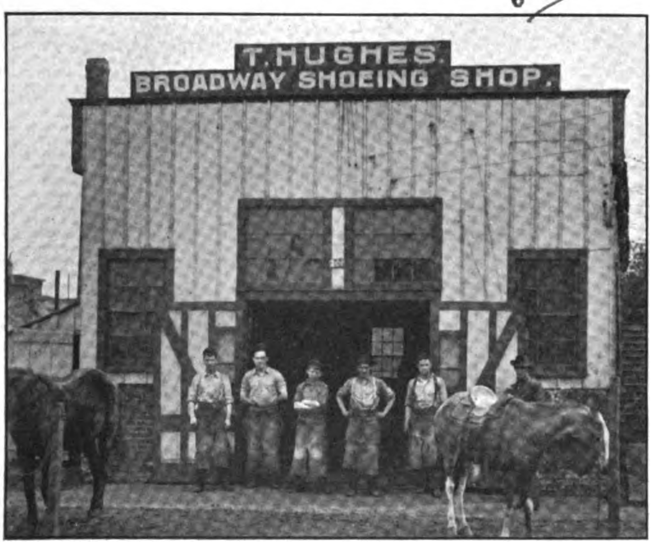

FIG. 3.—A DECATUR SHOP WHERE SHOEING ONLY IS DONE

FIG. 5.—MR. J. R. McLEAN'S CARRIAGE SHOP IN DECATUR

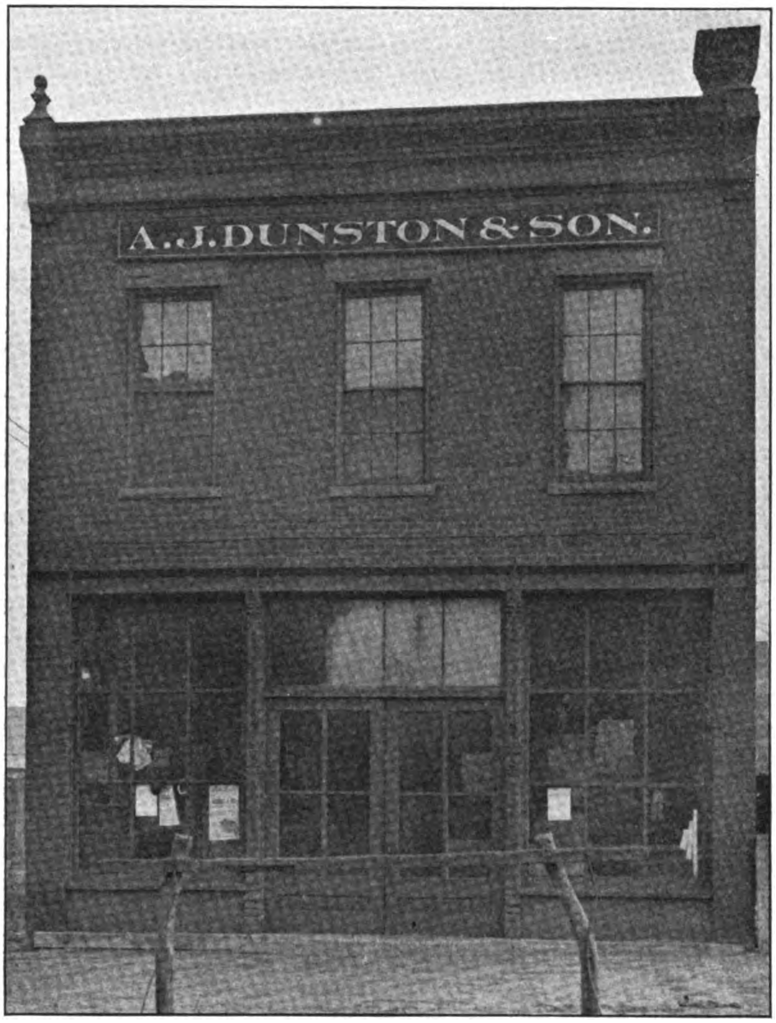

FIG. 6.—THE SHOP OF ONE OF THE BEST-KNOWN HORSESHOERS IN CENTRAL ILLINOIS

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has the most to do. Neither shop is equipped with power, but use the overhead bellows operated by a stirrup pull. These two shops do nothing but horseshoeing, but H. W. Jones, whose shop is shown in Fig. 4, does both horseshoeing and job work, and though his shop is not so large as either of the above, he does a fair amount of smithing business.

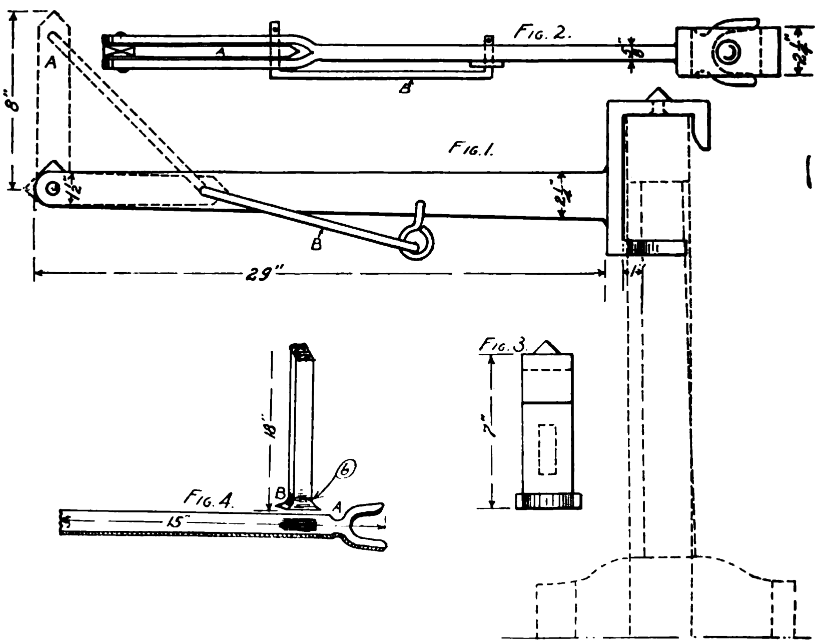
The Blue Grass Carriage Shop, run by J. R. McLean, is shown in Fig. 5. No horseshoeing is done here, but a good business in painting and vehicle repairing is carried on. Mr. McLean does considerable advertising in the local papers, and, as a consequence, he doesn't have much chance to loaf.

A Lumber Loader.

NELS PETERSEN.

This device was gotten up recently by an ingenious fellow who worked in a lumber yard. I made several for him and helped him to perfect it. This device is used for taking lumber off the wagon and piling it on the ground and vice versa. When in use it is fastened to the wheel of the wagon, as shown in Fig. 1, where a portion of the wheel is marked in dash lines to show how it is attached. With this device for assistance, one man can load or unload planks that are quite heavy by simply lifting one end of the plank up and letting the plank rest on one of the pivots to balance it while he swings the other end over onto the pile. A pin, A Fig. 1 is made so that it can be raised up or folded down and out of the way, to suit the size of the pile. The brace B being removed from the position as shown in the drawing, and put in position as indicated by dotted lines. This brace holds the pin rigidly in the upright position. There is hardly a town of any size but that has one or more lumber yards, and if the smith will show the engraving to the lumbermen, they must appreciate its value at once, and ought to be able to land an order for several without much persuasion.

To make the lumber loader, take two pieces of iron about 2 inches or $2\frac{1}{2}$ inches by $\frac{5}{8}$ inch and cut one piece 15 inches long for the head, and the other 18 inches long for the arm. First, fuller down at one end, as shown at A, Fig. 4, then punch a hole and cut out the center with a chisel in the same manner as when making an S wrench. The end can then be drawn out over the horn of the anvil to fit the spoke of the wheel. Then take the 18-inch piece, heat the end and fasten it in the vice. With a couple of hand hammers, using ball peen of the hammers, you and the helper beat the end down till it spreads out, so as to afford a wide welding surface as shown at B. When your heat is ready for welding, bring it on the anvil and place the 18-inch piece in position over the other, and let the helper strike a couple of swift blows on the end to stick it, and then bring



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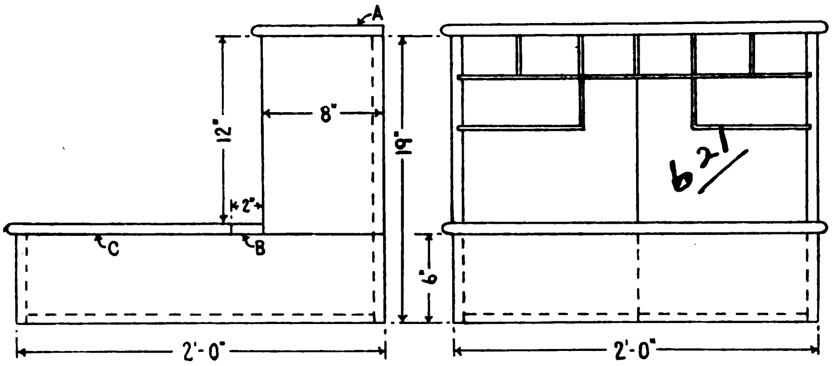
AN EASILY CONSTRUCTED DEVISE FOR THE LUMBERMAN the fuller into play again and weld down the edges all around, the helper striking rapidly on the fuller. This done the head can be bent into shape to fit the wheel it is to be used on. The fork which holds the folding pin is made of $1\frac{1}{2}$ by $\frac{3}{8}$ inch. Cut this piece 22



FIGS. 1 AND 2.—SHOWING SIDE AND FRONT ELEVATION OF SHOP DESK

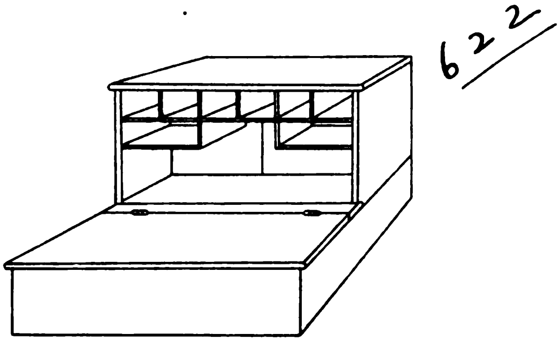


FIG. 3.—SHOWING DESK WHEN FINISHED

inches long and double it over, then take a light heat on the solid end and weld it down and scarf it. The end on the arm to be welded to this fork should be drawn edgeways to a uniform taper. Then scarf and weld the two pieces together. A piece one half inch thick should now be inserted and the fork shaped and trued. When pin A is forged to shape, as shown in drawing, it is ready to drill and put together.

A Handy Shop Desk.

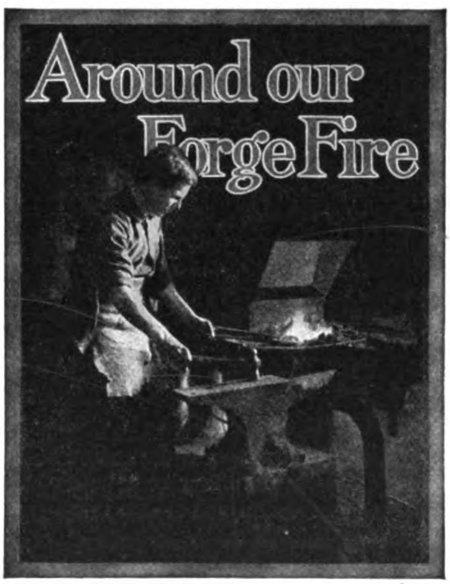
E. M.

The accompanying engravings show the plans for a very simply constructed writing desk which can be made by any practical smith or wood worker. White wood is the best material to use, but pine will answer the purpose very nicely. The stock should be about three fourths of an inch thick. Fig. 1 shows a side view of the desk which is nineteen inches high without the top piece. The length is two feet.

To construct this desk procure two pieces of white wood two feet long and six inches wide. To these secure two pieces eight inches wide and thirteen inches long as shown in Fig. 1. Next place these pieces two feet apart, and nail on the back made in two sections, each section measuring nineteen inches long and twelve inches wide. The bottom of this desk is made of two pieces each two feet long and twelve inches wide. The top is made of one piece twenty-six inches long and nine inches wide and placed on as shown at A in Fig. 1.

A strip two inches wide and twenty-six inches long should next be nailed on as shown at B, Fig. 1. The cover at C is made of one piece fifteen inches wide and twenty-six inches long and hinged onto B. The corners may be rounded to give it a finished appearance.

Fig. 2 is a front view of the desk showing the pigeon holes. These are made of $\frac{3}{16}$-inch stock. The dimensions of the six small ones are four inches wide and three inches high, while the two large ones are eight inches wide and three inches high. Fig. 3 shows the completed desk which can be fastened to the wall by two brackets secured underneath.



The Editor was busy planning the next issue of the paper when Tom Carter happened in.

"Hello! Tom,'' was the Editor's greeting, "How are things along the river?''

"Well, ever' thin's 'goin' 'long smooth'' returned Tom. "Got a good lot o' launches this year and 'nuff work to take me well into the winter.''

Tom Carter, it must be explained, runs a repair shop and lodging house for small river craft.

"Many launches on the river this year, Tom?'' Questioned the Editor.

"Yes, ther' thicker sand flies. Why at the races other day you couldn't get within a quarter mile o' the finish long before the time to start and more boats comin','' replied Tom in his characteristic way.

"Well, that certainly is good for your business,'' said the Editor. "Almost time to add to your renting space isn't it?''

"Oh, I got hold of the places each side o' me—think I got 'bout as much room as I'll need for a while anyway,'' returned Tom.

"How many men have you this year?''

"Well, I got Jack Day with me again this season and then I've got a couple of youngsters from the college to attend to deliveries and to take parties out. There are four of us all told, and it keeps us busy all day trying to keep up with the work.''

Benton came in at this point and seeing Carter greeted him with a slap on the back and a hearty hand shake.

"Just the man I want to see, Tom'' said Benton, "Ralph Towns bought a launch of the St. Lawrence people the other day and he asked me about your livery. I told him I'd hunt you up and tell you to call on him. Incidentally I told him that he couldn't take his boat to a better man.''

"Well, say, that's good o' you, old man. I'll sail right over to Ralph's wharf if you'll tell me where he hangs his pennant,'' returned Carter. Then continuing he said, "But say, before I go I want to know if there is a simple way of renickelling brass and copper without electricity.''

"I don't think there is,'' returned Benton, "at least I haven't heard anything that will put a nickel finish on brass or copper without an electric current.''

"I think there is,'' came from the Editor. "Just look through the index of my recipe book on that table beside you Benton. I'm quite sure you'll find something on the subject in there.''

Benton picked up the book and after a short search exclaimed, "Why, here's the very thing you want.'' Then continuing Benton read: "Dissolve eight ounces of sal ammoniac and eight ounces of double-nickel salts in one gallon of water and then heat the solution nearly to the boiling point. Now put in your brass or copper articles together with some scrap or granulated aluminum, seeing that the aluminum touches the articles to be nickelled. In a short time a nickel deposit will have been produced. While the deposit is not as heavy nor quite as white as that made by the electro-plating process, it may be lightly buffed and will do in many cases.''

"Well, that will serve me just right,'' put in Carter. "You see there is often a necessity for a light nickel plate on launch parts, though most fittings are of brass. That little scheme will just about suit us.''

And after inviting both Benton and the Editor to call on him Carter went out.

How We Beat the Favorite.

Part 2.

I took them a burster, nor eased her nor nursed her
Until the Black Bulfinch led into the plough,
And through the strong bramble we bored with a scramble—
My cap was knocked off by the hazel tree bough.

Where furrows looked lighter, I drew the rein tighter—
Her dark chest all dappled with flakes of white foam,
Her flanks mud-bespattered, a weak rail she shattered—
We landed on turf with our heads turned for home.

Then crashed a low binder, and then close behind her
The sward to the strokes of the favorite shook!
His rush roused her mettle, yet ever so little
She shortened her stride as she raced at the brook.

She rose when I hit her, I saw the stream glitter,
A wide scarlet nostril flashed close to my knee.
Between sky and water the Clown came and caught her,
The space that he cleared was a caution to see.

And forcing the running, discarding all cunning,
A length to the front went the rider in green;
A long strip of stubble, and then the big double,
Two stiff flights of rails with a quickset between.

She raced at the rasper; I felt my knees grasp her;
I found my hands give to her strain on the bit;
She rose when the Clown did—our silk, as we bounded
Brushed lightly; our stirrups clashed loud as we lit.

A rise steeply sloping, a fence with stone coping—
The last—we diverged round the base of the hill;
His path was the nearer, his leap was the clearer,
I flogged up the straight, and he led sitting still.

She came to his quarter, and on still I brought her,
And up to his girth, to his breastplate she drew;
A short prayer from Neville just reached me—"The devil!"
He muttered—locked level the hurdles we flew.

A hum of hoarse cheering, a dense crowd careering,
All sights seen obscurely and shouts vaguely heard;
"The green wins!" "The crimson!" The multitude swims on
And figures are blended and features are blurred.

"The horse is her master!" "The green forges past her!"
The Clown will outlast her!" "The Clown wins!" "The Clown!"
The white railing races with all the white faces;
The chestnut outpaces, outstretches the brown.

On still past the gateway she strains in the straightway,
Still struggles, "The Clown by a short neck at most."
He swerves; the green scourges; the stand rocks and surges;
And flashes, and verges, and flits the white post.

Aye! so ends the tussle—I knew the tan muzzle
Was first, though the ring men were yelling, "Dead-heat!"
A nose I could swear by, but Clarke said, "The mare by
A short head." And that's how the favorite was beat.

Yes, everybody makes mistakes, but it's a pretty poor excuse.

A clean shop goes a long way toward making one comfortable these days.

When it comes to making opportunities some good workmen fall down hard.

An association makes a bad competitor a good one and a good one a better one.

"In one town for thirty-eight years"—says a York State smith. Can anyone beat this?

The careless man is like a hen, for he seldom finds a thing where he laid it yesterday.

True, there is a limit to everything, but few men reach the limit of there capabilities.

While seeing is believing not all men are to be believed simply because you can see them.

Be truthful in your advertising. No advertisement is a good one unless it can be believed.

Economy is good but when overdone it becomes false economy and that means extravagance.

System is to be recommended but when it becomes "red tape" its best to discontinue and a new start made.

A carriage painter and trimmer will find a good opportunity by writing Mr. William Murray, Eveleth, Minnesota.

Ten years ago China had but fifteen miles of railway. Today it boasts of 3,746 miles with 1,622 miles under construction.

A good time right now to send out statements, if you haven't done so lately—and then keep up the good work regularly.

Don't put it under lock and key. When you have a good craft idea, send it to us for publication and for the good of the craft.

While the vehicle repairer should pay attention to wagon tongues, he should avoid wagging tongues as if they were poison.

Of course, you will give yourself a well-earned and needed rest just before the fall rush. 'Twill put you in better shape for the fall hustling.

You can't tell what a wagon needs by looking at its tongue. Examine the vehicle carefully before advising your customer what repairs will cost.

A good illustration is to your letter head what salt is to bread. If you don't know what that means, ask Mrs. Smith to forget the salt in the next bread she bakes.

The amount of work you get out of a machine may count for something—but what it's all worth is the main thing. The amount of work a man does may be important, still the quality of the work done is more important.

A new automobile wheel to take the place of the pneumatic tire is to be manufactured by a company to be organized in Detroit. The new wheel is of wood with a hollow hub containing a series of springs. The tire is of solid rubber.

Why will a smith pay a peddler two dollars for some welding powder which he himself could make for about thirty cents, if he would spend one dollar for a year's subscription to The American Blacksmith which would tell him how to make it?

A headlight for horses has just been patented by a man in Connecticut. The light is a six-candlepower incandescent electric lamp and is suspended in front of the horse's chest. The batteries are carried in the vehicle, wires leading along the harness to the lamp.

Germany announces the production of a substance which, contrary to the accepted law governing heat and cold, becomes liquid when brought to a temperature at which water freezes and when heated it turns solid. This substance is composed of equal parts of phenol, camphor, and saponine, with a little turpentine, and is called cryostaz.

Any man can sell a fifty-cent article for twenty-five cents but the true salesman is the chap who holds up the price and gets it. A cut in price is a man's admission that he is a poor salesman. The price-cutting smith admits by his price cutting that he is either a poor salesman or a poor workman. Good workmanship properly presented will always claim and get its just dues.

One doesn't realize what a marvelous machine a watch is unless a few of its features are pointed out. 'Tis said that about 175 different pieces of material enter into its construction and upwards of 2,400 separate operations are comprised in its manufacture. The roller jewel of this delicate machine makes every day 432 thousand impacts against the fork and it is said that one horsepower would be sufficient to run two hundred seventy million watches.

"I'm a detective" whispered Tom, as we stopped at the shop the other morning. "Got a badge and there's my certificate." When asked how he stumbled on this side-line, Tom replied. "Oh, I was appointed by the Pinkington Agency. I pay five dollars a year for registration but I'll get that back on my first case." "No, I haven't had my first case yet, I've only been a detective for three months, but I'm practicin' and keepin' ready for a job when it comes." Wonder how long it will take friend Tardy to detect the fraud.

A remarkable test of the interchangeability of the parts of a certain American make of motor car recently occurred in London, England. Three ten-horsepower runabouts were taken from stock and driven for fifty miles on a track. The cars were then taken to pieces under the eyes of inspectors, the parts mixed indiscriminately, some parts withdrawn and new stock parts substituted and from this indiscriminate pile three new cars assembled which upon completion not only started on the first turn of the crank, but made a run of 500 miles successfully.

When Tom opened shop the other morning about ten o'clock he found these lines on a piece of paper tacked on the shop door:

Have you heard of the shop of No-Good
On the banks of the River Slow,
Where the Some-time-or-other scents the air
And the soft Go-easies grow?
The shop's in the valley of What's-the-Use,
In the province of Let-her-slide.
It's run by a reckless I-don't care
Who's a Give-it-up beside.

Friend Tardy has been wondering ever since why anyone should tack that on his door.

What are you doing to help solve the apprentice problem? Are you blowing and kicking and knocking the craft? Are you showing your apprentice by your own example that there's nothing in smithing? Or are you putting heart and soul into the trade and reaping something more than a mere living? You can't expect to get something out of the shop if you put nothing into it. For the sake of the future craft, for the sake of yourself and family, put real energetic effort into the shop and show the apprentice—the smith of the future—that there's nothing quite so good as the good old craft.

American Association of Blacksmiths and Horseshoers.

There are many reasons why every competent blacksmith, wheelwright, and horseshoer should band himself with his fellow craftsman in an association for mutual interests and proper prices, and so few reasons why any man can afford to stay out, that no smith who has his own interests at heart should pass by an opportunity for securing the benefits thus proposed.

Organization is the order of the day, and with living expenses and cost of stock as high as they now are, coöperation becomes almost absolutely necessary if the smith wishes to make a reasonable living for himself and his family. Isn't this so?

In the first place, it has been shown and absolutely proved that a successful working association can be formed which absolutely will prevent price cutting. Such an association means dollars in your pocket if you are a member. It is most evidently to your interest to support and join.

Do not think you will get more work from your customers because you do it cheaper. A set of shoes which you will put on for a dollar or less, will wear as long as a set for which you get one dollar and twenty-five cents, and no one would drive his horse barefooted because it costs twenty-five cents more to get it shod.

Don't be afraid that your trade will leave you. You are the next man's neighbor, and he will join if you do. If the price is uniform your *skill* will hold your trade. It is often said that when a blacksmith cuts prices he admits that he is not as skilled as his brother smith. A good mechanic will always get his share of the work at a reasonable price.

Would you rather have five dollars for shoeing five horses or six dollars for the same work? You may think that you will lose some of your trade, but your customers will not leave if they have to pay the same prices elsewhere. The object of the association is to get a uniform scale of prices throughout the county.

Figure out how many horses there are in the county, and how many times they are shod. If prices are raised five cents a shoe, how many thousands of dollars more would that mean to the shoers of the county? Figure it out! Will do you your part and share in the increased profit?

Even supposing that you did lose one fifth of your trade, which is not likely, you will still get the same amount of money for less work and save one out of every five sets of shoes, to say nothing of time, nails, and coal. Wouldn't you rather have six dollars for shoeing five horses than six dollars for shoeing six?

Don't you think that the cost of your stock and material are somewhat exorbitant? Is it not reasonable to suppose that a dealer will make a better price if a county or several of them as a whole ask for better prices on stock? This is a benefit, which can probably be obtained, and which none but members of the association will participate in.

I am confident that you recognize the great advantages of coöperation and organization for mutual interests, and that you will want to get busy in your county right now. Ask for my easy plans, today. Address a postal to P. O. Box 974, Buffalo, N. Y., and I'll do the rest. Write today to

THE SECRETARY.

Thornton's Letters.—19.

Being "Straight-from-the-shoulder" Talk from a Prosperous Self-made Smith to his Former Apprentice, now in Business.

Dear Jim:

Yes, I believe in giving credit, old man, but—well, it's necessary in some parts to extend credit in order to do business in any paying quantity.

Suppose a shop located in the country, for instance. Farm trade is depended upon, of course; but the farmer hasn't always got ready money or cash to pay Johnnie-on-the-spot. He depends upon his neighbors to trust him until harvest, and if the farmer is good pay, there is no reason why you shouldn't trust him. Then, again, if a man runs an account, he is likely to have lots of things done which he would do without if he had to pay cash.

But credit is not a thing to be thrown out to everyone like a hand bill. Too much care cannot be exercised in extending credit. When a man asks to open an account, if he is unknown to you, ask for references and look them up. Don't think that the fact that he has given references guarantees his reliability. He may be bluffing you, and if he is, he will do you for all he possibly can. Then, too, consider the standing of the people named as references.

This reminds me of a smooth, slippery, middle-aged chap that came 'round the shop in the early days. He moved into the neighborhood, put up a doctor's sign, got a horse and rig, and usually came by the shop 'bout the time I was sweeping the walk (hadn't gotten any help yet). He was so very smooth when he said "Good morning," and asked about business, that I was sure he would trade with me some day and stick me for all he could, and I wasn't disappointed either. I think Mrs. Thornton and I went there for about five years with colds and other little ailments before we got our money back. And paying a blacksmith's bill at doctor's rates is pretty bum business. But I know better now—and I don't want you to go through the mill as I did.

Don't be afraid to tell your neighbor smith your experience with Mr. O. Them Moore, and when you want to know about anyone, don't be backward about asking for information. Why, just the other day a chap came in, with a broken threshing machine part. Said he'd had the machine for five years and hadn't paid a cent for repairs yet. He said too, that he had always thought of trading here and guessed that he'd bring his trade here instead of to Johnson's if I'd fix the part right. I told him we'd do our best, and that the thing would be ready in the afternoon. Soon as he was gone, I 'phoned Johnson and found out that the fellow had not only never paid a cent for repairs on his threshing machine, but had never paid a cent for anything else, either. Well, of course, I insisted upon cash for the repair and haven't seen him since. Spot cash is my policy with such people, and if it doesn't suit them I don't loose anything. As an old grocer friend of mine says: "Better to have the goods on the shelf than on the books," and I think that's about right. You can't be too careful in granting credit if you want to make a profit. Of course, a strictly cash business would be ideal, but there are few blacksmiths who can do any amount of business that way.

Yours for sane credit,

Thornton

Don't smoke when you are filling a gasoline tank for anyone. Your pipe or cigar may fall into the tank and interfere with the fuel supply to the carburetor. Better to lay the pipe aside, than be laid aside yourself. W. O. A. B., New York.

When starting a motor see that the spark is retarded, or you may possibly need the services of a doctor. If the spark is advanced too far, the starting handle is likely to slap you on the wrist. And it won't be a gentle slap either, as many can prove. W. O. A. B., New York.

Cheap cast-iron jacks may do good service for horse vehicles but are dangerous when used around heavy touring cars. They are likely to break when you are inspecting a disabled car. Best get a reliable set of jacks for use on heavy cars and insure a whole scalp. M. J. K., Ohio.

Riveting Automobile Frames.

This is a very important feature in the manufacturing of automobiles, as a great amount of riveting is done hot—very little cold riveting is used in the auto of today—and in this article we will endeavor to show how this class of work is taken care of, in one of the largest and best equipped automobile factories in the world, where one man for heater, and one man to run the hammer, drive, on an average, four thousand five-sixteenth inch and three-eighth inch rivets in ten hours. In the first place we will show how we heat the rivets, which is the best method worked out so far. Fig. 1 shows a homemade furnace made from fire brick for heating rivets. Secure a cast-iron plate or a piece of light boiler plate about twenty-four by sixteen inches. This is shown at A, Fig. 1. Bolt or rivet four legs, B, to this plate. This forms a good strong base. Then build up walls with fire brick, using fire clay very thin, leaving door at C, No. 2. Place another light plate on top, D. Then arrange your burner at center of back end, have the bend, E, at such an angle as to throw the fire in center of furnace as shown. Be sure to have the gas nearest the furnace and the air directly back of it. When lighting, turn on gas and light, then turn on air enough to blow a fine blue blaze on bottom of furnace. The bottom of the furnace should be made from one piece of tile. If no tile is to be had then use a few fire bricks with sharp corners and place very close together. At all times keep the cracks filled up with fire clay. After using a while it will become very hard and will last a long time. Now, a lot of different size rivets may be thrown into furnace and as wanted may be placed in center of furnace in path of fire, this makes a convenient way to handle the first part of the job.

We will now show how to drive the rivets rapidly. Fig. 2 shows what is known as a push hammer in operation on a front spring hanger of a side frame. When using this hammer the hammer man attends to the heating of the rivets himself, and his helper handles the parts to be riveted, drifting out the holes, and placing the rivet, head down, in bottom set. A very convenient and, at the same time, strong standard, or dolly, for holding bottom sets of different sizes is shown in Fig. 3. Have a piece of

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FIG. 2.—A RIVETING HAMMER IN OPERATION

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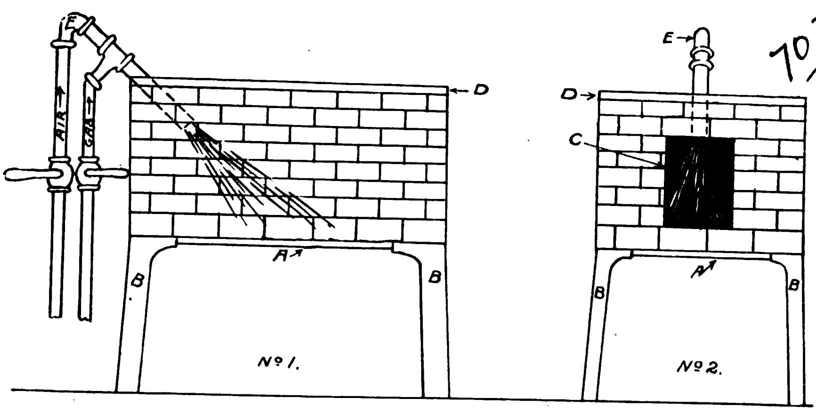
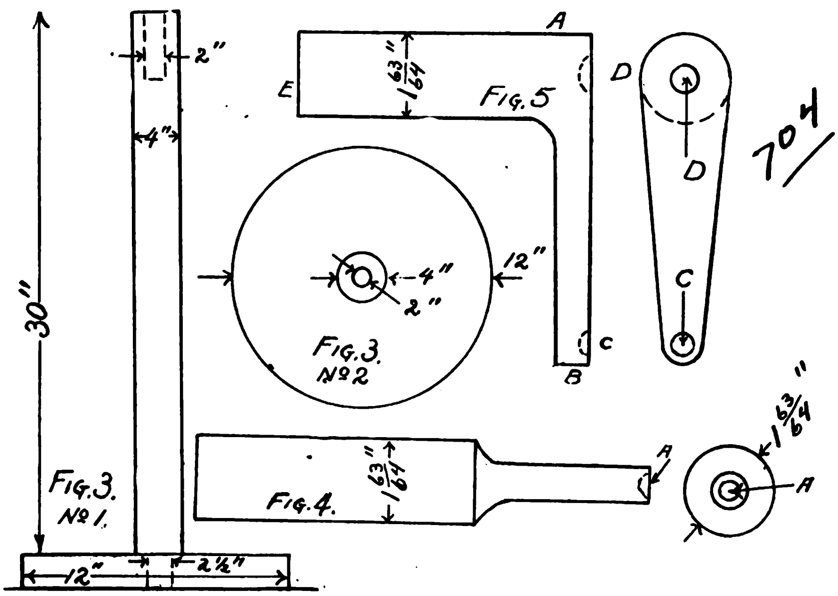


FIG. 1.—SHOWING TWO VIEWS OF FURNACE FOR HEATING RIVETS

round cast iron about three inches thick and twelve inches in diameter; drill a two and a half inch hole in center of this. Then take a piece of four-inch round machine steel about thirty-three inches long, turn one end down so as to shrink cast-iron base on. Drill a two-inch hole in other end about six inches deep and case harden with cyanide. This completes the standard.

Now for the bottom sets. Fig. 4 shows one style. These should be made from low carbon tool steel about fifty point carbon, or if made from machine



FIGS. 3, 4 AND 5.—SHOWING PARTS OF RIVET SET AND STAND

steel and carbonized in bone black they will wear a long time and give good satisfaction. The large part of this set should be one sixty-fourth inch smaller than hole in top of standard, to allow of placing and removing easily. They should be tempered about as you would temper a cold chisel, i. e., not so hard but what a new mill file will take hold a little. These sets can be made in different lengths to suit the class of work to be done and also countersunk for different sized rivets at small or upper end, A, Fig. 4. Another style of bottom set is shown in Fig. 5. It can be made from the same kind of material as Fig 4, and in various lengths from A to B to accommodate the different jobs. It can be countersunk on end C and also at large end D for heavier work; this set should be tempered at C, D, and E only. Fig. 6 shows standard complete with last-mentioned set in place. Fig. 7 shows a yoke hammer at work. This hammer is heavier than the push hammer and is handled with easė by the operator by having it swing from a light crane. Fig. 8 shows yoke hammer, counter balance, air hose, cable, pulleys, and crane.

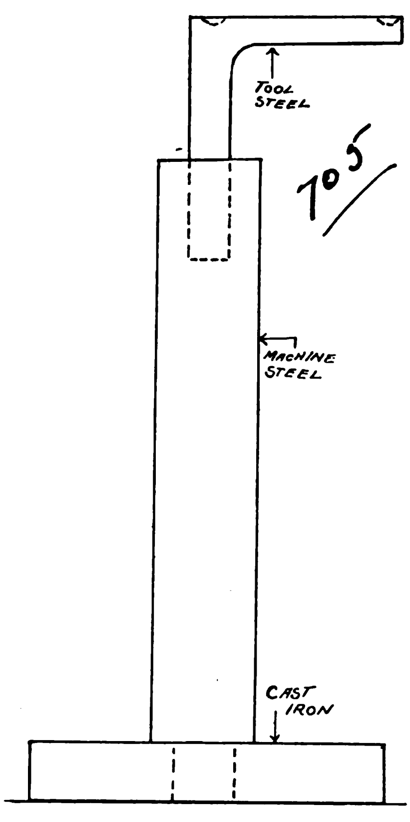


FIG. 6.—COMPLETE RIVET STAND

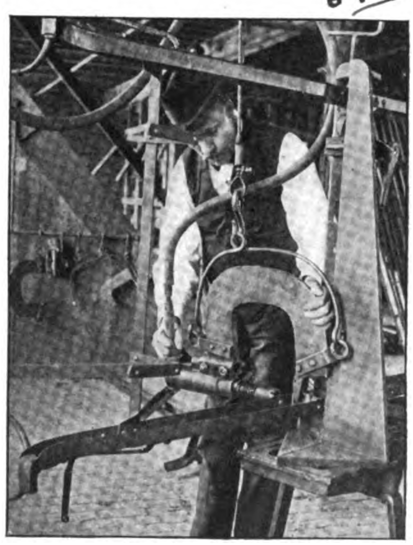


FIG. 7.—SHOWING A YOKE HAMMER IN OPERATION

Fig. 9 shows how one of these light, convenient cranes can be made if there is a good strong post in the riveting department, if not, it can be fastened to the wall. Make an eye bolt A, be sure and weld the eye end, put this through the post and have a washer and nut on. Then make a shorter eye bolt B. Take a piece of flat stock C, of the required size, say one half by two inches, round one end to about three-fourths inch and bend at right angle with bar. Then stave up the other end and punch hole about one inch, then bend as at D. Now, secure a round five-eighths inch rod E, turn an eye on each end and close one end into eye bolt A, and the other end into bar C. Put the rounded end of bar C into eye bolt B. This eye bolt need be put but partly through post, as there is no outward strain on this bolt whatever. A top and bottom pulley F and G are now secured and held in place by swivel H. A half-inch wire cable is used over bottom pulley, one end going to air hammer, and the other end to counter weight.

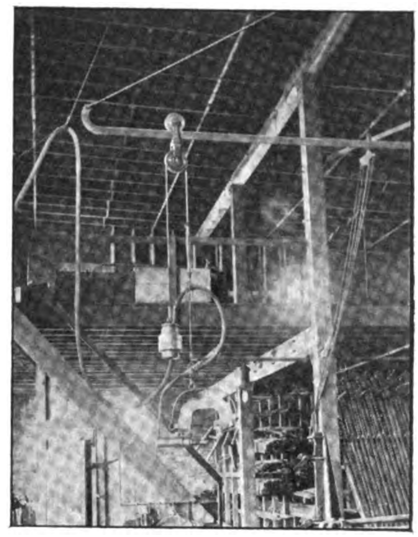


FIG. 8.—SHOWING YOKE HAMMER EQUIPMENT

To make the pulleys take a piece of cast iron or machine steel about one and a quarter inch thick and eight inches in diameter for the top pulley. Machine as shown at A, Fig. 10, to fit edge of flat bar C in Fig. 9. For the bottom pulley

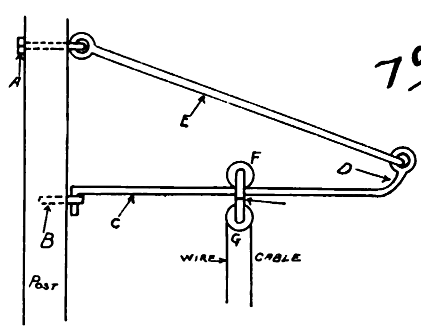
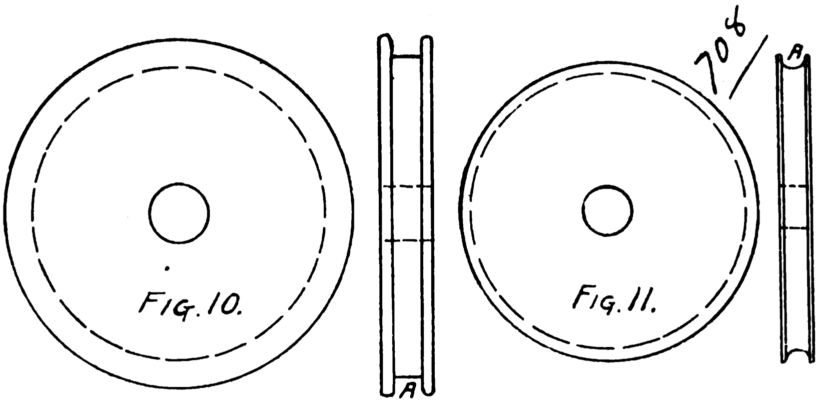


FIG. 9.—SHOWING STYLE OF CRANE FOR CARRYING YOKE HAMMER



FIGS. 10 AND 11.—SHOWING WHEELS USED IN SWIVEL

machine as at A, Fig. 11, to fit half-inch wire cable. To make a good strong swivel for connecting pulleys take two pieces of flat stock about one half by two-inch machine steel and forge as shown at A and B, Fig. 12. Fasten these together by stud C, with one nut on each end. Tighten nuts just enough to allow A and B to work around freely. Then rivet ends of stud so that nuts cannot come off. Altogether, this makes a splendid arrangement for handling a yoke hammer to turn out strong work rapidly. These yokes can be forged in any shape to suit the class of work to be done. Some frames require two or three different shaped yokes to complete the riveting of all parts, but by having a number of different cylinders, and having a hook at the end of cable for yoke to hang in it does not take up much time to change from one hammer to another. As can be seen in Fig. 7 the end of the yoke holds the head of the rivet and by turning on the air with the right hand the set does the rest. Fig. 13 shows a complete frame in a form which squares the frame before being riveted. The same cut shows air hammer, furnace, and other paraphernalia, in one corner of the riveting department in one of the largest automobile factories in the country.

