A TOOL FOR CENTERING WORK IN A LATHE.

BY H. D. CHAPMAN.

The accompanying drawing shows a handy tool for centering work in a lathe chuck. When a job is to be faced off it requires a little time to get it to run

SIMPLE METHOD OF CENTERING WORK IN A LATHE.

true. The drawing shows how the work can be expedited by the use of a simple tool. The tool is made of tool steel; the roller is hardened. When a job is placed in the chuck to be faced off and the face of the work does not run parallel with the face of chuck the roller tool is secured in the tool post, and the lathe carriage is then run up by hand until the roller strikes the face of the job. As the work wobbles in the chuck the high position will be struck by the roller and forced true with the face of the lathe. After the work has been trued it is then ready for machining.

REPAIRING A LEAK IN A STEAM OR WATER PIPE.

A pinhole will occasionally cause a leak in a steam or water pipe, after the piping has been put up and perhaps been in use for a considerable time. It can be repaired with an ordinary carriage clip and yoke

MENDING A STEAM OR WATER PIPE.

and bit of sheet rubber packing, although a piece of an old rubber shoe would last for years.

You can readily see the application by referring to the sketch. The writer stopped two leaks in steam pipes fifteen years ago by this method. The pipes have been in service ever since, and have not leaked. They were both in rather inaccessible places, where it would have been difficult to renew the pipe. At the same time, being in out-of-the-way places, the appearance of the patch did not matter.

GROOVED PULLEYS FOR EXPERIMENTAL WORK.

BY CHAUNCEY W. NIEMAN.

Small grooved pulleys or sheaves can of course be turned on the lathe, but a substitute for the lathe, which in some respects is quicker and cheaper, will be found very advantageous. The description of such a method follows:

In a piece of wood of the thickness desired for the pulley bore a hole of a diameter equal to that of the pulley at the bottom of the V-groove. With a half-round rasp or large drill countersink this hole on both sides. Split—do not saw—the board in two down the

MOLD FOR CASTING PULLEYS.

middle of the hole, then nail or clamp it tightly to a smooth board, the two halves being pressed firmly together. Find the center of the hole with a compass and drive in a headless nail, taking care to get it vertical, to serve as a "core" for the bearing. Have handy a piece of cardboard considerably larger than the pulley, with a hole in its center the size of the nail. Pour melted solder into the mold, and quickly

slip the cardboard over the nail and down upon the mold. This will force out superfluous metal and make the upper side of the pulley smooth. When cool, unclamp the mold and pull apart where split. A knife or rasp will then do all the finishing necessary. Two or more pulleys can be cast together by placing the molds one upon the other, with their centers common. The figure shows such a combination. A hub may be made in a similar way. If a stronger bearing is wanted, as for an idler, wrap a strip of brass around the nail and let it become soldered to the metal.

Along similar lines a cogwheel may be cast, but great care is necessary in cutting the teeth in the wooden mold. A large number of pulleys can be cast from one mold, and for duplication work this method will be found quicker than the lathe.

HOW TO CUT THREADS WITHOUT A SCREW-CUTTING LATHE OR THREAD-CHASING TOOL.

BY JOHN BERGSTROM.

The ordinary way to cut a thread by hand is to use a thread-chasing tool, with the number of teeth per inch wanted. The difficulty in chasing a thread is in the starting. It takes a great deal of practice, and even then a "drunken" thread may be the result.

The accompanying illustrations show how this can be done in a very simple way and yet give an absolutely true thread.

If a number of screws are to be cut the best way to proceed is as follows: Take a thin piece of tubing that will just fit over the bar or bolt to be threaded. In one end drill a small hole, into which fasten the end of a spring brass wire, preferably by soldering. Then wind the wire around the tube half a dozen or more turns. Now take a thread gage. Select the number of threads per inch wanted and place it lengthwise of the tube, bringing one turn of wire in each

SCREW-CUTTING ATTACHMENT FOR LATHES.

notch, after which pull the free end of the wire and keep it tight. Solder the coils to the tube, using only the corner of the soldering iron; then move the gage one-third of a turn around the tube and repeat the soldering, and finally move the gage again an equal distance and solder.

