Suggestions for the Workshop

Ingenious Expedients of Resourceful Mechanics

Centering Disk

By William Grotzinger

A HANDY tool for finding quickly the centers of round stock is shown in the illustration. It consists of a sheet-metal disk with a number of circular lines drawn on it and three deep notches cut in it. This disk of course can be made any size, according to

Centering disk.

the work it is to be used for. Simply place it on the end of the stock, move it about until the edge of the piece coincides with the circular lines, as seen through the slots, and then mark the center.

Testing the Hardness of Metals

By B. F. Dashiell

THE amateur who wishes to discover the hardest piece of metal among a number of samples will find the apparatus illustrated herewith suitable for his requirements. Ordinarily a delicate instrument is used for this test. However, for the average amateur's needs the rough instrument here described is sufficiently accurate. It consists of a light riveting hammer *A* secured to a piece of iron rod *D* about three feet

Apparatus for testing the hardness of metals.

long. A protractor *B* is fastened to a support from which the riveting hammer is suspended. Normally the rod hangs with its edge directly in line with the 90-degree mark of the protractor. The metal to be tested is indicated at *C* and should be held in a vise so that it just touches the riveting hammer. The hammer is then drawn back 45 degrees to the position indicated by dotted line at *E*. On being released it falls against the metal *C* and rebounds. The test piece giving the greatest rebound is the hardest.

Holding a Screw by the Hand

By George W. Colles

IT would be hard to find anyone who works with tools who has not frequently been required to hold a screw or nail by the head while working on the shank; and yet there is no appliance on the market for this purpose. Copper or lead vise-jaws are usually used for this purpose; but they are inefficient where the screw is short and the entire length of the shank has to be free. Pawing over the junk pile, I found the head of an old ten-cent hammer. This was the kind with a conical socket and a screw in the top end to hold the handle in place. After cutting off the round end, and slitting the balance longitudinally as shown by the heavy lines in Fig. 1 (which is a side view from the handle end) I had two jaws, as shown in Fig. 2, which

did the business. As the socket is conical, any common size of screw can be held with it. The bottom of the groove should be recessed with a round file.

If you have not an old hammer head like that described, get two pieces of 3/16-inch to a 1/4-inch sheet iron or brass about 1 to 1 1/2 inches square. To avoid unnecessary filing, a corner may be cut out. With a half-round file a groove is then filed parallel and close to one edge, and with a rat-tail file a semicircular notch at right angles to this groove. If the screw has a flat head, it is best to have the oblique edge of the

Vises for small screws.

groove next to the edge, and if a round head, on the side away from the edge. A pair of these jaws provided with both kinds of grooves and several sizes of notches as shown in Fig. 3 can be made in a short time, and will eliminate the screw-holding trouble for ever after.

A Boring Bar for Cylinder Bushings

THE accompanying drawing shows a boring bar for large work with which bushings may be bored perfectly true. This boring-bar consists of a heavy bar made of machine steel *A*, upon which there is a stiff traveling head *B*, also made of machine steel. The head *B* is bored to a neat sliding fit over the bar *A*. The head moves longitudinally over the bar and is fed by the screw *C*. At one end of the screw there is a

Boring bar for cylinder bushings.

bar wheel *D*, by which it is turned. As the bar revolves, one arm strikes against a stop at each revolution. This turns the screw by an amount proportional to the number of arms in the star. For example, if there are six arms in the star, the screw will be turned one-sixth of a revolution for each revolution of the boring bar. As the screw turns, it moves the head along with the tools *E* mounted thereon.

Adjustable Spanner Wrench

By Israel R. Hicks

WHEN assembling machines that have round or spanner nuts in their construction, a number of special wrenches are required. A handy tool under such circumstances is an adjustable spanner wrench, which may be made of a common monkey wrench. Drill a 3/32-inch hole in the end of each jaw to receive a steel pin *A* of the same diameter. Each pin may be held

Adjustable spanner wrench.

in place by means of a set screw *B*. The holes for the pins should be as deep as the pins are long, so that when the wrench is not to be used as a spanner, the pins may be dropped in their sockets flush with the ends of the jaws. Thus the wrench is in no way impaired for use in normal service.

A Home-made Surface Gage

By Albert F. Bishop

A SURFACE gage may very simply be made as shown in the drawing. The left-hand figure represents an iron pedestal with an ordinary pair of dividers, fastened on the beveled edge at the top with two machine screws. One leg has been cut off, as shown in the pic-

Two simple surface gages.

ture. In the other figure the pedestal is of hard wood beveled off on top and grooved out with a saw cut in the center of the groove, allowing it to clamp the dividers when laid in the groove, on turning up the thumb screw. This simple form will answer for woodwork, pattern making, etc. The dividers can be removed at any time, and are just as good for other work.

Handy Universal Wrench

THE accompanying engraving illustrates a very simple wrench for nuts and bolts of various sizes. It is made of a piece of 1/4-inch square iron rod about a foot long. This is heated to a cherry red and then is bent

Simple form of universal wrench.

to the shape shown. The wrench may be strengthened by welding it at the joint *w*. The manner of applying the wrench on a bolt head or nut is illustrated clearly, the nut being indicated by dotted lines.

To Keep a Tank from Bursting in Freezing Weather

By Lloyd V. Beets

TO keep a water tank from bursting when freezing, procure a very large jug, and inverting in the tank fasten it in this position by a wire wrapped around the neck and fastened to an eye in the bottom of the tank. This has been found successful by the writer. The secret lies in the fact that this jug contains air, mostly, and when any extra pressure is put upon the water, this air is compressed, relieving the pressure on the tank.

Preventing a tank from bursting in freezing weather.

Workshop Notes

To Restore Burnt Steel.—To restore burnt tool steel, heat the piece to a red heat, then sprinkle over it a mixture of 8 parts red chromate of potassium, 3 parts saltpeter, 1/4 part aloes, 1/4 part gum arabic, and 1/4 part rosin. Machine tools treated in this way will stand up as well as before they were burned. —C. D. H.

How to Prevent Babbitt Metal from Exploding.—Before pouring babbitt metal, add a piece of rosin about the size of a walnut and allow it to melt. If the bearing to be lined with babbitt is warmed before pouring, the metal will run better and a better job will be had. —H. D. CHAPMAN.