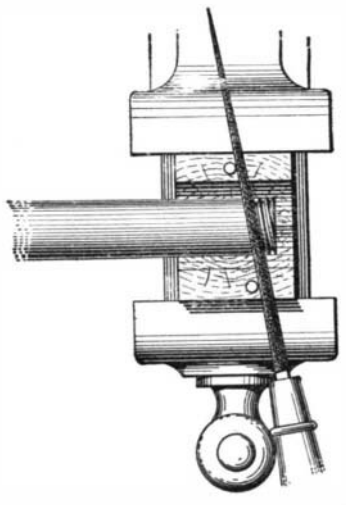
center of the rod at the end, forming the cup for the mercury. Bore a ⅛-inch hole through the base where the cup is to be fastened, and countersink it to ½ inch in diameter from the under side. This enables the brass nut to be put on the under side, thus serving both to hold the cup firmly in place and as a connection for a wire to the binding post. This is shown by dotted lines in the drawing. The yoke is made of a piece of sheet brass. Two holes are bored in the feet, and it is fastened to the base by means of screws. A hole is bored and tapped to receive the screw point. If a tap is not to be had, a ¼-inch hole may be bored in the yoke, and a battery nut soldered directly over the center of the hole.

The detector is best mounted on a piece of ½-inch hard rubber measuring about 3 by 4 inches. Four binding posts will be required for the usual connections.—Electrician and Mechanic.

THREAD CUTTING WITHOUT A DIE.

BY J. A. BERGSTROM.

It sometimes happens that the threads of a bolt or a pipe break off and must be cut without the aid of a screw-cutting die. This can be accomplished very



THREAD CUTTING WITHOUT A DIE.

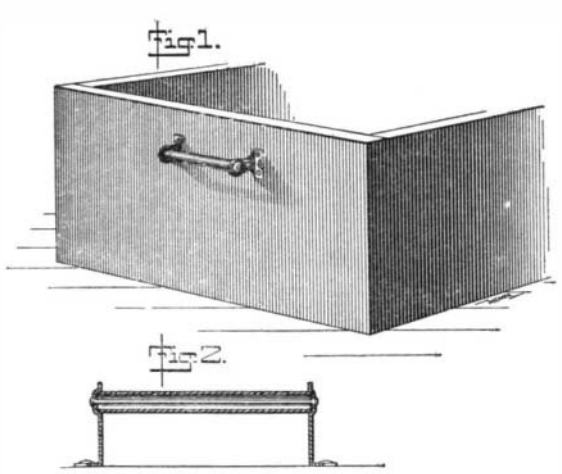
easily with the aid of an ordinary half-round file and a little patience.

Take a block of wood and fasten it in a vise. Make a V groove in the block deep enough for the center of the pipe to come a little below the surface. If the pipe is long, it will be better to make two of these blocks, so as to keep it steady. Now into this groove place a pipe with thread same as wanted, and on one side of the block drive in a nail. Place the flat side of a half-round file against this nail and see that it forms the same angle with the pipe as the thread does. Then drive in another nail on the opposite side of the block, so that it will touch the flat side of the file. Now remove the pipe and replace with the one to be threaded. Hold the file with the smooth side against the nails and while filing keep turning the pipe. The pipe should be rocked backward and forward. That is to say, on the forward stroke of the file turn the pipe in the opposite direction, thereby insuring a much better thread.

A SIMPLE METHOD OF CONSTRUCTING A HANDLE.

BY W. C. M'KENZIE.

The accompanying illustration shows a simple method for constructing a neat and strong handle for a box, or a drawer. The handle is fashioned from two similar shade roller brackets which are fastened in place by means of screws at the points where the handle is needed. A piece of pipe or tubing is posi-



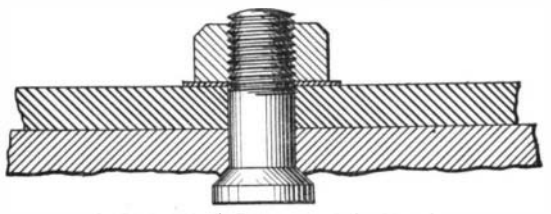
SIMPLE METHOD OF CONSTRUCTING A HANDLE.

tioned between the brackets and is held in place by a stiff wire or other rod which passes through the tubing and the openings in the brackets, having the ends hammered down or riveted at the outside of the bracket. The tubing may be of brass or any other suitable material adapted for the purpose, and preferably tending to add to the appearance of the handle. The ends of the tube should be inserted in the concavities of the brackets, as is shown most clearly in Fig. 2.