Bicycle and Automobile Repairing.

FRANZ WENKE.

A few years ago when the bicycle craze came up, I was often approached to repair bicycles. As a rule, I turned down such jobs as were not paying. Even when I bought my boy a bicycle, I sent it to town for repairs, because I thought they could do a better job than I. But, after I saw what I was paying for, I could see that I did better work on old manure wagons. Now come automobiles, and I, as a government blacksmith, do not have to do such work, as the government does not keep "honk honk" wagons out here. But some of the officers have them and they need repairing. The first one I would have liked to fight shy of if I

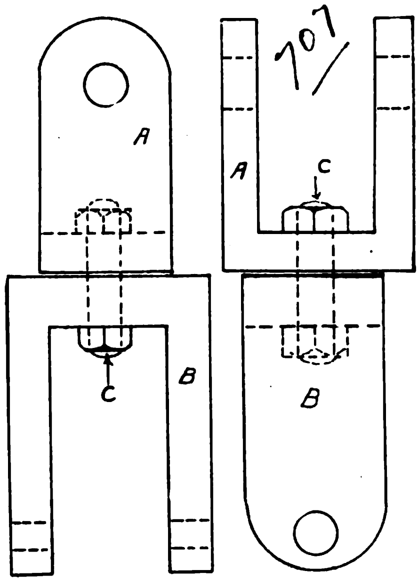


FIG. 12.—SHOWING HOW SWIVEL IS MADE

could, without spoiling my reputation, but it would not work. I had to go at it. O, my! How easy it was. The officer told me that in the garage, where they do repairing, they could not find out what made the machine hammer. After tinkering for about two hours on it, they let it go. Now, nothing was the matter with it at all, but three of the cranks were a little loose. It was a little matter easily adjusted, and I found it in the first five minutes. Since then this same automobile has been into my shop at least once a week, as the owner is an awfully hard driver.

I am not writing this in order to puff myself up as an automobile expert, but I want to show some faint-hearted countryman, who perhaps will get scared, as I did at first, that a nicely painted stink wagon is no mystery at all.

If a man is a good mechanic and a little ingenious he can make almost any repair, with but few tools. But one thing I would advise is to charge a good, stiff price, no matter how insignificant the job looks. The man who sports around in an automobile generally has the price and does not care as long as he can go on his way rejoicing, killing stray dogs and cats, chickens and pigs.

The Baker Electric.

The Baker Motor Vehicle Company have just placed upon the market an electric runabout, which they style a strictly gentlemen's carriage on the modern automobile lines. It will be noted that the steering of this model is manipulated by a wheel, as in the mod-

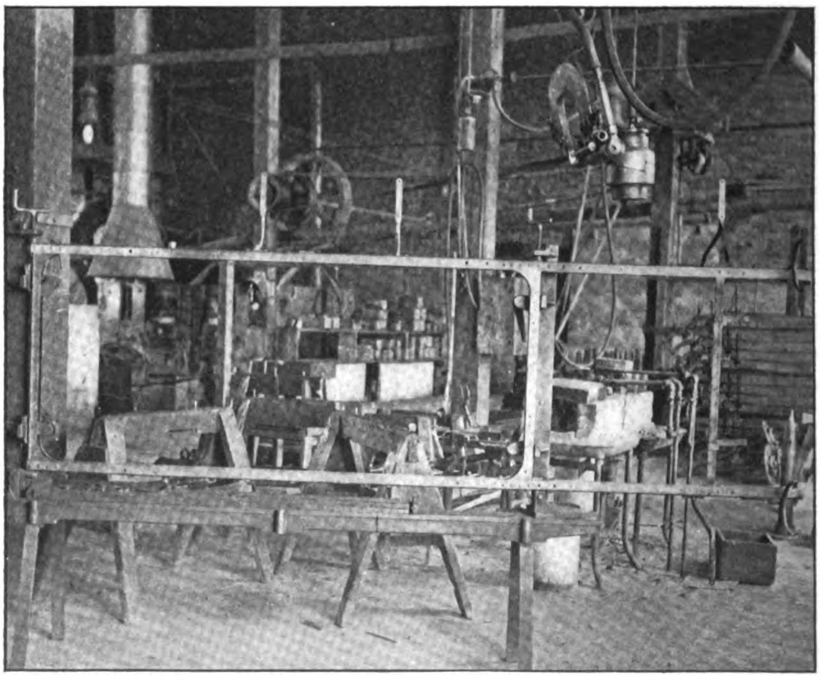


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FIG. 13.—SHOWING AUTOMOBILE ON RIVETING STAND

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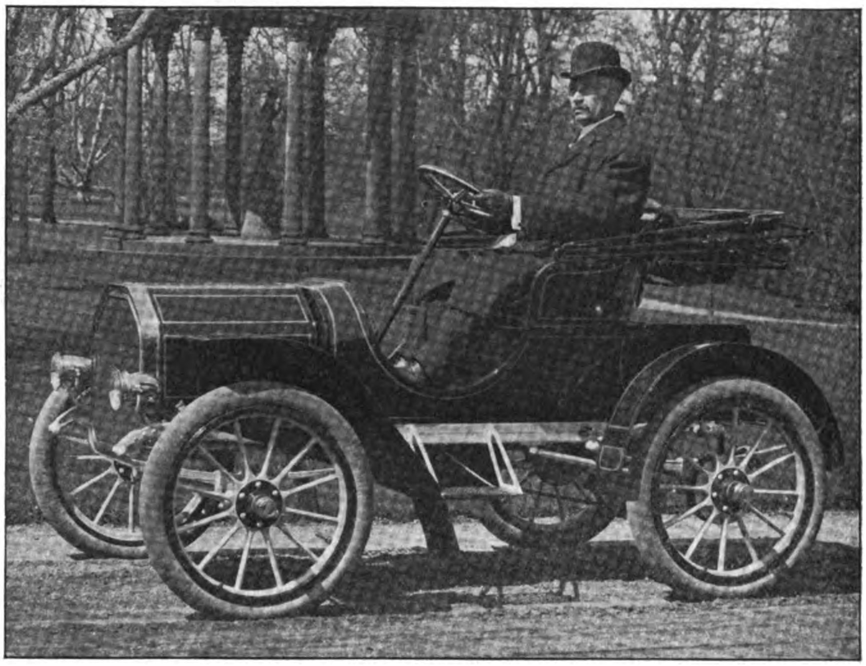
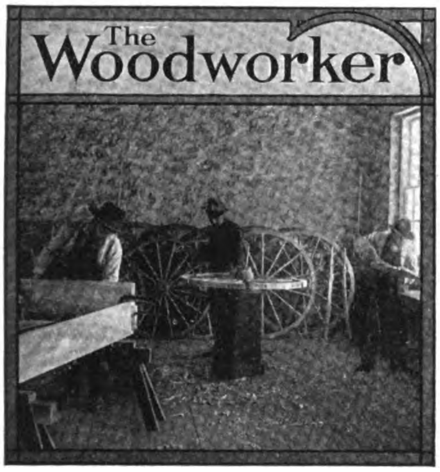
ern gasoline car. The controller lever is placed directly under the wheel and operates the controller with its six speeds forward and three speeds reverse.

The power is transmitted from the motor to the countershaft by means of a Renold chain encased in an oil and dust proof case. The drive from the countershaft to the real axle is by means of a single chrome nickel roller chain. Braking of the car is effected by means of two-foot brakes.

While there is little likelihood of the general smith being called upon to repair an electric carriage, it may be well for him to know a little about this style of vehicle, so as not to be entirely ignorant on the subject of electric-vehicle construction, should he be called upon to repair one.



THE BAKER GENTLEMEN'S ELECTRIC CARRIAGE



When a wood screw works loose remove it, fill the hole with cork and then replace the screw as previously. N. A. D., Illinois.

When running screws into hardwood have a piece of common yellow soap handy and stick each screw into it before driving. It saves a good bit of hard gripping and twisting. N. A. D., Illinois.

To remove a splinter from the hand, fill a wide-mouthed bottle or jug, the jug is not so likely to crack, with hot water and place the part of the hand containing the splinter directly over the mouth of the jug and press lightly. The action of the steam on the injured flesh will draw out the inflammation and also the splinter. Try this next time. G. N. G., New Jersey.

Some Wagon-Building Experiences.

L. VAN DORIN.

Since reading brother Daron's article on axle setting in the March number of THE AMERICAN BLACKSMITH, I feel like giving my evidence, which is altogether from an experimental standpoint extending over some forty years of practice. After learning that there were so few mechanics who could agree on the amount of gather an axle(or spindle) should have, and none could give any reason why they should have any, I started to investigate. Some would say that the taper in the spindle made it necessary, but they could not tell how much was necessary to overcome the influence of the taper. Mr. Daron gives a very pretty sounding reason, but I beg to differ with him, as I find a little gather spoils the run of a thimble skein wagon just as much as it does an iron or steel axle, which, from his theory, would require more, as it has more taper, his rule being one tenth of the taper. You can see I don't believe in gathering spindles, that is, to throw points forward at all. Now, I will attempt to tell you the first circumstance that set me right on that question, though I have had plenty more convincing circumstances since.

Some thirty years ago, a wood-worker and myself were working together building wagons in Iowa. I was the smith, and we built thimble skein farm wagons altogether, and, of course, it was his business to set the skeins. Many a tilt we had over the way he set them. I claimed he was giving them too much gather. Well, we wanted some lumber to enlarge our shop, so I took three wagons, and went twenty-five miles for the lumber. One man

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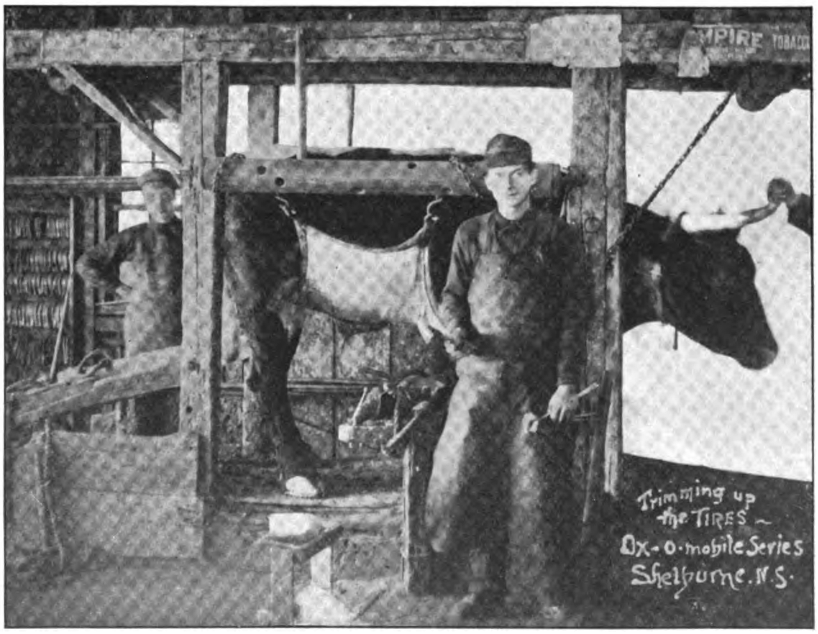

AN OXSHOEING IN NOVA SCOTIA, ACCORDING TO MR. CARROL A. FOERMAN

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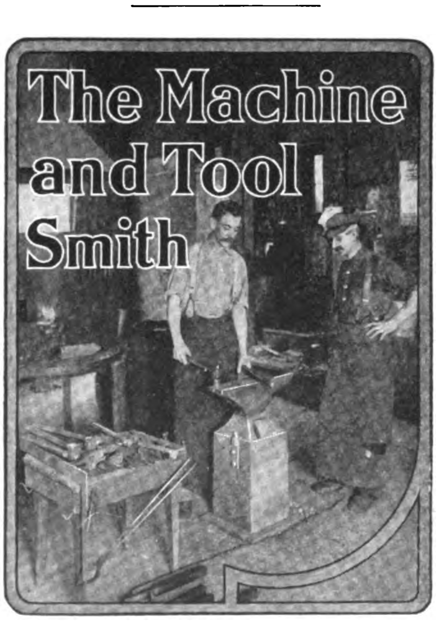
drove a wagon built in Fort Madison, another had a wagon made in Trenton, and the other had a wagon built by my partner and I, and though he had a good, heavy team of horses, I noticed that they were working much harder than the other two teams. Neither did this wagon of ours "chuckle" as did the others. At noon I got a stick and measured on each wagon the distance between the back part and front part of the wheels at the tire. One wagon measured the same back and front, the other very nearly the same, while the wagon we built measured between two and three inches nearer together in front than behind. I then paid particular attention to how it ran compared to the other two wagons, I found that the wheels would climb in trying to run in the direction which the spindle held them until the spring of the spokes would throw them out at the bottom several inches. That's what Mr. Daron calls the sliding friction.

The next wagon we built I told the wood worker that if he would set the skeins without any gather, and it failed to be the best-running wagon he ever made that I would pay him for putting in other axles. He did as I requested, and was thoroughly convinced.

I advocate a parallel spindle, and give no gather or set. But better still is to have the axle turn with the wheels. You may think me crazy but I made one for myself.

How long do you think a railroad car axle would last if you gave it gather, and the wheels ran loose? Not long, I assure you.

BROTHER SKELLENGER'S GENERAL SHOP OF YORK STATE



When steel warps in hardening, it is evidence of unequal heating, improper dipping or lack of annealing. Oil or tallow is not so likely to cause warping as a water bath. G. A. S., Vermont.

When a defect occurs in the same place in a number of finished articles it's a pretty good guess that the fault lies not with the steel but in the manipulation. Look to the working. G. E. S., Maine.

When manipulating high carbon steel remember that the higher the heat and the more rapid the quenching the coarser the grain. Oil does not cool the steel as quickly as water while mercury and brine cool more quickly than water. L. A. K., Florida.

Changing Steel.

When and How to Make a Change.

E. R. MARKHAM.

I remember an experience I had at one time with a lot of axes that persisted in cracking when they were being hardened. A party sent me a box containing ten or twelve axheads, every one of which was cracked. A note stated that seventy-five per cent of those they had attempted to harden cracked in the operation.

On investigation I found that this concern had been in business for a number of years; that they had hardened thousands of axes, and that they had never experienced this trouble before. Experience has taught me that every effect must have a cause; so I set about finding the cause for the trouble. The axes were drop-forged from steel made by a reliable steel concern. The same concern had furnished steel for many previous batches that had given no trouble. I sent for several axes from various lots that had worked all right, took drillings from them and from one of the cracked ones, analyzed the steel from the various heads, and found that the ones that were giving trouble contained a higher percentage of manganese than the others.

I immediately wrote the axe company and asked them why they had changed the composition of the steel used? Their reply was that the previous batches had been forged so thick on the cutting end that they had found it extremely costly to grind them to the proper thickness. As a consequence they had given orders to the concern doing the forging to change the dies so as to forge them thinner, and in this way make it possible to save on the cost of grinding.

After altering the dies, it was found almost impossible to make the steel flow out into the impression. The steel concern was consulted and said they thought they could furnish a steel that would fill out and make a perfect forging. Samples were submitted and were found to work nicely. But the trouble came when the steel was hardened.

However, the axes were forged, and the forgings had been accepted and paid for. The concern doing the forging didn't think they were in any way responsible, as they had altered the dies according to instruction, and had forged the work from steel furnished them. And, of course, no fair-minded man could blame them. But there was a batch of several thousand axes that must be used if possible, and it was up to me to find a way to harden them if I could. A careful examination of the various cracked heads showed that each crack started from a *depression* on the edge, as shown at A. The axes had been forged, annealed, and then cold-trimmed; that is, the flash was removed by forcing forging through a trimming die, and, as stated, the trimming had been done cold. As the cracks all started from the ragged edge, reason told me that we should get rid of this ragged edge before hardening. So I took a number of the forgings to an emery wheel and ground away the ragged portion, leaving no invitations to cracks.

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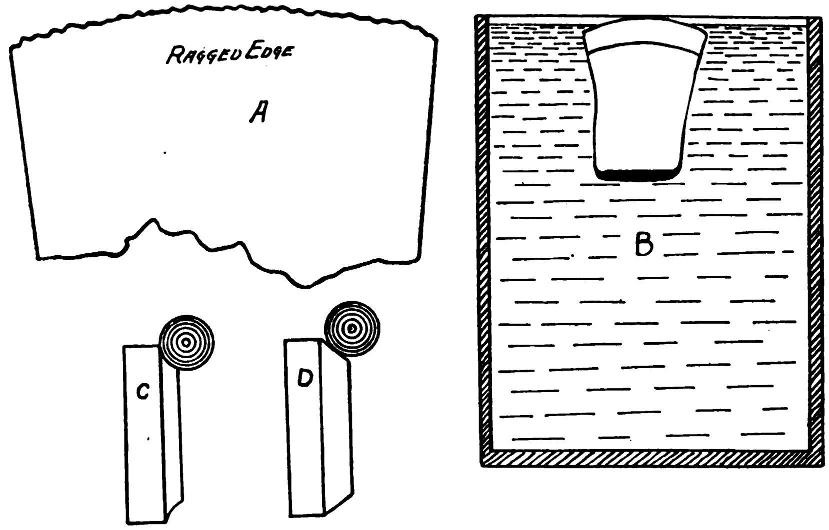

WHEN CHANGING STEEL CONSULT THE MAKERS AND GIVE THEM FULL INFORMATION ON YOUR NEEDS

The heads were then carefully heated to a low red and dipped in a bath of warm brine. To reduce, so far as possible the tendency to crack, they were dipped with the heavy portion down as shown at B. I hardened several dozen of the axes, and asked the company to test them. I requested them to give these as severe, or a more severe test than they generally gave those of the same size and pattern. They reported them as standing up as well, if not better, than any they had ever tested, and so far as I know they are making axes from steel of the same composition, and hardening them by the same method now.

I have found, many times, that a man wishing to accomplish a certain result will ask for a steel that will make it possible to get the desired result, and does not specify to the steel concern certain other things, which, if they knew, might lead them to furnish a steel that would insure good results all around.

I remember at one time when connected with a concern manufacturing bicycles, the purchasing agent learned that a rival of ours, who was building a good wheel, was using a steel for cones that cost several cents a pound less than the steel we were using. In order to economize he ordered several tons of this steel for use in making our cones. As the steel was ordered annealed, and went first to the automatic screw machines, and was blanked to shape; no one in the works knew of the change.

When the cones were put in use they failed to stand up, as our cones had been doing, and we had had an enviable reputation on our bearings.

As previously stated I always start for a cause when I see an effect that is not desirable, and in the case under consideration I found it in the purchasing department. The purchasing agent, said that if the steel gave good results on our rival's wheel, it should on ours, and would if we knew how to treat it. The rival company was using what is known as a "circle-track cone," shown at C, while we were making a "bevel-track cone" as shown at D, the ball getting but a line bearing on the cone. Consequently our cone had to be made from a better steel and hardened much harder than a cone of the other design.

In order to use the cones made from this steel it was necessnry to pack them with charred leather in an iron box, and subject them to a red heat for several hours, to charge them with sufficient carbon so they might be hardened sufficiently for our use. This process made the cones cost more than if the proper steel had been used. Our purchasing agent was given to understand that under no condition was he to change stock, or substitute a "just as good" unless such a change was sanctioned by the heads of departments who knew what was expected of the steel and how it was to be treated.

An expensive steel is not necessarily a satisfactory steel. For many purposes a cheap steel will work as well, or even much better, than an expensive article. When an expensive steel is needed, it is folly to buy anything but the proper article; for an expensive steel may be very cheap, and a cheap steel may be very expensive.

A purchasing department may be a good thing for a manufacturing concern, and it may be one of the greatest trouble breeders imaginable. It all depends on the power given the man running the department, and on his attitude. If he is willing to consult with those who are familiar with the requirements of the various portions of the product and the stock to be used, well and good.

Not every man who has worked in a shop for years understands the composition of steel or the effect of changing the proportions of the various elements. An addition of a very small amount of a certain element may produce a desired result, as was the case when a slight increase was made in the amount of manganese: the steel flowed into the impression in the die, but the effect was decidedly bad when the steel was hardened. To be sure, we were able to get out of the difficulty, but, it isn't always possible to get out of a "scrape" as easily as we got out of this one and have everything turn out satisfactorily.

When it seems desirable to make a change in the steel, and we decide to consult the makers, let us be sure to tell them everything concerning our

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MR. SHERMAN STEMPLE'S GENERAL BLACKSMITH SHOP IN OHIO

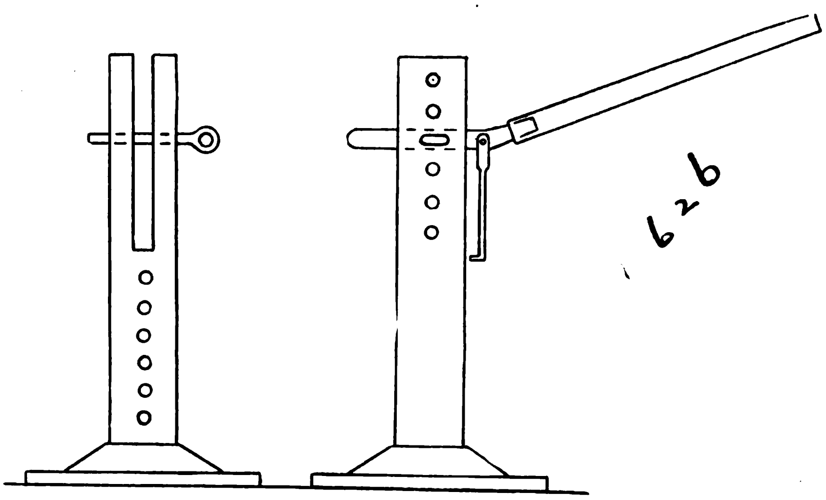

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FIG. 1.—A HANDY WHEEL JACK EASILY MADE

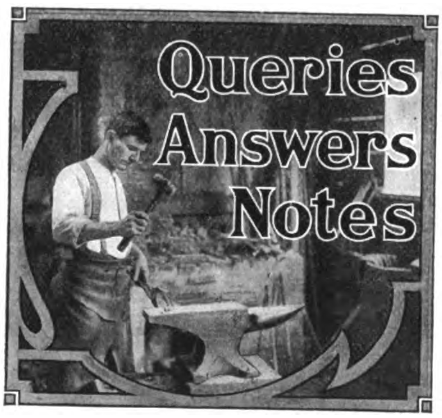
product, as they will then be able to advise us intelligently.

To Make a Wheel Jack and a Pair of Trestles out of Old Pipe.

ROBERT JONES.

To make this trestle, procure a piece of pipe about five feet long, and about six inches from each end saw two cuts across the seam of the pipe, using a hack saw for the work. The cuts should be about three fourths through the pipe and one and one fourth inches apart. The pipe should now be opened between these cuts at the seam, and the two lips bent back in the same angle at which the legs are to stand. Next procure four pieces of pipe about two feet six inches in length, having a bore of one and one fourth inches. Drill two $\frac{9}{32}$-inch holes in one end of each pipe, and rivet these legs to the lips of the other pipe by means of $\frac{1}{4}$-inch rivets. Now, about half way up on the legs, fasten a piece of 1-inch pipe and drill a $\frac{9}{32}$-inch hole through the center, fastening a brace made of iron one inch wide and one fourth of an inch thick, as shown in the accompanying engraving. Figure 1 of the engraving shows the completed pipe trestle which is a very handy article around a blacksmith or wagon maker's shop.

The wheel jack is made of 2-inch pipe, two feet six inches long. Cut a slot one inch wide and fifteen inches long down the length of the pipe, and drill twelve $\frac{7}{16}$-inch holes as shown in Fig. 2 of the accompanying engraving. This upright should be screwed into a pipe fitting and fastened to a block of wood two inches thick and ten inches square. When this is done, procure a piece of iron seven eighths of an inch square and twelve inches long; five inches from one end drill a $\frac{7}{16}$-inch hole, and make the other end round for a distance of about two and one half inches. Over this fit a handle made of pipe. On the bar of iron, fasten a three eighths inch piece of round iron bent as shown in the engraving. The pin shown at A in Fig. 2 secures the bar of iron at any hole in the upright so that the bar may be raised or lowered as desired, and the attachment shown at B holds it in the desired position.



The following columns are intended for the convenience of all readers for discussions upon blacksmithing, horseshoeing, carriage building and allied topics. Questions, answers and comments are solicited and are always acceptable. Names omitted and addresses supplied upon request.

Full of Genuine Information.—You are publishing one of the best papers of its kind I have ever seen, full of genuine information and solid facts. This is no joke; it is true. A. E. CARR, New York.

Wants to fit Hubs.—I would like to have some good brother wheelwright tell me how to fit a hub so that it won't dish the wrong way. I want information on buggy hubs more especially. I have tried several and they dish the wrong way. I am young in years as well as in business. R. ELMO HARRIS, Tennessee.

Wants to Temper Hammers.—I would like to ask some writer in THE AMERICAN BLACKSMITH to give me the best methods of tempering hammers. I either get my hammers too soft or too hard; they won't stand as long without breaking, as one I get new. Some advice on this subject will be appreciated. S. A. FLYNT, Georgia.

Wants to Make Steel Jars.—Will some brother smith tell me through "Our Journal," the best way to make solid end hard steel jars for well boring? I want to make the pin and box ends of the jars of low moor iron, joining them by means of a shark's mouth weld to solid hard steel for the jars proper. I receive the paper every month, enjoy it very much and read it from cover to cover. Can some well driller help? W. DEARNESS, Queensland.

Shoeing for Pitched Ankle.—Being in the profession I should like to ask a question and will endeavor to explain my wants and what I have done. I am shoeing a horse that has a pitched ankle behind, due to strain. It seems as though the tendons are contracted but they are not sore. The ankle is not enlarged but just a little above normal. I have been leaving the calks off behind and trimming the heel short, leaving the toes long in order to try to make him stand back straight and I have been successful to some extent. If any of the members know anything better I would like to hear. J. M. AUSTIN, Tennessee.

A Letter from Massachusetts.—We like your paper very much as we get a lot of good things from it. We used to get along without power in the shop, but read so much about it in your paper that we bought a three-horsepower Olds gasoline engine. Our equipment now consists of a band saw, a bench saw, a buzz planer, a drill, a bolt machine, and a horse clipper. We build wagons and sleds and do all kinds of general and automobile repair work. Last summer we sold nine wagons and have one in stock now. We are also building a new shop twenty-six by fifty feet, two stories high in front and three in back. RIX BROTHERS, Massachusetts.

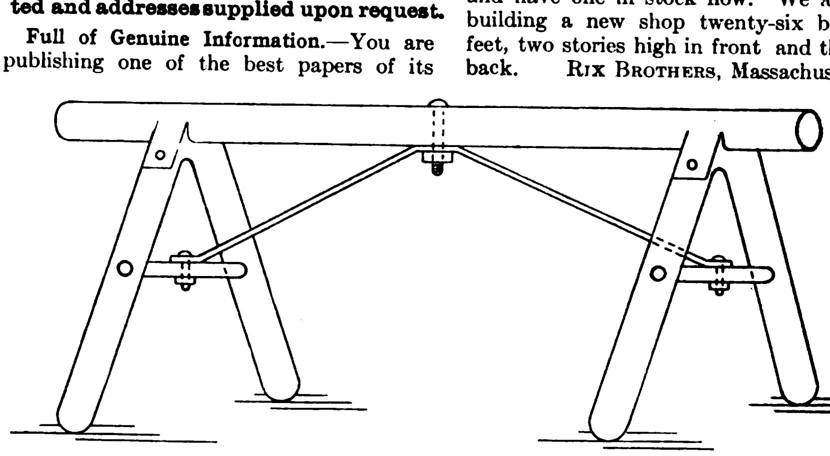


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FIG. 2.—SERVICEABLE TRESTLES CAN BE MADE FROM OLD PIPE

A Kentucky Smith's Equipment.—I have a fine large shop, thirty-six by ninety-six feet, and an eight-horsepower Fairbanks-Morse gasoline engine, which runs a 24-inch planer, a band saw, a rip saw, a drill press, an emery wheel, and also a corn mill which I run as a side line. I grind a great deal of corn as there is not another mill here or near here, and we Kentucky people must have our corn bread. I also have one tenon and boring machine, which I run with my engine. I have two forges and plenty of good tools of all kinds. I have a nut-boring machine, rubber-tiring machine, and box puller and would not think of trying to own a shop without power. GEORGE W. TIPTON, Kentucky.

A Shop of Louisiana.—Here is shown an exterior view of my shop. This engraving shows my water tank and engine yard and doors of machine and blacksmith shop. The wood shop for wagon repairing is to the right. I have a sixteen-horsepower Lambert gasoline engine, an eighteen-inch by fourteen foot bed Le Blam lathe, three Barnes drills, twenty-six, thirty, and thirty-two inch, a full line of hand tools, and pipe dies and tools. I make all kinds of sheet iron work. G. W. BOOZE, Louisiana.

A Voice from Australia.—I see some fellow is crying because there is too much gas-engine talk in "Our Journal." Never mind him—keep right on writing about gas engines, shoeing, and the making of ornamental gates or anything else connected with the trade. We are not all shoeing smiths, and while we like to see printed advice about horseshoeing, we also want to see something for the other fellow as well. So continue to write a lot about everything. I take it that Thornton's letters are written for a purpose, i. e., for advice to young smiths. And while I am not "learning to fly," there are some good things in Thornton's talks that we "old ones" might make a note of and benefit by. W. H., Australia.

Some Tennessee Prices.—I have read "Our Journal" for over a year and would not like to be without it. I started in the blacksmith business two years ago last March, and with the help of "Our Journal" and a few books I have learned to do a great many things. I am in a small place and have a nice trade, but would like to get a job with some smith where I could learn more. Prices are very low here to what some of our brothers get at other places. I will give a few of my prices:

Shoeing, plain	$1.00
Resetting	.50
Wagon hounds, front	2.50
Wagon hounds, hind	2.00
Tongues, wood only	1.25
Resetting tires, per set	2.00

CHARLES T. RODGERS, Tennessee.

A Kansas Price List.—The following is a list of my prices:

Four new shoes, any size	$1.50
Four old shoes, set	.80
Four old shoes, set and retoed	1.00
Buggy tire, set cold on a Brooks	1.50
Buggy tire, set hot	2.00
Wagon tire, set hot or cold	1.50
Plow sharpening, any size	.25
Lister sharpening	.35
New plowshares, twelve-inch	3.00
New plowshares, fourteen-inch	3.25
New plowshares, sixteen-inch	3.50
New wagon axle, hind	3.00
New wagon axle, front	$3.25
Cutting down with bent rims	9.00

My prices for all other work are in proportion to the above price list. I have no power as yet, but intend to install a gas engine in the near future. I fit my shoes neither hot nor cold, but just have them warm enough. A. C. WAGNER, Kansas.

Shoeing the Nervous Mule.—In the May number I noticed that brother Alex Fritz, of Pennsylvania, asks for advice as to what to do with that extremely nervous mule, which the owner won't allow to be placed in stocks to be shod. My advice in such a dilemma would be to request the owner of the nervous pet to provide a plentiful supply of blankets, quilts, and feather ticks, which are to be quietly placed near his muleship. Then get a good veterinary surgeon to quietly apply a liberal dose of chloroform to quiet the beast and then shoe him. If the mule never wakes up, but has gone to the realms where all mules go, good or bad, so much the better. The owner, of course, is to bear all expenses and stand all risks, and if he refuses, I would whisper to him quietly to take his mule away until such a time when he (the mule) can be shod without these appliances. GEORGE NABLO, Ontario.

From the Green Mountain State.—Your paper is worth many times the subscription price to every blacksmith, old or young. All craftsmen can get some very good ideas about their work. My boys are very much interested in the book—they look it over before I do. I believe it is the duty of every blacksmith to help "Our Journal" all he can. I have worked thirty-three years at this business and I do all kinds of work that is done in these parts. I have a shop thirty by fifty feet of two stories. It consists of a blacksmith shop and a wheelwright and paint shop. I have an eight-horse power Olds gasoline engine, two planers, a stripping saw, a cut-off saw, a turning lathe, and this last winter I made a band-saw and boring machine and they work first class. Now I am making a footpower with which to run my blower so I can have both hands to handle my tongs with. OVIDE BARBER, Vermont.

Something on Interfering.—I see in the shoeing department that a brother shoer says he can stop any horse from interfering in a couple of shoeings. I don't agree with him. I have seen horses that no man could stop. There may be a case of a horse that hits barefooted as well as with his shoes on. There is no rule for horseshoeing, as no two horses go alike. I have only had ten years' experience, but that is long enough to know that no one has ever learned all there is to know about horseshoeing. Our prices are almost uniform in our town:

Four new factory shoes	$1.60
Four new hand-turned shoes	2.00
Four new Neverslips	2.50
Four old shoes	.80
Two new rubber pads	3.00
Two new bar shoes	1.50

My prices for other work are in proportion to the above. L. B. SHREVES, Ohio.

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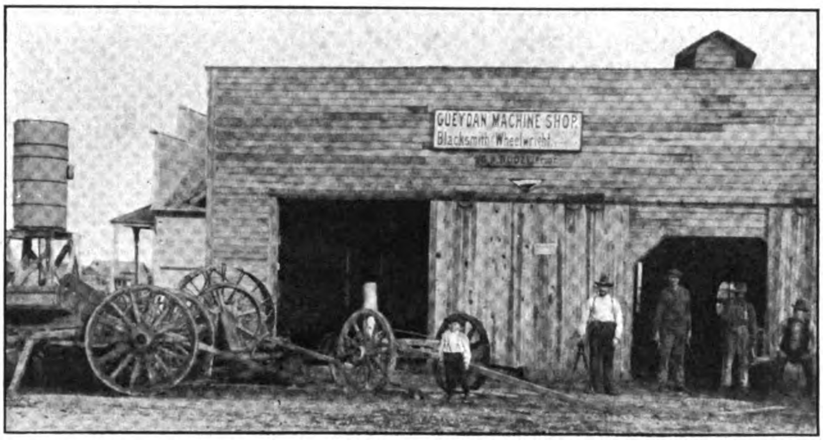

A LOUISIANA MACHINE SHOP WHERE GENERAL SMITHING IS ALSO DONE

Appreciation and Our Journal.—Well, I declare! something new to learn every day. I really feel sorry for the man who can't learn anything out of "Our Journal" unless it is all adapted to horseshoeing or engines. But you know there are lots of men whom you can't please. This puts me in mind of a rich old miser. His name was Oley, and he happened into the corner dispensary one day where a friend of his offered him a glass of thirst quencher. He replied, "Thanks, I — don't — drink — but I'll — take—the—nickel." Now, here is the point: if you are a horseshoer and don't like the engine talk, take the nickel; but, my friend, if you want the nickel, you must familiarize yourself with all of the articles in "Our Valuable Journal." We experienced craftsmen have used our brains to study articles, and we send them in order to give something of value to our brothers. There are scores who appreciate them, and I hope that this item will set some hungry soul a studying. C. W. METCALF, Iowa.

Explaining Thoroughly.—I have thought for some time of writing to the paper as I have seen so many urgent calls to do so. I have been in the shop for myself for the past fifteen years; and have run a general shop here for the past twelve years. My shop is iron clad, twenty-four by fifty feet, built about eighteen months ago. I have a good lot of tools and run two forges part of the time. Now, what I was going to say is this; I noticed a letter from Brother Silsa, of Kentucky, on tire setting. He fails to state what kind of tires he draws three eighths of an inch. I think right here is where some of us older smiths make a mistake. A young man just starting in would think it applied to all tires, although we older ones would understand what was meant. We all know that a hind tire of a farm wagon will take more draw than the front one, to make both tires have the same set on the wheel. You take a buggy tire, draw it three eighths of an inch and put it on if you can get it on and see what kind of a job you have. Just try it, if you haven't. I do not mean to say Mr. T. C. Silsa does not know how to set a tire, but I do say that he does not explain the matter enough for the young smith. H. H. HAYS, Texas.

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THE EAGLE SHOEING SHOP OF WASHINGTON

Success Due to Our Journal.—I have been a reader and a subscriber to THE AMERICAN BLACKSMITH for four years and would not do without it. I started in business three years ago the third of last December and my business has doubled itself in three years. I never worked a day under anyone, but I simply read your good paper and hammered the rest out. I am living in a small village of about fifty inhabitants and there is another smith here. He started about three months before I did. He is somewhat younger than I, but learned the trade, while I did not. My side lines are up-to-date apple butter boiling and cider making, and I make a specialty of woodwork. I am the only smith in the county that has power. I do an up-to-date business and treat everybody alike. I have the following machines in my shop: a band saw, a cut-off saw, a jointer, a drill press, an emery wheel, a tire bender, and all the other tools that are necessary. We have low prices in this county, but I think they will soon be better. I must say again that my success depends upon "Our Journal." Success to THE AMERICAN BLACKSMITH. W. IRA BAKER, Pa.

