Setting slides for spherical turning

By GEOMETER

To machine a dome or hollow with a proper spherical surface, the turning or boring tool must be set to radius from the vertical axis of the slide, and the axis must be directly beneath the lathe centre line. Viewed from above, the point of the tool will then move round in a circle (or the part of the circle required) and in so doing will generate the spherical surface as the work rotates.

For simplicity, it is understood, of course, that the point of the tool is at lathe centre height: for while it is possible to machine substantial parts of spheres with the tool slightly above or below centre, such a position requires the tool point to move in a smaller circle-which is something to watch if the results are to be what we expect.

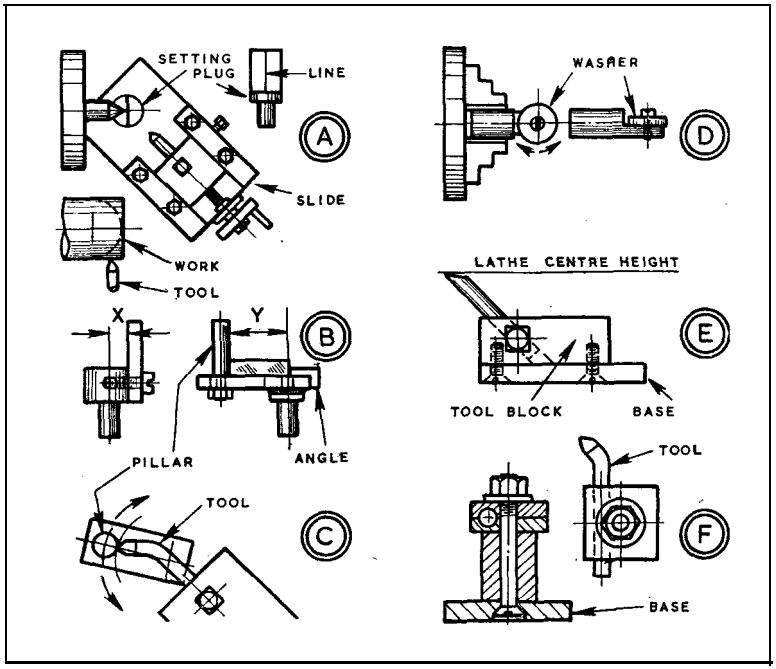
On the type of small slide which I have described, a turned plug can be inserted in the pillar about which the slide rotates, for positioning the slide on the lathe and for setting the tool to radius. Its upper part has a flat machined to its centre line, and a line scribed along the flat A. The scribing is done with the plug held in the chuck and a pointed tool mounted sideways at centre height.

With the plug in the slide, and the flat facing a centre as shown, the cross-slide can be fed until the line on the plug coincides with the point of the centre. Then the- cross-slide gib screws can be tightened to hold the setting.

For accurate centring

More accurate centring is possible with a parallel plug in the slide and an indicator mounted so that it can be rotated from the lathe spindle. Traversing the slide along the bed, we test each side of the plug, rotating the spindle half a turn for each.

If the work has previously been machined to diameter, the tool point can next be set to radius by squaring the slide and advancing the point to touch the work. Alternatively, a plug with a flat can be positioned to face the tool, and a gauge block or calipers employed for setting the tool



point. To machine hollow surfaces, the tool point must be positioned beyond the axis of rotation; and for this, other plugs B can be used. One type of plug has a head flattened at one part, and a piece of flat material screwed on to provide a known dimension X from the centre. For any smaller radius, a gauge or material of suitable thickness is used against the flat material. Another type of plug has a slotted arm on which a round pillar can be set. For this, it is helpful to have a piece of angle made to place on the slotted arm with its edge coming to the centre of the plug.

Then a gauge or calipers gives dimension Y.

Such a plug may be used in setting the tip of a bent tool to radius C. It is placed in the slide and swung to and fro while the tool point is advanced just to touch the pillar. A bent tool is useful where a straight one would be difficult to use because of obstruction to the movement of the slide.

With more time for setting up, a slide and a tool for machining a dome surface can be located experimentally from a washer on a mandrel in the chuck ***D,*** as when a slide lacks the means for positioning. The washer has the same radius as the dome to be turned, and is fixed by a screw or a bolt. Slide and tool are adjusted for the tip of the tool to follow round the edge of the washer.

For some classes of very small radius, the tool point must rotate without the shank or tool block causing obstruction, and for other work it is an advantage if a horizontal tool is quickly adjustable. In such cases, the tool block or mounting is fixed, its base being gripped in guides on the slide. A low tool block carrying the tool at an angle, ***E,*** will pass under the work, and a clamped holder, ***F,*** admits of speedy angular setting of tools. El