

MICROSCOPE ON
THE LATHE-9

Parts for optical micrometer

DIAGRAMS A and B illustrate a design for an optical micrometer to be mounted on a camera lens when this is used for an optical tailstock instead of a microscope objective.

The micrometer is secured on the short parallel diameter provided at the front of a camera lens to take a sunshade and colour filters. These accessories are light. Once fitted they need not be touched; they will hold by the friction grip of push-on fittings.

In contrast the optical micrometer is weighty for its size, and must be carefully adjusted and securely held to fulfil its purpose. Hence the need for clamping its backplate.

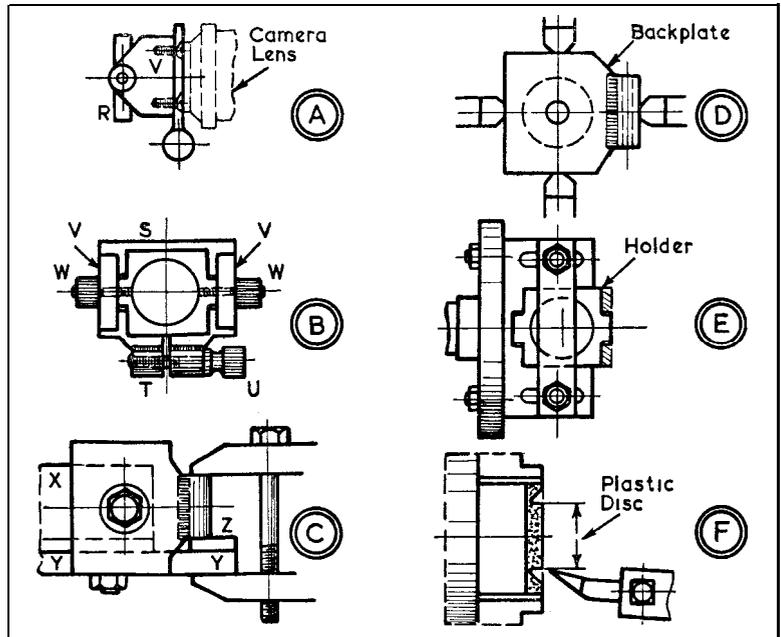
The device functions like the one described last week for a microscope objective. A disc of transparent plastic, which should be $\frac{3}{16}$ in. to $\frac{1}{4}$ in. thick, is set in a holder which can be tilted to deflect the line of sight through the tailstock, and thus bring a cross line in the ocular to the axis of the lathe spindle.

This adjustment can be made in a few moments. Then the holder is secured against movement by the tightening of two knurled nuts.

Parts in the diagrams for the optical micrometer are: holder **R**; backplate **S**; boss on backplate **T**; knurled-head screw for clamping backplate **U**; bearing brackets **VV** for holder **WW**. The two nuts are on studs in the holder. A similar nut and stud can be substituted for the knurled-head screw **U**. Backplate **S** and **T** are brazed together.

Diagram C shows the set-up for brazing which follows the preparatory operations on the backplate and the boss. The backplate is marked out on $\frac{1}{8}$ in. mild steel plate, hacksawed and filed almost to size, and drilled for a bolt. The boss is cut from $\frac{5}{16}$ in. mild steel rod, faced to length, centred at one end, and drilled through tapping size for its clamping screw. It has also to be tapped, drilled clearance halfway, and cut through the middle; these operations are left until the backplate has been bored to fit the lens.

For the brazin set-up, a piece of angle iron **X** is drilled in one flange



to take the bolt for the backplate, and in the other flange to attach a flat bar **Y**, on which the boss is clamped with a packing piece **Z**. This is done to maintain alignment while avoiding loss of heat from the area where it is needed. The clamp must be a made-up one, of course—not a standard toolmaker's clamp.

Boring the backplate to fit the lens is a straight forward task in the independent chuck, as at **D**. The bolt hole can be first enlarged with a drill from the tailstock and then finished to size with a boring tool on the topslide. Inside calipers, set to outside ones on the lens, can be safely used to a few thou undersize. Then the lens itself can be used to check after each fine cut.

The holder bearing brackets, **VV**, can be machined from flat material in the independent chuck, or when they are clamped on an angle plate on the faceplate. Radii can be filed in the vice to stepped plugs in the holes. These brackets are secured to the backplate by countersunk screws, whose positions can be

marked and drilled in the backplate, for this to be used as a template with the brackets clamped in place.

The plastic disc-holder can be from the same material as its brackets. After having been cut out, it is drilled and bored in the independent chuck. Faces and bosses can also be machined in this chuck; or the holder can be clamped on an angle plate, as at **E**. Clamping is the safer method for a holder which may be easily distorted in the chuck—although pieces of flat plate can be used against the main faces for a better hold by the jaws. After each boss has been faced and turned, it should be drilled and tapped.

The plastic disc is cut from sheet in the independent chuck, as at **F**, with an acutely-pointed tool which is bent and filed from silver steel rod, given plenty of working clearance, and hardened and tempered. Careful checks with calipers give a light interference fit for the disc—although some may prefer to cut the disc first and make it fit when boring the holder. □