

By GEOMETER

BORING and FACING TOOLS

MANY operations on the lathe require special tools and cutters which model engineers and professional turners in small workshops must design and make themselves. Their position differs greatly from that of machinists in large works where everything is prepared by planning and production engineers. There the skill of lathe operators goes into their work; opportunities for initiative are limited.

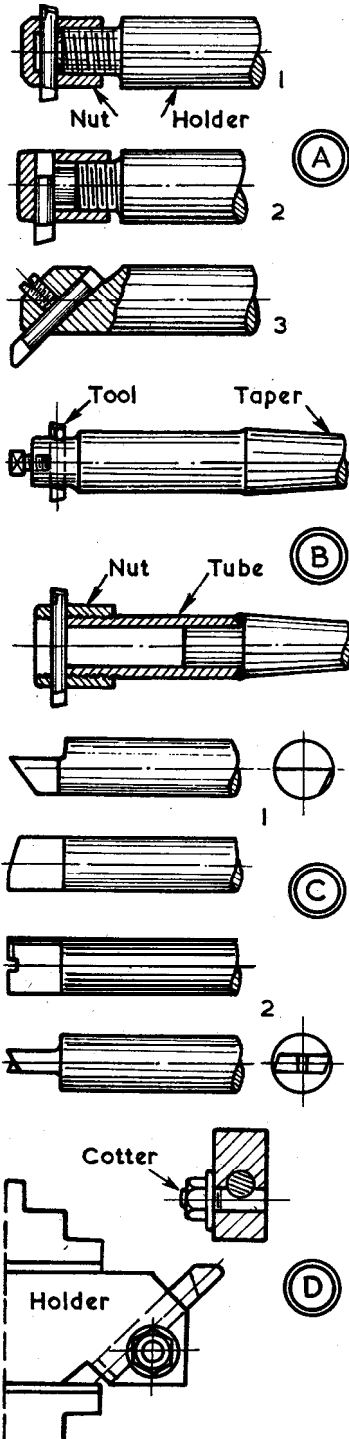
It is different at home and in small commercial workshops. As many facilities are lacking, ingenuity is often as important as skill. You may even come to rely on a calculated blending of the two for the solution to many problems. You never forget that your ideas must cost little in terms of time and money.

The first applications of these principles are usually tools and cutters made from silver steel and tool bits-boring tools and flycutters mounted in mild steel holders, D-bits and endmills to hold in chucks. Form tools, taper reamers, Woodruff key-way cutters and so forth, come later.

Easy to make

Some boring tools and flycutters which are easy to make appear at diagram A. *AU* have round holders and can be run in the chuck to machine work on the topline or vertical slide. Type 1 can be used for rough-machining bores from the tailstock. Types 2 and 3 can be mounted in split holders on the topline for boring work in the chuck.

Holders 1 and 2 have an advantage in strength in small sizes over holders with grub screws to secure tool bits. The end of the round stock carries a fine thread on which a nut is screwed to force the tool to the end face where it is firmly held. A double-ended cutter goes right through the nut, which can be drilled and reamed through two flats. I used a brass union nut for the first one. To hold a short tool bit, for topline boring, a blank nut must be used, with the tool bit against its face, the end of the round stock being reduced to bear on the bit, as at 2. For long life, nuts and holders should be in mild steel, preferably casehardened, or in hardened and tempered cast steel.



Holder 3 can be used in the two ways mentioned-in the chuck or on the topline, the angle mounting of the tool bit allowing it to work to shoulders or end-faces. To help in drilling the hole for the bit, a small flat can be filed on the holder where the drill is to enter, and another where it will emerge. This dodge helps reaming as well.

Boring tools at B are used in the tailstock to open out cored or drilled holes before they are finished in the normal way with a tool from the topline. The tailstock is brought up and clamped, and feed is applied through the handwheel.

D-bits are useful

The upper holder is in solid mild steel with a taper to fit the tailstock barrel and a grub screw to grip the double-ended cutter. This is standard for small and medium sizes. The lower holder is built up with the cutter held in a similar way to that for holders 1 and 2 at A. It is useful in large sizes, as it reduces extension of the cutter. A threaded tube is welded or brazed to a taper shank for the tailstock and carries an open, cross-drilled nut for the cutter.

A D-bit is almost as good as a reamer to smooth and size a hole which has been drilled in work in the chuck. The tool can be easily and cheaply made from standard silver steel rod, and can be held in a chuck in the tailstock or mounted in a taper-shank holder. The cutting end is shown at C. Take care in filing and honing the flats not to take the cutting edge beneath the diameter, or the bit will seize in the bore. The tempering should be to dark straw colour after the hardening.

Double-edged cutters or endmills, of which shows an example, are usually made in standard silver steel. The flats which give the cutting edges can be filed first like those of D-bits. Then a hand hone can be used for finishing after the tool has been hardened and tempered.

Diagram D shows a single-point cutter for facing from the chuck, the holder consisting of rectangular mild steel bar with a reamed hole for the bit, which is held by a grooved cotter. El