

PUNCHES and CHISELS

By *GEOMETER*

ALTHOUGH standard punches meet the requirements of a great assortment of ordinary work, there are inevitably times when they cannot be used by reason of size, shape or design. Sometimes, of course, a simple, quick improvisation will solve a punching problem; at other times, the requirements may demand special punches, particularly when there are cutting, forming or sizing operations to perform. The special punches can be in silver steel or cast steel, hardened and tempered.

The ordinary pin-punch is a straightforward tool, with a length-diameter ratio to meet normal needs, which means that it may dither or even bend at the extraction resistance offered by a beefily hammered-in taper pin. All is obviously well—once the pin has been started, and the ordinary punch can be used for driving it out. For the start, an improvised punch may be of silver steel rod, hardened and tempered, and conveniently held in a toolmaker's clamp, **A**. Alternatively, the shank of a broken drill or tap may be used; and if the end is slightly too large, it can be reduced by grinding a short distance.

If you are making a pin-punch, it is rather wasteful to turn it from silver steel rod when a short length of actual punch size can be inserted in a well-fitting hole in a mild steel holder. Should this not be possible, a somewhat larger piece, depending on the drill or silver steel, can always be substituted, its end turned to the required size. The principle is applicable also to centre punches of various dimensions.

When, by mischance, a punch insert snaps off with the holder, chuck the holder and turn back its end until you can get a grip on the remaining piece in the vice and pull it out. A punch insert is hardened by heating it cherry red and plunging in water. For tempering, it is polished bright with emery cloth and then laid on sand on a piece of sheet metal, or on sand in a large spoon, and heated slowly from below. Watch the piece carefully; mid-brown is the colour at which it is quenched again in water.

This method of hardening and tempering applies to special punches, **B**, as may be used (1) for driving holes in metal foil and spring blades, (2)

for finishing the bores of D-washers, (3) for making small hexagon box spanners. In turning, the blanks of cutting punches are advisedly given slight clearance (a few thou only) back from the working ends; this can be done, too, when filing hexagon punches. Foil and spring blades can be punched directly on a flat lead support, while the bore of a D-washer can be finished from a drilled hole, as can a box spanner.

In small sizes, forming punches are chiefly used for turning rivet shanks into neat snap heads, **C**. Silver steel can be used, or mild steel finally case hardened. A punch blank is centred and drilled a short distance, and then, with the end heated bright red, it is driven on a suitable steel ball—afterwards thrown away. Facing and heat treatment follow. For the heads of rivets, a hold-up is made similarly.

A sizing punch, **D**, is useful for straightening the ragged edges of a row of holes into an accurate port. In silver steel, it can be turned and

filed with the slight clearance given to cutting punches, and hardened and tempered in the same way.

Whenever possible, hollow punches for cutting soft materials should be tapered to the piece to be wasted, or the taper on the punch is likely to deform the piece to be used. This is revealed at **D1** where a hole punch has an outside taper, by comparison with **D2** when the taper is inside.

A similar effect of a chamfer at a cutting edge is sometimes apparent in using an ordinary chisel **E**, where there is sliding along line **W-X** that an attempt can be made to counteract by tilting the chisel. A flat-sided chisel cuts relatively easily along line **Y-Z**. On large punches and chisels, protection against chipping is provided at the heads, **F**, by applying bronze, or sometimes by using rubber sleeves.

