SHAFT and BOSS FITTINGS

WORKSHOP HINTS and TIPS

SECURING components to shafts and spindles, to ensure positive drive, is a problem that can be solved in various ways, according to the size of the parts and the duty they perform. Keys, splines, tapers are chosen when heavy twisting will occur, as on flywheels, pulleys and gears for power transmission; while for light duty, grubscrews and cross pins suffice.

For intermediate duty, squares and flats are often used, particularly on such parts as handwheels, knobs and levers-although these fittings have a general application and may be used for drive to small gears, cutters, and so forth.

Sometimes, the problem of fitting a small handwheel or knob can be solved by tapping its boss, screwing it up to a shoulder on the shaft, and fitting a locknut outside, Al. It looks like a prototypc wheel or knob on a squared shaft; but if it is a fitting on which some force must be used, the reduced diameter (core diameter of the thread) introduces a, possible weakness. This can be avoided by using a shaft with flats and slotting, or by broaching the boss to suit.

By GEOMETER

For either fitting, the shaft is shouldered in turning, and has a nut at the end, and pair of diametrically opposite flats, produced by filing or milling. When they are on the larger diameter of the shaft A2, the rear of the boss is slotted to engage them; and when they are on the smaller diameter, A3, the boss is bored smaller at the end and flats are produced by broaching.

In tiling flats on a shaft. control of depth- and angular location is ensured by a jig, A4. Two mild steel blocks are drilled at the centre line to make clamps for holding the shaft. A step is sawn and carefully filed-checking by micrometer-which will give the depth of flat. Then the blocks are casehardened by heating to red, soaking in casehardening compound, reheating, and quenching in water.

Before the shaft is removed from the chuck, a faint line is scribed where the flats will end; and two diametrically opposite lines are scribed horizontally, using the scribing block at centre height, or the chuck jaws for spacing. To locate the shaft in the jig, each line in turn is brought flush to one side of the step, and the circumferential line to the shoulder.

Slotting the boss of a handwheel or knob can be done with it mounted on the top slide (in the lack of a vertical slide), and using an end mill in the chuck. If work is finished except for the slotting, a set-up can be made on angle iron, ***B.*** This is squared across the lathe, packed if necessary to bring its face vertical, and held by the tool clamp. Running a drill in the chuck, drill a plug hole to locate the wheel, which is clamped -though if it has holes, others can be drilled in the angle iron for screws and nuts to be used.

If the wheel or knob is still on its stock material, an alternative top slide setting can be made with a built-up angle plate, C. Two pieces of true rectangular mild steel are joined by countersunk screws. The working face is also drilled and tapped for clamping studs, and is set parallel with the lathe axis. In preparatory work, the boss of the wheel is drilled; then the opposite end of the material is centred for a set-up at centre height, ***D.***

When a vertical slide is available. parallel flats on shafts can be milled from a set-up in two blocks, ***E.*** These are drilled for countersunk gripping screws. Being parallel, they go to the slide first one way and then the other. Each time, they are set vertically from a pair of stepped plugs in a tee-slot-fixed by grubscrews.

Broaching of flats in a boss, A3, is done by pressing a silver steel broach through it. The tool blank has two diameters, like the boss, joined by a taper in which steps are machined for teeth, ***F.*** Flats are filed to the ‘smaller diameter, and the teeth are extended down the sides by filing. On being cut off, the tool is hardened and tempered to dark straw. IXI