

# HOLDING and SUPPORTING for DRILLING

**U**SING a vertical or precision drilling machine, the operation of drilling is easily performed on normal materials, so that any problems which arise in its use concern the holding or supporting of parts. Given satisfactory solutions in these respects, holes can be accurately located and breakage of drills avoided. Of course, a considerable amount of drilling can be done holding the work by hand on the drill table or by mounting it in a machine vice; but anything which is somewhat out of the ordinary may call for other or modified methods—and a suitable machine vice is not always to hand.

## Small table area

In general work, a problem that often occurs has its basis in the inadequate area of the machine table. Perhaps only part of the component can be placed on it, and the overhanging portion has to be held up while drilling is done—a risky procedure for the drill. The solution is temporarily to enlarge the area, using a piece of good hard parallel board. Holes can be drilled for countersunk metal screws, by which it can be held by clamps gripping the underside of the machine table. Alternatively, a piece of metal plate of sufficient thickness—particularly aluminium because of its lightness—be mounted in the same manner.

For small parts, even a machine vice leaves something to be desired if it tends to be disproportionately large. There is also the need to keep work up near the top face of the jaws, which implies a heavy grip if it is not to push down—or packing must be placed beneath it. Often the best way is to use a toolmaker's clamp on the work, as at A, gripping with both laid on a flat surface. Then the work can go straight on the drill table—or on a piece of protective packing placed there.

## Using angle iron

Two pieces of angle iron can be used in similar fashion to toolmaker's clamps, as an alternative to a machine vice. An example of their use is setting up a slide valve cylinder to drill the valve face, as at B. A bolt can go right through the cylinder,

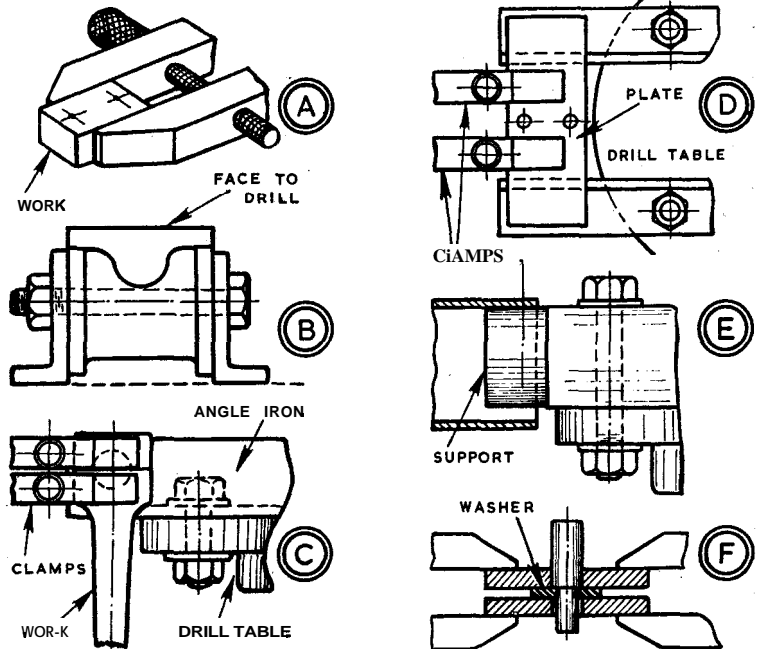
## By GEOMETER

and with it partly tightened, the face to be drilled can be set horizontal on a faceplate using a surface gauge—tapping the face true with a piece of lead, and finally tightening the bolt fully. Angular faces on components can be set horizontal in this way; and for parts without holes, the pieces of angle iron can be longer and fitted with two bolts.

A single piece of angle iron admits of setting up work which is long and must be drilled endwise—such as a connecting-rod to take bolts for the

This plate may be accurately marked off and drilled beforehand to serve as a template; and with free space between the edges of the angles, it can be manoeuvred as required to align the holes to the drill.

Also on the outrigger principle, a support can be arranged for drilling round the end of tubing—a boiler barrel, for example, as at E. For this, the support can be square hard wood, machined circular at the outer end. A length can be countersunk for this end, then set up in the lathe with support from the tailstock centre, and the other end trued in the independent four-jaw chuck. For



cap, as at C. Such work can hang down the side of the drill table, where there would probably not be sufficient space for it to stand on top. Two clamps may be needed for a connecting-rod and cap, as shown. The angle iron is bolted to the drill table with this slewed round, to align each centre punch dot in turn beneath the drill point.

Two pieces of angle iron clamped to the drill table, as at D, can provide outrigger edges to take work clamped to the underside of a piece of plate.

bolting to the drill table, there can be a vertical hole, or holes, through the square part.

Drilling out holes in washers poses a problem of holding which can be solved, as at F, when they are few in number, by clamping each one between two pieces of plate. In clamping, alignment can be effected through a length of stepped rod, its turned-down diameter the original size of the hole, and its top diameter the size to which the hole is to be drilled out.