A Letter from North Carolina.—I am a great friend of THE AMERICAN BLACKSMITH. I get lots of information out of it, but one thing I don't like to see is that the craft have so many different ideas on horseshoeing. Of course, for shoeing a horse that hits his pasterns, a standard rule will work the majority of times. Build the inside so as to get it level and he will walk wider. Should he overreach, shoe him wide and long in front and high at the heels, and let his hind shoes extend well in front and have a low heel, and he will seldom interfere if not rushed out of his gait.

My shop equipment consists of a Buffalo down-draft forge, a Trenton anvil, a Silver drill press, Green River tire setter, three full sets of dies and taps, including one set of Little Giant; one full set S steel wrenches, all sizes, and a complete set of woodworking tools. We do all kinds of work from repairing a plow to fixing a traction engine. We also sell several lines of hardware. Prices are not very high down here.

Shoeing, common	\$.70 to \$1.00
Tire setting	1.50
Axles, each	2.00
New brakes	3.00
Tongue	1.00
Bolster, each	1.00
Felloes, each	.20
Spokes, each	.12½

Other work in proportion.

H. P. CRANFORD, North Carolina.

An Interesting Craft Letter.—In reply to T C. Silsa, I would say the way we do the thing is to have a wheel form. We cut out the rim and screw it down face up and screw the dish into the wheel and then give about a quarter-inch draft to the wheel. If your wheel is any good at all, the draft you give it after it is solid has a tendency to crush the felloe and then it is no good.

Now for brother Murrell, of Louisiana, he has done well, but there are others. We, in California, are not so slow. I have been in business in one place for fifty years. When I commenced business, the first thing I did was to borrow \$500.00. I commenced to hammer and kept account of my income till 1896, and up to that time paid for expenses \$411,511.83. I find that others have done just as well, but I still keep at work simply because I like it. If any young man will settle down and tend to his business and live a clean life he will get along, for the lives of straight men make the world. I have one man who has worked for me for forty years, another thirty-two, and another twenty-three years. In the fifty years no man has presented a bill for which he has not gotten his coin at presentation. And if any of you brother blacksmiths had now what I have given away you would think you had enough. If you want to make a success of business, I would say, Brother, keep your credit good and your life clean. V. S. NORTHEY, California.

Tempering a Claw Bar.—This is the first time I have spoken in regard to your paper and must say that it is all right in every respect. I am like some of the other boys I see writing in the paper, not much of a blacksmith, but want to learn. About six months is the longest I served as an apprentice and during that time I had nothing to do but pare horses' feet, so I thought it would take me too long to learn how to make a plow share with that kind of work. So I put up a small shop on my farm, done my own work and most of the neighbors' around. Now, I have started in a little village two and one-half miles from my farm and have worked up a name as being a first-class plow man, and handy man in general. But there are scores of things I must learn and they must come from your paper.

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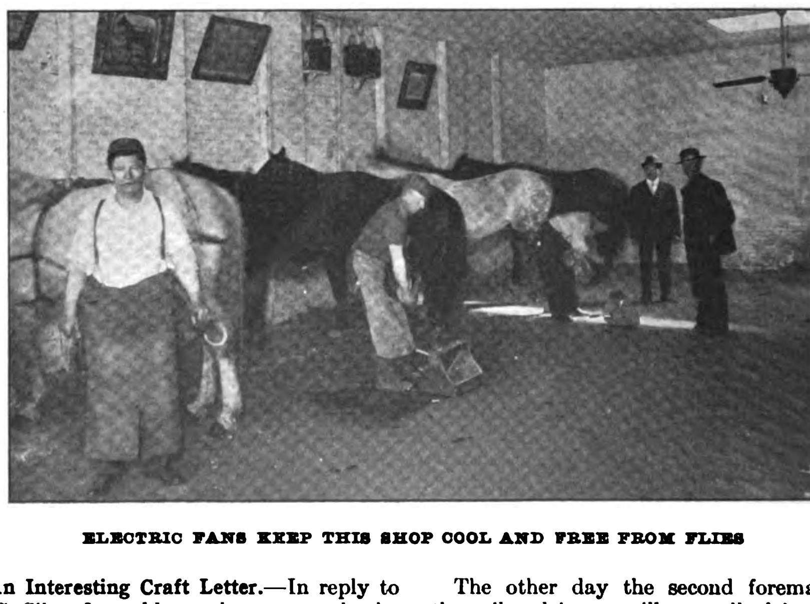


ELECTRIC FANS KEEP THIS SHOP COOL AND FREE FROM FLIES

The other day the second foreman of the railroad in my village walked into the shop with a crowbar for drawing railway spikes out of ties. The claws had been broken off and he said that if I could draw the claws out again and temper them so that one of the claws would draw a spike itself, he would give two dollars for it. Now, he claims he has been at that kind of work for twenty years and in that time he has only run across one blacksmith, that could temper the claws to stand. It would oblige me greatly if some brother would let me know how to do this.

D. R. VAN ALSTINE, Manitoba.

Two Shops of Washington State.—The accompanying engravings show two interior views of the Eagle shoeing shop and also an exterior view of Mr. D. W. Maloney's shop. Spokane has the neatest shoeing shops of any city in the Northwest. Others that might be mentioned are the shops of Mr. John Klein, Robertson & Skene, Mr. Jameson Brady and Mr. William McEcheron. These shops all have electric motors, electric lights, telephones, and other up-to-date equipment. The shoeing business is well organized in this city. Prices at this time are:

Four shoes, up to No. 6	$2.00
Four shoes, No. 6	2.50
Four hand-turned shoes	2.50
Rubber pads, per pair	$1.00 to 2.00
Bar shoes	1.00 to 1.25

Wages are $4.00 a day of nine hours and eight hours on Saturday. Shoes $5.50 per keg, coal $18.00 a ton, and rent from $25 to $60 a month. J. SIMPSON, Washington.

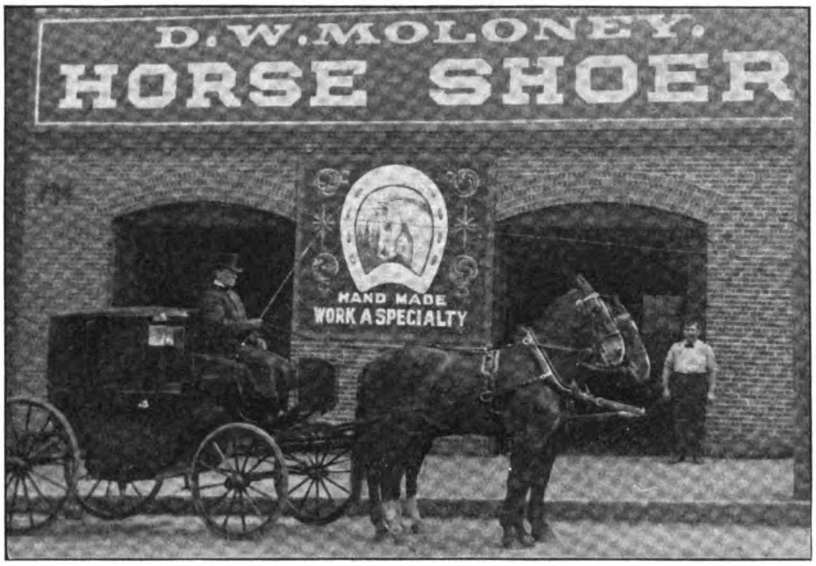
A Letter and Prices from Virginia.—I will write you a few lines to tell you how I like your paper. I would not be without it for ten times the subscription price. I owe the greater part of my success to THE AMERICAN BLACKSMITH. It put a new life into me. Since I have been a reader of THE AMERICAN BLACKSMITH I have put in power and have a general repair shop. I have a four-horsepower I. H. C. gasoline engine, a band saw, a rip saw, a twelve-inch jointer, a spoke and handle lathe, a power drill, an emery wheel, a sand belt, and first-class tools of all sorts that are to be found in a repair shop. I have two men, never have an idle minute, and times are getting better. I hope the smiths will soon get together and form a union. I will give a few of my prices:

Four new shoes	$1.00
Resetting four shoes	.80
New buggy tire	4.00
Setting buggy tire	1.50
Rimming buggy wheels	4.00
New buggy shaft	1.25
Setting wagon tire	2.00
Wagon felloes, each	.25
Wagon spokes, each	.20
Wagon tongue	1.50
Wagon hound, front	3.00
Wagon hound, hind	2.50
Bolsters, each	1.50

Other prices are about the same. I am only a young smith, twenty-two years of age, but have worked at the trade since I was eleven. I have run a shop of my own for two years. My father is a smith, but has retired on account of his age, but can do a good deal of work yet. He is seventy-two years of age and he can still shoe horses. R. D. GOOD, Virginia.

A Letter from Canada.—I say keep going just as you are and pay little attention to that kicker. Let him get out as a journeyman, as one of the smiths has already told him, and he will then learn to appreciate "Our Journal." I am a journeyman myself and have worked in several town shops and for various mill companies, and yet I find "Our Journal" a good instructor. I am of the same opinion as one of our brothers, that apprentices should have some instruction besides what his employer gives him. I know of some employers who never figure on giving an apprentice any more knowledge than they can help, and the apprentice has to catch on as best he can. But then I think there is plenty of good instruction for a young smith, such as the correspondence schools give.

I am interested in the anatomy of the horse's foot and limbs and have always taken much pride in shoeing. I also think Benton's recipes and Thornton's letters are just the thing, and that kicker wants to be careful that he doesn't fall into any of those baths of Benton's or he will think they take effect. One fine feature of "Our Journal" is the exchange of prices of both raw and the finished product. Another is the fine engravings of various shops; and your gasoline engine and shop equipment display is of interest to me and should be to most smiths, as the gas engine is becoming universal as a small power. Heavy forgings are of interest, such as the mast band. In fact, it is good all-around knowledge in its turn, and I hope to see the day when our trade will be better protected through some organization. May that day come soon. J. J. ZELLER, Ontario.



MR. D. W. MOLONEY'S SHOEING SHOP OF BRICK

A Texas Price List.—I sell bolts, files, and screws as a side-line, and do all kinds of tin work. The following is a list of my prices:

Wagon Work.

Four tires, set cold	$2.00
One spoke in wheel	.25
One felloe in wheel	.40
Wagon tongue	2.50
Tongue hounds	1.50
Back hounds	1.50
Bolster, front and hind	2.50
Coupling pole	1.00
Axle, front, $4.00; hind	3.50
Wagon box	16.00
Wheel filled	5.00
Rods, each	.25

Buggy Work.

Painting buggy	$10.00
Wheel filled	5.00
New rims	2.00
One spoke and tire set	$ .75
Four tires set	2.00
One side of box	3.00
Both sides of box	5.00
Two shafts, short H	3.00
Ging head	3.50
Cross bar	1.00
Singletree	$ .75
Reach, straight	1.00
New steels	8.00
Welding shaft iron	.50
Axles upset and tempered	.50
Setting cultivator feet	.05
Cultivator beams	$ .25 and .50

Plow Work.

Making shares, 16-inch, $3.50; 14-inch	$3.00
8 and 9-inch, $1.50; 10-inch	1.75
Setting beam	.50
Mould board, 9-inch	3.00
Sharpening sulky	.20
Busters Pts.	.20
8 and 10-inch	.10
Pointing sulky plow	.75
Pointing walking plow	.50
Handles on walking plow	1.00
Laying shears	.12½
Shovels sharpened, per inch	.10

J. H. PARKER, Texas.

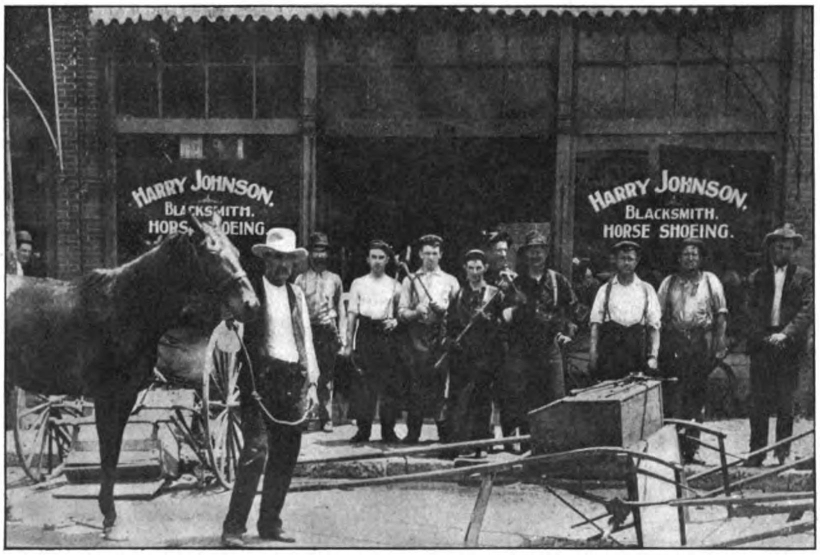
A Letter from West Virginia.—My shop is located eight miles south of town in the little mountain State of West Virginia. My shop is twenty by sixty-eight feet with basement of the same dimensions. My equipment consists of one six-horsepower Weber gasoline engine, and a good one it is I own one eighteen-inch French burr mill, one steel burr feed mill, one corn sheller, one turning lathe, one emery stand, one band saw, one circle saw, one home-made twelve-inch jointer, and one drill press. I would not attempt to run a shop without power of some kind. I also have one spoke tenon machine, one hub-boring machine, one tire bender, one tire shrinker, one 200 blower, one set Wells Brothers' screw plates, and a fair set of other small tools. I do a general blacksmithing business and build new wagons and buggies. Have plenty of work for two men the year around, and I find "Our Journal" a great helper in the shop.

I will say to brother J. C. Spruill that I have a six-horsepower Weber gasoline engine I will sell cheap. It is as good as new, and I don't think he can buy a better engine than the Weber. For particulars and price, address A. L. Wonycott, care of the Editor, who has my address.

I like to see the items on shoeing and on gas enignes in "Our Journal." I find the items on shoeing very beneficial, but when a horse comes to the shop to be shod I look at the old shoe and see how it is worn, if he happens to have one on; then I find a man must use his best judgment, with a little horse sense applied.

As to brother T. C. Silsa, of Kentucky, on tire setting, I don't agree with his rule. He says on a good tight wheel make the tire from three-eighths to one-half inch smaller than rim and put it on. I find a half-inch draw on a tight wheel will ruin it unless the rim is burned, which ought not to be done. My rule for setting tires on good, tight wheels is to make tire one-eighth to three-sixteenths inch smaller than rims for sarven wheels and not burn rim, and on wood hub wheels one-fourth to five-sixteenths inch for tight wheels and on loose wheels from three-eighths to three-fourths inch, according to looseness of wheel at hub and rim. A. L. Wonycott, West Virginia.

A General Shop of Oklahoma.—My shop is a two-story brick building, 25 by 100 feet. I employ twelve men, two wood workers, four smiths, and six helpers and handy men. We put up all kinds of wagons and buggies; and do all kinds of blacksmithing and rubber-tire work. We also have a large awning business, as a side line. I have one trip hammer, two motors, and one 36-inch band saw. The paint shop and storeroom are upstairs. I have been taking The American Blacksmith for some time and find it to be of great help and I enjoy reading the correspondence column very much. Harry Johnson, Oklahoma.



AN OKLAHOMA SHOP WHERE TWELVE MEN ARE KEPT BUSY

A General Shop of Missouri.—We have been in business about two years for ourselves. We have had several years' experience—my father being a mechanical engineer and my partner a general blacksmith. We have always found it to our advantage to subscribe to such journals as give us new ideas, kinks, recipes, and opinions from our fellow craftsmen. We now take several trade papers and refer to them from time to time. Both Thornton's letters and the other letters are good. As for the kicker, we do not like to hear a kick when we are doing a job as good as anyone can, at the same time we believe kickers make us try to improve. But we think, also, that some people would never be satisfied.

We have every copy of "Our Journal" that we have ever received, including the sample copies. We would not sell them if we couldn't replace them. Every craftsman, country or city, should read up on every subject in blacksmithing, woodwork, and machinery of all kinds. I have five brothers, the youngest fifteen years of age, and he is a practical mechanic. We repair every mechanical movement and never turn down a job that is worth repairing. We have learned to repair many a job through trade journals and expect to learn many more in the same way. We make our own drawings and patterns and cast our brasses. We have an I. H. C. gasoline engine, a twenty-two-inch by twelve-foot Blaisdell screw-cutting lathe, a drill, a trip hammer, an emery stand, and a rip saw of our own make, and will add more as soon as we can. We use our lathe for turning, screw-cutting, and milling. We make our own tools, and have learned to temper from "Our Journal."

We believe "Our Journal" could be improved only by adding more pages, including kinks and experiences with farm machinery and such things that the average smith cannot handle. While I was in a large city I often went out into the country for a few days, and I dare say it was seldom, if ever, that I was asked if I could do a certain job or make a machine do its work. No man can learn more than his head will hold, but he can refer to an article on a subject, and, if he is a mechanic, he can do the job without much trouble. Those that believe a man can learn but one thing right had better refer to books that deal on their subject.

If every blacksmith, woodworker, horseshoer, and machinist in the United States would take The American Blacksmith, take it home, read it, and practice what it teaches and send in their kinks we would all be first-class craftsmen and have a paper no one would kick on.] ere is a list of what we repair: steam d gasoline engines, threshers, grain l ıders, mowers, farm implements, pumps, windmills, well-drilling machinery, sawı ills, telephones, and other electric machin ›ry, sewing machines, bicycles, clocks a d watches, and other instruments and ma ines of different kinds. H. P. . S., Missouri.

An Electric Power Shop —I have an electric blower that will blo › four fires. It costs less than a cent an hour to run, and I find it a great labor saver and money maker. The other power machines I have are, a Modern power hammer, a Crescent band saw, a rotary disk sharpener, emery wheels, a Western Chief drill No. 16—all run by a three and one half horsepower Wagner electric motor. The other tools are two hand blowers, one Royal H. Western Chief portable forge, a Brooks cold tire setter, a Little Giant punch and shear, a tire bolter, two very complete sets of blacksmiths' hand tools, complete set of woodworkers' tools to do almost any job that is liable to come my way.

As to power, I consider none the equal of electricity when it comes to convenience and satisfaction. I would not change my electric power for gasoline if I knew I could get a gasoline engine to run on one half the expense. A gasoline engine is always giving more or less trouble. I have been running my motor about fifteen months and have oiled it once since it was installed. That is all the attention it requires. My largest electric bill for one month was $14.20.

If you have no power machinery, brother, you are not in the business. Do not hold off and look at that first expense as I did for two or three years. You can usually get easy terms on such things as you want and you will be able to meet the obligations as they come due and wonder how you did it, and still have as much left as by working the old way.

If I did not have power to do the work that is coming in now I would need double the men I now have. So get a power blower, a trip hammer, a band saw (if you do wood work), an emery wheel, and a power drill, and you will be surprised how much more work you will do, and do it so much easier too. If your city has electric power, run by that, if not, the next best thing is a gasoline engine.

Walter Main, of California, wants to build a trip hammer and asks for information. I will give him my ideas and talk plain. Forget the idea of building a trip hammer unless you want experience. Manufacturers of hammers build them by the hundreds and can build them and sell them to you a great deal cheaper than you can build one yourself. Two cases of homemade hammers have come directly under my observation, one in this city and one in a neighboring city. Both smiths spent a great deal more time and money than they would to buy a trip hammer, and still they haven't a good hammer. They say so themselves. There are many good makes of hammers. I use a Modern power hammer, which is advertised in "Our Journal." My competitor, who built one for himself, told me a number of times that he would have been ahead if he had bought one and he is going to discard his and buy a Modern. No, you cannot build one for $125, the cost of a good one. F. W. Smith, Colorado.

VOLUME 7

NUMBER 12

THE AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

BUFFALO N.Y. U.S.A.

SEPTEMBER, 1908

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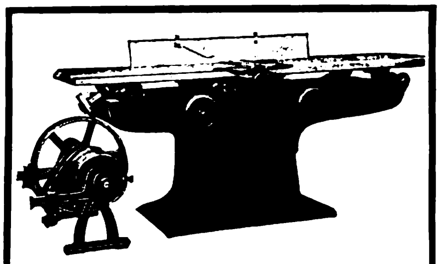

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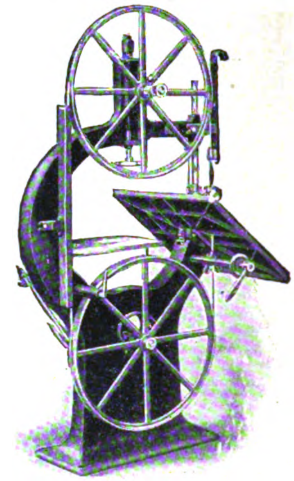

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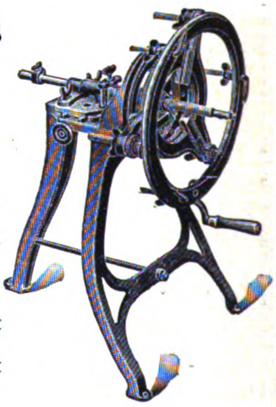

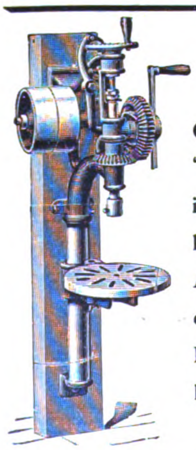

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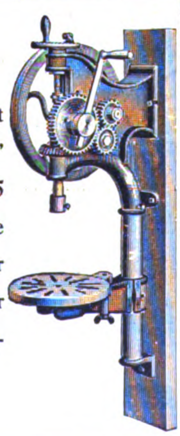
Our Booklet "Post Drills" illustrates 15 kinds we make Ask also for our "Power Drills" Booklet.



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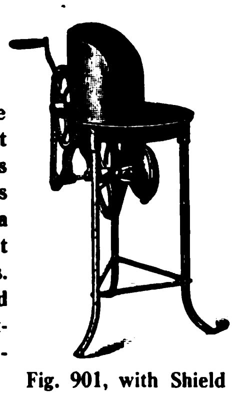
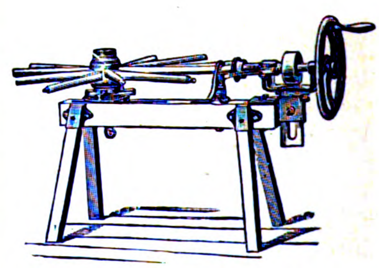


Fig. 901, with Shield



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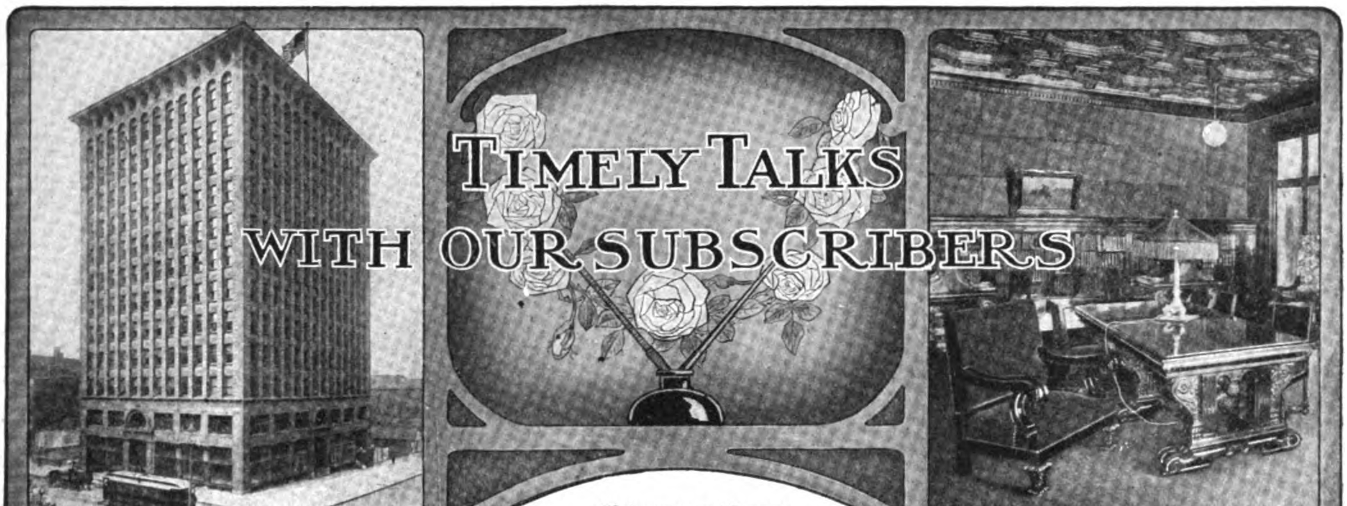

"Intercourse and Progress always go hand in hand."—Buxton.

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Subscribers should notify us promptly of non-receipt of paper or change of address. In the latter case kindly give us both the old and the new address.

Seven Years.

This issue marks the close of another volume of "Our Journal," and as we look back over the seven years of existence, we see seven years of growth, improvement, and prestige. THE AMERICAN BLACKSMITH has always aimed to serve the best interests of the craft at all times. THE AMERICAN BLACKSMITH is the biggest kind of a success. Letters complimenting us upon our good work have poured in from every corner of the world. AMERICAN BLACKSMITH matter has been reprinted by both foreign and domestic contemporaries, and it has generally been acknowledged as authoritive. THE AMERICAN BLACKSMITH has always stood for the best of everything along craft lines, and it will continue to stand for honesty and fair dealing for time without end. An honest industry needs an honest publication, and the mission of THE AMERICAN BLACKSMITH is to honestly represent, help, and encourage the smithing trade. Our policy of serving readers at the first table and the interest of the craft first, last, and always, has been our platform since the beginning. Our "big stick" plan of protecting the interests of the individual craftsman is another plank in our platform, and always our motto has been and will continue to be, "A Fair Deal and a Square Deal for Everyone." And we want every one of "Our Folks" to feel at liberty to write, discuss, praise or complain of anything that appears in the columns of "Our Journal."

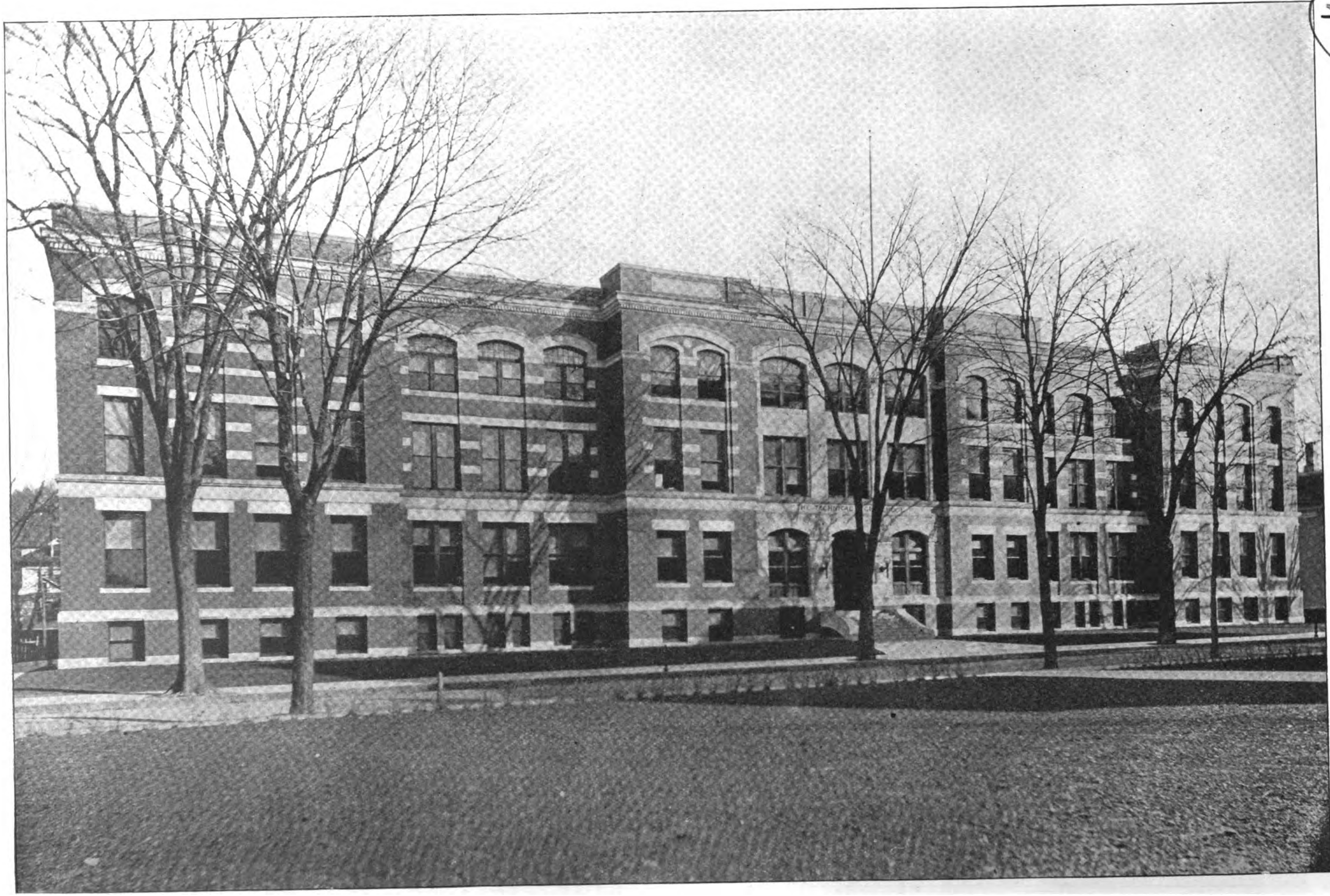
Changing Your Address.

Just a word about this. If you have recently changed your place of residence or shop location and haven't notified us, do so immediately. And do give both the old and new address. It requires only a post card. Of course, we would prefer a letter with a word or two about your business and the like, but if you're busy make it your business to send us a post card concerning your removal and change of address. Give both old and new—please remember.

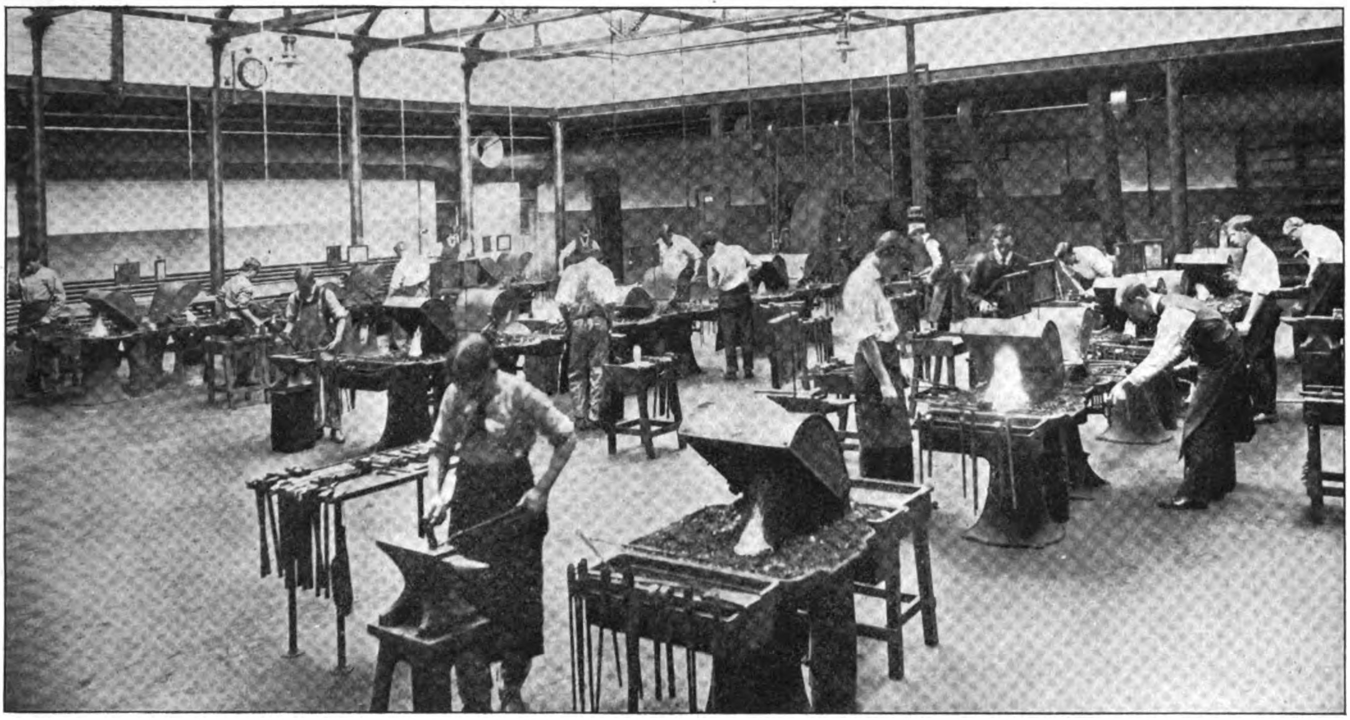
Contents September, 1908.

At Our Desk.

They may interest you—these few letters from a morning's mail. Just read them with us. 'Twill make you feel that there are other staunch, loyal smiths who are looking into a future of good promise. Here's a little note with an international money order from New Zealand. "I am so taken up with THE AMERICAN BLACKSMITH that I have decided to make my friend, Mr. Stephenson, a present of a year's subscription. I imagine that in twelve months, if he is as far sighted as I think he is, he will become a permanent subscriber." Here are a few words from a Minnesota reader: "You will please find enclosed money order for subscription. I would not do without the paper under any consideration, there are a thousand and one good facts to be taken from our little book." This is from a Canadian friend: "Please find enclosed $1.50 for subscription to THE AMERICAN BLACKSMITH—the paper worth the money. Special thanks for your courtesy and the gentlemanly way in which you conduct 'Our Journal' and the uplift you give the craft." Another of Our Folks writes: "You are building a monument that the waves of time cannot wash away. It is growing brighter every day it stands and it will stand forever. Your great paper has lifted us out of the mire of carelessness and indifference. It has placed a new song upon our lips, new ideas in our heads, and new tools in our shops. I send my best wishes for your future welfare and trust that the good old AMERICAN BLACKSMITH may live forever." And so we could go on, almost indefinitely, quoting letters from "Our Folks" to the complete rout of the pessimists who have a mistaken idea that the craft is going to the dogs. Staunch, loyal members of the Boosters' League are pushing the craft ahead at every opportunity. Be a booster and help push. Don't let the knockers' words go unchallenged. Boost the craft for all you are worth. If you will do it, every one of "Our Folks" will do it.



A NEW BUILDING WHICH HAS COST, WITH ITS EQUIPMENT, SOMETHING OVER $350,000



THE FORGE SHOP WILL ACCOMMODATE THIRTY DOWN-DRAFT FORGES

The Technical High School at Springfield, Massachusetts

BURTON A. ADAMS, INSTRUCTOR IN FORGING

THE progress of the new movement for the industrial education of the pupils in the elementary and secondary schools of this country which is so much in evidence in the public press and in the proceedings of commercial, industrial, and educational organizations, is strikingly illustrated in the growth of the Technical High School, of Springfield, Massachusetts—a typical representative of those institutions which are being established all over the country in response to the need, which has been shown to exist, of training the motor activities of the child along with his literary development.

The Springfield Technical High School opened for pupils in September, 1898, and started in a temporary building with a teaching force of five and a pupil enrollment of fifteen. At the present writing it occupies a new building which has cost, with its equipment, something over $350,000, has a teaching force of thirty-seven, and a pupil enrollment of seven hundred eighty-two.

While the school, like others of its type, does not meet the desires of many ardent advocates of intensified industrial training because it does not definitely teach trades, it is nevertheless true that many of its courses are to an extent vocational, and the gratifying record of its graduates shows clearly that the broad and comprehensive all-round training which they have received has been of direct practical assistance to them in earning a living.

The existence of the school in the community has permitted the school authorities to organize an evening school of trades which utilizes the equipment and many of the instructors of the high school and gives direct trade instruction to men employed during the day in the various manufacturing establishments of the city. The success of this evening school has been gratifying and has attracted the notice of the Massachusetts Commission on Industrial Education and has caused it to recommend the establishment of similar schools in other parts of the state to whose support the state contributes.

Among the mechanical branches taught in the Technical High School are joinery, cabinet-making, pattern-making, molding, forging, and machine-shop practice, with mechanical drawing in connection with each subject.

The forge shop is a room sixty-eight feet square, abundantly lighted from

A FEW FORGINGS FROM SPRINGFIELD

the roof and planned to accommodate thirty down-draft forges, of which twenty are at present installed. Each forge has a complete outfit of the hand

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and anvil tools that are constantly used, and the tool room is well supplied with the general and special tools that are used less often and in common. Power is supplied through a twenty-horsepower direct-current motor which operates, beside the blast and exhaust fans, a sensitive drill and emery grinder, and will soon operate a power hammer which is shortly to be installed. Benches and vises are located at convenient intervals about the room.

The course in forging, which is well represented in the photographs shown of work, covers all the fundamental operations of forge practice, including work with both iron and tool steel, and is taught by demonstration and practice. The class is assembled about the instructor's fire, and each new piece is forged and explained and opportunity given for questions. Then each boy gets out his stock, goes to his own fire and makes the piece for himself, while the instructor moves about the room with a word of advice or caution or a helping hand with the sledge as the need arises. Occasional brief talks on combustion, the manufacture of iron and steel, and commercial forge practice along special lines, supplement the ordinary instruction. The forging period is an hour-and a half four times a week, and occupies half of the second year of the high-school course. The other half-year is devoted to pattern-making and molding.

Brief as is the course in forging many of the boys develop surprising skill, and not only complete with credit the prescribed amount of work but undertake many ambitious projects of their own and do useful work on the running repairs of the school. The andirons and door-knockers shown in the illustrations are only a few of the extra pieces of the past year, and these pieces are not undertaken until the boy has forged for himself the set of lathe tools he is to use in the machine shop the next year. The special work of the farrier or carriage ironer is not touched on in the course.

