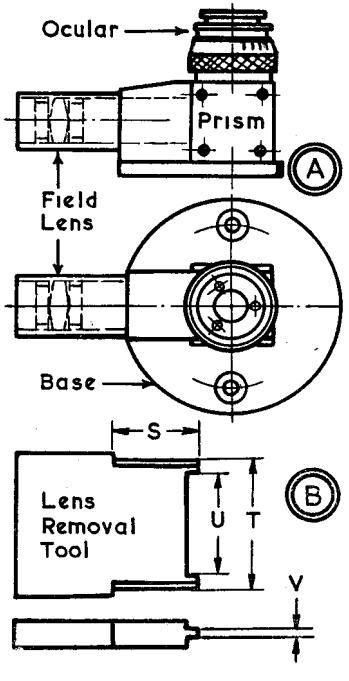
MICROSCOPE ON THE LATHE — 10

Adapting a TELESCOPE

ALMOST any small telescope can be converted to a microscope by the fitting of a microscope objective, or the lens of a small camera, in place of the field lens. An ordinary telescope consists of a large field lens and a Ramsden ocular. After adaptation it can be used on the lathe and for work on the bench.

The best for the lathe is an elbow telescope. It has the advantage that it will stand firmly on the bed or the slotted cross-slide; and you can look into it vertically, in a natural attitude, as in setting cutting tools. Briefly, it makes an ideal instrument when it is fitted with an objective and an optical micrometer-details of which I have given in recent articles. Scribed lines can be set " spot on " to the spindle axis by normal adjustment of work in the independent chuck and on the faceplate.

My elbow telescope, which is shown in diagram ***A,*** was obtained from Charles Frank Limited of 67-75 Saltmarket, Glasgow Cl, a firm with which I have no connection except as a completely satisfied customer.



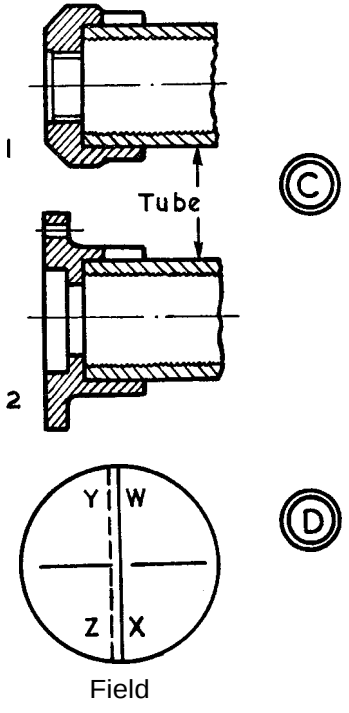
It is a Government surplus instrument, apparently unused, with everything to make conversion as simple and cheap as possible. Perhaps the designer was himself a modelling enthusiast who foresaw its peacetime use. And its use is not confined to small lathes. The massive but handy design should meet the requirements of most production turners. This was my impression when I first examined it.

It comprises a well-proportioned gunmetal casting, with a base 5) in. dia., and a lens tube making the total length 8 in. The horizontal line of sight is turned vertically by a prism past a graticule into a Ramsden ocular, which you can adjust by rotating a large knurled sleeve, so that the cross-lines of the graticule are brought into focus. You make the adjustment before using the instrument on the lathe, and afterwards move it towards the headstock to focus the lines scribed on the work. Both sets of lines are then clearly seen-and by adjusting the optical micrometer and the work, you obtain the precise setting.

The rise-to-centre from base to lens tube is 1.365 in., which makes possible a cross-slide mounting, with packing, on many lathes. On others, wood blocks can be used to give a centre setting within 1/32 in. The optical micrometer does the rest. In the base, two spot-faced &in. clearance holes, spaced opposite at 4 in. dia., can be used for bolts. Ample space remains for others, or for clamps, though for normal use the instrument stands firmly without fixing.

As received, the thing was dustv from long storage, and so I dismantled it with small and medium-sized square-bladed screwdrivers, using a magnifying glass to see the tiny locking screws-whose loss I prevented by doing the work in a tray !

All went well until I came to the field lens. I pulled off a covering sleeve from the tube, took out a tiny locking screw and scraped out a black anti-reflective sealing. Then I had to make a tool as at ***B*** to screw out the lens-securing ring. It was from mild steel 1 1/2 in. long X 3/32in. thick. Using the independent chuck, I turned S 3/4 in., ***T*** 1 9/32 in., U 1 3/16 in. to 1/16in. deep. I made V 1/32 in. by filing and then case-hardened the end. The securing ring screwed out easily, bringing the field lens with it.



When you have reached this point, the next step depends on the lens which you intend to substitute, for the holder must be made to suit. For a microscope objective, the holder must have the RMS thread, while a camera lens is best fitted by a flanged holder. Both are shown at C, diagrams 1 and 2. The lens tube of the telescope takes either of them as a split, push-on fitting. The controlling diameter is 1.450 in. on this chuck-and-mandrel work, with brass or duralumin.

Diagram ***D*** shows the field of the instrument. Line WX is one on the graticle Line YZ is one on the w.ork Having centred the instrument with the optical micrometer, you adjust the work so that the two lines coincide, ❑