GRUB SCREWS and others

By GEOMETER

SEVERAL types of screw perform important duties in machine assemblies, beginning with grubscrews which are used in a range of sizes in full-size and model practice. Their normal functions are to fix locating collars and small gears and pulleys to shafts; though grubscrews, and similar ones, can be used for many purposes from adjusting the gibs of slides to fixing bushes in housings.

Screws which resemble grubscrews and function in similar ways are usually designed to overcome some of the drawbacks-grubscrews should not be used, for example, to locate collars which will be subjected to considerable end thrust, or to fix gears or pulleys when there is heavy torque to transmit. To use grubscrews in such circumstances is to invite the risk of collars moving endwise and gears and pulleys twisting on shafts.

Dog or dowel screws may provide the necessary resistance to movement with their plain ends entering drilled holes in shafts. Movement can then occur only through shearing, as with keys, which are used when optimum security is essential.

The ordinary grubscrew is as at Al with a point machined at an angle of 120 deg. to make its own indentation in a plain shaft, or enter a drilled dimple. For the dimple, a twist drill can be used, the normal angle for the lips of which is 118 deg. It has the advantage that the shaft is not burred by the end of the screw which can obstruct removal of components. There is also positive location of the screw in the dimple, and greater resistance to movement than when the screw is tightened to a plain shaft.

The alternative to a pointed grubscrew is the flat-ended screw, as at A2. It can be lightly tightened to a plain shaft while adjustments are made, though full security with hard tightening requires a flat on the shaft. To use a dog-type screw, as at A3, which can be substituted for either of the others, the shaft must be drilled to receive the plain diameter of the screw. This sometimes solves the problem of security when a component has persistently worked loose after having been fixed by different screws.

Normal fittings for screws are as at B: 1 a flat-ended screw bearing on a flat on the shaft; 2 a pointed grubscrew with its end in a drilled dimple; 3 a dog screw with its plain diameter in a hole.

The screw at B4 is tapped into the shaft to locate a collar which is too thin to take a grubscrew. It can also be used through a collar or boss of soft material like fibre, in which, with hard tightening of a grubscrew, threads might slip. By fitting a grubscrew, or dog screw, as at *B5,* an eccentric can be without a boss, which is helpful when space is restricted.

Other common fittings of screws are as at C. By pointing the end of a setscrew 1, it can be used in a collar like a grubscrew-but tightened much more firmly. A setscrew machined with a plain end like a dog-screw will locate a bush 2. Mainshaft and crankpin screwed into the web of an overhung crankshaft can be secured with grubscrews 3. The crankpin can be screwed in tightly with a bolt, as shown.

When it is necessary to locate a component like an eccentric precisely on a shaft for drilling a dimple or hole, the job can be done as at D. Two blocks should be drilled and bolted together and then bored in the chuck to clamp on the shaft beside the component. If it is an eccentric, it is then set in correct angular relationship to the and gripped to the blocks by a toolmaker's clamp.

Ordinary grubscrews can be made from screwed rod as at *E.* This is held in a split bush 1 for turning the point at the end of the screw, and is transferred into split blocks 2 for finishing by hand.

Hexagon-headed screws can be made as at *F:* 1 from hexagon rod; 2 from long setscrews in a split bush; and 3 from short setscrews in a split collar in the chuck. ❑