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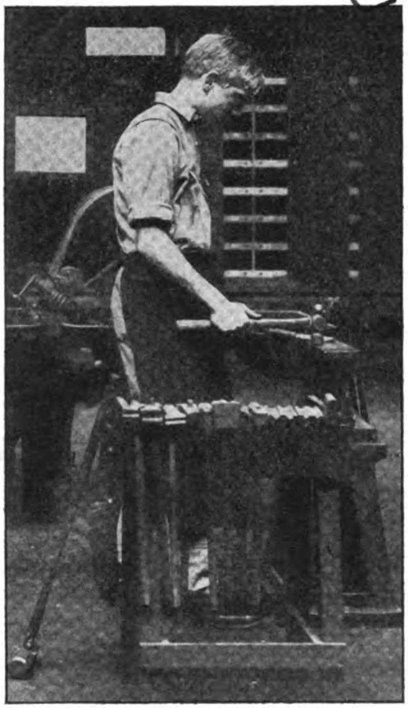
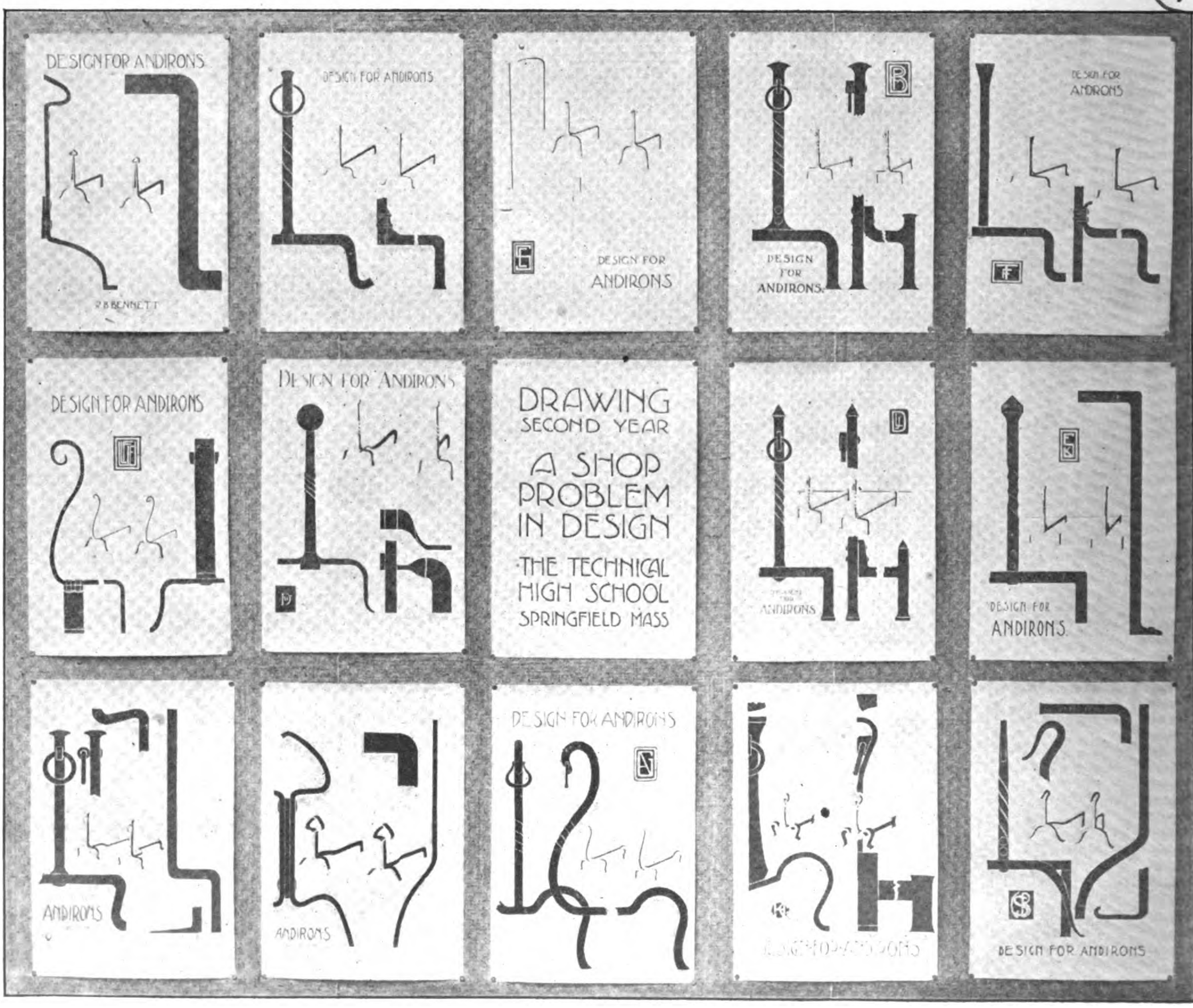


THE FORGE SHOP IS ABUNDANTLY LIGHTED



THE BOY IS TAUGHT TO PUT HIS IDEAS ON PAPER AND THEN TO FORGE THEM IN THE HARD METAL

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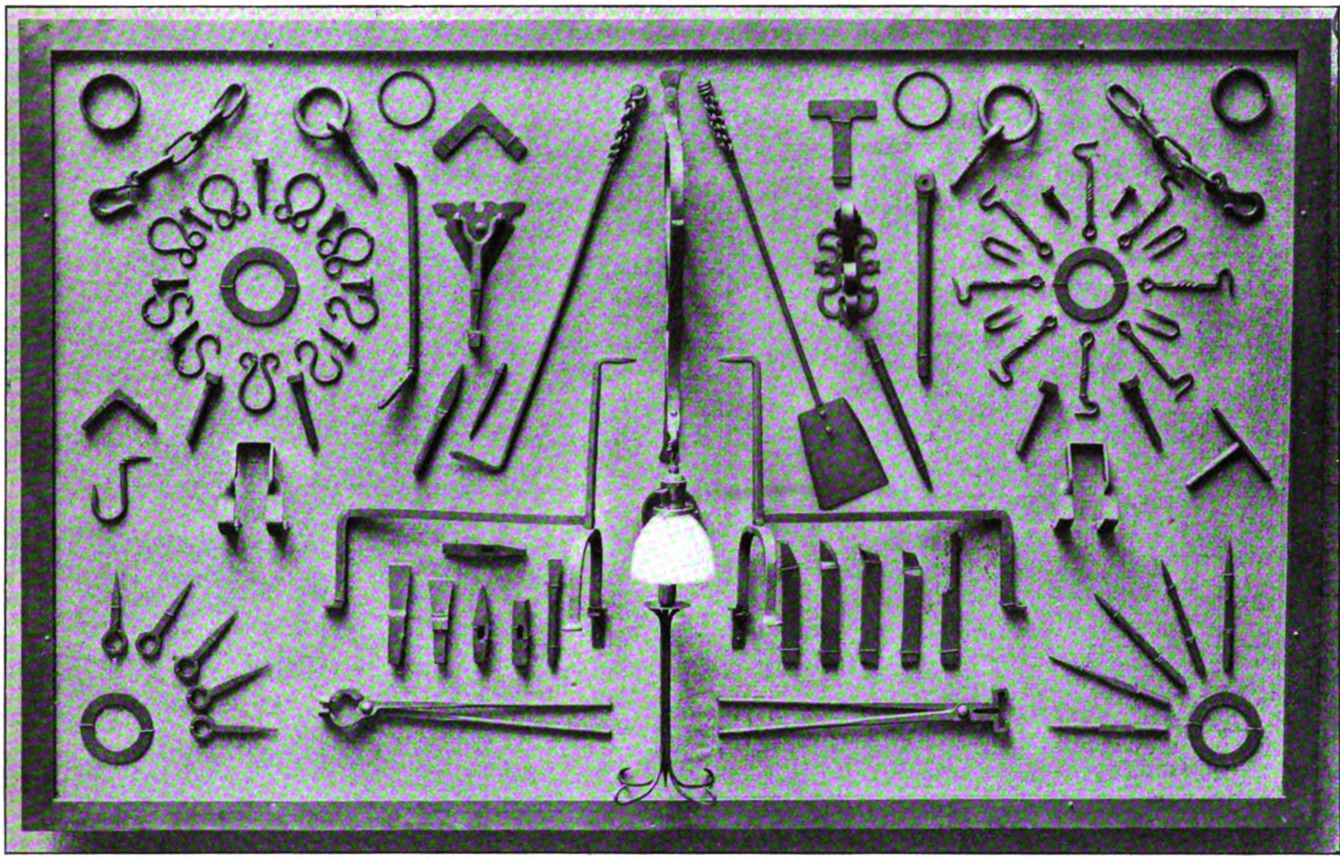

ORNAMENTAL PIECES ARE NOT UNDERTAKEN UNTIL A SET OF LATHE TOOLS HAVE BEEN FORGED FOR MACHINE WORK THE NEXT YEAR

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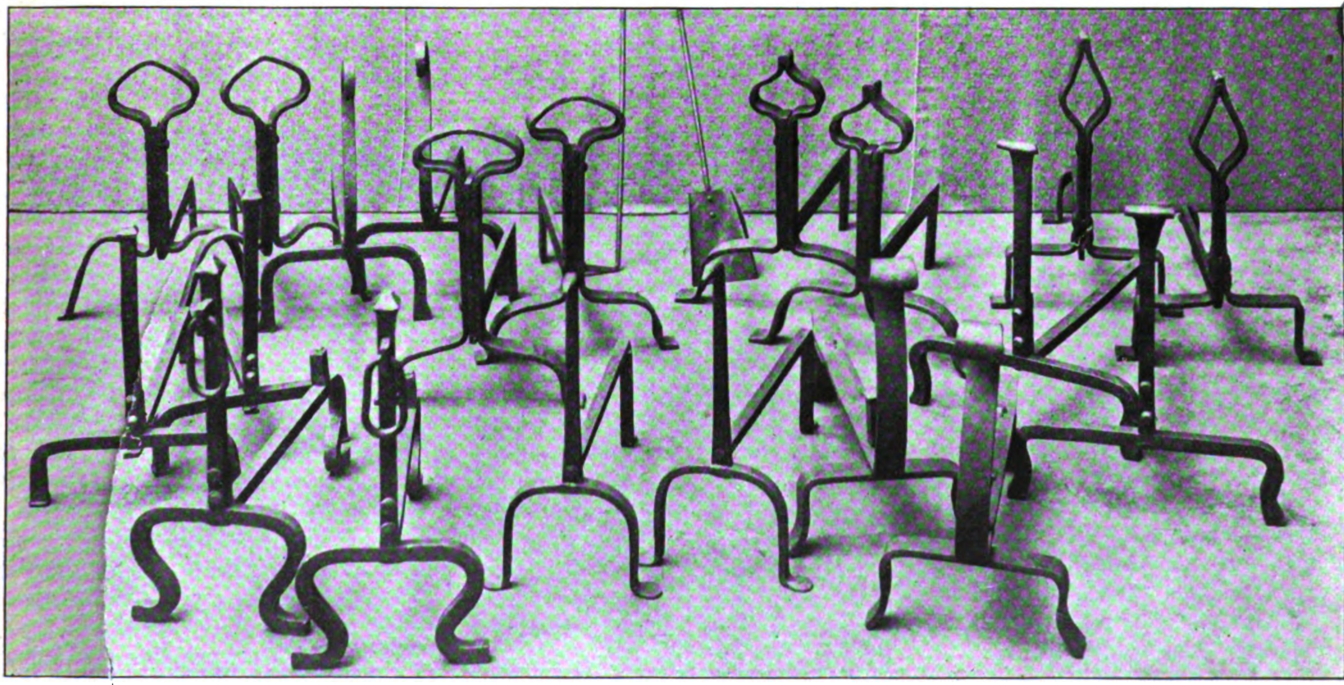
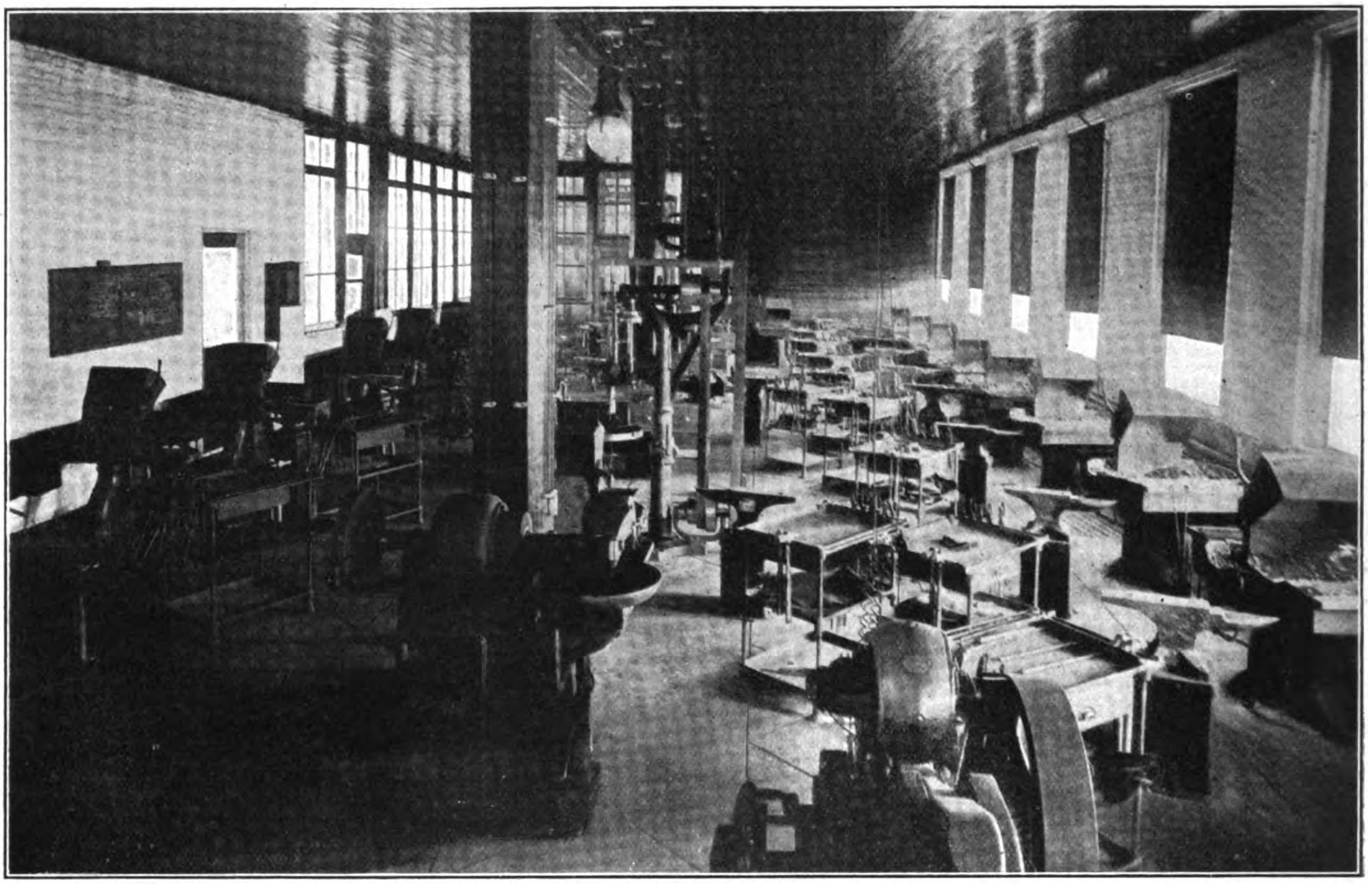


MANY OF THE BOYS DEVELOP SURPRISING SKILL AND COMPLETE WITH CREDIT MANY ORNAMENTAL AND USEFUL OBJECTS

The forge work is always popular with the boys and the majority of them leave it and pass on to the other shops with regret; and this interest coupled with the character of the work stamps forge practice as of decided educational value. The necessity for concentrated attention, for quick decision and corresponding action, and the sense of achievement which comes with the realization of mastery of the stubborn metal are the items which establish its right to its position in the school's curriculum; and all this, of course, is aside from its practical value as a handicraft.

Then, too, the boy who has donned overalls and apron, rolled up his sleeves and literally by the sweat of his brow and the skill of his hand achieved a difficult forging, has acquired a new



THE FORGE ROOM AT THE UNIVERSITY OF MISSOURI CONTAINS TWENTY-FOUR DOWN-DRAFT FORGES

appreciation of and sympathy for, the man who works with his hands, and a sense of the dignity of labor that makes for the true spirit of democracy that should be within him.

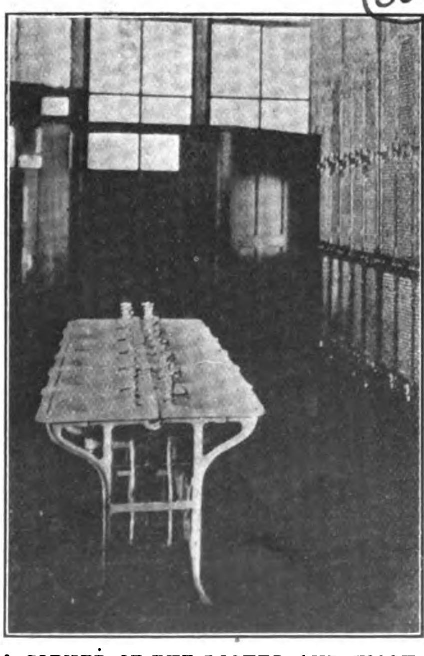
The Mechanical Department of the University of Missouri School of Mines.

J. H. BOWEN.
Head of Shops and Drawing.

I have been very much interested in the work done, and the equipments installed in the different engineering schools, as described in THE AMERICAN BLACKSMITH from time to time; so much so that I am sending you a brief description of our shops, and an outline of the work given. Our shops are all new, and the equipment is what we consider the best on the market for our particular purpose.

The wood shop was the first to be equipped. It has thirty benches for carpentry, cabinet, and pattern making. Each bench is equipped with the following tools which are kept in a case with a lock: three saws, rip, cross cut, and back; three planes, jack, smooth, and fore; five chisels, one fourth, one half, three fourths, one, and one and one half inch; one rule; one oilstone; one oilcan; one mallet; one hammer; one screw driver; one scratch gauge; one try square; one bevel; one pair dividers; besides the following additional equipment: one drawer with lock for each section; one bench stop; one Oliver quick-acting vise.

In addition to these, there is kept in the stock room, and given out on checks all of the special tools, accessories, etc., which might be required on any class of wood work in an institution of this character. In this room is a Brown & Sharpe thirty-six-inch grindstone, motor driven.



A CORNER OF THE LOCKER AND WASH ROOM

The lathe room for wood turning is equipped as follows: twenty Fay and Egan lathes, twelve-inch swing, five-foot iron shear; one Fay and Egan twenty-seven-inch planer; one Fay and Egan thirty-inch band saw; one Oliver universal saw table; two Oliver wood trimmers, No. 1, and No. 5; one Greenlee hollow chisel mortiser; one Beach jig saw; one Cyclone dust collector, motor driven; one Brown and Sharpe thirty-six-inch by five-inch grindstone. Each lathe has a complete set of turning tools in a case with a lock; two face plates; two screw plates; and all of the necessary wrenches, etc. Each student has a separate drawer with a lock for his work before it is turned over to the instructor. The shafting in this room is driven by a thirty-horse-power motor.

The forge room contains the following equipment: twenty-four Buffalo down-draft forges; one Rock River power shear, motor driven; one American twenty-inch drill press, motor driven; one Bridgeport double safety emery grinder, No. 2, motor driven;

one air hammer; one swage block; one leveling block; one cone; and three benches with eight vises. These benches are built with Brown & Sharpe bench legs, and are covered with sheet steel.

Each forge is provided with the following tools: one New Britain three-tray tool racks with drawer; one Starrett twelve-inch blacksmith's brass rule; one pair calipers; one square; two hammers; five pair tongs; and two hardies, hot and cold. The forges are run with a Buffalo blower and exhaust fan, driven by one fifteen-horsepower motor. Each six forges have the following extra tools: one set of punches, one fourth to one inch round; two cutters, hot and cold; one set swages, top and bottom, one fourth to one inch; one set fullers, top and bottom, one fourth to one inch; one blacksmith's center punch; one blacksmith's countersink, and three sledges, four, six, and eight pounds.

The machine shop is equipped with the following machines: one twenty-four by twenty-four inch by six foot Chandler high-speed planer, motor driven; one Hendey fifteen-inch shaper, motor driven; one Hendey fourteen-inch toolmakers' lathe, motor driven; one Reed twelve-inch lathe, motor driven; one Reed twenty-inch lathe, motor driven; one American fourteen-inch lathe, motor driven; one Barnes twenty-two-inch drill, motor driven; one slate thirteen-inch sensitive drill, motor driven; one Blount eleven-inch, speed lathe, motor driven; one No. 1

A CORNER OF THE DRAWING ROOM

Burr cold saw, motor driven; one Morse double wet emery grinder, motor driven; one Brown & Sharpe No. 2-A universal milling machine, motor driven; one Yankee twist drill grinder, motor driven, and two Greenard Arbor presses, Nos. 3 and 3½. This room is thirty by fifty feet, and has a bench running around one side and one end. The benches are made up with Brown & Sharpe patent bench legs, and have hard maple tops. An air pipe running along the back of the bench, and hose connections allow for cleaning, etc. Each machine is provided with a locker for all of the tools ordinarily used with the machine. The keys to these lockers are kept in the stock room, and given out on check, as are the special tools. So far as I know, our forge and machine shops are the only ones in any college with all the machines equipped with individual motors. Our effort was, all the while, to get what was best adapted to our particular needs, and I think that it may be classed, in this respect at least, as the most modern.

We have only had one year in forge work, so we have no extensive exhibits to show, but our work has been what was best suited to the needs of the mining engineer. After the preliminary exercises in drawing, upsetting, bending, welding, etc., students are given miners' candlesticks, prospectors' picks, rock drills, etc., to construct and temper, special attention being given to the working of steel, grades of steel, and the best temper for the purpose required, comparison being made between the different brands of steel used.

In the machine shop, this work is continued, and tests are made on the different steels not only in cutting metals, but also in the drilling and cutting of rocks, cement, slag, etc. Machines are constructed as designed by the students or instructor, and castings are obtained from tool builders, and machined in our shops.

In the wood shop, we try to make the work as practical as possible. After a few preliminary exercises covering marking, sawing, planing, and fitting, useful articles are constructed. In the

THE DIRECTOR'S OFFICE, SHOWING SOME SCHOOL WORK

STUDENTS REGISTER IN AND OUT ON A TIME RECORDER

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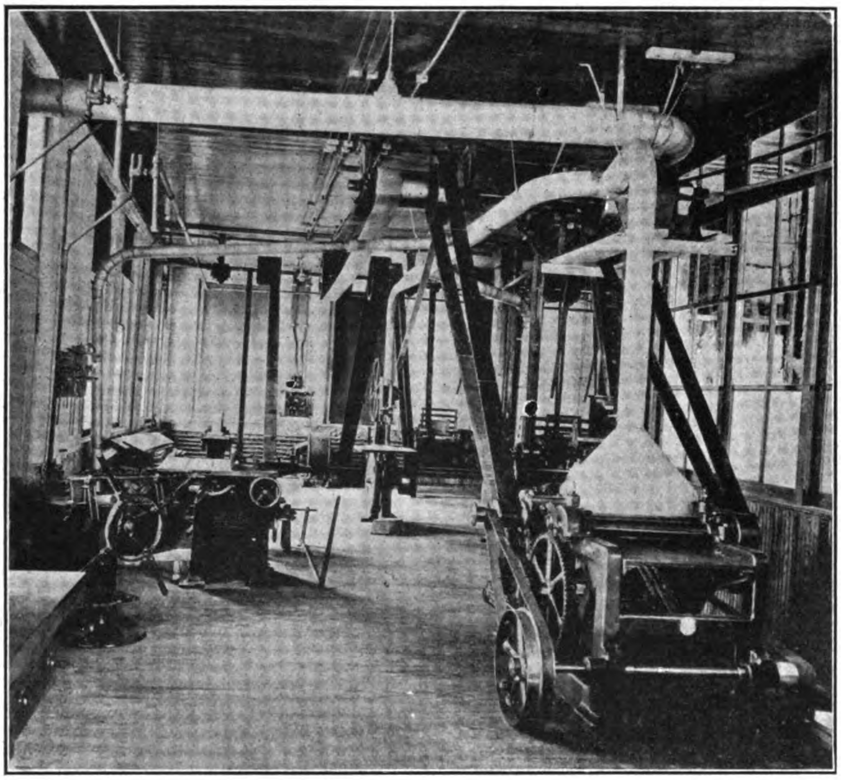

ONE END OF WOOD-TURNING ROOM, SHOWING SOME OF THE MACHINES

past three years, we have made over a hundred drawing desks which are used in the drawing rooms. We also make book cases, drawing boards, models of mine timbering, in fact, anything we may need we try to make ourselves, and as much as possible is done by the students. What they cannot finish for lack of time, is finished by our expert mechanics. All students in this department register in and out on a time recorder which is located in the front entrance, and a student one minute late is marked absent. This system of registration has many advantages, not the least of which is the habit of promptness that the student necessarily forms and which will prove valuable in his future life.

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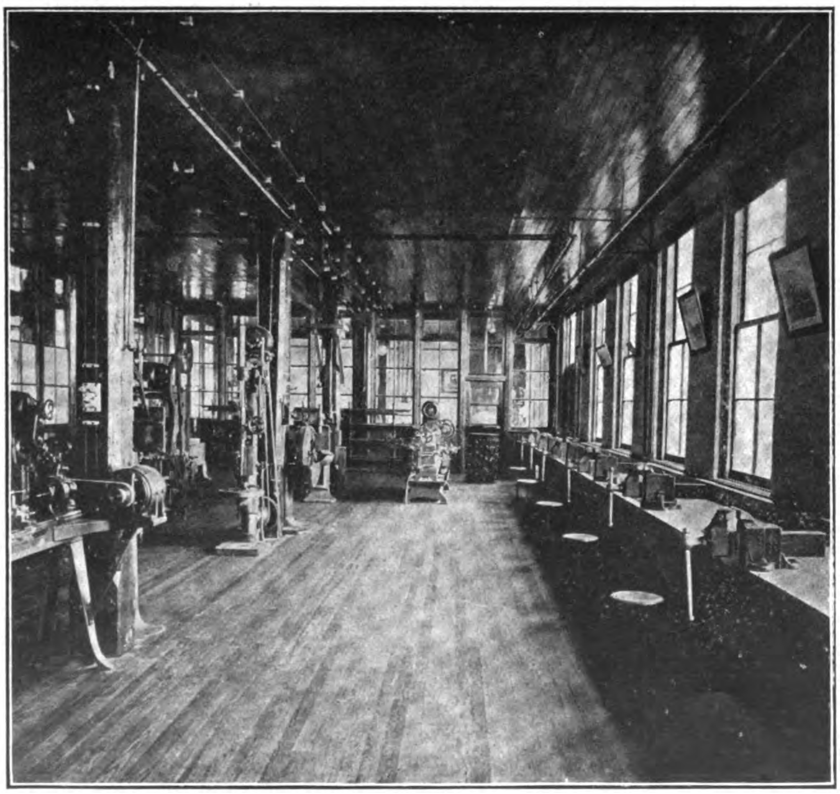


A VIEW OF THE MACHINE SHOP SHOWING NEAT ARRANGEMENT

The How, The Why, and The Wherefore of Brazing.

ETHAN VIALL.

Again and again do subscribers ask for brazing directions and brazing fluxes, and as often are they answered, but still they come and apparently it is as fertile and as interesting a subject for the old hand as for the beginner. For a number of years I had charge of a department in the great Pope Manufacturing Company's plant where an unusual amount of brazing of all kinds was done. Some of the readers of THE AMERICAN BLACKSMITH are like James D. Ennis, of Florida who, in a recent number, said in substance that he knew nothing of the art but would like to learn. I shall begin a good deal as I would with a green hand in the shop, and endeavor to leave no point slighted or untouched that would make it in the least degree doubtful how to proceed.

The first thing to discuss is the forge, and in order of their convenience and adaptability they may be placed as follows: Gas, gasoline, and coal forges. If any great amount of brazing is to be done a gas forge with two burners and a power blower should be put in if possible as it makes a good, clean fire, and the effect of the heat, and the way the brass is flowing is visible at all times. If a gasoline forge is purchased one should get a good one, as a cheap gasoline forge is an abomination and a pure waste of time and money, and the chances are that it will be thrown on the scrap heap within three months. But whether a gas or gasoline brazing forge is used, the burners should be so placed that the heat comes from below, and is thrown upward onto the piece being brazed as shown at A in the engraving. The piece to be brazed H is placed in the furnace made of fire-brick G. Heat is supplied by the burners J. It is a very poor practice to blow a blast directly onto the metal as it causes too much scale to form. However, as few blacksmith shops have anything but the regular coal forge, and do not have enough brazing to do to put in gas, we will confine our attention to how the forge should be used in this particular work.

One must bear in mind that after a coal forge has been used for a brazing job it must be cleaned thoroughly and every trace of brass removed from fire pot, tuyère, and fuel, or trouble will follow when a job of welding is undertaken. It is for this reason that many smiths refuse to do a job of brazing in their forge at any price. A good way is to have a second forge, or even a small portable one, to be used for brazing only. Even then care must be taken to prevent brass from running down and clogging the tuyère.

A good, thick bed of clean fire should be used and fed with the cleanest coal possible to obtain. Sulphur in the coal is bad for any kind of brazing, especially cast iron, and for a particular job, charcoal or coke should be used. Don't think because you or some other smith can braze a piece of malleable iron with a dirty fire that that kind of a fire is good enough for anything. It isn't—a dirty or thin fire is liable to cause trouble at a most inconvenient time. It is just as bad for brazing as for welding. A fire that isn't deep enough allows the blast to strike the metal which causes excessive scale to form, and will invariably cause an imperfect braze even if the outside does look all right. The real strength of a braze, like that of a weld, lies inside where it cannot be seen, and a thick, clean fire with a nice even blast is the best in either case.

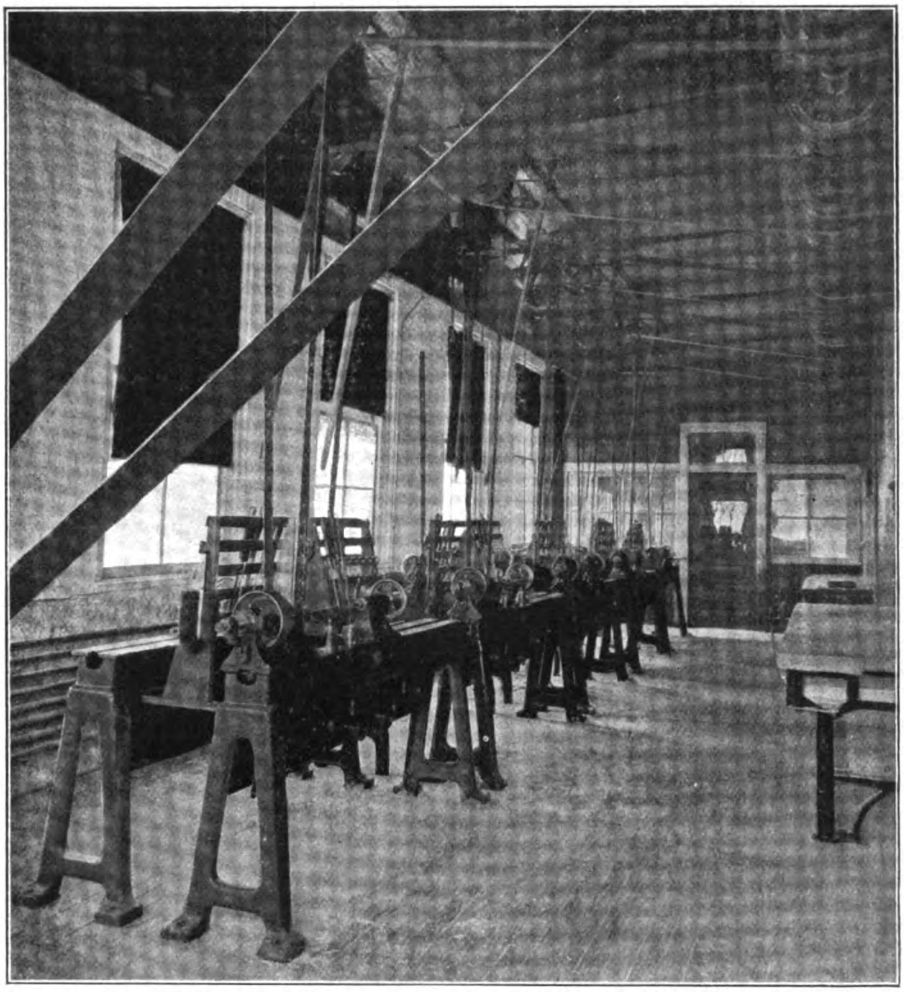
The pieces to be brazed may be pinned together, clamped, propped up with bricks or packed around with fire clay or arranged in any convenient way, just so that they will not jar apart or move during the process of brazing. A little experience will soon teach a man how to set his pieces. Always bear in mind not to put any strain on the parts in any way that will cause them to warp or bend while hot, especially if the pieces are small or thin, for iron and steel at a brazing heat are about as strong as wet paper, and just as "cussed" to handle. A good way for a beginner to do is to take two pieces of strap iron, say one eighth by three fourths inch, and twelve inches long, prepare them as I shall presently direct, and then set them in the forge as at B, using pieces of iron to hold them in place so that the ends overlap about an inch and just touch evenly for the length of the lap. No light should show between the pieces, but there should be no pressure or they will bend when heated. A very small crack can be filled with brass when brazing. You cannot handle melted brass like so much putty. It's more like melted butter—you can coat a thing with it but you can't pile it up.

Iron wire is sometimes used to hold pieces in contact or to fill up a space caused by poor fitting, but it is only a makeshift and exceedingly unworkmanlike. If wire is used at all it must be used with care for it possesses very little strength in the fire, often not enough to support itself let alone holding anything.

In preparing the pieces to be brazed, they must be clean and free from grease and dirt. A file, emery cloth, sandpaper, a scraper, or anything that will answer the purpose, may be used to clean the parts. Not only must the surfaces to be brazed be clean, bright, and free from scale, but they should also be clean for a half inch or more all around. Any grease that would run down and get into the joint when heat is applied must be removed. If the parts to be joined are uneven, as in a break, they may be cleaned and polished with a wire brush or even a good clean, stiff, bristle brush will help to remove the dirt.

Now, for fluxes for use in brazing iron, steel, or malleable iron. Powdered borax (A), such as is used for welding may be used, but it has a tendency to form a glass-hard scale on the outside of the work difficult to remove, and is objectionable on that account. But a good job of brazing may be done with it, nevertheless, if nothing else is at hand. A better flux (B) is made of a mixture of: one part of sal ammoniac, and seven parts of borax. This causes the brass to flow nicely, and is somewhat more cleansing in its action than borax alone, but it too forms considerable scale. The best brazing flux (C) for general use, and one that I always use is made this way: Take an old half-gallon tin can, put in a pint of boiling water, add one pint of common borax and again bring to a boil, then add two pints of boric (boracic) acid. This flux leaves scarcely any scale and brass will follow it "up hill." When used, if it is too dry, add enough water to make of it a nice creamy paste easy to handle.

Now, let us go back to our two pieces



THE WOOD-TURNING ROOM, SHOWING DOUBLE ROW OF LATHES WITH LATHE PARTS UNDERNEATH of strap iron and let us suppose you have just finished cleaning the ends where the lap is to be. Paint the cleaned parts with a thin coat of the above paste. (If you use either of the other fluxes, mix with a little water and do the same.) Then being sure your forge fire is in shape to burn properly, arrange the pieces as at B. Now, secure a small open box (a cigar or sardine box will do), put in about a handful of flux and about half as much granulated brass, called spelter. Get a $\frac{3}{8}$-inch rod two feet long and flatten out one end for about an inch. Now, start the blower and gradually raise the heat, keeping the fire pretty well up around the lap but not touching it. When the pieces are a nice red, take the iron rod and drop a little flux and brass on the lap, gradually increase the heat, carefully watching the brass and when it begins to melt and run, take a spoonful of the mixed brass and flux, and put it on the piece at the end of the upper lap and as it starts to flow gently lead it along the edge of the lap with the rod, being careful not to knock the pieces out of line. When the brass shows like a bright, shiny streak all around the edges of the lap stop the blower and let the piece cool. When it gets black remove and examine it,—put it in the vise, twist it and tear it apart and see if the brass shows evenly where the lap was. If bare, black, scaly spots show, you didn't clean it properly or else burnt the pieces before your brass had a chance to flow. If it was a poor job, begin all over again using more care.

Don't hurry.

Don't put on too much brass, but be sure to get enough.

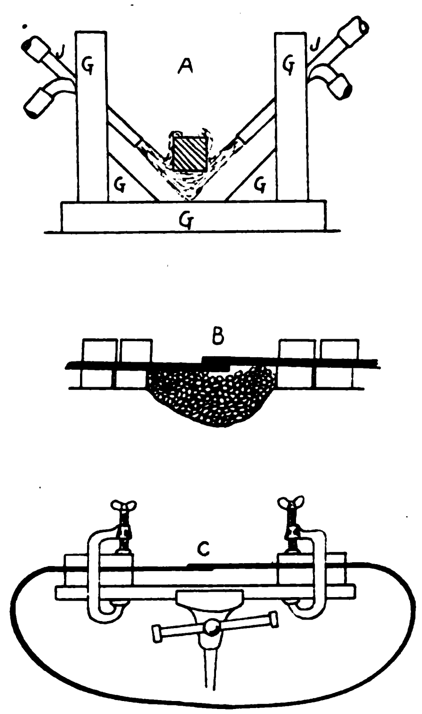
Don't heat the metal too hot but just enough to get a good flow and keep your fire so that it throws the heat on the lap and don't heat up any more of the piece than is necessary.

Experience and practice alone will enable one to handle difficult jobs of brazing successfully. If possible, in setting up a difficult job, so arrange the joint that the brass can flow downward, and do not be afraid of getting too close a fit. Brass will follow the flux, and the man who tells you to rough up the surface to be brazed with a coarse file so that the brass can get a chance to flow through or to take hold, doesn't know what he is talking about. All that is needed is for the surfaces in contact to be clean and bright, and the closer the fit without causing tension, the stronger will be the joint.

The brass used need not be grain spelter, but may be scrap sheet brass clipped up with tin snips, or a piece held in a pair of light tongs, or a piece of small brass rod or brass wire may be substituted.

Cast Iron Brazing.

After becoming proficient in brazing iron, steel, or malleable iron you can take up cast-iron brazing. The same precautious and general rules as to fire and cleaning apply to this as before, except that a stiff wire brush is almost a necessity, as a cast-iron break is always rough and ragged. Wherever possible in mending a piece of broken cast iron it should be reinforced with a piece of wrought iron or steel, for if the original piece wouldn't stand the strain the piece that is just brazed



BRAZING MADE EASY

together isn't apt to. The flux (D) used on cast iron is different from those just given and is made as follows:

Boric acid, one pound; pulverized chlorate of potash, four ounces; carbonate of iron, three ounces.

This stuff may be gotten at almost any drug store and will cost about fifty or seventy-five cents. It should be thoroughly mixed, all lumps being rolled out. Keep in a glass jar or bottle, as dampness injures it. When wanted for use a little should be taken out and mixed with nice yellow brass spelter and used dry. Arrange pieces in forge as for ordinary brazing, *except that no flux is painted on the parts.* Heat to a nice cherry red, and then, *and not till then,* apply the mixture of brass and flux, being very liberal with the flux and brass, as more is needed for cast iron than for any other metals. Work the mixture along the break with the iron rod, at the same time increasing the heat till the parts being brazed are almost white hot. Then when sure that the brass has flowed wherever wanted, stop the blower and let the piece cool in the forge until it can be taken up with the hands. It is more important in brazing cast iron than it is in ordinary brazing that the break be so placed so that the brass can flow down through the joint.

