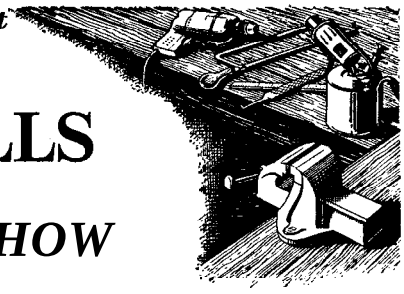
Types, sizes, materials and techniques are dealt with by GEOMETER in this article on



BEGINNERS' WORKSHOP

DRILLS AND HOW TO USE THEM

THE TOOL COMMONLY used for boring holes in metal is the twist drill, the diameter of which can vary in size from a few thousandths of an inch up to several inches. The working part of the drill comprises two spirals or flutes (twists), and these are ground at the end to a vee point (included angle 118 deg.), and given clearance or backed off from the cutting edge, so they will bite into the material. The twist drill has a much freer and more rapid cutting action than other types, which may be called flat drills, or diamond point drill.

Drill sizes

Twist drills are made in a wide range of sizes and sets, dimensions of which can be obtained from catalogues and tables; these are fractional inch sizes such as 1/16 in., 1/8 in., etc.; millimetre sizes; wire gauge sizes and letter sizes. These are necessary for the different diameters of holes for tapping and clearing sizes for different ranges of screws and bolts, etc. Drills generally found in the small workshop are fractional inch sizes, and wire gauge or number sizes.

Small twist drills have parallel shanks, but to fit in drilling machines or chucks with taper spindles, all but the smallest drills can be obtained with taper shanks. These are generally Morse taper in sizes numbered 1, 2, 3, 4 or 5 according to the size of the drill. Square taper shanks are also used to enable twist drills to be mounted in a type of brace.

The cheap twist drill is made of carbon steel, and will break fairly easily if wrung or subjected to rough treatment, and will soften if overheated. The better class of twist drill is in high speed steel-this is much tougher, and does not lose its cutting powers so easily if allowed to get hot. These drills are more expensive, but because of their superior performance usually prove more economical.

Types of machines

The small hand drill takes parallel shank drills up to 3/16 in. or 1/4 in. These are placed in the chuck and the chuck is tightened by rotating the body, thus causing the jaws to grip. There is a correct theoretical speed for all drills according to the size and the material drilled, but with this type of drill,. small drills are turned as fast as possible, and the larger ones more slowly.

A larger machine of this type is the breast drill which has a pad to come against the chest. This drill may be supplied with a standard drill chuck or the spindle may be tapered to accept taper shank drills. These are simply pushed in and tapped on the end; they are extracted with a flat key. Small electric hand drills are available in different makes and sizes, and there are also bench-mounted machines for hand and power operation.

Marking off for drilling

It should be checked that a drill is not wobbling before it is applied to the material, but even so the point may run from the desired position, if this is not marked.

There are many methods of marking the positions of holes. For most occasions, the tools required are a steel rule, a scriber, dividers, and centre punch (Fig. 1). the last three have hardened points which will mark metals. When the positions of holes have been made, the centre punch is tapped in. and the drill will start correctly in these small indentations.

Fig. 2 shows points in drilling. A correctly-sharpened drill will cut to size, while a drill ground off-centre will cut oversize and leave a shoulder. Burrs are commonly left top and bottom in drilling. If removed by filing, an internal burr may result in a tight hole.A larger drill or countersinking tool should, therefore, be used to produce a chamfer. Oil may be used to lubricate steel in drilling; paraffin for duralumin and aluminium; while brass, cast-iron, fibre, etc., should be drilled dry.

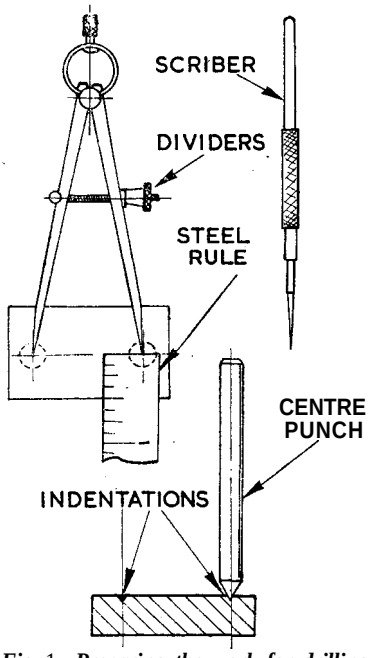


Fig. 1 *.-Preparing the work for drilling*

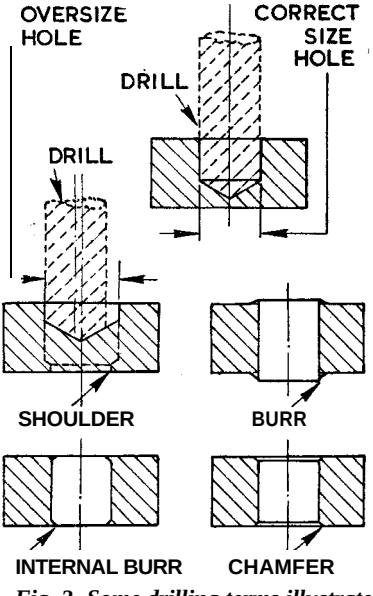


Fig. 2.-Some drilling terms illustrated