It will now be seen that there is a perfect thread or spiral around the tube, which we will call the master thread. This master thread must be slipped on the bar or bolt to be threaded, so that it will not turn, allowing enough room at the end for the threads to be cut. The cutting tool consists of an ordinary hand tool, with only one point. Procure a small piece of wood, long enough to reach over the master thread and to the end of the bolt. Into this piece of wood drill a hole just large enough for the cutting tool to slip through and fit snugly.

In operation the cutting tool is held in the right hand, in the usual way. Then with the left thumb press the piece of wood against the master screw and start up the lathe. The master screw will feed the cutting tool the right pitch. As soon as a good start is obtained the tool will feed itself without the aid of the master screw.

When the thread is finished the master screw may be removed and slipped over another bolt to be threaded. The spiral may be wound right or left, according to the direction wanted. Any number of threads may thus be formed. That is to say if a triple or quadruple thread is wanted, it is only necessary to wind three or four wires around the master thread and proceed as before described. This arrangement is also very handy in starting a thread when the ordinary chaser is used, as it will always insure a straight thread. It is not necessary to nick or mark the wooden block, as it readily takes the impression of the thread from the master screw.

Fig. 1 illustrates a plan view of an ordinary lathe, ready to cut a thread. Fig. 2 shows how internal threads may be cut and Fig. 3 shows the master thread.

SIMPLE METHODS OF FINDING THE CENTER OF A CIRCLE.

BY AUGUST MENCKEN.

Very often it is necessary in the drawing room or shop to find the center of a circle, a disk or a piece of shafting, etc., when the diameter is not given. Below are three ways in which this can be done:

The first, Fig. 1, is the method usually used. It consists of two right triangles drawn so that their angles are in the circumference of the circle as abc and def . The point where their hypotenuses intersect is the center of the circle.

The second method is shown in Fig. 2. Draw any chord as ab and take two points on it as cd equidistant from its ends. At these two points erect perpendiculars to ab , cutting the circle at efg and h . Then

THREE WAYS OF FINDING THE CENTER OF A CIRCLE

draw eh and fg , and the point where they intersect will be the center of the circle.

Fig. 3 is similar to Fig. 2. Draw any two chords as ab and cd and at their centers erect perpendiculars to them. The point where the perpendiculars meet will be the center of the circle.

HOW TO SHARPEN A PIPE DIE.

BY ALFRED F. BISHOP.

I discovered a short time ago that a mill-cut file would sharpen a solid pipe die quite easily and quickly without removing the temper in the die. The first few rubs of the file will slide without cutting, this being due to the grease on the die. Just as soon as the greasy surface is thoroughly worked off,

A PIPE DIE CAN BE SHARPENED WITH A FILE.

the file will commence to cut, and will cut very smoothly, making a keen edge on the cutting thread. Heretofore I have always worked on emery grinders to try to do this work without removing the temper of the die, but found they worked very slowly on account of the small diameter of the wheels, also that it was quite a nuisance to set the die for the cutting wheel. Most mechanics would not try the file, not having the least idea that it would do the work. That was my case.

A "SPANISH WINDLASS."

BY GEORGE H. M'ENTIRE.

Herewith is a sketch of what is known among cowboys as a "Spanish windlass."

One end of the rope is made fast to the load, the other to a "dead man," tree, or fence post. The vertical post or timber which is used as a drum is rotated by means of a bar placed in a nearly horizontal posi-

A "SPANISH WINDLASS."

tion bearing against the vertical post but not fastened to it. The rope is passed around the end of this horizontal bar.

One man holds the post against the ground and vertical, and a second man walks around with the bar passing it above the rope, and thus winding the rope on the vertical post.

The whole windlass moves toward the "dead man" as the rope is wound on, so no permanent hole can be

made in the ground for the vertical post to turn in. This windlass is very useful for pulling wagons and autos out of the mud. All one needs is a rope and two posts or timbers.

THE WEIGHTING OF TOOL HANDLES.

BY A. J. JARMAN.