More heat is needed for cast iron than for any other brazing work and excessive blast or a thin fire is especially harmful. The secrets of successfully brazing cast iron are, not to apply the flux too soon, to have plenty of heat, but not too much blast.

Brazing Brass.

Only the most expert brazer can braze brass, with brass, and hence silver is generally used. This silver comes in strips about three quarters of an inch wide and the thickness of paper. It is put up in ounce boxes at one dollar each, and a box will last a long time in the average shop. In a pinch, a dime may be hammered out very thin on the anvil and used instead of the regular silver strip, but it isn't quite so good. The flux used is (C) and after painting the parts as for iron the silver should be placed between, if possible, as it doesn't flow as well as brass. If flux (C) isn't at hand either (B) or (A) may be used.

Brazing Band Saws.

Where no regular band saw brazing fixture is on hand, a very good way is to bevel the opposite sides of the broken ends back for from one to three teeth (depending on the coarseness of the teeth), and then clamp them as at C, which is made up of scrap pieces of iron and two C clamps. For convenience it is held in the vise as shown.

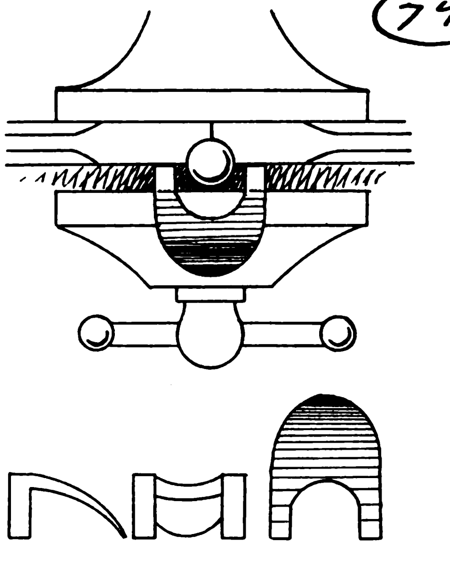
After clamping the saw in properly, paint the ends with flux and slip a piece of silver, a little larger than the lap, in between the ends and braze with a pair of hot tongs. Be very careful to press the tong jaws together but lightly, holding them steady for a minute, being sure not to bend the saw. After the color dies in the tongs they may be removed and the saw smoothed up with a file.

A better way is to use two pieces of hot iron instead of the tongs. The lower block, which should be the same thickness as the block on which the saw is clamped, is heated and slipped under the lap, and the other piece laid on top, both pieces being laid lengthwise unless they are rather wide. They are then left to cool. Less care is needed in using blocks than with tongs to avoid kinking the saw, and a better job is usually the result.

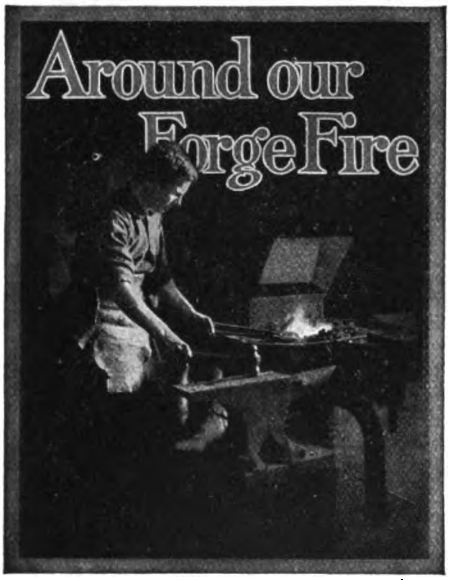
A Handy Device for the Buggy Shop.

H. N. POPE.

The accompanying engraving shows a very handy device for the finisher's bench. It is useful for holding top joints when filing them. The tool is made of ⅝-inch square machine steel. First rough out the ends of the piece with a fuller. Then bend the fullered ends down and then bend the whole piece into a half circle. Now, forge out the center part and bend slightly to conform to jaw of the vise. You now have a little tool that you will not do without after you once use it. This device prevents the buggy top joint from bending or doubling up in the vise.



A VERY HANDY TOOL FOR THE BUGGY REPAIRMAN



"Hello, Mr. Editor," cried Benton, as he burst into the Editor's sanctum. "How are you?"

"Finer than silk," replied the Editor. "My, but you are looking good—struck a gold mine, or rich uncle die?"

"Neither one nor the other," returned Benton. "I've just got back from my vacation—the best one I ever had."

"You look as though it did you a world of good. Where have you been?" and the Editor, seeing that Benton had forgotten his pipe, handed him a cigar.

"Well," began Benton, after lighting his cigar, "to make a long story short, Mr. and Mrs. Connor and Mrs. Benton and your humble servant took a little trip up to Chicago in Mr. Connor's touring car."

"You must have had a grand trip," returned the Editor. "Did you run across anything of interest to 'Our Folks'?"

"Yes," replied Benton. "We stopped at a small town in Indiana one night, and when about to start the next morning, Connor discovered that something was wrong with the machine. It would go, but not just right. Well, we took the machine over to one of the several smiths in town, and while he fixed the motor, I discovered a pretty neat stunt that this smith had introduced in his town."

"What was it?" put in the Editor.

"It was a credit and collection bureau," returned Benton. "I introduced myself to the smith, and as he read the paper, he, of course, was glad to see me. This man said that about a year ago he was going over his books and was simply knocked speechless by the amount of money he found was outstanding. He figured up his unpaid bills and found that if he had the money that his customers owed him, he would be able to pay all his bills, and then have enough to buy all the machines he needed to place his shop among the best ones. He studied the thing, and the more he thought of it the more he realized the injustice of his carrying farmers and merchants along for months, while he, himself, had to pay up promptly to uphold his credit. Finally, he struck upon the collection-bureau idea. He figured it all out, so as to be able to argue with others when he told them about it, and one after another of the business men of the town came in on the scheme, until the principal business places in all lines were in. There are four smiths in the town and about six scattered about in the vicinity. Three of the smiths, one in town, and two of the outsiders, wouldn't come in. The three grocers came into the bureau, while the two hardware men, both dry-goods stores, and one of the butchers also joined in the scheme."

"How do they work their plan?" asked the Editor. "Sounds to me like something pretty good."

"It is an excellent plan," returned the other. "To begin with, the merchants hired a good, experienced collector. This man was told of the scheme and assisted a great deal in shaping a system of collecting the accounts and in caring for the business of the collection bureau. He was placed in charge of the bureau, but was subject to orders issued by a board of directors, consisting of four town merchants—the smith being their chairman. The collector goes after accounts as an agent representing all merchants in the bureau. Of course, he knows how many stores John Smith or William Jones owes, and when presenting a bill shows an itemized account of all the bills reported against the person in question."

"Well," said the Editor. "It looks like a good scheme. It seems to me, though, that a lot of accounts would be made public knowledge, and that people would be inclined to feel rather sore on the business men."

"All accounts are kept strictly secret," returned Benton. "No one has any knowledge of what any customer owes another merchant until such customer's accounts have run over a certain time. Then the customer's name is handed to all merchants in the bureau, with an explanatory note regarding their credit. This, however, is not done until the customer is warned and given ten days in which to make some arrangement for paying the bills."

"I don't see how this system would protect the smith, who does work for the merchants, shoeing their horses and repairing their wagons," said the Editor.

"There is a clearing-house arrangement to take care of accounts between members in the bureau. The smith told me that in planning his scheme, it took him some time to figure how this very feature was to be overcome. But he hit upon the plan of having a general meeting of all members once every month. This meeting is for the transaction of general business as well as the exchanging of accounts. Suppose, for instance, that the butcher owes the smith for shoeing, while the smith has run a meat bill, the accounts are compared, and the balance on either side paid in cash. By this means all accounts between members are settled every month."

"How do the members guard against the juggling of accounts and books on the part of the collector?" asked the Editor.

"An accounting is made every day to the members. Those who have paid the bureau receive a receipt from the bureau or collector, and then receive another receipt from the several merchants whose accounts they have paid. Almost everyone in town knows about this scheme and, if they don't get a receipt from the merchant inside of two days, they usually report to the merchant."

"That is certainly a very excellent plan," put in the Editor. "It divides the cost of collecting accounts, adds to the value of the collector by advising him what a certain person owes every merchant in the bureau, and is certainly a very satisfactory arrangement all around. Then, too, the collector having charge of accounts in that way, is able to pass upon the credit of most anyone in town."

"Of course, I have given just an outline of the scheme. I didn't have time to get the small details of the plan, but these anyone could work out."

"The bookkeeping end at the bureau would be no little item, yet it could be so simplified and systematized as to take little time and allow no mistakes." Then continued the Editor. "I wish you would scheme out something, so that you can give 'Our Folks' the information they need in working a scheme of this kind."

"I'll be very glad to," returned Benton. "It seems to me that several smiths will want to work a plan of this kind in their own towns."

"I'll be very much mistaken," said the editor, "if you don't receive a batch of letters asking for details of the scheme. If you will work on the idea of simplifying the work at the office end, the collector can spend so much more time in actual result-producing work—work that will prove his value to the merchants."

The Blacksmith of Ragenbach.

FRANK MURRAY.

In a little German village,
On the waters of the Rhine;
Gay and joyous in their pastimes,
In the pleasant vintage time;
Were a group of happy peasants,
For the day released from toil,
Thanking God for all His goodness
In the product of their soil;

When a cry rung through the welkin,
And appeared upon the scene,
A panting dog with crest erect,
Foaming mouth and savage mien;
He is *mad*, was shrieked in chorus,
In dismay they all fell back,
All—except one towering figure,
'Twas the smith of Ragenbach.

God had given this man His image,
Nature stamped him as complete,
Now it was incumbent on him,
To perform a greater feat
Than Horatius at the bridge,
When he stood on Tiber's bank,
For behind him were his townsfolk,
Who, appalled with terror, shrank

From the most appalling danger,—
That makes the bravest quail,—
While they all were grouped together,
Shaking limbs and visage pale.
For a moment cowered the beast,
Snapping to the left and right
While the blacksmith stood before him
In the power of his might.

"One must die to save the many,
Let it then my duty be,
I've the power, fear not, neighbors;
From this peril you'll be free,"
As the lightning from the storm-cloud
Leaps to earth with sudden crash,
So upon the rabid monster
Did this man and hero dash.

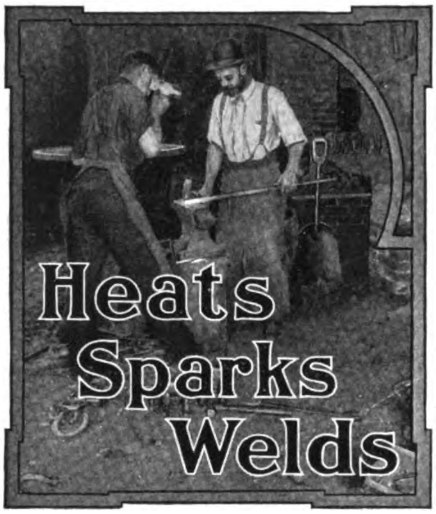
In the death-grip then they struggled,
Man and dog with scarce a sound,
Till from out the fearful conflict
Rose the man from off the ground·
Gashed and gory from the struggle,
But the beast lay stiff and dead;
There he stood while people gathered
And rained blessings on his head.

Friends," he said, "from one great peril
With God's help I've set you free,
But my task is not yet ended,
There is danger now in *me*.
Yet secure from harm you shall be,
None need fear before I die.
That my sufferings may be shortened,
Ask of Him who rules on high."

Then unto his forge he straightway
Walked erect with steady step,
While the people followed after,
Some with shouts, while others wept,
And with nerve as steady as when
He had plied his trade for gain,
He selected without faltering
From his store, the heaviest chain.

To his anvil first he bound it,
Next his limb he shackled fast,
Then he said unto his townsfolk,
"All your danger now is past.
Place within my reach, I pray you,
Food and water for a time;
Until God shall ease my sufferings
By His gracious will divine."

Long he suffered, but at last
Came a summons from on high,
Then his soul with angel escort,
Sought its home beyond the sky;
And the people of that village,
Those whom he had died to save,
Still with grateful hearts assemble,
And with flowers bedeck his grave.



The consciousness of having done right is recompense sufficient.

Trade just enjoys coming to the business place of the happy, cheerful man.

Some men move about as though they had riveted joints with the rivets drawn too tight.

Lots of smiths gulp their pleasures when they should be sipping them through a straw.

The smith who is good at making excuses is seldom good at making wagons or shoeing horses.

A stake on the bosom of the trouser seat is more deserved by some men than a steak on the interior of their stomach.

With a band saw, band iron, and hub bands in the shop, is it any wonder that some men love the music of the smithy?

The apprentice who is too good to sweep out the shop is not very likely to ever get the chance of hiring some one else to do it.

The gas engine—does it receive the treatment it deserves? It won't fail you if you don't neglect it. Of course, you've got an engine.

The study habit is a good one to cultivate. Study your shop, customers, help, and everything else that comes into your business life.

The apprentice with an intelligent, inquiring mind is most likely to some day find himself in a shop with his own name over the door.

There are no free tickets to the hall of success—you must pay the price of admission. The price of success is work! work!! work!!!

Cents make dollars—a raise of a few cents on each shoe will amount to quite a sum at the year's end. Organization will secure the raise for you—sense makes dollars.

Of two salesmen, who will be the most successful: One who attempts to hammer his talk into the customer's head, or the one who states facts plainly and lets the customer decide?

"No, my dear," said Newly Wed to his wife, "A punching machine has nothing to do with the hub boxer. But both of them may help to swell the scrap heap, if not used intelligently."

Warm the seat of trouble's trousers with the toe of your boot when he calls, but get a strangle hold on opportunity's neck when he comes within a mile of you. How many smiths reverse this procedure!

Your pay envelope is not affected alone by the frequency with which you use your tools—intelligence also counts for much. The wearing out of many hammers may affect your wage favorably or otherwise.

The man who works for a living usually gets what he works for and nothing else. The chap who picks the plums is he who works for the joy of working—he who gets his pleasure from the accomplishment of his task.

The grouch often makes good—he spends little time in being a good fellow. And he is a pretty bum specimen of humanity from whom we cannot learn something. Trouble is we ofttimes learn too much or the wrong thing from the teacher.

The jinrikisha, the man-drawn carriage usually thought to be of Japanese origin, is said to have been invented by Albert Tolman in Worcester in 1846. The Japanese first saw the vehicle in China where it had been introduced by missionaries.

"The Pay Streak" is the name of the amusement avenue of the Alaska-Yukon-Pacific Exposition and corresponds to the "Midway" at Chicago, the "Pike" at Saint Louis, the "Trail" at Portland, and the "Warpath" at Jamestown. This exposition will be held at Seattle, Washington, in 1909.

Thus reads a York State smith's letter-head: "Wheelwright and Blacksmith, Wagon Painting, etc. Agent for Walter A. Wood's Harvesting Machinery; Steam and Water Pipe Fitting; Custom Cider Mill; Stone Crushing; Saw Mill; Automobile Repairing." Have we heard of your side line?

The thoughtful smith avoids "talking politics" as he would a plague. He knows it leads but to misunderstandings, warm discussions, accomplishes nothing, and tends to turn trade away. One smith we know has this sign up in the shop: "If you want to know who's going to be elected, come in tomorrow. Today is my busy day."

"My grandfather," said Tom, "was a pretty nice old man. He was the best smith of his day and I've got the same tools and equipment that he had. But I don't seem to succeed as well as he did. The old man left quite a bit of money when he died." Friend Tardy doesn't realize that times and conditions have changed since his grandfather's days.

If you depended upon yourself alone for new ideas, methods, hints, and kinks, where would you stand on the ladder of efficiency? When you hit upon something new pass it along to the rest of "Our Folks." A fair and liberal exchange of ideas and the unrestricted discussion of craft matters tends toward a better general understanding of not only the craft but the men in the craft. Let us one and all think on these things.

The grocer told us and he said Mrs. T. told his wife. This is how it happened: Tom saw the ad of a money-to-loan-by-mail concern in a cheap, trashy paper he gets and he applied for a loan. The company replied that they would send the money by return mail if the title of his security was satisfactory. To pay attorney's fee for searching title five dollars was requested. They also asked Tom how he wanted the money—money order or cash by registered mail. Well, friend Tardy is still awaiting the loan and is poorer by five dollars. As the grocer said: "Tom is a regular professional easy mark."

American Association of Blacksmiths and Horseshoers.

September—time to get our shoulder under the wheel again and to hustle and work hard along the lines of protection and coöperation. Work in the majority of the branches has been going on right through the hot weather, and those associations who have rather "laid low" during the summer will find it to their interest to get busy right away. Association activities have started in a majority of the states and those in which no movement has been started we want to hear from as soon as possible. If you, Mr. Reader, have not got an association in your county, write me today for my easy plans. Then when your state gets together you will have your county all ready. Don't be afraid to approach your brother smiths on this subject. You'll find them just as enthusiastic as you are. But get started now. A start now will enable you to raise prices on work during the fall rush. And this will turn quite an amount right into your pocket without a bit of extra effort.

Let us all work together to make the coming season one of the biggest seasons in association circles. If you have an association in your county, work hard for its development and growth. Get non-members interested. Push for a stronger organization and, whether an officer or not, support the association as if president. If you haven't the advantages of an association in your county, ask for my easy plans today. Get the ball rolling in your county. There are advantages without number, and the best method of meeting the great number of smithing problems that are before the craft today, is by cooperation. Write me at P. O. Box 974, Buffalo, N. Y., and by return mail my easy plans will be sent you. Do it today and get full advantage of an association during the fall rush.

THE SECRETARY.

The Smith of the Future.

The apprentice problem in the smith shop of today is not a matter to be passed upon lightly. The future of the craft depends upon today's apprentices. And if you think that the situation concerning apprentices is in any way mythical, question any salesman calling upon the trade. Ask him how many apprentices are serving in the shops at which he calls. He won't need the fingers of both hands upon which to count.

But little is to be gained by simply mourning over a condition. Measures for the insurance of the future craft welfare should be adopted. Less of scaring the would-be apprentice into other trades, and more encouragement for the shop kid on the part of the individual shop owner will do much toward insuring a plentiful supply of smiths for the future.

There are, of course, several sides to this question. The shop owner asserts, and with a good deal of fact, that the would-be apprentice is afraid to work; that he is afraid to soil his hands, and that the monetary encouragement which he is able to give the beginner does not compare favorably with the money which the young man can secure in other lines. The would-be apprentice, on the other hand, relates an attempt at learning the trade, and, as one young man tersely sums up the situation, "the apprentice's lot is by no means all bread and honey; there is considerable vinegar thrown into his smith-shop life." "Old-Timer," in his series on "The Failures and Successes of an Apprentice," now running in these pages, has found that employers are as various as the patrons of a smith shop. For the one found who encourages his help, there are six who attempt to get all they can out of their apprentices, without giving them much in return, either in the shape of practical training or monetary encouragement.

Mr. R. E. Stephenson, as told in these columns some time ago, has struck the keynote of the situation. He solves the apprentice problem along the lines that "an ounce of prevention is worth a pound of cure." And Stephenson doesn't have any apprentice troubles. He treats his boys as if they were his own. And he rightly feels a responsibility, not alone for the mechanical training of his boys, but for their moral training as well. He rightly believes in showing the smith of the future that a smith can be an expert mechanic and a gentleman at the same time.

We have simply singled Mr. Stephenson out as a case known to "Our Folks." There are other shop owners about the country who are discharging their duty to the future craft satisfactorily. But the number of these smiths is by no means yet sufficient.

The Little Weight and the Big Horse.

Did you ever notice a big, strong horse quietly standing where the driver has left him tied only by a narrow strip of leather to a weight which he could draw away with the merest effort? The animal thinks, if horses think, that he is tied hard and fast, and, therefore, he doesn't move. Did you ever think that some men are like this? Held by a mistaken idea; held to old methods because they think that the incorporation of something new will subject them to ridicule. Afraid to ask for trade, contemplating a refusal. Afraid to advertise, fearing failure. Afraid to do anything but plod along in the same old rut.

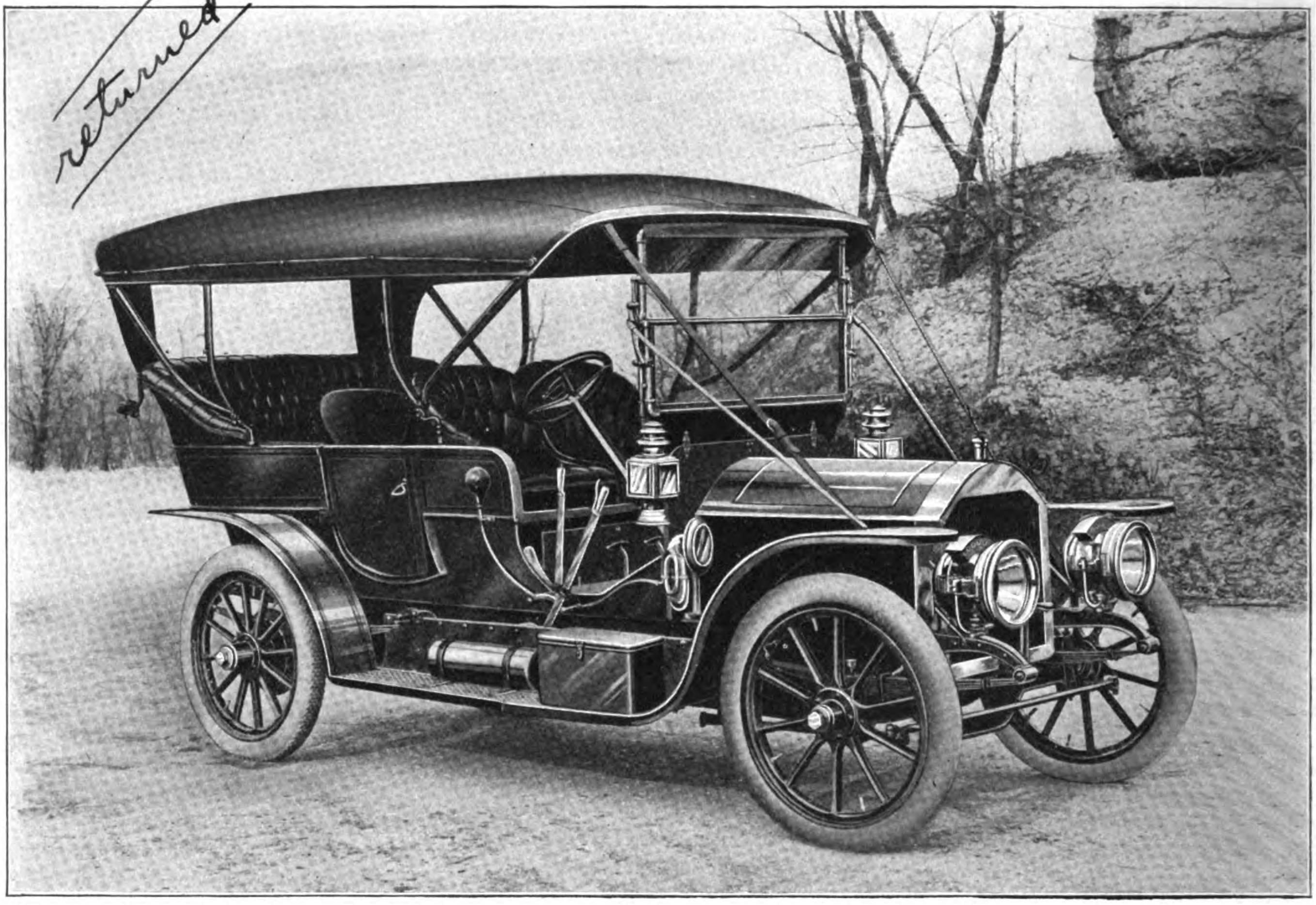
Now, suppose the big horse attempts to break away. A sudden jerk of the head, if it doesn't part the tie strap, will start the weight. And when once started, the animal finds little to interfere with free movement and action. And the simile can be carried out again in the case of some men. Should they attempt to break away from moss-covered methods and grandfather ways, they would be ashamed at discovering how slight, how small, the ties that held them. A start, and succeeding action is easy. The effort for the start is really the most difficult, and this after the start has been made, will appear extremely simple.

There are lots of little weights holding business smiths to a second and third-rate success, when a very slight effort would suffice to place them in the top-of-the-ladder class.

Gun and Novelty Repairing.—1.*

W. G. MUMMA.

The general smith will find little to be purchased in the way of tools and equipment, to enable him to undertake the repairing of guns, bicycles, typewriters, sewing machines, and the like. He already has a forge or two, anvils, work benches, and vises. Wrenches of several styles and sizes are usually included in the average shop equipment, together with pincers and pliers. If a breast drill is not included in the shop equipment it had best be secured, also a pair of heavy snips. For holding work rigid the clamps used by the wagon worker may be used. Calipers of various kinds—inside, outside, and a small micrometer caliper—will also



THE GREAT WESTERN MODEL NO. 16, FOUR CYLINDER, FIFTY HORSEPOWER CAR

be useful. A hand vise will be found very handy for holding small work, while a brace and bits, several chisels, a draw knife, several planes, screw-drivers, and a good wood saw may be procured from the woodworker's bench when needed. A set of carving chisels and gouges of various sizes and shapes will be found very useful in repairing gun stocks, furniture and other wood-work. A good glue pot and a quantity of the very best glue obtainable will also be needed. A set of false vise jaws and vise caps will also be necessary to keep fine work from being bruised or marred. When working upon small delicate parts, a jeweler's eye-piece will be found very convenient.

Then an assortment of miscellaneous odds and ends will come in very handy. Some sheet brass and steel, some German silver, some copper and some round iron and steel will be found very handy. Then also some supplies such as tool steel, spring steel, pumice stone, borax, emery powder, shellac, rosin, babbit metal, solder, spelter, emery paper and sand paper will be found already included in the average smith-shop equipment. A supply of gun, pistol, and bicycle parts should also be on hand. Before securing these parts get a catalogue or two from some good reliable supply houses and keep the books on file. When you want something not on hand you'll know where to get it.

The machine equipment should include a drill press, a scroll saw, a lathe, measuring about 40 inches between centers with a ten-inch swing, and a wood-turning lathe. A grinding machine with several sizes of emery wheels will enable you to grind cutlery, scissors, razors, and the like. This machine need not be a large one, and with a set of polishing and buffing wheels it will be found a great labor saver.

In connection with the repairing of guns and small machines, the smith can derive a considerable revenue from the sale of ammunition, gun and revolver supplies, fishing tackle, hooks, lines, flies, bicycle parts, pedals, bells, horns, lamps, tire tape, oil, graphite, and all kinds of sporting goods. The lines which will suggest themselves are almost without number. Of course, all of these lines will not do for every shop, but in a locality where there is no nearby fishing ground, hunting is very likely the sport. Or, should neither fish nor game be abundant, then the smith will find call for bicycle repairing and supplies. Where ever woman has set her foot there also will you find sewing machines. Locks, clocks, lawn mowers, typewriters, and numerous other small machines are found in every locality and will be found to bring other trade with them when brought for repair.

The business of gun and novelty repairing will be found very pleasant and profitable. For the man who enjoys solving puzzling problems, it will be found to contain a veritable world of enjoyment, for new problems, new situations, and new jobs are continually appearing. There is perhaps less routine about gun and novelty work than any other occupation, for new things are continually coming in. One is often surprised at the variety of things brought in, and the old guns, pistols, and machines that make their appearance is very often astonishing.

(To be continued.)

EDITOR'S NOTE.—This is the first of a series of articles by Mr. Mumma on the repairing of guns and novelties. These articles will contain much of interest to the repairer of guns, sewing machines, etc.

A thick, medium stiff painter's brush is an excellent instrument with which to clean an automobile engine. Waste and cloths are more troublesome than useful among the pins and projections and only make the cleaning more difficult. P. A. R., Illinois.

The Great Western Four-Cylinder, Fifty-Horsepower Car.

This is the Great Western No. 16, built by the Model Automobile Company. The car shown in the engraving is a seven-passenger, four-cylinder, fifty-horsepower car, with a wheel base of one hundred and twenty-two inches. The engine is of the separate cast cylinder type, with five main bearings to crank shaft, the end ones provided with ring oilers, as shown in Fig. 2, which is a sectional view of the motor. A photographic view of the intake side of the motor is shown in Fig. 3.

The oiling of the motor is accomplished by the splash and also force-feed systems to main parts. Cups are also so placed on inside of crank case that there is a continuous flow of oil through the bearings. The bearing next to the balance wheel is so arranged as to cage the surplus oil, preventing it from working out on the wheel. This feature is shown at the left in Fig. 2.

The man to whom automobile construction and engine mechanism is new can trace the fuel, or gasoline, from the carburetor shown in the center of the motor in Fig. 3, up through the intake pipes, which divide first into two and then into four branches. From the intake pipes it passes through the intake valves, which are operated by valve lifters, which in turn are operated by cams on the cam shaft. The fuel is now in the exploding chamber, from whence it is discharged in the shape of burnt gas at the top of the cylinder, through the exhaust valve into the exhaust pipe, and then through the muffler to the air.

The shaft at the right of the center of the motor in Fig. 2 bears on its top end the timing device for the ignition spark. This device is operated by means of a bevel gear by the cam shaft. Two systems of ignition are used. First, the spark coil in connection with a commutator and storage battery; second, a Bosch magneto, with separate set of spark plugs.

Cooling of the motor is accomplished by a gear-driven pump. The water is taken from the bottom of the radiator, enters the water jacket at the bottom, and leaves the water jacket at the top through the pipe, which is shown slanting upward toward the right at the top of the motor in Fig. 3. From this pipe it enters the radiator on the front end of the car, where it is cooled by means of the fan, which is belt-driven from the crank shaft.

By a comparison of Figs. 2 and 3 the man unacquainted with automobile motor construction can learn much that will be of value to him in repairing a disabled motor.

An Automobile Truck Built in a Smith Shop.

W. P. HOCKLEY.

The accompanying engraving shows a horseless truck that I built in the shop. The entire car is shop-made except the engine which is a five by five two-cylinder. Any blacksmith can make the castings for the hubs and other parts. A band saw makes the cutting of the wood parts simple. The axles are one and three-fourths inch with two-inch springs with five leaves. The sprockets are made of two by one-half inch steel punched out and ground out on an emery wheel. The truck will carry three thousand pounds.

Hiring and Rating of Employees.

It has been a source of wonderment to the writer, why so many shops lack system in this important question, i. e., the rating of their workmen. This lack of system is the cause of a great deal of trouble, and it generally can be traced to jealousy on the part of the one who does the hiring, be he the superintendent or assistant. Being at one time foreman for a firm, whose help was all hired in the front office by the superintendent, I had occasion to discharge one of the men for being absent

returned

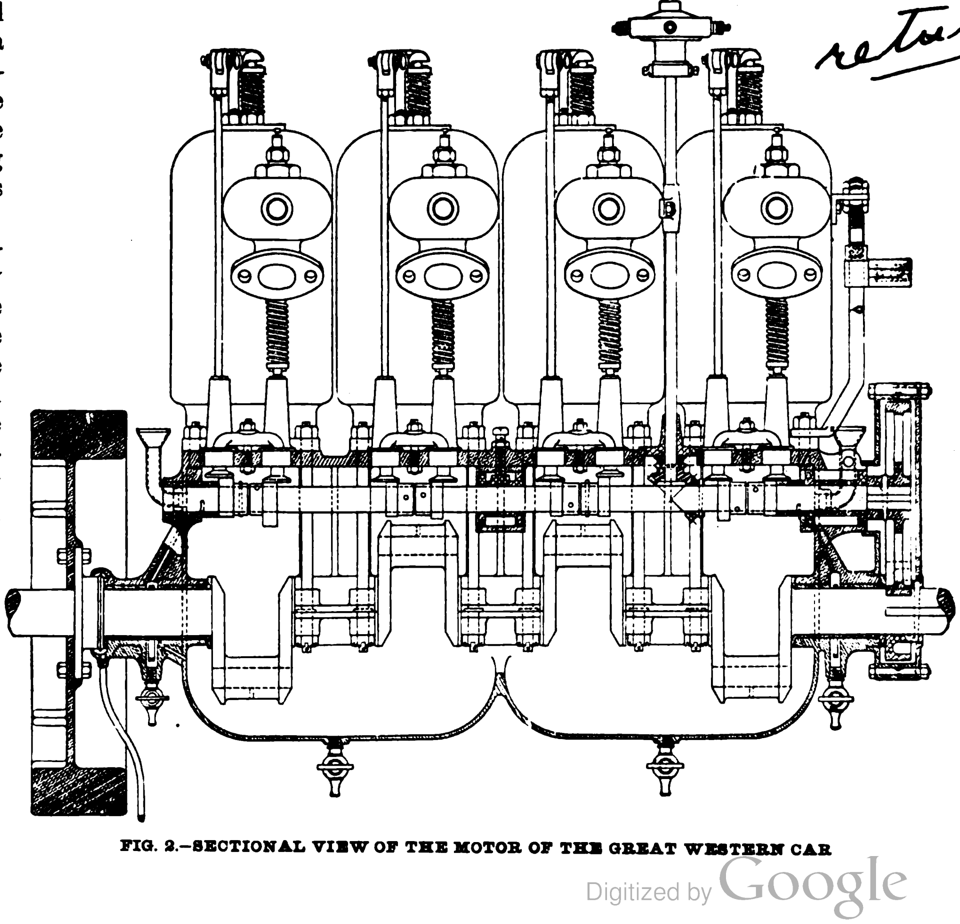


FIG. 2.—SECTIONAL VIEW OF THE MOTOR OF THE GREAT WESTERN CAR

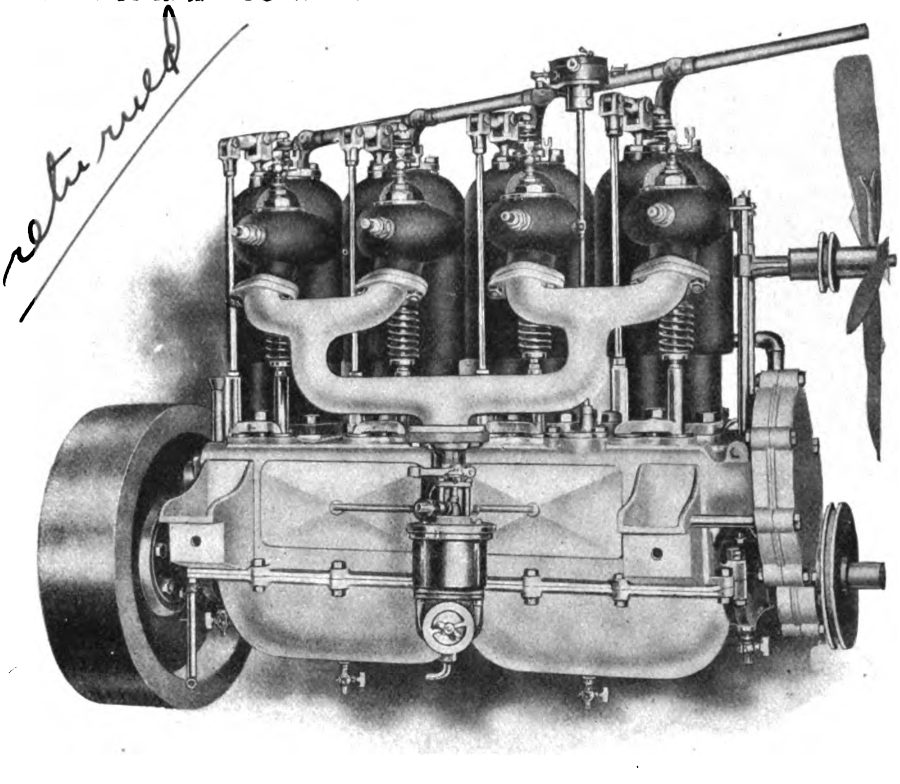


FIG. 3.—SHOWING THE INTAKE SIDE OF THE MOTOR

and drunk. The man simply went to the superintendent with his story, added a lot of stuff that was not true, and landed back on the job the next morning drunker than he was the day he laid off. This really happened in what was a few years ago one of the best factories in the country, but of late has depreciated, no doubt because of lack of proper management. Some shops (thank goodness not many), are run about as follows: The assistant superintendent does all the hiring, he picks out the cheapest help he can get, gives

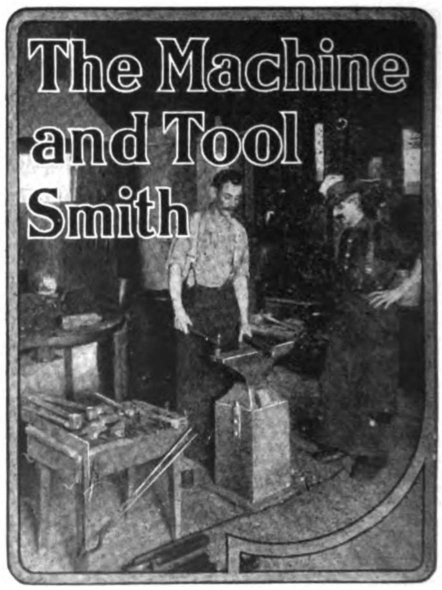
AN AUTO TRUCK BUILT IN A SMITH SHOP

them an order on the timekeeper for a number on the clock, and that is the last seen of him by the man who hires him. The new employee is assigned to the department foreman, and is put to work on a job he has never seen before. The result is a lot of scrap for the first day's work. If he is slow to learn, after a few days he is discharged by the foreman. He goes home for a few days, and returns to the same shop looking for work. Of course, the assistant superintendent does not remember him so hires him again and sends him to some department, perhaps the same one he was fired from a few days before.

The writer knows of an incident where an employee in the grinding or buffing department was dissatisfied, and asked his foreman for a change. The man was told that he could not be transferred from one department to another, and that if he could not "hop to the work" like the rest of the men to quit and get out, whereupon the man walked out and down to the "front," as it is called, mixed up with the other men looking for work, and was the first man hired. He was sent to the paint shop.

Now, if a man makes good in his work, pays strict attention to business, and is doing a little more and better work than some of the others, he finally asks his foreman for an increase in wages, and his foreman not having that authority tells him he will take the matter up with the assistant superintendent, the man who hired him. The superintendent says he will think it over, and after a few weeks of this parleying the man quits, and another, perhaps a worthless one is hired and put in his place at the same money. This may look all right to the one who hires the men, but how about the foreman who has to break in a new man every few hours besides looking after the rest of the work? In the first place a good competent foreman should be in charge of each department, those having executive as well as mechanical ability. The man hiring them should not be afraid to hire a foreman who knows as much or even a little more than he does himself. This is sometimes the trouble, as some men are afraid the new man might get their job.

