

# Small drill and cutter spindles

**F**or contra-rotation drilling a hollow tailstock barrel bushed at each end affords the simplest means of mounting the drill spindle for running from an electric hand-drill through a universal joint. Accuracy is thus promoted in deep drilling work in the chuck, and a tiny drill can be run at much increased speed. This is a considerable advantage when it would otherwise be running far too slowly.

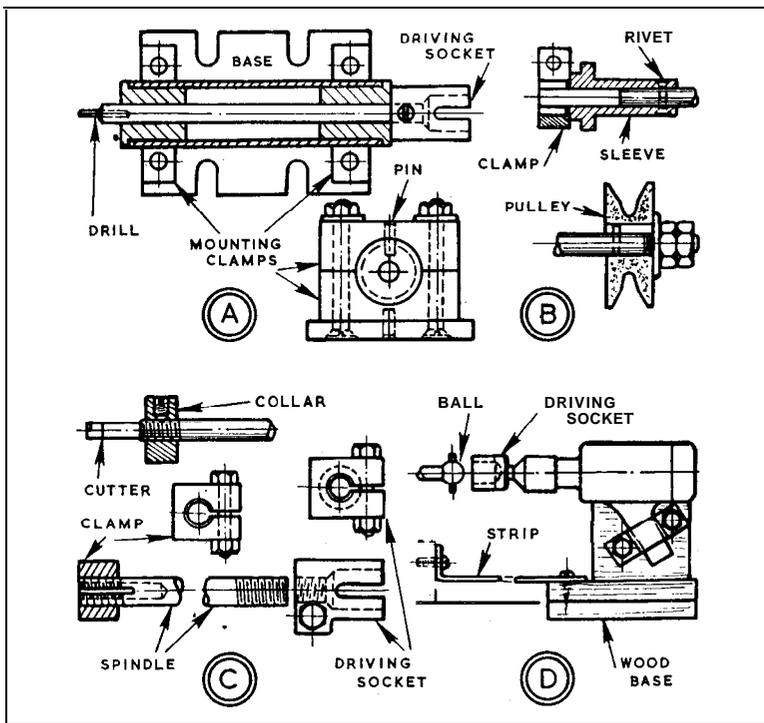
## By GEOMETER

The alternative to this arrangement -when the tailstock barrel is of the centre-ejecting type-is a set-up using a bracket or head with bearings on the vertical slide. The drill spindle can be the same as before but shorter, and driven in the same manner. It can be centred to the axis of the work through adjustment of the vertical slide and cross-slide, while its advance can be controlled by movement of the saddle on the bed-the tailstock being removed for better access with the electric drill.

A bracket for such a set-up, as at A, is easily made from odds and ends of material. The base can very well be of flat mild steel plate, squared up, trued by filing, and drilled and slotted to match the slots of the vertical slide on which it will be used. Bushes for the spindle can be of gunmetal or phosphor-bronze, lightly pressed in the ends of a faced length of steel tube, itself mounted in split clamps on the base. These clamps can be of duralumin or aluminium-alloy for easy machining, and attached to the base by countersunk screws. Their machining-including the boring-can be done in the four-jaw independent chuck; or the boring can be done when they are on the base by mounting this on an angleplate on the faceplate.

Lightly filing at the joint lines of the clamps after boring will ensure that the tube is held firmly. But, if desired for security, the cap of each can be drilled for a dowel pin-through the tube and into the bearing; and likewise location for the bottom halves can be obtained by fitting a pin into each from the base.

For contra-rotation drilling, the spindle can be of mild steel or silver steel rod with the drill soldered in a



hole or clamped, and drive provided from a mild steel socket secured by a grub screw. Centring to the axis of the work can be done in various ways, either to the bores of the bushes or on a plain spindle, using an indicator for accuracy. Afterwards, cross-slide and vertical slide should be clamped against movement.

By using modified spindles ordinary drilling and light milling operations can be performed in addition to contra-rotation drilling--without alteration to the bracket or head other than providing the front bearing with a larger bore.

In this way, as at B, a sleeve with a reamed bore can be used on the front of the spindle, which can be of silver steel rod 1/4 in. or 5/16 in. dia. So that similar material can be used for mills and cutters to fit in the front of the sleeve. Here a cross-wise slit permits contraction by a clamp to grip the shank of a cutter.

The spindle can be secured to the sleeve by a countersunk rivet, and its rear end threaded for adjusting to eliminate endplay. If drive is to be

by pulley, a pin in the spindle can engage a keyway in the pulley, while a washer and locknuts outside keep it in place and provide for adjustment. If drive is to be by universal joint, the socket should be tapped, then slit for clamping, as at C.

Using silver steel rod, a small cutter or endmill can be integral with the spindle, which avoids the problem of mounting it. The cutter blank is turned in the normal way, and the adjacent end of the spindle threaded for a screw-on-collar located by a pointed grub screw. The other end of the spindle is threaded for locknuts or a socket, then the cutter finished and hardened and tempered-not the whole spindle. Alternatively, a threaded spindle can be drilled up and split for a screw-on clamp to secure small drills or cutters.

When an electric drill is used fixed, two universal joints are required-or a short flexible drive. For drilling or milling to the chuck, a mounting can be as at D., on a wood base to the lathe bed with a connecting strip to the saddle. □