ACCURATE

Centring and drilling

By **GEOMETER**

GIVEN that a centre punch dot can be located at the exact point where it is intended to be, there is every chance--even in ordinary drilling-that the resulting hole will be accurately positioned. A small well-sharpened drill can be used to provide a pilot hole from the centre punch dot; and if the required hole is large, the opening-out can be done in stages with several drills. This reduces to a minimum the chances of the hole's running.

If the job is done on the lathe, its precision depends upon the accurate setting of the centre punch dot-which is obtained by using a needle [ME, January 26, page 103], or a pointed rod and indicator [March 30, page 405]. The work can be clamped to the faceplate, or mounted on an angle plate on the faceplate., either method being suitable for obtaming the precise rise-to-centre of the angle plate.

The setting of an angle plate is, of course, particularly important, as any error is inevitably transferred to the rise-to-centre of components machined on it. Accuracy is ensured by using a centre-punched block, A, which is clamped to the front edge of the angle plate, and the centre punch dot is brought true by adjusting the angle plate on the faceplate.

For locating the centre punch dot precisely from the edge of the block, a plate is used which has a reamed or lapped hole for a short centre punch, and a stop strip is held by a toolmaker's clamp, to give the centre distance.

One way of obtaining this distance is to push the centre punch through the plate so that callipers (set from a micrometer) can be used between the punch and the stop strip-with allowance for the radius of the punch. Once this setting is obtained, the device can be laid on the block on a flat surface, and the centre punch lightly tapped. Then the block is ready for the lathe.

A development of the device consists in slotting the plate for securing and adjusting the stop strip with a countersunk screw, B. This gives the same accurate setting for locating centre punch dots from the edge of work; and a cut-away, w, which can easily be milled or filed, admits light from a torch to facilitate the sighting of spacing lines for two or more holes.

An alternative method of spacing holes is as at c. The position of one hole is centre punched. Then the hole is drilled and reamed and a plug is inserted. From this plug, a distance x to the edge of the plate can be obtained with calipers; or if there is a cut-away on the plate a thin gauge can be inserted to a second plug in the centre punch hole. The plate is then preferably of a size that admits of holding to the work with a toolmaker's clamp. In this way, with a thick plate, drilling can be done direct.

A thin gauge_, c, can be made from sheet metal. It is sheared oversize and finished to micrometer by draw-filing -rubbing edgewise on a Swiss file. If the gauge is made undersize in the process, the metal can be stretched for another attempt by careful tapping with a hammer on a block.

With any of these centre-locating devices, the basic setting from the edge of the work can be obtained as at D, using a block gauge (instead of calipers) between a plug in the centre punch hole and the stop strip. When the stop strip is of known thickness, distance Y can be taken over the strip and the plug by micrometer.

Centring in this way obviously demands centrality of the centre punch point, which is ensured as at E. Standard silver steel rod is used for its good fit in reamed holes. After being faced and pointed in the chuck, the punch is hardened and tempered. Then its point is finished against a grinding wheel on a mandrel in the chuck. It is in a hole in a bar on the slide and is turned by a knob.

The general principle of centring and drilling is applicable, F, to cutting a large hole, z, by drilling a series of small ones, while maintaining control over their spacing by a pin in the jig plate.@