Then as to hiring the men, why not let the timekeeper and foreman do the hiring together? A foreman could notify the timekeeper that a certain number of men were wanted, stating what they should be qualified for. The timekeeper would be on the lookout for the men wanted, and when hiring them take their names and addresses, and keep this on file. When a man quits or is discharged, the timekeeper should file his card bearing the date, the department he worked in, and the reasons for leaving. This will do away with mistakes. At the same time if a foreman knows a good man he could ask the timekeeper to give him a number and send him to his department.



Railroad Blacksmith Shop Work.

ETHAN VIALL.

Most of the heavy bending and shaping of the parts used on cars and other railroad rolling stock, is done in

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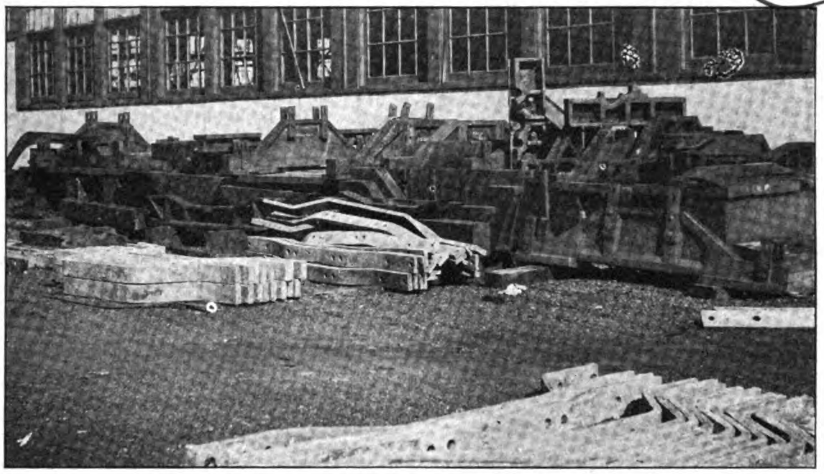

FIG. 1.—A FEW OF THE BENDING FORMS AT THE WABASH SHOPS

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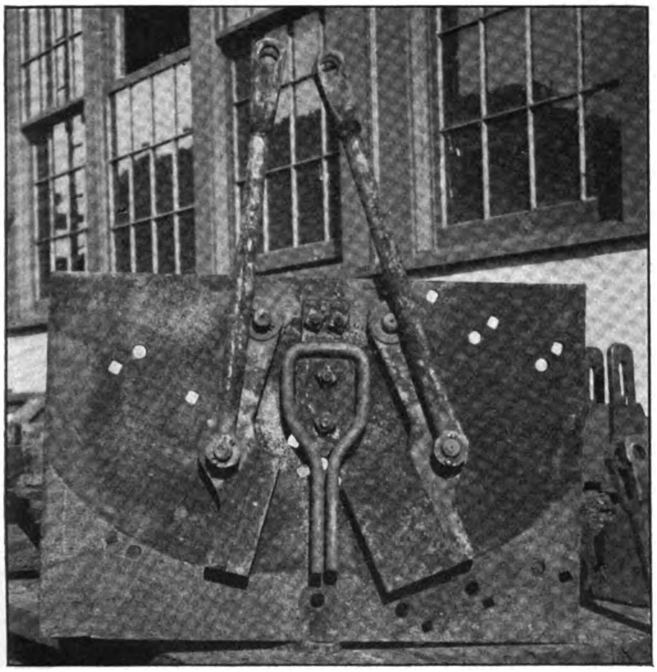

FIG. 2—METHOD OF BENDING A LOOP OF ROUND STOCK

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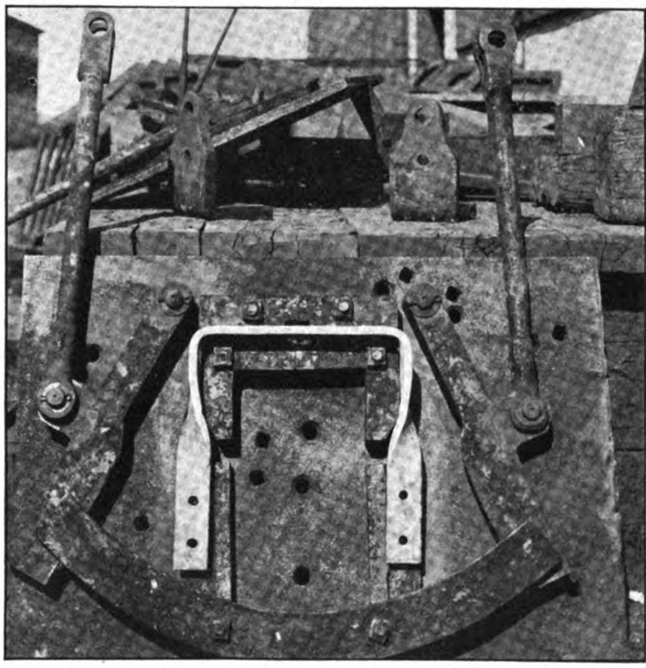

FIG. 3.—BENDS AND TWISTS MADE AT ONE OPERATION

the blacksmith shop on what are known as bulldozers. Of course, there are a good many things that are forged to shape under the power hammers, but that is another class of work than that to which I refer.

The bulldozer itself is a machine which is too familiar to most readers to need any description; suffice it to say that as a rule it is used to bend iron or steel into certain shapes by pressing it between two forms. The iron or steel may or may not be heated, depending entirely on the size and nature of the work.

Most of the punches and dies used in rough bulldozer work are simply pieces of cast iron, cast into the desired shapes and used without any machining whatever.

A slight idea of the number of these forms used in even an ordinary-sized railroad shop may be had by glancing at Fig. 1. This picture was taken at the Wabash shops, at Decatur, Ill., and represents about a third of the forms on hand. A pretty good idea of the size of these may be had by comparing them with the windows.

However, the cast forms are of little interest, as no great amount of skill is required to make a pattern for them, but, in bending complicated shapes that require compound punches and dies, there are times when the highest mechanical skill is taxed to the utmost.

For the benefit of those readers of THE AMERICAN BLACKSMITH who have never had an opportunity to see any of this compound bending, I shall illustrate and describe a few of these devices. Fig. 2 shows an arrangement used for bending and shaping the stirrup-shaped iron loops shown in the middle of the plate figure. In using this, the plate is bolted to the bed of the bulldozer and the two lever arms, shown pointing up, are fastened to

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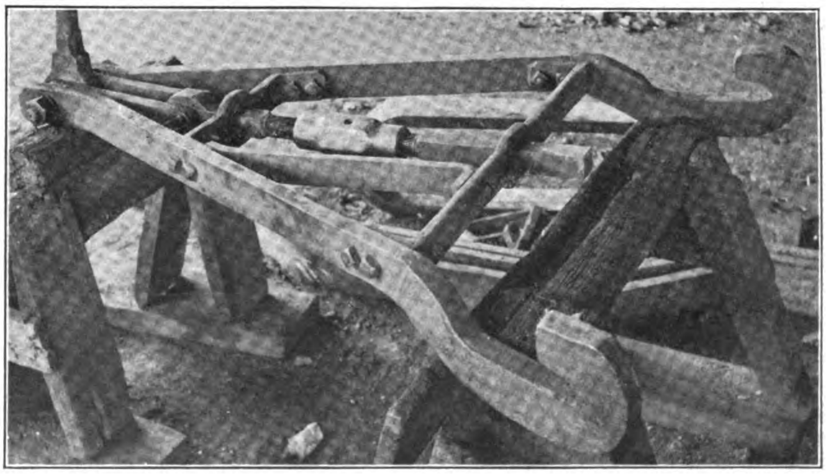


FIG 4.—A DEVICE FOR BENDING RAILROAD RAILS

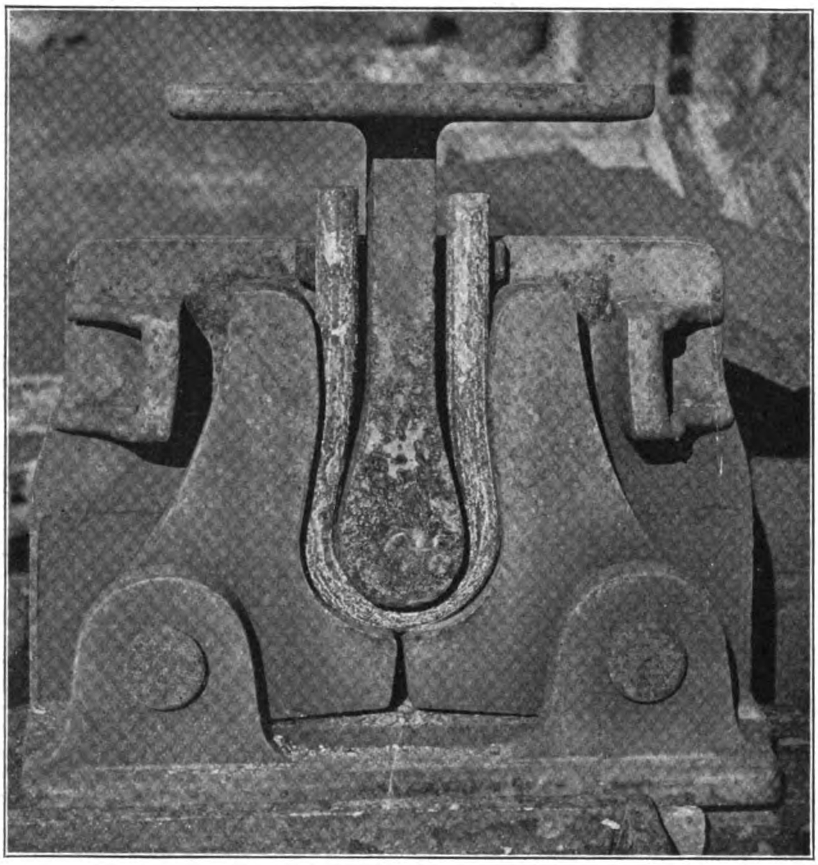


FIG. 5.—AS THE PUNCH PRESSES AGAINST THE ENDS OF THE FORM, THE BRANCHES OF THE LOOP ARE PRESSED IN

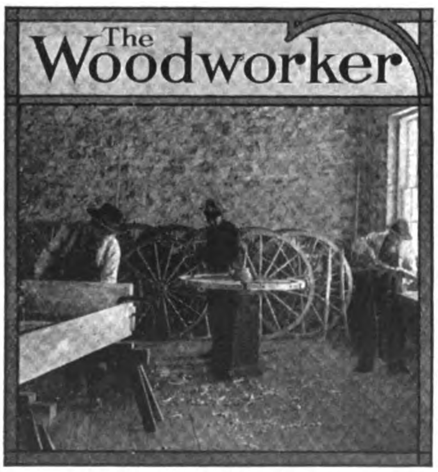
the ram. The complete bend is made at one stroke. Iron plates are riveted to the top of the bending forms to keep the ends of the loop from "kicking up" during the bending operation.

Fig. 3 shows another shaping device which is fastened to the bulldozer exactly as the one just described. The special pieces used to fasten the arms to the ram, are shown resting on the platform, between the arms. On this plate the first part of the bend is very simple and the twist is given to the pieces by having the ends of the bending arms shaped something like an inverted L. A careful inspection of the cut will quickly show the idea.

Fig. 5 shows how a loop with a slight eye-shaped bend is made. The first bend is U-shaped, but as the punch presses against the end of the form the ends of the loop are bent in, as shown. The ram is then run back and the bent piece is easily lifted off the punch. In all the above bends the iron is heated red hot.

In Fig. 4 is shown a simple hand-bending apparatus used to bend short sections of railroad rails. The hook-shaped ends are so made to fit the flanges on the rails.

The picture shows it a little out of proportion, owing to the position in which the picture was taken. The plunger in the middle is operated by an eccentric movement and has a stroke of three quarters of an inch. The nut in middle of plunger has a right and left thread and allows an adjustment of four inches. This little device is very handy for heavy-bending work of a special nature.



Axle Lengths for Front and Rear Wheels.

W. H.

In a recent issue of "Our Journal" some brother says that the front and back axle of a wagon should be the same length to make the wheels track. This is wrong. When we set axles down at the point, the wheels will seem narrower at the bottom than at the top. This is also done to get a plumb spoke. If the hind wheels are four feet six inches, and the front wheels three feet in diameter, we must make the hind axle longer than the front one or the wheels will not track. A stick that will just touch the inside of both tires at the bottom would be an inch too short at the top. Now the center or box of a hind wheel being higher than the center of the front wheel, they must necessarily be further apart, and we must, of course, take a longer axle to place them so.

The Principles of Correct Axle Setting.

W. H. GUNN.

My good friend, Mr. Daron, writes like an intelligent man, and takes issue with me on page 140 in regard to the principles of axle setting. As a matter of fact, there is more or less theory in all mechanical construction, and when we demonstrate theories we make them facts. Referring to the rule which I thought best, he says: "Brother Gunn claims that the centrifugal force in a wheel of considerable dish is greater than the centrifugal force in the same kind and height of wheel with less dish, and he claims more gather of wheels will counteract this force. I cannot comprehend the difference and if he has discovered anything new in this respect I should be glad to have him illustrate and explain his findings through 'Our Journal', as that is what it is for."

FIG. 1.—SHOWING TRUCK ATTACHMENT IN USE

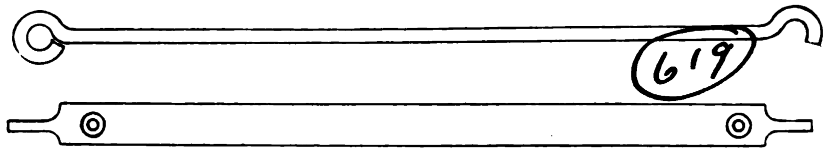


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FIG. 2.—FOR HOLDING THE CHAIN WHEN HANDLING A BARREL

The wheels of a vehicle are governed by the same laws of friction and gravity that control in the physical world of matter about us. Rule 1. A wheel becomes divergent in proportion as the rim sets from a straight line; and the tendency to fly off at a tangent is increased by the momentum and the distance of the extreme circumference from the center of gravity.

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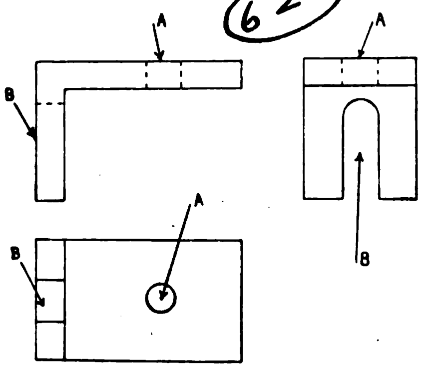

FIG. 3.—FOR HOLDING THE CHAIN WHEN HANDLING A BOX

Rule 2. In practical analysis the hub of a wheel being a common center, an axle arm thrown back produces the same result as a badly dished wheel. Consequently, in every case the wheel presses hard against the nut. If the arm is thrown forward too much the wheels press hard against the collar.

Therefore, in order to set an axle properly, these divergent and convergent forces must be equalized so that the resistance or "friction" may be reduced to a minimum. The rule which I have adopted after thirty-five years of practical experience is again respectfully submitted as follows: wheels should be gathered one half of their dish to the front. To illustrate: if a pair of wheels should be dished one half inch each they would need to be gathered one fourth inch each, making them stand one half inch less at the front than at the back measurement.

A Barrel Truck Assistant.

Have you ever seen three or four men trying to load a barrel or box on a truck, one man pulling down on the handles, and the others "lifting their heads off"? The writer has, and at once made drawings, and ordered the pieces shown in Fig. 2 and 3 made. Fig. 2 is made from a flat piece five-sixteenths by one inch with an eye on one end, and a hook on the other. This is bolted or screwed to the bottom side of the truck just behind the middle cross piece. A chain with $\frac{5}{16}$-inch links is then fastened to the eye end of Fig. 2. With this simple contrivance, one man can shove the nose of the truck under a barrel, tip the truck up close to it, place the chain around it, fasten the link on the hook end of Fig. 2, and by pulling down on the handles can, with ease, accomplish what otherwise would require three of four men to accomplish.

For loading boxes on the same truck, we have on the other end of the chain a couple of hooks. We also have a piece of $\frac{3}{8}$ by $1\frac{1}{4}$-inch stock bent at right angles as in Fig. 3. This is fastened in the center of the back part of the top cross piece of the truck by drilling a hole A, and using the same bolt that already holds the brace running from the cross piece to the handles of the truck. Fig. 3 should have a slot B, and then by shoving the nose of the truck under box and placing the hooks on the far side of the box draw up tight on the chain, and place link in slot of Fig. 3. This contrivance acts the same as a grab hook, and by placing hooks on the far side of box we do not break the side out of it. A heavy box can be loaded in this way by one man, and it makes no difference whether the box has been opened or not.

Several Practical Shop Kinks.

E. P. KILE.

The accompanying engraving illustrates my way of holding heavy short stock under the trip hammer. Just unkey your vise and fasten your stock in it. My son is shown in the picture cutting tenons on spokes with a common blacksmith drill press. To do

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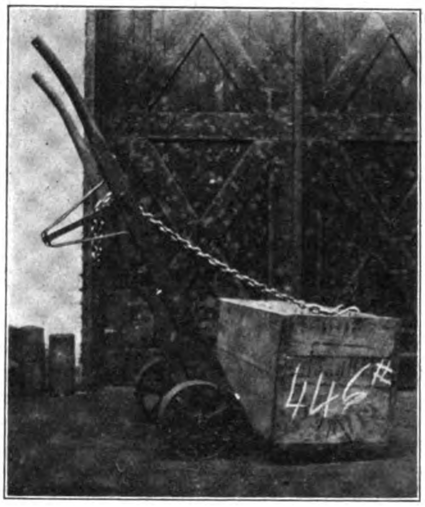

FIG 4.—SHOWING HOW EASILY A BOX MAY BE HANDLED

this put your hollow auger in the chuck and run the feed down on the spoke until it is cut far enough. If you have no chuck, take a piece of hollow material and square it on one end and round the other to fit the drill; then wire the

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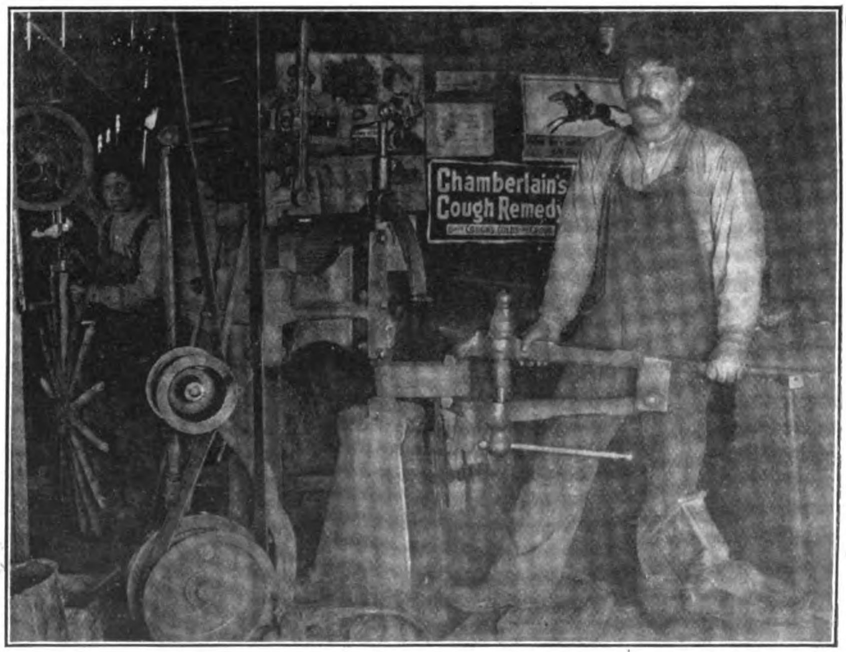
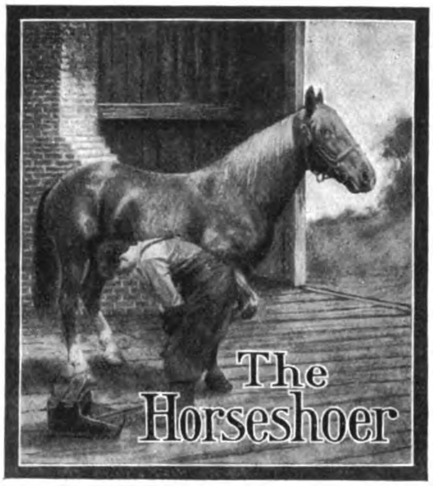


A SIMPLE METHOD OF HANDLING SHORT, HEAVY WORK UNDER THE STEAM HAMMER auger to keep it from dropping down. I use cotton lint or cotton batting instead of mud to hold babbitt when I run a bearing. Do not crowd the cotton in the end too much or it will keep the babbitt back, and the box won't be quite full at the ends.



Thrush may be successfully treated by cleaning the hoof thoroughly every day with a hoof pick and dry oakum. Use no water. A. O. C., Ontario.

My one and only rule in shoeing interfering horses is to insist upon shoeing the horse all the time. By doing this an intelligent shoer can soon tell why the horse interferes and how he can be cured by shoeing. LEE STEVENS, New York.

Contracted feet are often caused by high heels and calks and can usually be overcome with properly made and fitted bar shoes. Let the foot come down as close to the ground as possible. Keeping the foot soft, with an ointment or other means, will assist in the cure. D. B. S., New York.

A simple remedy for clicking consists in delaying the hind feet by making the hind shoes thicker at the toes, gradually thinning toward the heels. The toe or wall in front should not be trimmed much. This method allows the front feet to get out of the way of the hind feet. A. K. J., Ohio.

Chest Founder and Speed.

E. H. MALOON.

In the May number of THE AMERICAN BLACKSMITH, Mr. A. F. Libbey in his article makes use of the term "horses that are slightly chest foundered." I wish he would tell me through these columns what he means by the term "chest foundered." Also, to tell me what organs are affected and what is done to them. It is the first time I ever saw the word used in print, to describe certain conditions that we sometimes find in a horse, although it is very commonly used among men in describing a horse that is stiff forward. Twenty or more years ago I looked the matter up as well as I could, and my conclusion then and still is that there is no such thing as "chest founder." If I am wrong I certainly desire to be corrected and set right.

As we look over young, sound horses, we find that some of them are full-breasted, and in some the breast is flat or shrunk in. This is natural. Now, take the horse with the shrunken breast and drive him hard, let him stand in the wind, give him grain when warm, and we soon have a horse whose cords are stiff and sore and the horse wants to lower his toes to take the strain off the cords, and his whole body is thrown forward to relieve them. His general poise brings his breast in. Now this is the way I look at it, but I am anxious for knowledge.

In the same article, Mr. Libbey says, "Some horses that have shape to go fast still lack power." I would offer him this as the something lacking. Twice in my life horsemen have said to me that the power that caused the horse to go fast was his ability to take in and consume large quantities of air. I have owned two horses that were great roadsters. One was a little chunk that had no marks of speed, always round and fat, weighing about eight hundred and fifty pounds. She wanted about seventy minutes to go twelve miles over our New Hampshire roads, which are rough and hilly. I never yet stopped her when she was in any way distressed for breath or puffed any. Without doubt she could take in air as fast as she needed it. The other only asked for twenty or twenty-five minutes to go five measured miles, conveying two persons in a top carriage, yet when stopped she would take one long breath, then to all appearances was comfortable. Neither of these horses had any shape for speed as the professional horseman looks at it.

A Connecticut Shoeing Shop.

JOHN DONNELLY.

To show what can be done with a run-down shop, I write you my experience with one. Twenty years ago, in search of a job, I drifted into this town with twenty dollars in my pocket. The first shop I struck had holes in its roof through which the sun was shining brightly. The smith had stepped out to see a man, so his boy told me. I found him in a nearby store playing "seven-up." He was not hiring any help he said, but he was willing to sell out his business, stock, and good will for a five-dollar note. I offered him three and a half dollars and my offer was accepted. I paid him spot cash and he handed me the key to the shop and wished me good luck.

I found the landlord and agreed to pay him seven dollars per month rent for the shop, and in just one hour from the time I struck the town I was in business for myself and working hard with sixteen dollars and fifty cents in my pocket. For three years I worked in that shop and besides supporting a family I put eight hundred dollars in the savings bank. I bought a building lot on Main Street and paid my eight hundred dollars for it. Upon this lot I built a shop forty by twenty-one feet. Since then I have added to the shop and it is now one hundred and eight feet long, well equipped with tools, has a gas engine and electric light. I have worked forty-two years at smithing in many different countries. I worked for years in the world's largest city, and yet there are very many things

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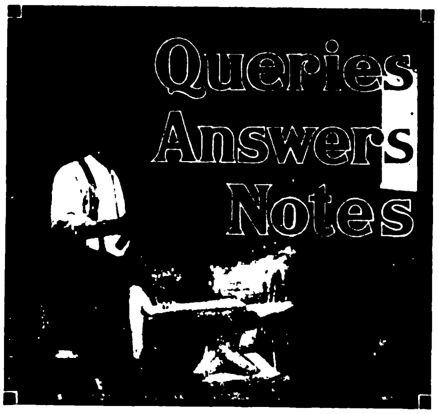
BROTHER JOHN DONNELLY'S CONNECTICUT SHOEING SHOP about the trade which I do not know. When I get in a tight place I consult my constant companion, THE AMERICAN BLACKSMITH, and from it I generally get what I want.



The following columns are intended for the convenience of all readers for discussions upon blacksmithing, horseshoeing, carriage building and allied topics. Questions, answers and comments are solicited and are always acceptable. Names omitted and addresses supplied upon request.

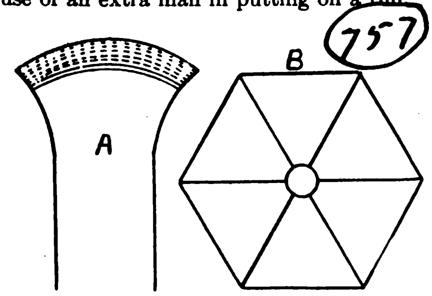
To Stop Clicking.—In answer to the question about stopping a horse from clicking when travelling, lower the heels as much as possible on the hind feet; pare the foot to the natural size and use good length of shoe, especially on outside. My reasons are, it takes the horse longer to get over by giving good length of foot, giving the front feet a chance to get out of the way of the hind ones. H. L. GRISWOLD, New York.

Tempering Rock Drills.—In answer to the question as to the proper way to make and temper rock drills I submit the accompanying engraving at A. I use a bath consisting of one ounce of ammonia, a double handful of barrel salt in two gallons of clear water; apply a little every three or four days. I have been working in glassy blue flint rock for six months, and the drills tempered in this way will cut six to eight inches with one sharpening. I am dressing steel for compressed air drills. The steel is hollow with six cutting points, as shown at B. JOHN GUNSELMAN, Tennessee.

A Question on Brazing.—I do some brazing of cast iron and use Weldarine to braze with. I have a little trouble with some jobs. I clamp the pieces after they are well cleaned and put some powder on the break. I then heat the piece, where the break is, in a clean fire until it begins to turn red, then I put on the borax and heat to a bright red and add my spelter and let it melt and run all over the break. I then let it cool slowly. After it is cold I take a file and clean off the roughness, and sometimes when the joint looks sound and the crack is all filled up with spelter, it turns out to be a bad job and falls apart, and the fracture shows a break of rough brass, but when it is a good job and it is broken it will show a solid cast-iron break. Now, what I would like to ask is to have some brother blacksmith tell me how to avoid these brass breaks or, in other words, breaking in the same old place after the break has been filled up with spelter. And should it give good satisfaction where the joint does not come together by one-sixteenth of an inch and is filled up with Weldarine powder? I would like a little information on this brazing subject. JOSEPH J. UTZ, Illinois.

In Reply.—The trouble brother Utz has is simply because of his failure to clamp the broken edges together as closely as possible. If he will place his pieces in as near their original position he will find his brazing to be successful. There is no danger of the spelter not reaching all parts of the break. Heated spelter will find its way into the most minute cracks and openings, and the better and closer the fit between broken edges the better and stronger will be the braze. BENTON.

A Device for the Wheelwright.—The accompanying drawing shows a very handy tool for putting spokes in the rim. By putting one of the hooks over the spoke that is already started in the rim and the other hook over the next one to it, then pulling the lever down, brings the second spoke into place for inserting in the rim. Both hooks are loose or riveted together like a pair of tongs. This tool will save the use of an extra man in putting on a rim.



TEMPERING ROCK DRILLS

We have a shop twenty-six by seventy-two feet, the front part of which is two stories high. We do shoeing in the back part and in the front part do wood work. We have one eight-horsepower I. H. C. gasoline engine, one power drill, one band saw, one bench saw, one twenty-four-inch planer, an emery wheel, an iron turning lathe, and a grindstone. We do painting upstairs, and have an up-to-date shop in every respect. We keep anywhere from two to four men besides ourselves quite busy. E. D. BEAN & SON, New York.

Some Questions, also Shoeing Pointers.—The July AMERICAN BLACKSMITH was certainly good. In answer to Mr. Sawyer of Iowa: Bending the tire upsets the inside of the circle, while it also stretches the outside. Suppose you are using one-half-inch tire; if you cut it the same size of the wheel you will find it one and four-sevenths inches longer than the wheel measures. An easy rule to remember is to cut the tire three times the thickness of the tire longer than the wheel measures.

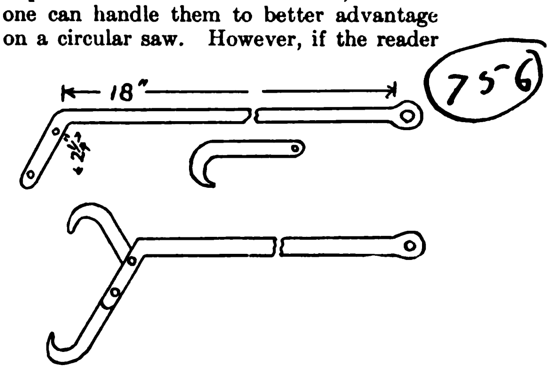
Now, I want to correct G. Koppius in his method of leveling a horse's foot. He says to trim the foot on the opposite side from where the shoe is worn. He has it just wrong. The foot should be trimmed down where the shoe shows the wear. Measure from the top of the hoof and trim the foot so that it will measure the same on each side and the foot will set on the ground level. Then set the shoe so that the heels of the shoe are equally distant on each side of center cleft of the frog and the toe of the shoe on a line with the center of frog, and the horse will wear the shoe level. I also believe a horseshoer should pass an examination, and also that a man should not advise anything that he is not sure is right. I am thirty-three years old, but started a course in mechanical engineering in the American School of Correspondence this spring. I saw their advertisement in THE AMERICAN BLACKSMITH. That one advertisement was worth the price of the paper. I find the school a fine thing for the mechanic.

Can a horse, in forging, pull his hind shoes off with his front shoes, if so, how can he do it?

I wish to thank P. M. Wade for his article on the log wagon. I would like to have a plan to build a log wagon with a fifth wheel. Can anyone give it to me? Prices for work are low here. Some of the work is poor. My motto is, better work and better pay. Do your work good and you will get the work and the pay. H. K. DERKS, Missouri.

Information on Band Saws.—I would like to ask for a little information regarding the use of a band saw. I have never had any experience with a band saw but have been using a ten-inch rip saw for the last four years. I have the idea that I want a band saw if I can do all the different kinds of work with it. What I want to know is this; can you take a plank three and a half inches thick by twelve or sixteen inches wide and line it off for mower and binder tongues and rip it off as well as you can with a circular saw? Are they as good for such work as for ripping out coupling poles, tongues, and any long stock where it is necessary that the work be done on a straight line? I know they are very satisfactory for irregular sawing, but how about using them for straight ripping? Another thing I would like to know is the size best suited for a general repair shop. Some tell me that a small twenty-inch machine is the best. Another will tell me not to buy less than a thirty-six inch. I would like to hear from someone who has had practical experience with one. Tell me of the different work you can do with one. P. V. BURGESS, Missouri.

In Reply, will say that a band saw can be used for most all kinds of saw work, but is not as well adapted for ripping heavy stock, especially where long cuts are to be made, as a circular saw is. They would require two men to handle them, whereas one can handle them to better advantage on a circular saw. However, if the reader



A DEVICE FOR THE WHEELWRIGHT

hasn't the room, or the amount of work is not sufficient to warrant putting in two saws the band saw would be preferable. It can be used for sawing out pieces of almost any shape, such as felloes for wheels, hounds for wagon tongues, or any work that requires curved or angular cuts to be made. Of course, different sizes of saw blades must be carried for use on heavy or light stock. The size of the frame is not of such great importance, and I would advise him to consult the manufacturer of wood working machinery as to the size suitable for his particular work. The saw used in the shop where I am working has a thirty-inch frame and seems to meet all requirements of this shop, and we do mostly heavy work. NELS PETERSON, Nebraska.

On Welding Rock Drills.—I saw a question on the welding of cast-steel rock drills. It is quite possible and quite easy by using the Laffitte welding plates. My experience is that it has no equal. I have worked in shops where it was unknown, and a substitute of an inferior mixture was used, where much valuable time was wasted in welding those drills. It is quite easy to split up the long and short piece, scarf the ends, then slip the short piece in between and lay (when the steel is a little hot) a piece of the Laffitte welding plate on the steel. Now, put gently into a clean coke fire, put on the blast and weld at a low heat. When welding hammer gently at first, then as hard and fast as possible, and a good job is the result. Another method is shown in the accompanying sketch, which is also a very simple one. The cut in the scarf is necessary, as is well known to smiths that steel is inclined to slip at first. A little practice in this will soon give desired results. I may mention that this same welding plate is also very valuable in welding carriage and wagon springs. In welding springs, I jump up the ends a little and also narrow the spring which broadens out in welding. Put a little of the plate on the faces that are to be united, lay in the fire face uppermost, put on blast, and when the plate is melted to a hold on the spring, turn over, and the rest is as simple as welding a piece of iron. A little more care is needed in this, but time is saved by using the above welding plate and a first-class job is sure to result.

I trust this will help my brother Scotsman, Mr. Stewart. If not, write again and we will try and help you. Bear in mind in welding steel, a clean fire, as in every good job, is essential, and use quick, sharp blows. WILLIAM W. WATT, South Africa.

Recipes for Tempering Mill Picks.—I would like to know a recipe for tempering mill picks. The trouble is to temper the pick hard enough and not to break it. The pick should be hard and the steel tough at the same time.

WESLEY THOMPSON, Pennsylvania.

In Reply.—The following recipes represent a variety of methods and will, no doubt, fit Mr. Thompson's needs:

1. To six quarts of soft water add pulverized corrosive sublimate one ounce, and two handfuls of common salt; when dissolved it is ready for use. Some think it better to add two ounces of sal ammoniac to the above. Heat to cherry red, plunge, and don't draw any temper.

2. Salt, one half teacupful; saltpetre, one half ounce; one teaspoonful pulverized alum; one gallon soft water; don't heat above a cherry red or draw any temper.

3. Saltpetre, sal ammoniac and alum, two ounces of each; salt, one and a half pounds; water, three gallons. Cherry red, and draw no temper.

4. Saltpetre and alum, two ounces of each; sal ammoniac, one half ounce; salt, one and a half pounds; soft water, three gallons. Cherry red, draw no temper.

MR. J. P. SKEHAN OF VICTORIA, AUSTRALIA, DOES A GENERAL SMITHING BUSINESS, BUILDS BICYCLES, AND DOES MISCELLANEOUS REPAIRING

5. Water, three gallons; salt, two quarts; sal ammoniac and saltpetre, two ounces of each; ashes from white ash bark, one shovel, which causes picks to scale clean and white as silver. Don't heat too high or hammer too cold; avoid flaws and don't heat more than one or two inches of pick when tempering.

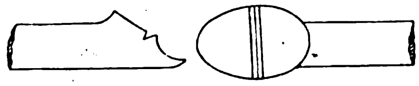
6. One ounce corrosive sublimate, one ounce sal ammoniac, one ounce pre. potash, one ounce saltpetre, one quart salt, four gallons soft water. Heat steel to cherry red and cool in the bath.

7. To six quarts of rain water add one ounce of corrosive sublimate and two handfuls of salt. When it is dissolved it is ready for use. The first ingredient gives the steel strength, while the second gives hardness. Some smiths prefer two ounces of sal ammoniac added to the above. In preparing the pick for hardening, care must be taken not to overheat the steel or to hammer it too cold. Never heat more than two inches at a time. When ready to harden bring the pick to a cherry red, then dip, but draw no temper. Keep dipping vat covered and labeled, as this solution is very poisonous.

8. Take one cup of salt, one-half ounce saltpetre, one teaspoonful of pulverized alum and one gallon of rain water. Heat pick to a cherry red and dip, but draw no temper.

9. Two ounces of saltpetre, two ounces of pulverized sal ammoniac, two ounces of alum, one and a half pounds of salt and three gallons of rain water. To make picks look like silver, mix in the solution one shovelful of burnt bark of white ash.

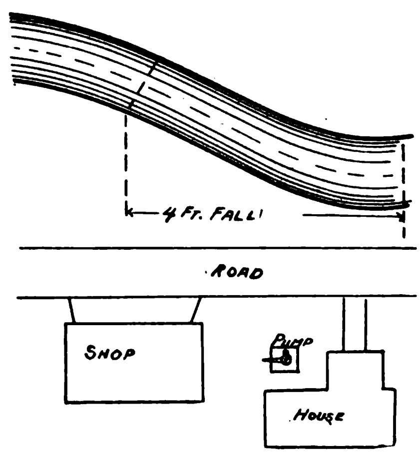
10. Mill picks should be hard as possible and moderately tough, and the greatest care should be taken to avoid burning the steel. Where there is much of this work to be done, the picks can be heated in a pot of cherry-red hot lead and then dipped plumb into clear water of about sixty degrees Fahrenheit. Do not draw the temper. The hardening by the ordinary smith's fire can be well done if charcoal is used, and the



WELDING ROCK DRILLS

pick not hurried through the fire, for hurry burns the corners. Much also depends on the shape of the pick as to whether it is a sectional or leaf pick, or a thick, solid pick, the last being the most difficult to manage, on account of the thick back and sharp edge. A pick of this kind is laid across the fire, so as to heat the eyes as fast as the edge. E. F. S., Ohio.

