Microscope on the *lathe*—II

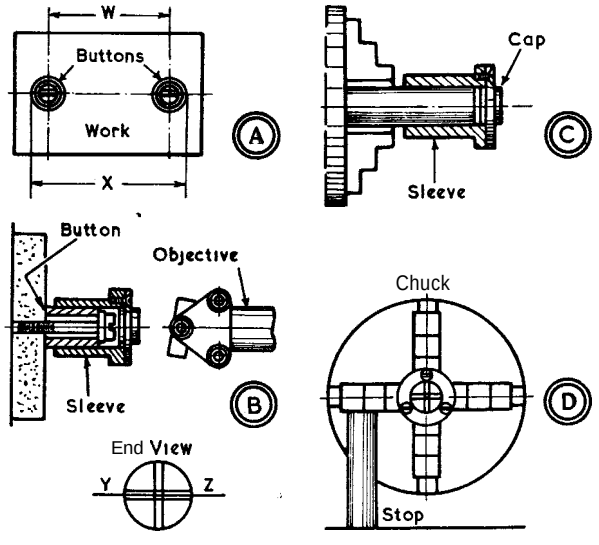
SLEEVE WITH BUTTONS

By GEOMETER

Most of the examples which I have given of using a microscope on the lathe are of truing work from cross lines. In marking off, these lines are scribed to intersect at points which locate the centres of holes.

Normal operations are pursued after the work has been trued by the lines. It is centred and drilled from the tailstock and bored with tools from the topslide. Precise positioning of the cross lines, first in marking off and then in setting-up on the lathe, is essential for accuracy.

With an older method, buttons 'locate the positions of holes on the work. In setting-up, a button is made to



spin truly to a test indicator. The work may be clamped to the faceplate or on an angle plate; or it can be held in the independent chuck.

An advantage of working with buttons instead of directly from scribed lines is the opportunity which they provide for correcting first errors. Marking-off may not be correct, although it may be accurate enough for screw holes for holding buttons. And so the holes are drilled and tapped for button screws. Then by checking and resetting of the buttons, with micrometers, final accuracy is achieved. Diagram A shows the principle. The hole centres are at dimension *W*. A check is made over the buttons by micrometer to dimension X, the radius of each button being added to the spacing dimension.

With a microscope for setting-up on the lathe, work can be buttoned-up in the old way for the sake of the advantage which this method provides-and then you do not need a test indicator. For truing a button, a special but simple sleeve is made to slip on the button, the end of the sleeve having cross lines at which to aim the cross line in the microscope ocular.

This method is simple and straightforward, but it teaches precision engineering of the sort that is done on a jig-borer. When a microscope is used in the spindle of this machine, the work is set to cross lines; or a service hole may be bored and fitted with a plug which has cross lines, the same as those on the button sleeve.

The difference is that, on the lathe, each button must be set true; on a jig-borer, once the operator has picked up datum readings from the plug in the service hole, he can take other positions from readings of the feed screws.

Anyone who has done the job on a lathe can do it on a jig-borer with a minimum of further instruction.

Diagram ***B*** illustrates the principle for a lathe. The work with the button is set up in any of the ways which I have mentioned, and the sleeve is slipped on the button, after setting it as truly as possible by eye. The microscope objective, with optical micrometer, is advanced to focus the lines on the button-which are as in the small diagram, where line YZ is the one in the microscope ocular. There are four lines on the end of the button sleeve; and with correct setting of work, pairs of them straddle the line in the ocular. The work is carefully adjusted for this.

The button sleeve can be one piece with a blind core, which can be first machined and then carefully lapped. Instead of this, many machinists may prefer a two-piece device, as shown. It is an open-ended sleeve with a spigoted cap fitted by three small screws, as the end cover is attached to the cylinder of a double-acting steam engine. The construction offers the alternative of reaming the bore. If lapping is chosen, the operation is easier than in a blind bore-particularly for a hardened sleeve, although hardening is not essential.

For either reaming or lapping, the sleeve should be carefully bored in the chuck. For reaming, the flutes of the tool should be let in almost to the end of their taper. With the spindle locked, the reamer can be advanced by the tailstock and turned by a spanner. For lapping, the lap should run in the chuck and the sleeve be held by hand.

For scribing lines on the cap, diagram C shows the set-up on a mandrel. A pointed tool, which is mounted sideways just off centre, is traversed right along the face, at four positions given by a stop, at at diagram *D*. ▣