DRILLING AND FINISHING HOLES

By GEOMETER

You can perform normal drilling operations with ease, using bench drill, hand drill or lathe, according to the work and circumstances. Many drills, of course, are not run at their recommended speeds: because these cannot be attained on the equipment. But rate of feed can be regulated to compensate for this deficiency and, with well-sharpened drills and normal care, results are satisfactory. Breakages are kept to a minimum by attention to lubrication and clearance of swarf before flutes become clogged. Soluble oil is used for mild steel and silver steel; paraffin for aluminium and duralumin. Brass and copper can be drilled dry, or with the use of soluble oil. Cast-iron is drilled dry.

There are other points which should be observed. When a drill is almost through metal, pressure on it should be eased, as this is the time when it is most likely to break from suddenly being dragged in. If the chuck slips, the shank of the drill may be scored. Sometimes drill chucks must be tightened very hard to maintain a grip in these circumstances.

Dragging-in occurs particularly with sheet metal, when there is no backing of thicker material. It happens, too—unless care is taken to prevent it—when pilot holes are near to finished sizes. Final drills may then pull quickly into the remaining metal and break or jam. When you have a large drill in the lathe, there is risk of more serious mishap. Careful feed is thus essential.

It is the angle of the flutes on a twist drill which causes it to drag into metal in cutting near the full diameter with most of its end clear. The drill pulls in like a self-tapping screw. The angle is S at diagram A. The way to eliminate it at full diameter is to grind the extreme edge of each lip, position *T*, so that the face is on a line U, parallel to the drill axis. This helps especially for brass and bronzes, in drilling which there can be difficulties with drills that have not been doctored.

In drilling a hole at an acute angle to a surface, a guide piece can be clamped to the job. If the hole is to emerge at a corresponding angle, there should be a second guide piece on the opposite side. In the diagram, the job is K The first guide piece is W and the second is Sometimes the pieces can be soldered to the job, preferably with the faces tinned first. If the hole is to be reamed, they can be used for that operation, too.

For drilling holes in sheet metal, a metal or hardwood backing can be used as support. When the work can be clamped to the lathe faceplate, holes can be finish-bored after drilling. Large ones can be machined from the outset with a pointed tool.

To drill holes at an angle through tubing, a set-up can be made on the lathe, as at **B.** The tubing is plugged with turned wood, packed to height and clamped.

A twist drill can be flattened at the end and its lips given relief. Alternatively, an end mill can be used. The job is slow, but not difficult with feed from the saddle. With several holes at the same height, the cross slide can be used for spacing.

In diagram C is a simple device for guiding a large parallel-shank drill to avoid mishap from dragging-m. Either a pointed or a hollow centre can be used, according to the centre on the drill. The carrier is a home-made one from square mild steel, with an arm to rest on the slide. The guide is a tube sliding closely on the tailstock barrel, with four screws to adjust to the drill.

By using the same carrier, but fitted with two short studs YZ, you can make a device for reaming, as at ***D,*** the carrier clamping on the square of the reamer. The guide is a tube with brazed-on plate, which has slotted holes through which the studs pass for washers and nuts to be fitted. Tightening of the nuts is done with the reamer supported by the job and the centre, to be certain that it is in true alignment. ❑