A Question on Water Power.—I wish to ask a question through THE AMERICAN BLACKSMITH in regard to obtaining water power from a large creek which runs near my shop. I am of the opinion that I can harness this large supply of swift running water and make it of value in my shop, such as running drill press, blower and emery grinder, etc. I will state the surrounding conditions as best I can and will be very grateful if someone would reply as soon as possible. I want to install a water wheel in the large creek which runs very swiftly. It already runs a large milling plant above my place and delivers ten horsepower at that point. I cannot construct a dam on account of the valuable lands on either side of the creek, and must depend on the rapid current on an under shot or some other style of wheel that will not require raising the water much over two feet at the wheel. I can secure a quantity of eight-inch water pipe cheap from an old mine. This I can place in position and raise the lower end about two and a half feet without obstructing the stream and can get full capacity of water for this size pipe with slight pressure only. I wish to install a suitable wheel under these conditions that will give the maximum



A QUESTION ON WATER POWER

power for the available water pressure as mentioned. The engraving shows the position of the creek and shop, the shop being about eighty yards from the creek.

E. W. WILLIAMS, North Carolina.

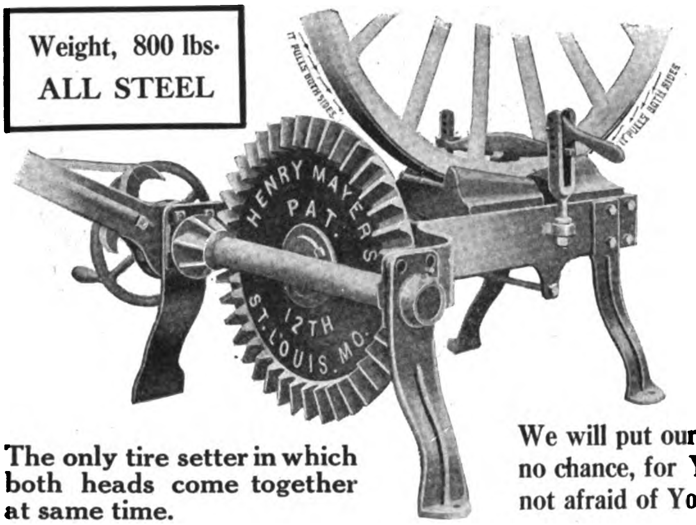
Index to Volume 7.

End of Volume 7.

MR. BLACKSMITH, HOW ABOUT THIS?

It is not a question of "CAN you afford a Tire Setter." But it IS a question of "Can you afford NOT to own one."

Weight, 800 lbs.
ALL STEEL



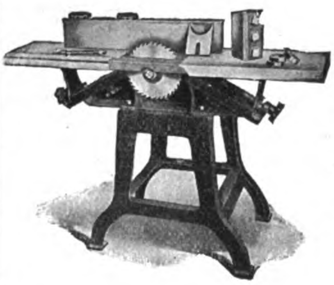
It takes about 3 hours, the old way, to set 4 tires. Your time is worth 50 cts. per hour at this season.	
Therefore, you use of your time or labor about	$1.50
The bolts, in 4 wheels, will cost not less than	.12
The fuel is a small matter, but probably worth	.05
You are out for time, bolts and fuel,	1.67
You receive, on an average, for the job,	2.00
Your actual profit, for this work, is	$0.33
With our machine, you set 4 tires in 30 minutes.	
Your time, at 50 cts. per hour, will cost in labor	$0.25
Bolts and fuel cost you nothing, and you get	2.00
Your actual profit ABOVE labor is	$1.75
With MAYERS TIRE SETTER you clear a profit of	$1.75
By the old, hard way of fire and hammer you get	.33
WE MAKE YOUR PROFIT OF 33 CTS. AND AN EXTRA ONE OF	$1.42

The only tire setter in which both heads come together at same time.

We will put our machine in your shop on 15 days trial. You take no chance, for YOU TRY IT BEFORE YOU BUY IT. If WE are not afraid of Your Judgment, why should YOU BE?

MAYERS TIRE SETTER MANUFACTURING CO.

4028-30 Forest Park Boulevard ST. LOUIS, MO.

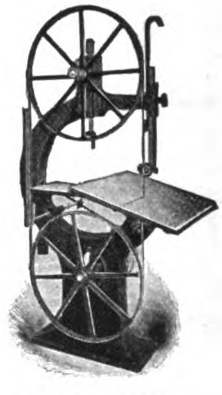

Chicago No. 57 Combination Saw and Jointer.

THE FAMOUS

CHICAGO LINE

WOOD WORKING MACHINERY

Designed especially for blacksmith and wagon shop equipment. We show only a few of our machines here, selected from our big complete line. *Write for circulars and net price list.* Describes in detail all of our machines. Mention The American Blacksmith. WRITE TODAY. Come in and see us when in Chicago. Over 600 machines exhibited.

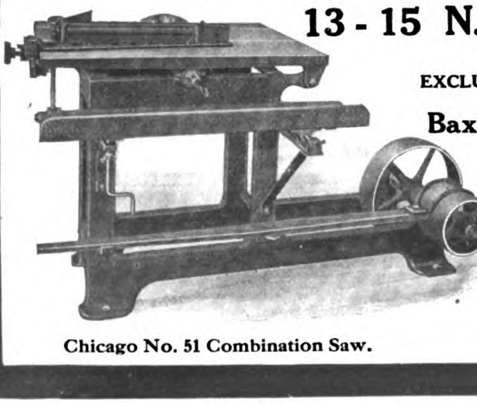

Chicago 27, 32, 36 in. Band Saws.

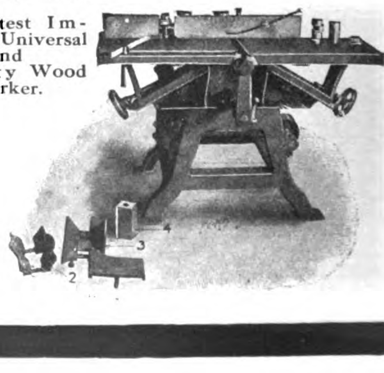
CHICAGO MACHINERY EXCHANGE

13-15 N. Canal Street, Chicago, Ill.

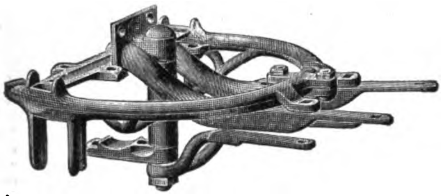
EXCLUSIVE REPRESENTATIVES

Baxter D. Whitney & Son
C. O. & A. D. Porter
Hermance Machine Co.
McDonough Mfg. Co.
Greaves-Klusman Co.


Chicago No. 51 Combination Saw.


Our Latest Improved Universal and Variety Wood Worker.

THE DAYTON FIFTH WHEEL



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FOR ALL LIGHT VEHICLES.
USED BY LEADING MANUFACTURERS.

Made in High-Grade Malleable Iron.

No. 440B. Buggy Size, 10 in., for $\frac{15}{16}$ or 1 in. Straight Bed Axles.
No. 440C. Buggy Size, 10 in., for $\frac{15}{16}$ or 1 in. Fantail Bed Axles.
No. 440E. Surrey Size, 12 in., for $1\frac{1}{16}$ or $1\frac{1}{8}$ in. Straight Bed Axles.
No. 440D. Surrey Size, 12 in., for $1\frac{1}{16}$ or $1\frac{1}{8}$ in. Fantail Bed Axles.

IMPORTANT

Axle Tie and Rear Perch Irons will be furnished for PLAIN AXLES unless SWAGED AXLES are specified when ordering.

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Burgess-Frazier Iron & H'dwre Co., St. Joseph, Mo.
D. L. Carpenter & Co., Cincinnati, Ohio.
Campbell Iron Co., St. Louis, Mo.
Dayton Iron Store Co., Dayton, Ohio.
Des Moines Iron Co., Des Moines, Iowa.
Faeth Iron Co., Kansas City, Mo.
C. D. Franke & Co., Charleston, S. C.
Fischer Iron & Steel Co., Quincy, Ill.
Fort Wayne Iron Store Co., Fort Wayne, Ind.
Fulton, Conway & Co., Louisville, Ky.
S. T. & G. A. Gebhart, Dayton, Ohio.
Grolock Vehicle Material Co., St. Louis, Mo.
Hamilton, Bacon & Hamilton Co., Bristol, Tenn.
Haysler Iron Co., Kansas City, Mo.
W. J. Holliday & Co., Indianapolis, Ind.
Huey & Philp Hardware Co., Dallas, Texas.
Jackson Hardware & Implement Co., Durango, Col.
Jones Hardware Co., Richmond, Ind.
Kelley, Maus & Co., Chicago, Ill.
G. A. Kempel & Co., Akron, Ohio.
Minneapolis Iron Store Co., Minneapolis, Minn.
Mossman, Yarnelle & Co., Fort Wayne, Ind.
National Hardware Co., Cincinnati, Ohio.
Nichols, Dean & Gregg, St. Paul Minn.
Oklahoma City H'dwre Co., Oklahoma City, Okla.
Omaha Iron Store Co., Omaha, Neb.
Orr Iron Co., Evansville, Ind.
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St. Louis Iron Store Co., St. Louis Mo.
Sligo Iron Store Co., St. Louis, Mo.
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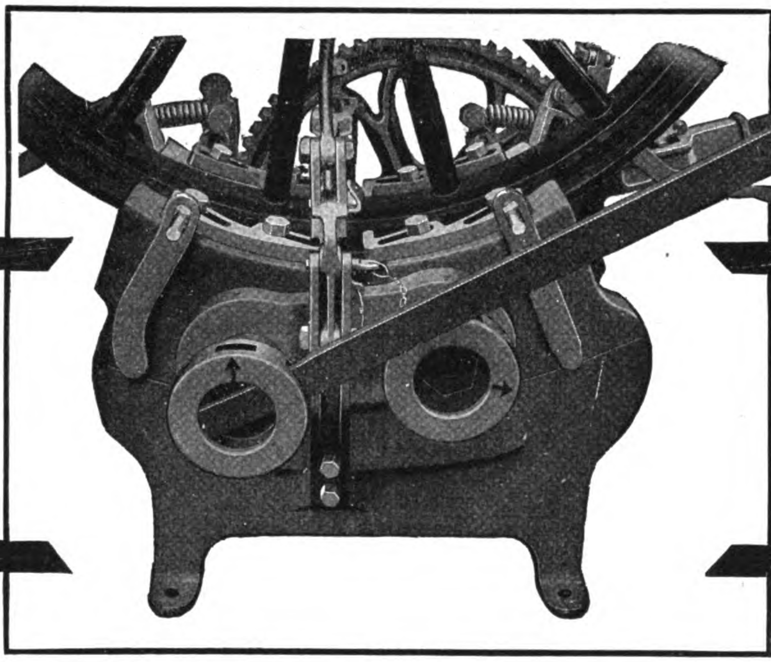
THE BROOKS

is giving satisfaction to more blacksmiths than any other tire setter made. It is built by the longest established builders of edge grip cold tire setters in the world. It is our long practical experience that has made the BROOKS the best.

The Draw-heads move in a circle with the wheel, and upset the tire without kinking it. The Draw-heads of other machines move in a straight line, which often straightens or kinks the tire where it is upset. Our Grip key device is a necessity to keep the keys from slipping and bending the tire edgewise. Other machines are without it.



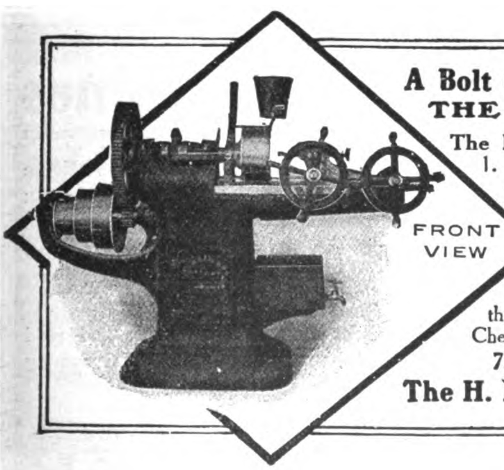
The BROOKS is throughly protected by patents; it is built right and tested for years in all parts of the country; declared the best by the U. S. Government officers, and in use by the U. S. Government.

Why waste time, patience and money, and dissatisfy your customers with an unsatisfactory machine, when you can get the best. Increase your profits, build up your trade and please you customers by using the BROOKS.

Send us your address and we will mail you our booklet, "Of Interest to Blacksmiths," and a Vest Pocket Memorandum book free. Write us now.

THE BROOKS TIRE MACHINE CO.,

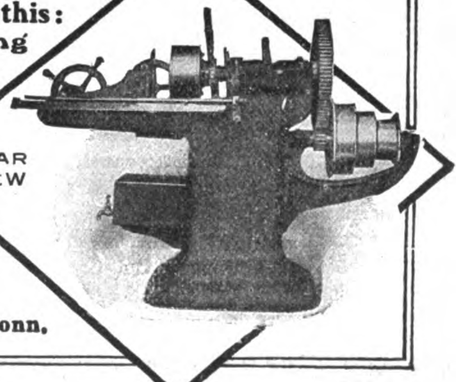
121 North Water St. Wichita, Kansas, U. S. A.



FRONT VIEW

A Bolt Cutter is much like a man in this:
THE HEAD is nearly everything

The Merriman Bolt Cutter Head is Noted for 1. Simplicity of the Head: Only four parts, consequently, 2. Great Durability. Few repairs needed. 3. Square Bearing of the Dies in the Ring; consequently, 2. Solidity of the Dies like a Solid Die; consequently, 5. Uniformity of the Product; Bolts all the same size. 6. Effectiveness of Operation; Cheapest help can understand and run it. 7. No machine turns out work more rapidly.



REAR VIEW

The H. B. BROWN CO., East Hampton, Conn.

Send for Catalog No. 11.

The BULL DOG has a grip on the shoe and won't let go.

SEE

THE POINT—NEVER LET GO

PHOENIX

"BULL-DOG" TOE CALK

Every shoer will see at a glance where this new style BULL-DOG Calk differs from all others. The construction of the points overcome the disadvantage of the old styles.

A TRIAL WILL PROVE

that the BULL-DOG Calk Drives Easily, Welds Perfectly, Never Lets Go, Cannot Twist or Drop Off in the Fire, Will Not Split the Shoe.

These calks are made by the same company who have been manufacturing Phoenix Horse and Mule Shoes for over 25 years, and our long established reputation for quality is back of every calk.

TRY THESE CALKS AT OUR EXPENSE

then decide if you want to use them, and order from your dealer. Write us a letter or postal card simply saying, "Send us samples of your new 'BULL-DOG' Calk." We will then forward calks free so you can test them and learn of their many advantages. Write NOW.

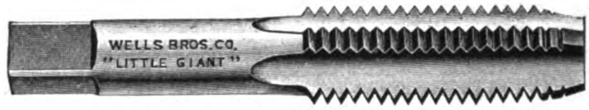
PHOENIX HORSE SHOE COMPANY

Rookery Building, CHICAGO, ILL., U. S. A.

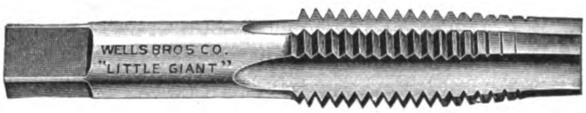
LITTLE GIANT TAPS

ARE

TIP



TOP



TAPS

They stand above all others in the estimation of careful smiths and mechanics the world over. Lasting longer than others, cutting faster and better, their use is an economy—a saving on your shop expense. No need to tolerate inferior substitutes; you can have the accurate clean cutting LITTLE GIANT for the same money.

Little Giant screw cutting tools are the results of years of experience and careful perfecting; in them is combined the highest quality of material with the most skilled workmanship.

In your next order specify Little Giant.

—— Carried by all jobbers. ——

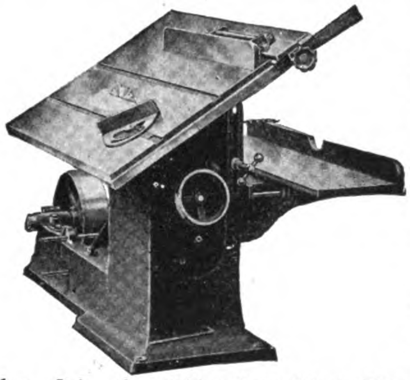
Write for illustrated catalog of our complete line of screw cutting tools and machinery. Will be mailed free.

WELLS BROS. COMPANY

GREENFIELD, MASS.

YOU

will increase your profits and save a lot of time by making the **CRESCENT** machines an important part of your shop equipment. They are well built by mechanics skilled in building wood-working machinery, and only the best materials are used in their construction.



This is the No. 2 Crescent Saw Table illustrated and described on pages 28 and 29 of 1908 catalog. It is a thoroughly substantial machine, well suited for general work. Can be furnished with Boring Attachment if you want it that way. Table tilts to 45 degrees, and mandrel is made long enough so dado head may be used. Machine is self-contained, no countershaft required. It is complete with saw and endless belt when it reaches you. Send for 1908 catalog, giving complete description and telling about our line of Band Saws, Saw Tables, Jointers, Shapers, Borer, Swing Cut-Off Saw, Disc Grinder, Planers, and Planer and Matcher.

THE CRESCENT MACHINE CO.

245 Main St. LEETONIA, OHIO

"GOOD-AD" WINDOW SIGNS PALM FECHTELER & CO.

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Special Name Plates of all descriptions
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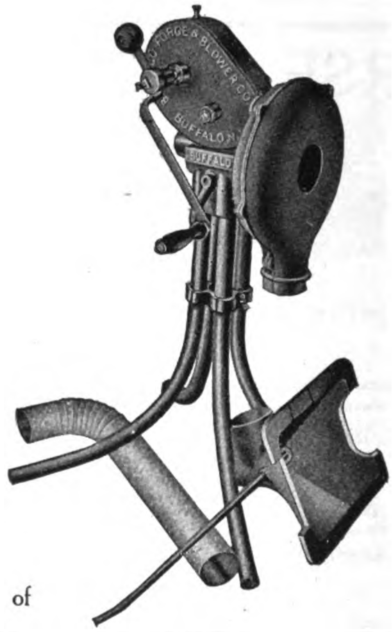
Palm, Fechteler & Co.

67 Fifth Ave., NEW YORK

CHICAGO ST. LOUIS MONTREAL TORONTO

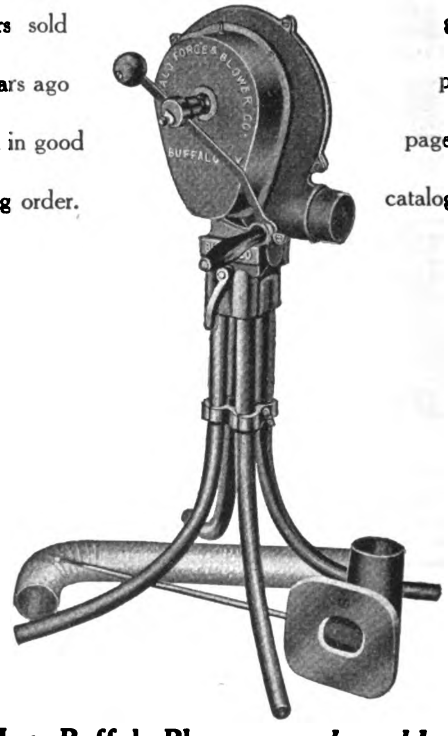
BUFFALO HAND BLOWERS

Are Guaranteed for Ten Years



Thousands of Blowers sold 30 years ago are still in good working order.

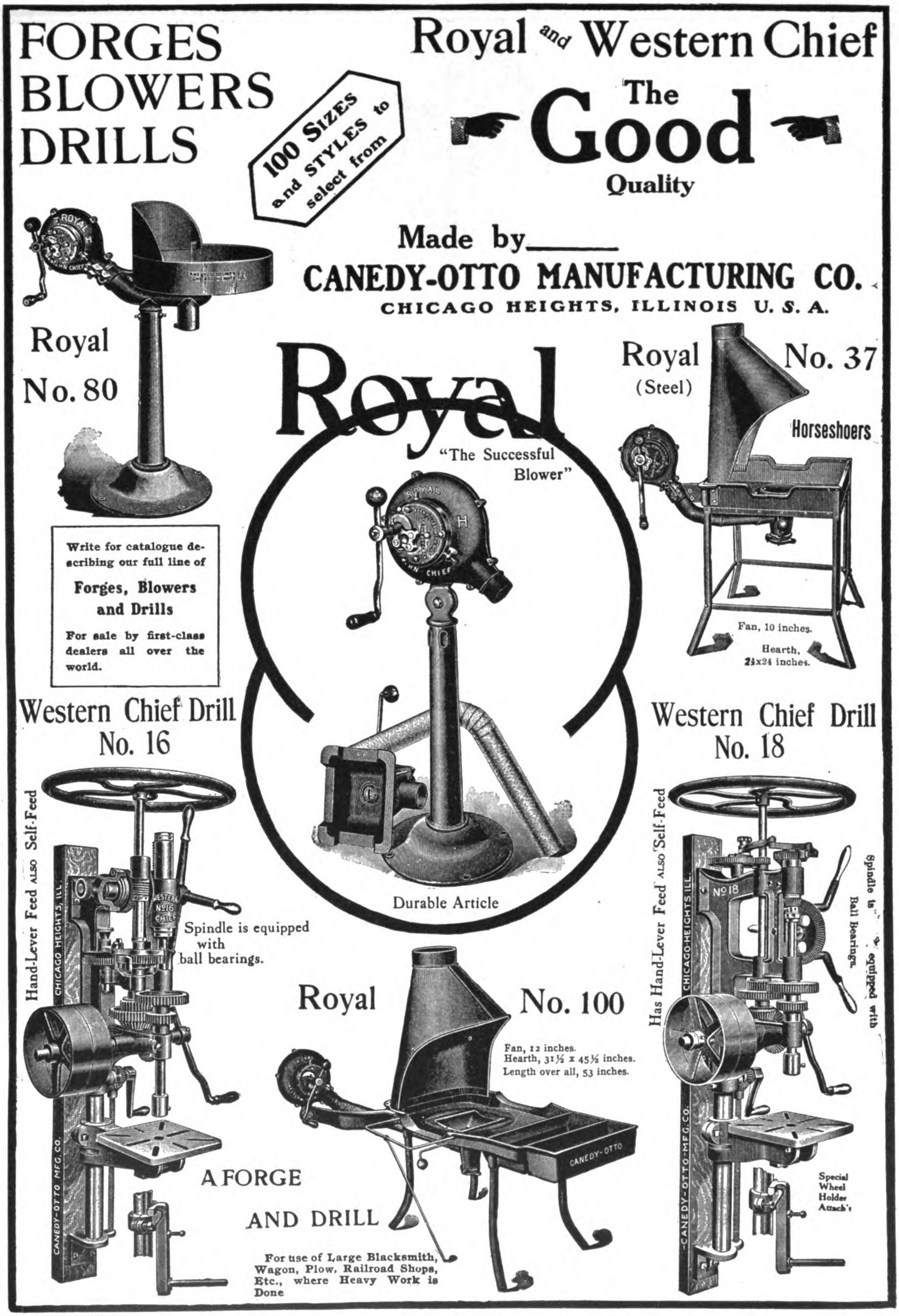
Read the guarantee printed on page 1, new catalog 78 AB



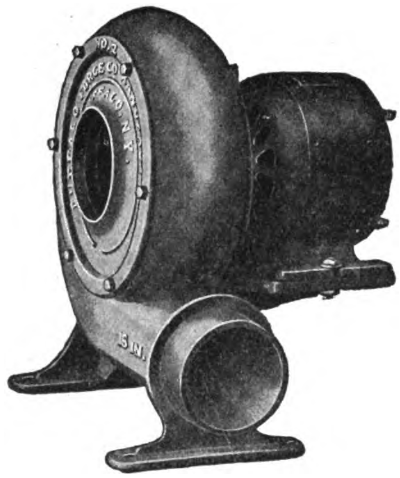
More Buffalo Blowers *made, sold* and *in use* now, than ever before.

Buffalo Forge Company
Buffalo, N.Y.

22B Canadian Buffalo Forge Co., Montreal.


FORGES
BLOWERS
DRILLS
100 SIZES and STYLES to select from
Royal and Western Chief
The Good Quality
Made by
CANEDY-OTTO MANUFACTURING CO.
CHICAGO HEIGHTS, ILLINOIS U. S. A.
Royal No. 80
Royal
"The Successful Blower"
Durable Article
Royal (Steel) No. 37
Horseshoers
Fan, 10 inches.
Hearth, 24x24 inches.
Write for catalogue describing our full line of
Forges, Blowers and Drills
For sale by first-class dealers all over the world.
Western Chief Drill No. 16
Hand-Lever Feed ALSO Self-Feed
Spindle is equipped with ball bearings.
Western Chief Drill No. 18
Has Hand-Lever Feed ALSO Self-Feed
Spindle is equipped with Ball Bearings.
Special Wheel Holder Attach't
Royal No. 100
Fan, 12 inches.
Hearth, 31½ x 45½ inches.
Length over all, 53 inches.
A FORGE AND DRILL
For use of Large Blacksmith, Wagon, Plow, Railroad Shops, Etc., where Heavy Work is Done

Buffalo Electric Forge Blowers



A Most Economical Method for Operating Forge Fires

ELECTRIC BLOWERS are not new by any means, having been on the market for several years, but the increased demand for reliable electric blower outfits has brought forth most favorable recognition for the Buffalo models. So evident are the advantages offered that at the latest it will only be a question of a few years until every smithy shop within reach of electric power will be using electric driven blowers.

Great saving in labor---no crank to turn or lever to operate---both hands free to handle the work.

Steady blast so desirable for many kinds of blacksmith work assured.

Select the blower to conform to the conditions of your shop---number of forges to be operated, etc.

If you wish to install individual blowers for each fire; desire information regarding direct current forge blowers or alternating current forge blowers, address Dept. B for new catalog No. 78 A. We have new literature to send you.

BUFFALO FORGE COMPANY

BUFFALO, NEW YORK, U. S. A.

Branches in all large cities.

Down Draft Forges, Special Designs for Varying Situations.

Hand Blowers and Portable Forges for All Requirements.

Blacksmith Drills, Tire Benders, Punches, Shears and Bar Cutters.

Steel Pressure Blowers for Cupola and High Pressure Blast Service.

"B" Volume Blowers for Forge Shops, Forced Draft, etc.

"B" Volume Exhausters for Removing Forge Smoke, Emery Dust, etc.

20B

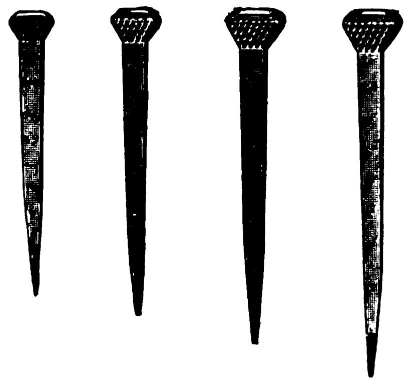
IN THE SELECTION OF HORSESHOE NAILS

QUALITY

IS AN ALL IMPORTANT CONSIDERATION

"CAPEWELL" HORSE NAILS

DRIVE THE BEST



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"The best horse nails in the world"

The QUALITY of a nail determines whether it is **cheap** or **costly.** So called "cheap" nails are the most expensive because they are of **poor quality.**

"Capewell" nails are the **most economical** because they are of the **best quality** both as regards material and finish.

The nails packed in "Capewell" boxes are all **good nails.** The purchaser does not pay for scrap, or weak inferior nails, but every "Capewell" nail is perfect and can be **relied upon to do its part in holding the shoe and in making a profit for the horseshoer.**

SPECIFY FOR "CAPEWELL" NAILS AND GET THE NAIL OF THE BEST QUALITY

MADE BY

THE CAPEWELL HORSE NAIL CO.

HARTFORD, CONN.

BRANCHES.

NEW YORK BUFFALO PORTLAND, ORE. BALTIMORE CHICAGO ST. LOUIS
DETROIT MEXICO CITY, Mexico PHILADELPHIA DENVER CINCINNATI
TORONTO, Canada BOSTON SAN FRANCISCO NEW ORLEANS YOKOHAMA, Japan

The Largest Manufacturers of Horseshoe Nails in the World.

KIBLINGER MOTOR VEHICLES, ENGINES AND CHASSES

Air-Cooled. Two Cylinder. 30 miles on 1 gallon of gasoline. 30 miles per hour. Simple construction. Ample power. Economical. Reliable. Complete vehicles or parts as desired.
ASK FOR CATALOG 151 and PRICE-LIST OF PARTS.

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Standard Manufacturers, A. M. C. M. A.

NATIONAL SELF-OILING STEEL TUBULAR AXLES

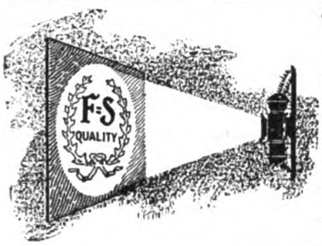
Now made of high carbon steel.

Guaranteed to be stronger and more rigid than solid steel axles. We make both. Write us

National Tubular Axle Co., EMIGSVILLE, PA.

BOLT CLIPPERS

EACH ONE GUARANTEED **CHAMBERS BROS. CO.,**
N. Fifty-Second St.,
Philadelphia, Pa.



The closer you look at "F.-S. Quality," the *better* it looks.

It will pay you to look into our "Superfine" Coach Colors, Varnishes and Japans. A trial will prove their merits.

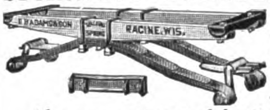
FELTON, SIBLEY & CO.
MANUFACTURERS OF COLORS, PAINTS, VARNISHES
136-140 N. 4th St., PHILADELPHIA

Our ROTARY WELL DRILL

Has no sprocket wheels, belts, chains, springs, no separate horse power nor tumbling rods. Drill turns its own rope, and drill bit never strikes twice in the same place. Excels in quicksand and hardest granite. It is easy work for one man and team. Write for prices.

Ft. Smith Well Drill Mfg. Co., Ft. Smith, Ark.

SPALDING BOLSTER SPRINGS

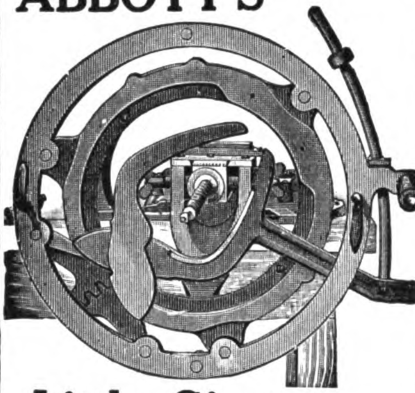


Send for catalog showing and describing the "ADAMS PATENT END PLATE"

Also many other useful articles in your line.
E. B. ADAMS & SON, - RACINE, WIS.

H. K. PORTER
EVERETT, MASS., U.S.A.
BOLT CLIPPERS

ABBOTT'S



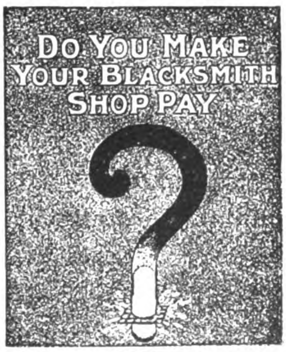
Little Giant Hub Borers
AND Abbott's Box Puller

Made by ABBOTT & CO., Hudson, Mich., and sold by all Dealers in Carriage Makers' Machinery.

PHINEAS JONES & CO., Newark, N.J.
General Agents for the Eastern States

LAFFITTE WELDING PLATES

SEND FOR SAMPLE AND OUR BOOKLET



THE PHILLIPS-LAFFITTE CO.
PHILADELPHIA, PA.

THE MAN who knows uses STERLING WHEELS They give results

The Sterling Emery Wheel Mfg. Co.
TIFFIN, OHIO, U. S. A.

CASH Always Secures BARGAINS and ALWAYS WILL

Special Net Price on Sarven Patent Wheels (C. B, 50c. extra) with steel and rubber tire

Size of tread	Price per set for wheels with flat steel tire on and hubs bored	Price per ser for wheels complete with channel and rubber tire on, and hubs bored: 36 and 40	38 and 40	40 and 44	Add to price of wheels for axles and boxes set
3/4	$7.00	$13.95	$14.15	$14.35	$2.25 L. D.
7/8	7.25	15.25	15.55	15.85	2.25 "
1	7.50	16.75	17.05	17.35	2.50 "
1 1/8	9.00	24.75	22.50	26.25	2.75 H. P.

Repair wheels, $5.00. We will rerubber your wheels for $7.25
Five sets or more one order, you can deduct 25c. per set as freight allowance. **Write for Catalogue.** We manufacture wheels with Steel or Rubber Tire on 3-4 to 4 inch tread. Buggy Gears with wheels and shaft all ready for body, $18.50.
Buggy Shafts (Ironed) $1.65. Poles $3.25.

The A. Boob Wheel Co., Cincinnati, Ohio, U. S. A.

CONTRACTED HOOF

readily expands when properly treated with

EMOL
THE GREAT HEALING OINTMENT

MR. TOM STUARD, Dayton, Ohio, writes: "I have tested EMOL Ointment and can heartily endorse it, for it is all you claim and more too. It is the best hoof ointment I ever used."

EMOL heals any wound or sore, promotes the growth of healthy new hoofs and relieves all foot troubles quicker and safer than any other preparation.

An ATTRACTIVE PRICE PROPOSITION to BLACKSMITHS made on REQUEST.

EMOL MFG. CO., 84 La Salle St., CHICAGO

INDEX TO ADVERTISERS. PAGE

The Classified Buyers' Guide will be found on pages 40 and 41 of this issue. Whenever in need of anything it will be to your best interests to write the parties listed there.

HONEST DEALINGS.

Before an 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 faith in *American Blacksmith* advertisers, we will make good to our subscribers loss sustained from any who may 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.

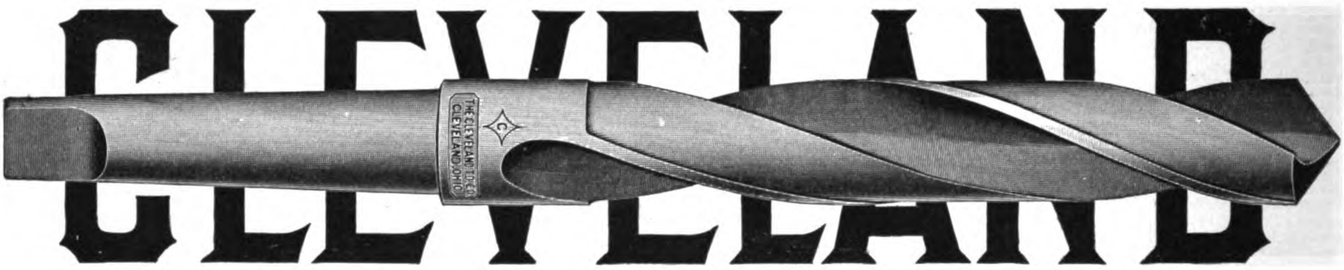
TRADE PIONEER C.S.&CO. BRAND MARK

TO make a PIONEER POLE END, we take two pieces of smooth finish, stiff steel; a piece of clear-grained, seasoned hardwood; a malleable Pole Tip and some high-grade black baking enamel. These are all put together with modern machinery and skilled labor.

First, the two pieces of steel—one heavier than the other—are cut to shape and formed into tubes. The locked seam being rolled down, and one tube inserted in the other, thus giving double strength. The piece of hardwood is turned down to fit snugly in the tube; the large end being recessed for a dowel. The malleable Tip is riveted on the small end of the tube, and two coats of black enamel baked on by steam, makes a finished, rust-proof Pole End. They will repair a broken pole or lengthen out a short one. Your Jobber can furnish in three sizes: Size "A" 24 ins. long, 1¾ ins. diameter at opening. Size "B" 24 ins. long, 1⅞ ins. diameter at opening. Size "C" 24 ins. long, 2 ins. diameter at opening.

CRANDAL, STONE & CO. Binghamton, N. Y.

ASK THE MAN WHO USES THEM?



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THE GREATEST PROBLEM

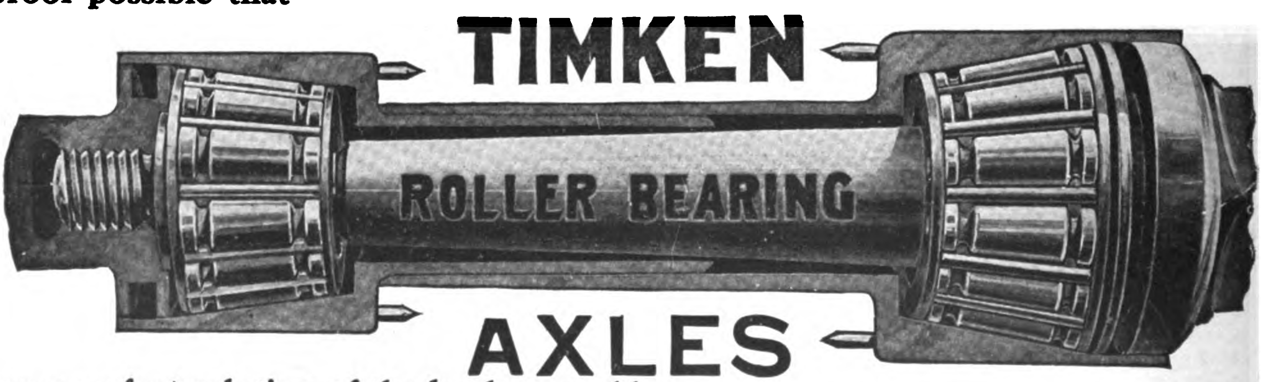
in hauling is how to haul the greatest load with the least trouble and expense.

The Timken Roller Bearing Axle Co. Canton, Ohio. Chicago, Ill.

Gentlemen: Replying to your inquiry concerning the roller bearings furnished for our wagons, state we now have them in fifteen wagons, in use in Minneapolis, St. Louis, Chicago, Etc., and are fully satisfied of the utility and benefit coming from their use. We cheerfully recommend them to people in teaming lines on account of saving, less annoyance in the way of oiling, etc.

Yours respectfully, THE RUMFORD CO., F. J. Selden, Mgr.
Dealers in the productions of the RUMFORD CHEMICAL WORKS.

The above is one of a number of letters sent us, which offer the most conclusive proof possible that



are a perfect solution of the haulage problem.

Every manufacturer, dealer and owner of a vehicle should know about TIMKEN BEARINGS—what they save and how they save it. Interesting Literature on request.

THE TIMKEN ROLLER BEARING AXLE CO.

BRANCHES: 10 E. 31st St., New York. 429 Wabash Ave., Chicago. CANTON, OHIO.

Current Heavy Hardware Prices.

The following quotations are the prices generally quoted at Chicago, Aug. 25, 1908, and are subject to fluctuations. Corrected for **The American Blacksmith** by The National Heavy Hardware Reporter, Chicago.

No changes in heavy hardware prices have been reported by any correspondents.