How often it occurs that when a tool such as a bradawl or particularly a keen-edged chisel is thrown down in a hurry it will roll off the bench and fall upon the floor, perhaps into a glue pot or upon the foot of the workman, or on a hard surface that will nick or dull the cutting edge. The following little scheme is employed with all the wood-working tools of the writer and found to answer admirably: Bore a hole in that part of the handle that rests upon the bench, with a five-eighths rather dull cutting twist bit. Bore the hole only as far as the center of the handle, but no farther, or the object desired will be defeated. A dull cutting bit makes a rough-sided hole. Into this pour some melted lead (of course the lead should not be too hot). When the lead becomes set, trim it off evenly with a fine rasp and finish off with coarse sand paper. Now when the tool is thrown down hurriedly upon the work bench it will not roll over more than once and will come to rest leaded side down. This little dodge is not only inexpensive, it is thoroughly effective; it will not only save annoyance, it will prevent many an accident, which no one can realize more than the man who is handy in the use of wood-working tools.

BRAD AWLS WITH HANDLES WEIGHTED TO PREVENT ROLLING.

The illustration shows two brad awls, fitted as described, and used by the writer for several years.

AN ILLUMINATED GAS HEATER.

BY F. G. WILLIAMS.

The accompanying illustrations show how an illuminated gas heater can be made. The heater is mounted on a suitable pedestal, such as a wrought-iron stand or a base of some old discarded oil lamp. The heater proper consists of a burner A, a screen B, and an outside cover or shield C, which is removable. A suitable handle is provided at the top of the cover for this purpose.

Through the base passes an ordinary gas pipe, and at its lower end a stop-cock is fitted with a suitable attachment for a rubber hose, so that it can be connected to the gas supply in the usual manner. At the upper end of the gas pipe is attached an adjustable sleeve for regulating the proper proportion of air to be mixed with the gas. The sleeve terminates in the burner proper, which is made with double walls. The lower part is made conical, so as to better distribute the mixture of gas and air. The burner proper is made from ordinary culinary utensils; the inside part from a small pan, and the outside part is made from a colander with very small holes, the smaller the better. These two parts are riveted together at the top, so as to make them tight. The lower or conical part may be made from ordinary black iron and may be fastened to the upper part as well as to the lower or gas pipe in any suitable manner, as by riveting or seaming.

The screen is made of wire netting fastened together, forming a cone with the same taper as the burner. The upper strands are bent inward so as to serve as a support for the cone. On this screen long asbestos fibers are attached. The raw Canadian rock asbestos is procured and the fibers pulled out in long threads, sometimes two or three inches long. These fibers are fastened and spread all over the surface on top of the perforations in the burner, and when the gas is lighted an incandescent mass will be formed which radiates heat but is not consumed. The outside cover is also made from some sort of pot or pan, provided at the top with a suitable handle, terminating with a downwardly extending rod, which passes through holes in the top of the burner proper and fits into a small socket at the lower or conical end. This is for the purpose of keeping it securely attached to the same. A

number of holes at the top should be made for the circulation of the air and spent gases.

The cover may be cut out or perforated in such a way as to represent a landscape or any conventional design. The inside of the shield may be lined with mica so as to render the heater more safe. The mica may be tinted in almost any color desirable. Aniline colors are dissolved in amyl acetate, then mixed with amyl acetate collodion (commonly called banana oil). This mixture is applied with a soft brush and will dry very smooth. It will withstand a great deal of

A GAS HEATER IN THE FORM OF A LAMP.

heat. When the burner is lighted the gas will burn and form small blue beads on the outside of the perforated burner, and as the flame strikes the asbestos fibers it will make them glow very brilliantly and change colors as the fibers are moved to and fro by the currents of air passing between the cover and the burner.

If artistically made the heater may be used on the top of a table and will be a real ornament to the house but, of course, will show off to a better advan-

SECTIONAL VIEWS SHOWING DETAIL OF CONSTRUCTION.

tage in a dark room. The outside cover is not at all necessary, but is only used to get the desired effect.

FILES AND THEIR USES.

BY HOMER CLOUREY.

