AIDS IN BORING

By GEOMETER

IT is a sure indication that a turner is skilful when, with conditions far from easy, he can machine bores to acceptable standards of accuracy, with a good surface finish. This means working with a boring tool, leaving the minimum of metal to ream away or to remove by lapping.

The operation differs markedly from many turning operations which can be followed by careful use of a smooth file and emerycloth, to eliminate taper or to improve finish. In boring, there are no such helpful dodges: you have to face facts squarely-and, as we all know, they can be awkward.

In the first place, for boring a deep hole, a tool must have considerable overhang, and even when its shank or its holder is as large as possible, there is some springiness. You can keep this to a minimum by setting the shank or the holder at the shortest projection from the topslide or turret which is consistent with working clearance. Then a first cut can be taken through the bore, well beneath the surface of the metal. With this, there is less risk of damaging the tool with scale than when you can take only shallow scraping cuts.

With a deep cut there is heavy pressure on the tool and a tendency to twist and tilt the slides which increases with overhang of the shank or holder. Adjustment can be made to eliminate movement from which chatter could develop, though the slides must still resist the forces.

As the topslide is not normally used in a boring operation, you can clamp it rigidly. The stiffness of the cross-slide and the saddle will indicate whether they need adjusting as well. If they do, bring the cross-slide to the working position before tightening it, and make the action of the saddle firm and smooth-rather harder than for turning if the job is large, or the metal hard cast iron.

Diagram A illustrates how a tilting force is applied to the cross-slide when a boring tool is cutting downward pressure X is transmitted to the cross-slide at Y and is resisted by the saddle. Owing to the overhang of the tool, there is a tendency to tilt the slide by pulling the right side up at Z. If the cross-slide guide is worn, or is rather narrow as on some production lathes. you can relieve the strain and improve the results with a special, but simple. set-up for the tool.

Diagrams B and C depict the tool and setup. For the holder, you use square mild steel bar. File or grind its tail end smooth, top and bottom, to slide in the support which is mounted on the saddle. At the opposite end, drill a hole crosswise for the tool and another endwise for the clamping screw. Ream one hole and tap the other and fit it with a grubscrew, an Allen screw, or a short setscrew, to choice,. For the support, use two bars and a block, as shown. Machine the block-which can be in light alloy in the Four-jaw chuck, or on an angle plate on the faceplate, so that the tail end of the holder will rest firmly on it. When you have put a cut on the tool, you can grip the holder to the block by tightening the bar above it. Tilting is thus moved from the cross-slide to the saddle which is better able to resist it.

When a support cannot be mounted on the saddle as with some small lathes-it can be attached to the bed, as at D. For this arrangement. you use three mild steel bars spaced by distance pieces. Which are faced. drilled and tapped in the chuck. As the support is fixed. the tool must slide without shake between the two top bars and so the two distance pieces for them must be carefully faced-although they can be shimmed. or you can ease the tool holder if necessary.

Diagram *E* shows mountings for tools in holders, straight (1) and at an angle (2). To drill and ream the hole for the latter, use a block (3) clamped to the holder. To avoid chatter in boring, as may occur with a round-nosed tool F (I), you can use a square one with a tiny radius (2).