Horse Shoes—

All Iron Shoes	$4.40
Steel Shoes	4.25
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
Featherweight Steel Shoes	5.50
Countersunk Steel Shoes	6.00
Tip Shoes	5.75
Ideal Countersunk	6.00
Goodenough, heavy	6.00
Goodenough, sharp	6.50
Toe Weight	7.00
Side Weight	9.25
Track Weight	9.50
E. E. Light Steel	5.50
Steel Driving	5.50
O. O. Mule Shoes, extra	1.50

Merchant Bar Iron—
$1.90 to $2.10 rates full extras, and 20 cents per 100 pounds extra for broken bundles.

Steel Bars—
$1.90 to $2.10 rates, full extras.

Toe Calks—

	Per box.
Blunt	$1.30
Sharp	1.55

Carriage Bolts—

6 x ⅜ and smaller	60–10%
Larger and longer	50%

Machine Bolts—

4 x ⅜ and smaller	60–10%
Larger and longer	50%

Nuts—

Less than 10 lbs. of a size	$2.50 off
From 10 to 50 lbs.	3.00 off

Washers—
Same price as nuts.

Skeins—
Cast........ 65%

Malleables—
Common...... $ .09

Half Patent Axles—
.... 65%

Springs—

Single Spring, each	$1.25
Springs, black and half bright	.06

Hickory Lumber—Per Foot—

1 to 2½	$.09½
2½ to 4¼	.11

Ash and Oak Lumber—Per Foot—

1–1¼	$ .07½	2½–3	$ .08½
1½–2	.08	3½–4	.09½

Yellow Poplar Lumber—Per M. Feet—

	6 to 12	13 to 17	18 to 24
⅜"	$65.00	$65.00	$75.00
½"	65.00	68.00	80.00
⅝"	68.00	75.00	85.00
¾" } ⅞" }	72 00	80.00	104.00

Rough Hickory Axles—

		Each.
3 x 4	6 ft	$ .60
3½ x 4½	6 ft	1.00
4 x 5	6 ft	1.20
5 x 6	6 ft	2.20
4 x 5	6½ ft	1.30
4½ x 5½	6½ and 7 ft	2.00
5 x 6	6½ and 7 ft	3.00
5½ x 6½	7 ft	3.50

Finished Hickory Axles—

For 2½ and 2¾ Skeins	$1.00
For 3 Skeins	1.20
For 3¼ Skeins	1.45
For 3½ Skeins	1.60
For 3¾ Skeins	1.95
For 4 Skeins	2.25

Rough Oak Bolsters—

Short	$ .08
12–14–16 ft.	.09

Finished Oak Bolsters—

2¾ x 3¾ and under	$ .65
3 x 4	.70
3¾ x 4¾	.90

Rough Oak Wagon Tongues—
4 x 4 x 2 x 4 x 12 and smaller $1.00

Finished Oak Wagon Tongues—

3½ and smaller	$1.25
3¾	1.30
4	1.40

Two Inch Sawed Hounds

	Per Pair.
Tongues	$ .40
Front	45
Hind	.55

Patent Wheels—

A. B. No.13 and under	40 %
D. No. 13 and under	30 %
All Grades, No. 17 to 33	35–5 %
All Grades, No. 39 and Larger	20 %
C. No. 13 and under	35–5 %

Cupped Oak Hubs— Set.

7 x 8 x 9	$1.10
7 x 9 x 10	1.10
8 x 9 x 10	1.35
8 x 10 x 11	1.50
9 x 10 x 12	1.70
9 x 11 x 12	1.75
10 x 12 x 13	2.60
11 x 13 x 14	3.65
12 x 14 x 15	4.50

Plain End Oak Hubs-Set.

10 x 14	$2.90
11 x 14	3.60
11 x 15	4.00
11 x 16	4.50
12 x 16	5.00
12 x 17	5.50
13 x 18	6.25

Rough Sawed Felloes-

1½ x 2"	$1.55	2 x 2½"	2.00
1¾ x 2¼"	1.75	2½ x 2"	4.75
1¾ x 2⅜"	1.85	3 x 3"	5.75
		3 x 3½"	6.00

Ironed Poles, White, XXX—

1¾ x 2¼" No. 2	$4.00
2 x 2½" No. 3	4.00

Ironed Shafts, White, XXX—

1⅜" x 2" and smaller	$2.15
1½ x 2"	2.35
1½ x 2¼"	2.90

Farm Wagon Bows—

Round Top, ½ x 2"	$ .65
Flat Top, ½ x 2"	.80
Round Top, ⅝ x 2½"	1.40

Standard size Piano Bodies with Seats—
Each $4.25

Plow Beams—

1 Horse	$ .70
2 Horse	.85
3 Horse	1.00

All Hickory and Oak Spokes and Patent Spokes—
Discount from Weis & Lesh List No. 5.. 5%

Wagon Neck Yokes—

	Forest	Mixed Second Growth	White Second Growth
2½ x 38"	$2.15	$2.95	$4.25
2½ x 42"	2.90	4.05	5.50
2¾ x 46"	4.40		
3 x 44"	4.70	6.95	8.90
3 x 48"	5.50	7.85	10.50

Single Trees—Oval—

	Forest	Mixed Second Growth	White Second Growth
2¼"	$1.60	$2.90	$3.50
2⅜"	1.70	2.95	3.60
2¾"	1.80	3.05	3.80
3 x 36"	2.45	3.55	4.20
3 x 38"	2.50		
3 x 40"	2.65	4.00	4.85

Single Trees—Round—

	Forest	Second Growth
2¼"	$2.10	$3.60
2½"	2.10	3.65
2⅝"	2.15	3.75
2¾"	2.85	4.25
3"	3.45	4.80

Oval Plow Doubletrees—

2¾ x 36"	$1.75
3 x 40"	2.55

Flat Plow Doubletrees—
1¾ x 3½ x 42" $3.00

Wagon Doubletrees—

2 x 4 x 48"	$3.60
2¼ x 48"	4.80
2¼ x 4½ x 50"	5.20
2¼ x 4½ x 52"	5.60
2¼ x 5 x 52"	6.40
2½ x 5 x 54"	7.20
Mixed Second Growth	50 % advance
White Second Growth	100 % advance

Oval Plow Singletrees—

	Forest
2¼ x 30" and under	$1.00
2¼ x 30" and under	1.25

Buggy Doubletrees—

	Forest	Mixed Second Growth	White Second Growth
2¼" and smaller	$2.65	$3.65	$4.60

Express Doubletrees—

	Forest	Mixed Second Growth	White Second Growth
2½"	$2.95	$3.65	$5.00
2¾"	3.55	4.15	5.50
3"	3.55	4.30	5.75

Express Singletrees, Turned—

	Forest	Mixed Second Growth	White Second Growth
2⅛"	$2.50	$2.65	$3.75
2¼"	2.90	3.65	4.00
2½"	3.50	4.00	4.75

Express Singletrees, Square Center—

	Forest	Mixed Second Growth	White Second Growth
2¼"	$3.00	$4.15	$5.25
2½"	3.50	5.45	6.00

Buggy Neck Yokes—

	Forest	Mixed Second Growth	White Second Growth
2 x 42"	$2.75	$3.15	$4.50
2⅛ x 2¼ x 42"	3.15	3.75	5.45

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FOR SALE OR RENT—General shop guaranteed $2,600 per year. Cheap; poor health. **O. H. LEMBERG. Fertile, Minn.**

FOR SALE—Patent rights on a Spoke Setter and Guide. A one man tool. For particulars, address **J. HANAN, Frazer, Mo.**

FOR SALE—General blacksmith shop with power and up-to-date tools. Work for two men. Only shop in town. **BEATON & CO., Calvin, N. Dak.**

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FOR SALE—Blacksmith and wagon shop, dwelling, barn and 1¼ acres of land. Everything in good shape. Splendid trade. Good location. **W. E. FRITZ, Church. Iowa.**

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WANTED—Woodworker for new and repair work. Must be steady and sober and know something about machinery. Steady work all the year. **JOHN M. MAYER, Roundout, N. Y.**

FOR SALE—Oldsmobile in good condition, 8-10 h. p. engine, water cooled, 1906 model. Will sell for $175.00, cost $900.00, or will trade for engine lathe or other machinery. **Wm. Doring, Ruskin, Neb.**

FOR SALE—Entire or half interest in a good blacksmith and horseshoeing shop, 31x81 feet, and machine shop 31x50 feet. Well located; profitable business. Must be sold to fill vacancy caused by death. Write **W. A. Pannebaker, East Waterford, Pa.**

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FOR SALE—Blacksmith shop, stock, tools and everything that belongs to a first-class shop. Electric motor. A bargain for some one. Good stand and a paying business. Reason for sale, owner's death. Address **MRS. R. Schweikert, Lincoln, Neb.**

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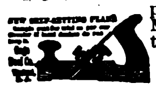

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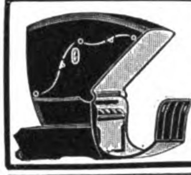

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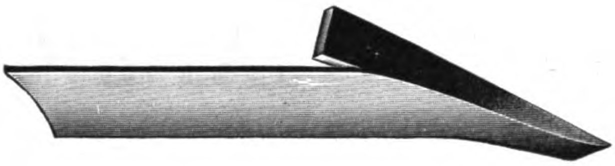

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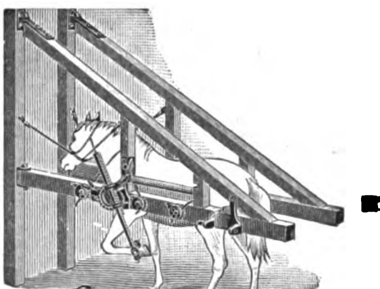

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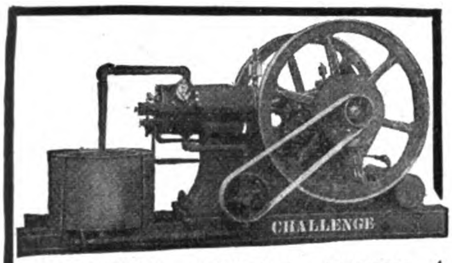

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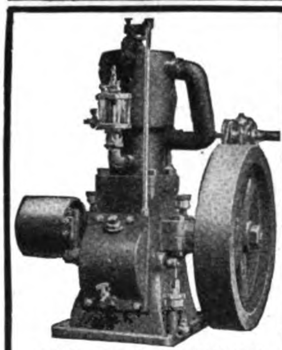

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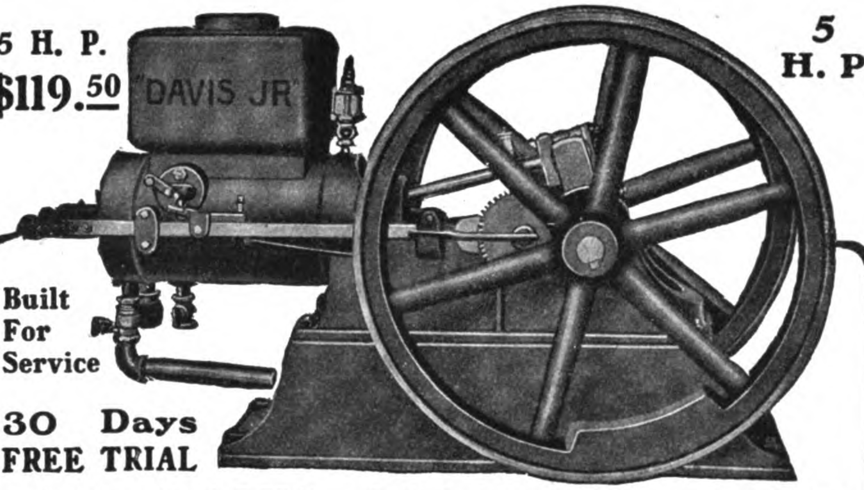

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On the larger sizes, if it is not entirely convenient for you to pay all cash, I will take your note for the balance at the regular rate of interest for 6 months.

The price given is for the 5-horse power only, but we make these engines in seven sizes.

Note my special proposition to blacksmiths.

I have a plan by which every blacksmith can partly or entirely pay for his own machine. It's good; it's away out of the ordinary; and you will be overlooking a big chance if you don't write for my proposition.

Ask for my free information on stationary and portable gasoline engines from two to twenty-eight horse power. We make the best, and we price them at a reasonable figure.

WRITE TODAY. WILLIAM GALLOWAY, President.

THE WILLIAM GALLOWAY COMPANY, 577 Jefferson St., Waterloo, Iowa.

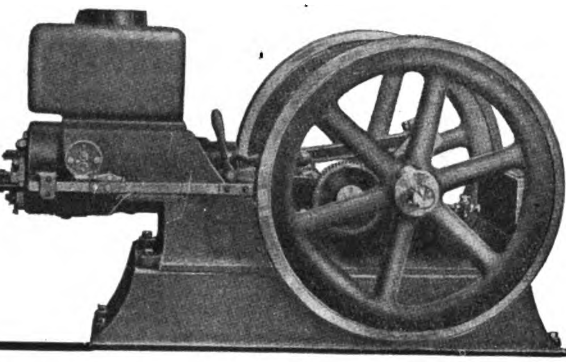
GOOD RULES TO GO BY

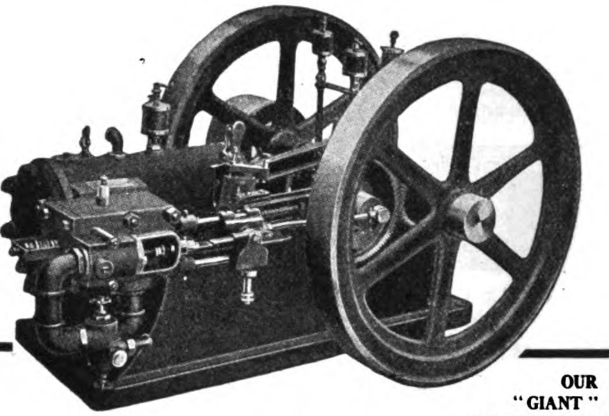
BLACKSMITHS' HOOK AND HANDLE RULES

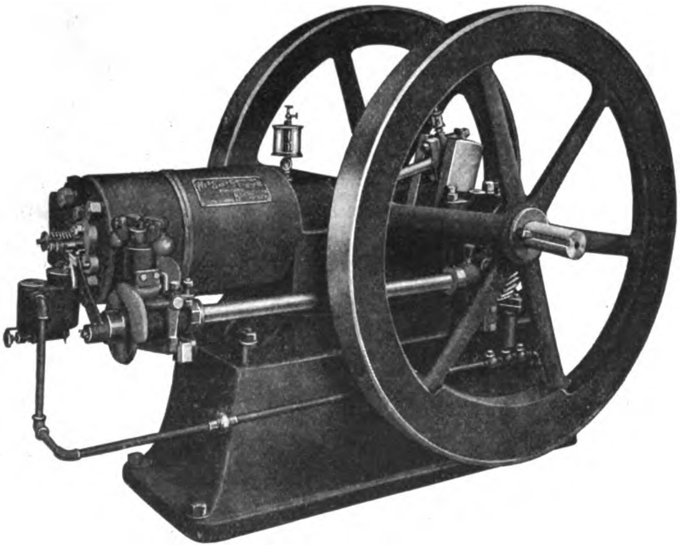
Made from hard rolled sheet brass, one-tenth inch thick, one and one-sixteenth inch wide, with heavy gradations and figures, graduated from the end in sixteenths of an inch on one side and from the inside of the hook in sixteenths of an inch on the other, adapting them for taking correct measurements from either the outside edge of a hot piece of iron, or from the inside when held against a corner. Graduated twelve inches, have flat handles and measure over all sixteen and three-fourths inches.

Price, postpaid, $1.15. Catalog No. 17 AH of fine Tools free.

The L. S. STARRETT CO., ATHOL, MASS.







DON'T BUY GASOLINE ENGINES

UNTIL YOU INVESTIGATE "THE MASTER WORKMAN," a two-cylinder gasoline, kerosene or alcohol engine, superior to any one-cylinder engine; revolutionizing power. Its weight and bulk are half that of single cylinder engines, with greater durability. Costs Less to Buy—Less to Run. Quickly, easily started. Vibration practically overcome. Cheaply mounted on any wagon. It is a combination portable, stationary or traction engine. SEND FOR CATALOGUE. THE TEMPLE PUMP CO., Mfrs., Meagher and 15th Sts., Chicago. THIS IS OUR FIFTY-FIFTH YEAR.

Apple Ignition Dynamo

EVERYTHING NEEDED FOR IGNITION

The Dayton Electrical Mfg. Co.

152 St. Clair St., DAYTON, - OHIO.

BUILD YOUR OWN GASOLENE MOTOR

We supply the castings, drawings and all accessories. A complete line of rough castings, also finished Motors for Bicycle, Automobile, Marine or Stationary. A 2-cent stamp gets our catalogue.

STEFFEY MFG. CO.
2941 Girard Ave. Philadelphia, Pa.

MONEY SAVERS

Gasoline power has proven more economical than any other power for general purposes in factory shop or mill. That is one reason why I.H.C. gasoline engines have become so popular. Vertical—2 and 3-horse power. Horizontal—(portable and stationary) 4, 6, 8, 10, 15 and 20-h.p. Air cooled—1-h.p. Write for catalog and full information to International Harvester Company of America, Inc., 13 Harvester Building, Chicago, U.S.A.

STAR POWER HAMMER

Less Than $75.00

50 lb. Head warranted for one year.

Ask your jobber or write us for Catalogue.

"Hook'er to your Ingin."

STAR FOUNDRY COMPANY
ALBERT LEA, MINN.

GOES LIKE SIXTY
SELLS LIKE SIXTY
SELLS FOR SIXTY

$60 GILSON GASOLENE ENGINE

For Pumping, Cream Separators, Churns, Wash Machines, etc. FREE TRIAL
Ask for catalog—all sizes

GILSON MFG. CO. 39 Park St. Port Washington, Wis.

"QUICK ACTION" IGNITING DYNAMOS

Excel all others!

The only generator that cannot lose its magnetism. For either make and break or jump spark work. Also spark coils. Send for Catalogue B.

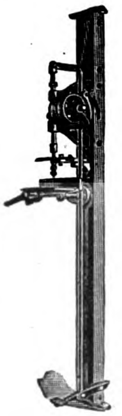
The Knoblock-Heideman Mfg. Co.,
SOUTH BEND, IND.

Vulcan Iron Works

(INCORPORATED)

Mason City, Iowa

Prices and goods right



Catalog free, write today

Universal Tenon and Boring Machine

for wagon repair shops. Cuts tenons on set of wheels in twelve minutes.

The New Little Giant Trip Hammer

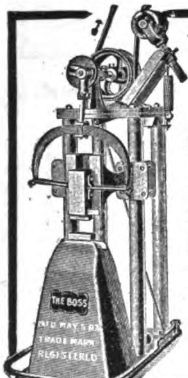
Made in 3 sizes

25 lbs.
50 lbs.
100 lbs.

The best power hammer on the market, works material up to 5 ins. round. Fully guaranteed.

MAYER BROTHERS, Inc.,
MANKATO, MINN.

U. S., All Jobbers
New Zealand Agents, Alex Storrie, Ltd., Invercargill.

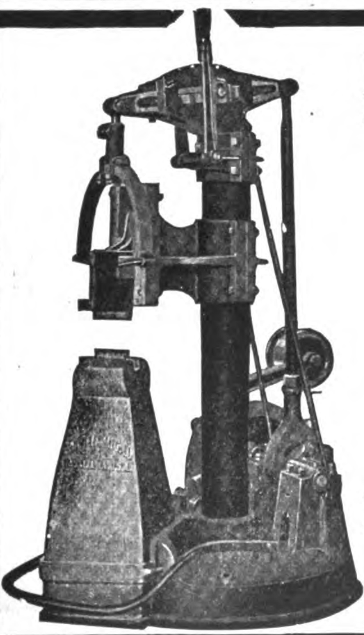


NOVELTY IRON WORKS BOSS HAMMER

For Plow Work, Wagon Work, Heavy Work, Any Work.

"Will strike as you like." Heavy or light at full speed or less. A broken anvil will cripple no other part of the hammer.

G. E. DAVIS, Mgr.
DUBUQUE, IOWA.



MODERN POWER HAMMER

The ONLY hammer on which you can get a LIGHT BLOW at FULL SPEED. The shifting lever controls the length of stroke. Set it in any one of the five notches and then handle the hammer with the treadle the same as any other. Actually five hammers in one.

WRITE ANY JOBBER OR

The Grinnell Mfg. Co.,
GRINNELL, IOWA.

THE PERFECT POWER HAMMER

The Only Hammer Made with extra long guides, insuring a direct vertical stroke of the ram.

The Only Hammer Made with a disk attachment with a special anvil for sharpening plow and harrow disks.

The Only Hammer Made with a Hardy Anvil, in which you can use your swedge blocks.

Made in three sizes:

2½ in. Sq. Ram, Wgt. 30 lbs.
3 " " " " 40 "
4 " " " " 80 "

Prices are right. Write any jobber or

Macgowan & Finigan Foundry and Machine Co.
ST. LOUIS, MO.

Trade Literature and Notes.

ONE OF THE SPECIAL TECHNICAL INSTITUTES of the West is located at Terre Haute, Indiana. This is Rose Polytechnic Institute, under the presidency of C. L. Mees, who has made and maintained it at a high standard of excellence. It occupies a large and completely equipped building within the city limits, and its work is both theoretical and practical, its equipment enabling it to give its engineering students civil, mechanical, and electrical, an abundance of practical work. The reputation of Rose Polytechnic Institute is such as to give its graduates a high standing in their profession.

THE SILVER MANUFACTURING COMPANY, whose attractive advertisements appear in every issue of our journal, are anxious to place their five new booklets in the hands of every one of our readers. Each one of the attractive booklets is devoted to a certain line of machinery of their manufacture. They are well illustrated and fully describe the different machines. Every shop-owner ought to have this set of booklets for reference. Send for them today. They will be mailed free to any address by the Silver Manufacturing Company, Salem, Ohio. For the names of the different booklets refer to their advertisement on page two of this issue.

APPEARING IN THIS ISSUE for the first time will be found the advertisement of the W. H. Kiblinger Company, of Auburn, Ind. They are the manufacturers of the well-known Kiblinger High-Wheel Motor Vehicles. This Company, though engaged in a comparatively new industry, appears to have enjoyed the greatest prosperity, despite the recent business depression. They report having operated their factory twenty-three hours per day almost constantly since February. Evidently business has not been dull in the High Wheel Motor Vehicle line.

An attractive, well illustrated catalog of their complete line of motor vehicles will be sent on request to any address by writing the W. H. Kiblinger Company, Auburn, Ind.

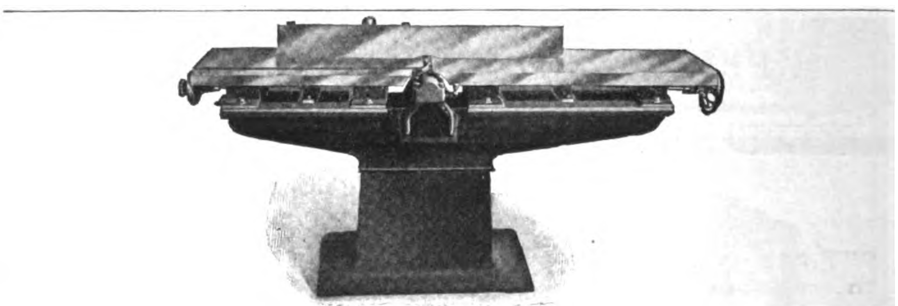
A HIGH-GRADE BATTERY herewith illustrated has recently been placed on the market by The Dayton Electrical Manufacturing Co. The

manufacturers have named it the Hubler-Dayton and claim that it is the best storage battery ever produced for gas engine ignition work. It has several marked improvements over the old styles, such as an acid tight lid, which eliminates all leakage and trouble, also new method of carrying the connections from the inside of the battery out to the terminals. This new battery is being produced only after long and careful experimenting with the new features, and it will, no doubt, prove a great success. Every gas power user should be interested in this battery and should send for bulletin No. 2 B. containing full description and illustrations. This will gladly be sent to any address by The Dayton Electrical Manufacturing Co. of Dayton, Ohio.

A NEW WHEELWRIGHT MACHINE is being advertised in this issue by the House Cold Tire Setter Company. This is a perfectly new combination, that they are bringing out, and one that will, no doubt, create much interest among the wheelwrights and wagon-makers throughout the country.

The machine is built of structural steel in place of cast iron, and has many other new features and improvements. This combination consists of a band saw, a combination spoke and rim borer, boring and drilling machine, and hub boring machine. The manufacturers state that this is the only hub boring machine made that is used in connection with other machines. It will certainly pay our readers who are interested in woodworking machinery of this kind to investigate more thoroughly. The House Cold Tire Setter Company will be glad to answer all such inquiries, and will furnish circular matter and prices.

THE "DEFIANCE" JOINTERS are built from entirely new designed patterns, and are made in four sizes, 8 ins., 12 ins., 16 ins., and 20 ins. The frames are made in column form, of a good substantial construction, with a large floor space, the base being cut away from the side for operation to prevent accidents when the work is alongside of the plane. The heads are made of a high-grade, hand-forged, crucible steel, milled perfectly true on four sides, two sides being slotted for molding, dadoing, and rabbitting, and may be used in connection with the regular cutter knives. The bearings in the cylinder shaft are unusually large, and have patent reservoirs to keep the journals constantly flooded with oil.



A new type of Jointer manufactured by The Sidney Tool Co.

The tables are planed perfectly true, and are made extra long, the extreme length from out to out being 7 ft. 3 in. Both tables are mounted on inclines and have independent adjustments for the different depth of cuts. This movement being accomplished by means of a convenient hand wheel and screw, the only reliable method of securing accuracy and steadiness. Each of these wheels is fitted with a small lock wheel to prevent tables from getting out of line while the machine is running at a high speed. The tables can also be drawn back from the head without interfering with the rational heighth, permitting the operator to have free access to same, and also to use molding cutters, working in a larger circle than the knives. Provisions are also made for readjusting the incline in case the tables should get out of line by accident or otherwise. The adjusting fence can be angled to 45 degrees, and adjusted to any desired position and material can be planed full width of the machine without removing same.

A beautiful book, showing these jointers, as well as other machines which they manufacture, will be mailed upon request by the Sidney Tool Company, Sidney, Ohio.

CLASSIFIED BUYER'S GUIDE.

To Find Address of any Firm given here, consult their advertisement.

For its location in this issue, see Index on Page 19.

Anvils.
Columbus Forge & Iron Co.
Eagle Anvil Works.
Hay-Budden Mfg. Co.
Wiebusch & Hilger.
Peter Wright & Sons.

Awls.
C. A. Myers Co.

Axles.
National Tubular Axle Co.
Timken Roller Bearing Axle Co.

Axle Nuts.
Hardware Co.

Blacksmiths & Wagon Builders Tools & Supplies.
Beals & Co.
Buffalo Forge Co.
Campbell Iron Co.
Canedy-Otto.
Champion Tool Co.
Cummings & Emerson.
Heller Bros.
E. F. Reece Co.
Silver Mfg. Co.
Standard Tool Co.
Wells Bros.
Wiley & Russell.

Blowers.
Buffalo Forge Co.
Canedy-Otto Mfg. Co.
Electric Blower Co.
Roth Bros. & Co.

Bolt Clippers.
Chambers Bros. Co.
H. K. Porter.

Bolt Cutters.
H. B. Brown & Co.
Wells Bros.

Books.
American School of Correspondence.
Theo. Audel & Co.
J. F. Sallows.

Calks.
Franklin Steel Works.
Ludvigsen Bros.
Rhode Island Perkins Horseshoe Co.
Phoenix Horseshoe Co.

Carriage Top Dressing.
West Mfg. Co.

Carriage Specialties.
C. C. Bradley & Sons.
Crandall Stone & Co.
Richard Eccles Co.

Clipping Machines.
Chicago Flexible Shaft Co.

Coke.
Bourne Fuller Co.

Corundum Wheels.
Pike Mfg. Co.

Disc Sharpeners.
R. M. Hammond Co.
Murray Iron Works.

Drills.
Buffalo Forge Co.
Canedy-Otto Mfg. Co.
Silver Mfg. Co.

Dry Batteries.
Nungesser Electric Battery Co.

Emery Grinders.
Kerrihard Company.

Emery Wheels.
Chicago Wheel & Mfg. Co.
Sterling Emery Wheel Mfg. Co.

Fifth Wheels.
Dayton Fifth Wheel Co.
National Safety Fifth Wheel Co.

Files & Rasps.
Heller Bros. Co.
Nicholson File Co.

Flexible Shafts.
Chicago Flexible Shaft Co.

Forges.
Buffalo Forge Co.
Canedy Otto Mfg. Co.
Silver Mfg. Co.

Gas & Gasoline Engines.
Air Cooled Motor Co.
Alamo Mfg. Co.
Challenge Co.
Cushman Motor Co.
Fairbanks-Morse & Co.
Foos Gas Engine Co.
Gade Mfg. Co.
Gardner Motor Co.
Wm. Galloway Co.
Gilson Mfg Co.
Hagan Gas Engine & Mfg. Co.
International Harvester Co.
Kansas City Hay Press Co.
New Way Motor Co.
Steffey Mfg. Co.
Sidney Tool Co.
Temple Pump Co.
Waterloo Gasoline Engine Co.
Weber Gas Engine Co.
Williamsport Gas Engine Co.

Gears.
Akron Selle Co.
Gibson Gear and Mfg. Co.

Hammers.
Champion Tool Co.
Heller Bros.

High Wheel Motors.
W. H. Kiblinger Co.

Horseshoes.
American Horseshoe Co.
Humane Horseshoe Co.
Phoenix Horseshoe Co.
Powers Rubber Horseshoe Co.
Rhode Island Perkins Horseshoe Co.
U. S. Horseshoe Co.

Horseshoe Nails.
Capewell Horse Nail Co.
Standard Horse Nail Co.
Union Horse Nail Co.

Horseshoe Pads.
Goodyear Tire & Rubber Co.
Morgan & Wright.
Revere Rubber Co.

Horse Stocks.
Geo. Barcus & Co.

Hotels.
Joyce Hotel.
Pontchartrain Hotel.

Hub Borers.
Abbott & Co.
Silver Mfg. Co.

Igniters.
Dayton Electrical Mfg. Co.
Knoblock-Heideman Mfg. Co.
Motsinger Device Mfg. Co.
Remy Electric Co.

Iron.
Bourne Fuller Co.
Campbell Iron Co.
Milton Mfg. Co.

Lathes.
Sebastian Lathe Co.
Sidney Tool Co.

Lawn Mower Grinders.
Chicago Wheel & Mfg. Co.

Machinist's Tools
Morse Twist Drill & Machine Co.
L. S. Starrett & Co

Magnetos.
Dayton Electrical Mfg. Co.
Knoblock-Heideman Mfg. Co.
Motsinger Device Mfg. Co.
Remy Electric Co.

Neckyoke Centers.
E. B. Adams & Son.

Nuts.
Hardware Co.
Milton Mfg. Co.

Paints & Varnishes.
Campbell Iron Co.
Felton, Sibley & Co.

Patent Attorneys.
Royal E. Burnham.
Chandlee & Chandlee.
Watson E. Coleman.
Industrial Law League, Inc.
Herbert Jenner.
R. S. & A. B. Lacey.
C. L. Parker.

Plow Shares.
Crescent Forge & Shovel Co.
Star Mfg. Co.

Poles.
Pioneer Pole and Shaft Co

Power Hammers.
Griffitts Machine Works
Grinnell Mfg. Co.
Kerrihard Company.
Macgowan & Finigan.
Mayers Bros.
Novelty Iron Works.
Star Foundry Co.
Vulcan Iron Works.

Power Transmitting Mach'ry.
W. A. Jones F'dry and M'ch. Co.

Pulley Breaking Bridles.
Prof. Jesse Berry.

Rubber Horse Shoes.
Humane Horseshoe Co.
Powers Rubber Horseshoe Co.

Punches.
Badger State Machine Co.
Bertsch & Co.
Buffalo Forge Co.
Little Giant Punch & Shear Co.
Rock River Machine Co.
Geo. Sears & Son.
International Electric and Engineering Co.

Rules.
L. S. Starrett & Co.

Saws, Band.
Crescent Machine Co.
Sidney Tool Co.
Silver Mfg. Co.

Schools.
American School of Correspondence.
International Correspondence School.
Veterinary School.

Screw Plates.
Butterfield & Co
J. M. Carpenter Tap & Die Co.
Hart Mfg. Co.
E. F. Reece Co.
Wells Bros. Co.
Wiley & Russell Mfg. Co.

Shafts.
Pioneer Pole and Shaft Co.

Shaft Couplings.
C. C. Bradley & Son.
Richard Eccles Co.

Shafting.
W. A Jones F'dry and M'ch. Co

Shears.
Badger State Machine Co.
Bertsch & Co.
Bicknell Mfg. Co.
Buffalo Forge Co.
International Electric and Engineering Co.
Little Giant Punch & Shear Co.
Rock River Machine Co.

Soap.
Klenzola Co.

Springs.
E. B. Adams & Son.
Harvey Spring Co.
Raymond Mfg. Co.

Steel Stamps.
Geo. M. Ness, Jr.

Steel.
Bourne Fuller Co.
Firth Sterling Steel Co.

Steel Shapes.
Crescent Forge & Shovel Co.
Star Mfg. Co.

Stocks & Dies.
Butterfield & Co.
Carpenter, J. M. Tap & Die Co
Canedy-Otto Mfg. Co.
Hart Mfg. Co.
E. F. Reece Co.
Wells Bros. Co.
Wiley & Russell.

Tenoning & Boring Machines.
Hagan Gas Engine & Mfg. Co.
Silver Mfg. Co.
Sidney Tool Co.
Vulcan Iron Works.

Tires, Rubber.
Goodyear Tire & Rubber Co.
Morgan & Wright.

Tire Heaters.
Rochester Tire Heater Co.

Tire Setters.
Brooks Tire Machine Co.
House Cold Tire Setter Co.
Mayers Tire Setter Mfg. Co.
Rochester Tire Heater Co.
Standard Tire Setter Co.

Tire Shrinkers,
Buffalo Forge Co.

Tops & Trimmings.
Buob & Scheu.
Indiana Top & Vehicle Co.

Torches, Brazing.
Emmelman Bros. Mfg. Co.
White, H. F.

Transfer Signs.
Palm Fechteler Co.

Twist Drills.
Cleveland Twist Drill Co
Morse Twist Drill & Machine Co.
Standard Tool Co.

Vehicles.
Buob & Scheu.
Wm. Galloway Co.

Veterinary Remedies.
Church Bros.
Emol Mfg Co.
Newton Horse Remedy Co.
O. K. Stock Food Co.
W. F. Young.

Vises.
Eagle Anvil Works.
Chas. Parker Co.
Prentiss Vise Co.

Wagon Brakes.
Keller Mfg. Co.

Wagon Standards.
A. H. Harshbarger.
National Wagon Standard Co.

Welding Compounds.
Perfection Welding Compound Co.
Weldarine Agency Co.

Welding Plates.
Phillips-Laffitte Co.

Well Drilling Machinery.
Fort Smith Well Drill Mfg. Co

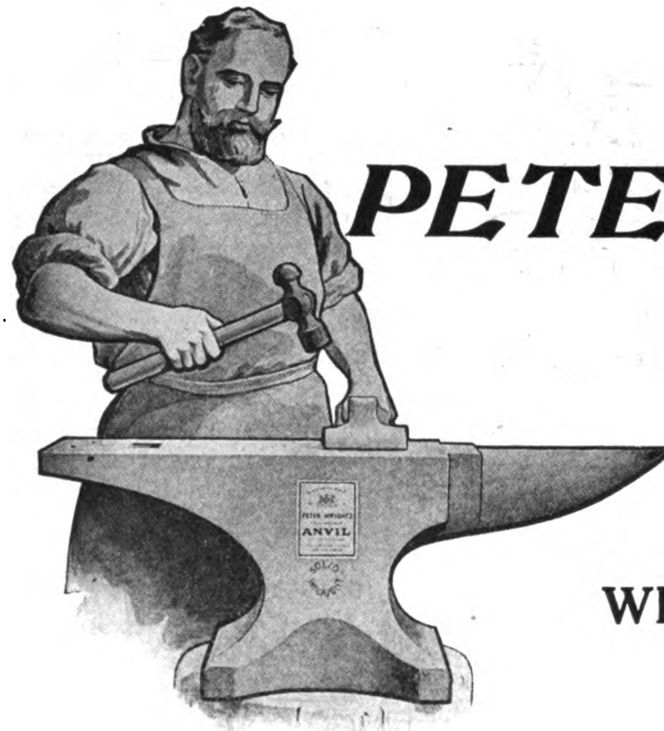
Wheels.
Boob Wheel Co.
Carriage Wheel Supply Co.
Muncie Wheel and Jobbing Co.

Wheels, Metal.
Electric Wheel Co.
Empire Mfg. Co.

Wood Working Machinery.
Bicknell Mfg. & Supply Co.
Chicago Machinery Exchange.
Crescent Machine Co.
Hagan Gas Engine & Mfg. Co.
House Cold Tire Setter Co.
Sidney Tool Co.
Silver Mfg. Co.

See Page 19 for Index to Advertisers.

STRIKE WHILE THE IRON'S HOT



ON A

PETER WRIGHT

ANVIL.

FOR SALE BY THE LEADING DEALERS
ALL OVER THE UNITED STATES.

AGENTS FOR THE MANUFACTURERS

WIEBUSCH & HILGER, L'D

9-15 Murray St.

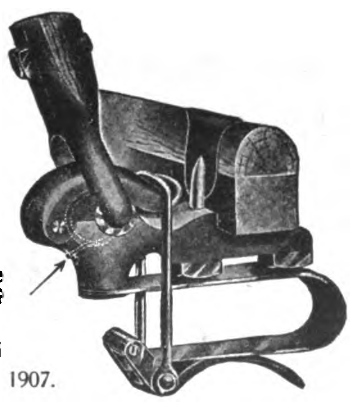
NEW YORK, N. Y.

ECCLES BALL-BEARING COUPLINGS

The cut shows our coupling bolted to axle, and the form on flat leather bushing takes, when the shafts are placed and locked in the coupling. The leather can be securely fastened in by the user, by driving a soft wire nail through the small hole we drill, which clinches it.

When the shafts are removed, the bushing does not come out, but stays in the Coupling where it belongs. NO LOST BUSHINGS WHEN YOU USE OUR COUPLINGS.

We would like to send you our circular and have you try our Couplings. They will save you money.



See the Clinch?

Patented June 11, 1907.

Patented Nov. 25, 1902.

The Spring is pivoted at the front so that it can be turned forward out of the way of the wrench while clipping the Coupling to the axle.

These are two of the good points, but there are plenty more desirable features in our Couplings.

We also have a Catalog showing our full line of **Carriage and Wagon Forgings** all of which we make.

RICHARD ECCLES CO., Auburn, N. Y.