Ways with toolmakers' buttons

By GEOMETER

When the highest standard of accuracy is essential in the spacing of holes, it is necessary in a small workshop to employ toolmakers' buttons. Their use is the only way which ensures accuracy to the standard of a micrometer or vernier.

The job-which may be a special component or part of a jig or tool-is " buttoned up " on the bench. A toolmakers' button is attached where every hole is to be. Then the job is clamped to the faceplate of the lathe, and each button in turn is set true by indicator.

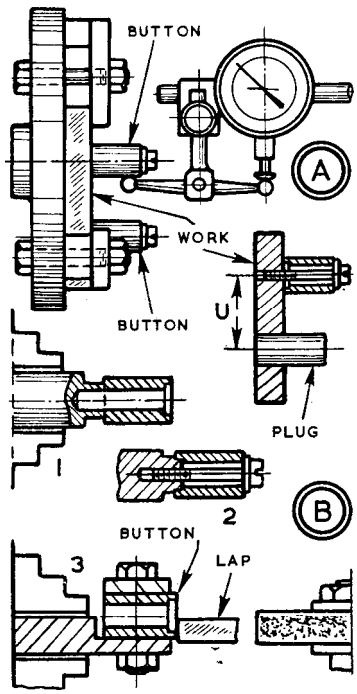
When a button is running true, the job is firmly clamped, the button removed and the hole opened out with a drill and finished to size with a boring tool . In this way, all holes are accurately located at the finish, each at the positlon given by the setting of its button.

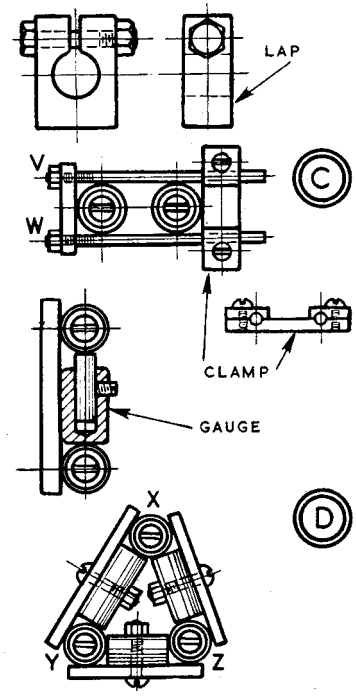
For buttons to be square with the face of the job, the face must be smooth and flat and must also spin truly on the lathe-though this condition follows automatically when the base or back face is parallel. A small divergence from parallel can, of course, be corrected by packing at the faceplate. A job with an angular face naturally requires special setting-up.

After preliminary facing, the job can be prepared for buttons by first carefully marking off in the normal way with rule, scriber, dividers, surface gauge, and so forth. As usual, the centre of each hole is indicated by a pair of crossed lines .Then each intersection is carefully centre punched for the drill which follows, which is the tapping size for the screws holding the buttons.

The holes through the buttons clear the screws and so setting can be to the micrometer before the screws are fully tightened. Thus, the holes for screws to hold the buttons are positioned to ordinary standards of accuracy, but the buttons are set by a micrometer or other gauge.

A typical set-up is as at A. The work is a piece of thick plate in which a pair of holes have to be bored at precise centres .The normal clock indicator, as shown, must be used with its lever attachment, though some types





can be used direct .The work is lightly clamped for truing, which is done with a lead hammer, or with a brass or copper drift and ordinary hammer. When the button is spinning truly, the work is fully clamped.

In machining the first hole, take care not to move the remaining button. Should it happen that the button is inadvertently knocked, a plug can be fitted in the finished hole, and the button reset to centre distance U. In fact, this principle can be adopted at times Bore a hole, fit it with a plug, and use it as the base from which to locate other holes.

Buttons occasionally used can be in mild steel, unhardened. A suitable size is 1/2 m. dia. x 3/4 in. long, drilled 7/32 in. (for a 5/32 m. screw) with the bottom end of the hole recessed 3/32 in. to 11/32 in. dia. The outside diameter should be full and necked, as at Bl, for lapping, after which the button can be parted off.

Mild steel buttons which are case-hardened, or cast steel ones which are hardened and tempered, can be lapped on the outside on a mandrel, 2, while the end can be lapped or ground with the button in a split holder, 3. This can be machined in the independent chuck. For lapping the outsides, a lap can be in brass or aluminium, adjusted by a bolt.

Another way of finishing a button square on its seating face is to bore and face a block in the lathe, push the button through it, and rub the lap-charged with fine grinding paste-across the end.

The device shown at C can be used to adjust two buttons to exact dimension in the shortest time. It consists of a clamp, two rods threaded a distance, a plate, and two nuts *VW*. Alternatively, pairs of buttons can be set by gauge and straightedge, as at *D*. Several buttons (XYZ) can be set by making end gauges in mild steel and fixing each to a straightedge by a small bolt.