METHOD OF PATCHING A BOILER.

BY JOHN W. E. LAKER.

The following method of bolting a patch on a boiler perhaps shows some originality. It was required to patch the bottom of a combustion chamber



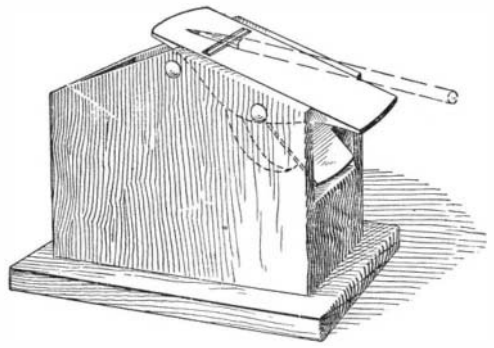
BOLTING A PATCH ON A BOILER.

of a very old boiler, badly pitted on the water side. Riveting was impossible for want of space. The patch was five feet by two, fitted on the fire side, and the greatest difficulty to overcome was to make the bolts watertight, owing to the impossibility of driving them or getting a contact under the heads against the bad plates. Gaskets did not appeal to the repairer, and a metallic contact was aimed at. This was accomplished by making each bolt act as an ordinary miter-seated valve. They were turned a hand-workable fit (all but the last ¼ inch, which was tight) to reamered holes of steel, and case-hardened, fitted in from the water side, and hammered up with a spanner. The "seat" was sunk into the boiler plates. There were altogether 128 bolts in the patch. The job when finished passed a government surveyor's examination, and steamed from Honolulu to San Francisco without mishap.

PENCIL SHARPENER.

BY JOSEPH N. PARKER.

I have to provide means for the sharpening of one hundred or more pencils daily, and after having tried with little success a number of the expensive sharpeners, I fitted up a small all-metal carpenter's plane in a box, and it answers the purpose admirably. After a little practice one can easily make any kind of a point desired. The bit will stay sharp long enough to point several thousand pencils, and then it can easily be re-



CARPENTER'S PLANE AS PENCIL SHARPENER.

moved for sharpening. The accompanying sketch shows how it is done.

Shavings from pencils are excellent for driving away moths.

COPPERING FLOWERS WITHOUT WAX.

BY ARTHUR E. HAGARTY.

The writer is interested in electroplating flowers, etc., and has had considerable success in coppering and silvering, using no wax. The rose (or other article) is dusted over with the finest graphite (blow the excess off) and immerse in the copper solution. An ordinary rosebud is thickly and sufficiently plated in about fifteen hours, using six large-sized gravity batteries. Of course the silvering and gilding are easy after a good coat of copper has been deposited. The wax is unnecessary except to stiffen the petals or when glass, etc., is to be plated.

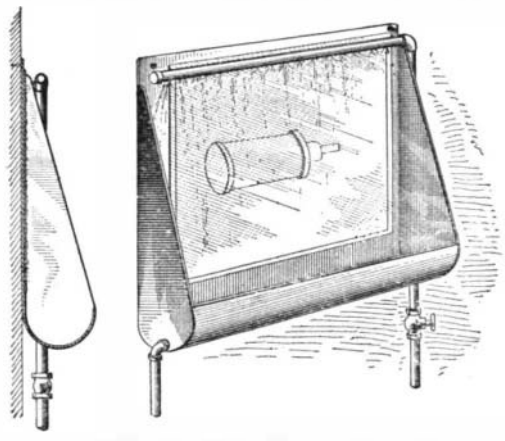
Some beautiful rosebuds have thus been plated in copper and silver, with the stalks, etc., enameled green. Undoubtedly many amateurs would like to experiment with this work, if they knew it was so easily done. A stout copper wire is pointed with a file and carefully drilled (by hand) into the center of the lower part of the bud, care being taken not to break off the small green petals. After dusting well with the graphite the wire is thrust through a piece of heavy cardboard as a handy means of adjusting in the plating bath, which should be about ¼ inch above the flower. The wire is then connected, and in a few minutes the copper can be seen creeping over the petals. The flower should not be disturbed till entirely plated. Of course the flower can be put in any position, but the vertical position is the best, because the petals tend to float out of position when inverted. The wire can be bent in the form of a large hook with the point upward, but this makes unnecessary and wasteful surface to plate with a small battery. All the plating should be concentrated on the flower, if possible. The finished flowers should be polished for bright effects, and well rinsed in hot water, or boiled, to get rid of the acid, which would otherwise corrode.

