WORKSHOP HINTS AND TIPS

# Holding and chucking small diameters

WHEN small diameters, like drills and rods, must be held or chucked, difficulties occur, unless your equipment is suitable for this sort of work. They arise from two basic factors, geometry and wear.

Geometry sets a limit to the minimum diameter which a chuck can grip--even a drill chuck-because it cannot close to zero diameter unless the faces of its jaws are knife edges. Obviously, this is impossible; the faces are made as small flats or radii. Consequently, a chuck can be closed only so far. The larger the chuck, the larger the minimum diameter it will grip; and this minimum diameter increases with wear of the jaws. As an example, it may be found that a chuck which once gripped 1/16 in. dia. will not do so any longer, although it may be quite satisfactory for larger diameters.

**By GEOMETER**

Similar factors limit the minimum diameters which carriers can grip when drills must be held or work driven on the lathe. A carrier screw will go only a limited way into the V in the body-unless its end is brought to a point, which is not advisable, as it would mark a drill shank, or even bend it, through the concentrated pressure.

When a lathe is not equipped with a tailstock chuck, a carrier must be used for drilling, as at A, after the work has been centred with a centre drill in a holder. With care, the method is applicable to a small drill as well, providing that it can be held. A split sleeve on the shank of a drill, Bl, is a simple solution to the problem.

Sometimes the sleeve can be from copper or brass tube. At other times, sleeves can be folded from sheet metal; and once drills can be held, you can make sleeves by drilling rod in the lathe chuck. Springs slipped on drill shanks are other means of increasing diameters so that they can be held in chucks: on this principle, soft copper wire can be wound on. It can be fixed with solder, with the drill flutes wrapped in wet rag so that the temper is not drawn.

Besides these methods of holding drills, there are several ways of making small carriers, three of which are illustrated. One way, B2, employs a stud with two nuts and washers. The stud is cross-drilled and each washer has a tiny filed V locating on the drill. When this has been pushed through the hole in the stud, the washers and nuts are advanced each side to hold firmly. The cross-drilling is done through the flats of the locked nuts, B3. Then these are thinned by facing.

The second way of making a small carrier, B4, uses two pieces of square bar and two setscrews. The third way, Cl, employs two pieces of plate or strip metal and four screws with nuts.

This last carrier is particularly suitable for long slender drills, as it eliminates most of the deflection; while a further advantage is the sensitive feel one has of the job. The carrier is released if the drill seems to be on the point of jamming. If each piece of plate has a locating V, a short drill can be held, and a centre used from the tailstock, C2; and if a little mandrel is made, C3, the broken end of a drill can be used for drilling on the lathe.

Diagram Dl shows how the jaws of a four-jaw chuck meet so that small diameters cannot be gripped. The solution is a split sleeve, D2; V-blocks, D3, provide an alternative means of holding, D4, which is applicable to a range of sizes.

Diagrams Eand Fillustrate methods of machining V in carrier plates and blocks. At *E,* a plate is pointed to locate in a hollow centre, and drilled, XY, for planing with a V-tool. Finally, it is cut to length, Z. At Fl, a plate is bolted to angle iron for mounting on the slide, while a block, F2, is clamped direct. Diamond pomted cutters are used for both Vs.