Nearly everyone who has had much filing to do, knows what a difficult thing it is to get hold of a reliable handle. Wood ones will split even if ferruled, or the brass ferrule will become battered and weakened. Steel ones are rarely satisfactory, and the set screws are always in the way. The following is a simple method of reinforcing the file handle: At the

end of the file handle turn two $\frac{3}{8}$ -inch grooves, placing them $\frac{3}{8}$ inch apart. Connect by two diagonal grooves of the same size, wrap with a piece of paper, and pour Babbitt metal or solder in the top. Trim up, and you have an everlasting file handle.

A simple and inexpensive file cleaner is made by hammering either end of a medium or large sized common wire nail until it is flat. This tapering flat piece is then trimmed off square, with a file, and filed to an even thin edge. This cleaner is self-adjusting to all files and is far more effective than the expensive wire brushes usually used.

Files as nearly everyone knows are made from the best of tool steel to hold a sharp and strong edge under tremendous strain. This steel primarily has to be capable of being easily worked and, after it is worked, of holding the finest temper imaginable. It will be seen therefore that it must necessarily be the best of raw material for the articles enumerated below. It must be remembered that files have a very high temper, and therefore in all operations in which this degree of hardness is not essential, the temper should be drawn by heating and cooling down slowly in order to render the steel less brittle. In fact, the temper and quality of a good file are instanced by the fact that the writer has seen made and has tried satisfactorily a razor ground from a 10-inch flat mill file on a regular emery wheel and then honed and stropped into shape.

Perhaps the first use I ever saw old files put to was a full set of nail sets made from 6-inch triangular files by snapping them off to an even length at five inches, and grinding the points down to various sizes required. The top ends were rounded off nicely, and the teeth were ground just enough to give a beautiful knurled effect to the set. I asked the mechanic who made these tools why he hadn't used rat-tail files and make them round, but he said he just wanted them different from the common run of tools. Some years later I did have the pleasure of seeing a beautiful set made from round files. Only with these there was left an unground strip between the two ends, to afford a good grip for the fingers.

Another splendid set which was evolved out of files

REINFORCED FILE HANDLE.

by a machinist who had occasion to do a little special pattern making from time to time, was a complete set of little V-shaped gouges and flat chisels and half rounds, all made with curved shanks to reach otherwise inaccessible places. These were made by forging small files of the requisite cross section into the curve required, and grinding the shank and edge to the tool desired. By requisite cross section I mean that he always took a flat file to make a flat chisel, and a triangular one for a V-shaped one, etc. When these were ground nearly to their finished sizes, he hardened them by suddenly cooling in oil from a cherry-red heat, and then tempered them to a medium straw and again cooled them, after which they were given their final grinding and sharpening. The tang on the file was just the thing to fasten the finished tool in a firmly ferruled handle, and his tool was complete.

If you want a good heavy center punch, snap off either a rat-tail or triangular file of the right size to a convenient length, say five inches; grind a good long taper on it up to the last $\frac{3}{8}$ of an inch, and make the taper shorter to give more metal to the point, and there you are.

Sometimes a file will help out a serious difficulty if it is only used. An occasion arose in which it was absolutely necessary to shear off some large spikes in some built-up timbers that had already been placed in a building. It looked well nigh impossible until I thought to sharpen a file to an edge on the blunt end similar to a cold chisel, and by driving this in between the plies it was a simple matter to cut the spikes, though to tell the truth it spoiled the edge of the file several times before they were all cut.

Perhaps the most common use to which they are put is to make them into burnishers for sharpening cabinet scrapers and kindred tools. For these they are simply mounted in a handle, and ground until they are perfectly smooth. Triangular files are the ones commonly used for this purpose.

A round file makes an efficient awl for any purpose, and with scarcely any trouble to transform it ready for its new duties, as it needs only to be sharpened.

An amateur desiring to take up brass craft work, and not wanting to pay the exorbitant price generally exacted for an outfit, decided to make one from files. In less than two hours he had made every tool illustrated in a large assortment, and they were a creditable-looking outfit, comprehensive enough for any ordinary purpose, and included all the customary piercing, denting, tracing, and stippling tools.