Some very beautiful effects can be obtained with ferns, etc. Anything can be plated which is not affected by the acid during plating. To deposit on glass it must be coated with paraffin first, all the excess of graphite being brushed off.

BLUE-PRINT WASHER.

BY W. J. C.

A very compact blue-print washer, which has the great advantage not only of taking up very little space, but also of permitting the washing to be done without the usual slopping over and dripping incidental to the use of tanks, can be made very cheaply of galvanized iron, as shown in the accompanying sketch. The washer is attached in a vertical position on the wall, and the pipe furnished with valve running up the side and across the top. The last piece of pipe, the horizontal, is drilled with one row of holes 1/16 inch diameter about 3 inches apart, and so placed that the water strikes the back of the washer at an angle of about 45 deg. To wash a print,

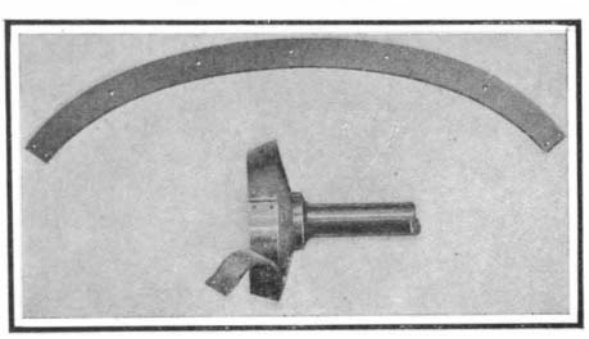


A VERTICAL BLUE-PRINT WASHER.

the water is turned on for a moment, wetting the back of the washer, and then shut off and the dry print stuck up on the wet surface. Care should be taken that the top edge of the print comes slightly above where the water strikes, to prevent the print being washed down by water getting back of it. The water is then turned on, and a thin film of water allowed to run over the face of the print. If there is no trimming space left on the print, it can be turned upside down after a few moments, to insure the top edge being washed evenly. This method washes prints in a very short time, as the running water is much more effective than the tank method. Painted with aluminium paint, the washer looks well in any office, and will save its small cost in a very short time.

PUTTING ON A NEW CLUTCH LEATHER.

A clutch leather may be cut from a wide piece of leather belting of uniform thickness, usually ¼ inch. If the piece chosen is too thick, it will be impossible to release the clutch fully. Take off the old clutch leather, lay it out flat, and use it as a pattern for the new leather. (See cut.) As the leather will stretch somewhat, it is not essential to have the new leather curve as much as the old one. Cut the new leather about ½ inch short, and punch and countersink holes in its ends for the rivets, whose heads should be below the surface of the leather. Soak the new leather in water until it is thoroughly soft. Stretch it over the clutch, and put temporary rivets in the ends. Mark the central rivet hole, remove from the clutch, and punch that hole. Put the leather on



PUTTING ON A NEW CLUTCH LEATHER.

the clutch again with temporary rivets, and punch and mark the remaining holes. When all have been punched and countersunk, rivet the leather in place. For this purpose it is necessary to have a bar whose end diameter is about the diameter of the rivet heads. This bar is used as an anvil against the rivet heads. Two men are necessary, and the whole job, after the leather has been taken out of the water, must be done quickly, else the leather will shrink so that it will not go on.