MICROSCOPE on the lathe — 4

FOR use with a microscope, a Ramsden ocular is an alternative to the Huyghenian eyepiece which I described last week. Like that device, the Ramsden can be fitted with a pointer or scale for reference at the plane of the real image.

In using the microscope, you see the pointer and the field both sharply defined. You can align the pointer to an object in the field, such as the end of a needle, a punch dot, or scribed lines, which must be true before you can proceed with a job on the lathe. This is a great help in setting uu auicklv.

To-fit a pointer correctly, it is necessary to distinguish between the oculars. Fortunately, this can be done in a moment. The Huyghenian has the curved sides of both lenses downwards. The Ramsden has the flat side of the lower lens downwards, as shown at *A*. With this ocular there is often a screwed-on extension to the body tube with a flanged ring in it. Here diameter T limits the circle view. The real image is formed at the plane UV', which is where the pointer or other reference is fitted.

As the real image is formed outside the two lenses, you can use a Ramsden ocular to examine tools and small parts placed at plane *UV*, whereas, with a Huyghenian ocular, you must screw the eye lens out,. or you must have an additional objective lens, as in a telescope or microscope. The Ramsden is thus the more serviceable for many purposes. For a surveyor's level, it has the advantage that the crossed soider-web can be fitted in the bodv of the instrument towards thd object lens. In a modern theodolite, there may be two such oculars for reading the horizontal and vertical circles.

For the present purpose of a microscope on the lathe, it matters little which ocular is used, provided that the reference is correctly fitted. You can use a pin soldered to the bottom of a clip, as for the other ocular, pushing the clip firmly down to plane *UV*. Alternatively, a single diametral wire or a pair of cross wires, as at B, can be fitted to either ocular, with use of a brass ring.

This ring should be turned smoothly on the outside to fit snugly in the lower part of the body tube, where it will hold without further fixing. In the bore, it should be at least the same diameter as the flange in the body tube-that is, T. If it obstructs the view at all when it is tried without the wires or lines, it can be carefully rechucked, and chamfered with a boring tool to the top edge. To avoid reflections, the bore can be painted matt black at the finish

Machiiing is all straightforward, ending with a parting-off operation. Afterwards, the sharp edge in the bore can be chamfered with a hand scraper. Diagram C shows the chuckrng

Solid brass should be faced with a turning tool and then centred from the tailstock with a Slocomb drill. You can make a pilot hole with a 3/16 in. drill in the tailstock chuck and open it with a larger drill, or drills, using a carrier. Turning and boring operations follow; take the dimensions carefullv with calipers. The width of the ring can be ~marked with the parting tool; go down about 3/64in.

Outside burrs should be removed with a fine file. The burr m the bore can be taken out with the boring tool, or scraped out by hand. This prepares the-ring for marking to fix the wire

For indexing, the chuck is used with a bar as at *D*. For one wire (B1), jaws WX are used. For two wires (B2), jaws YZ are used as well. The tool must be honed to a V-point and set at centre height. Depth of Vs should be such that the solder can be filed flush. Cross-feed gives the cuts. Then the ring is parted off.

To solder the wires under tension, the ring can be laid with its Vs upwards on a piece of wood and the wire taken over it and tacked down at the ends. Fine strands from electric cable are suitable for Huyghenian and low-power Ramsden oculars. When they appear too large, from magnification by two lenses, floss silk can be substituted. It is stuck with shellac. ❑