Cutting keyways in bores

By **GEOMETER**

TECHNICALLY, a key is much better than a grubscrew or cross-pin for securing a fly-wheel, pulley, gear or sprocket to a shaft, which is why it is always employed in full size practice. Its considerable length offers greater resistance to shearing against torque than does a grubscrew or cross-pin of limited diameter. This is not to say that these alternative means are not satisfactory within their capacity, particularly in small sizes where conditions are easier and where it is unnecessary to adhere precisely to detail or typical representational features.

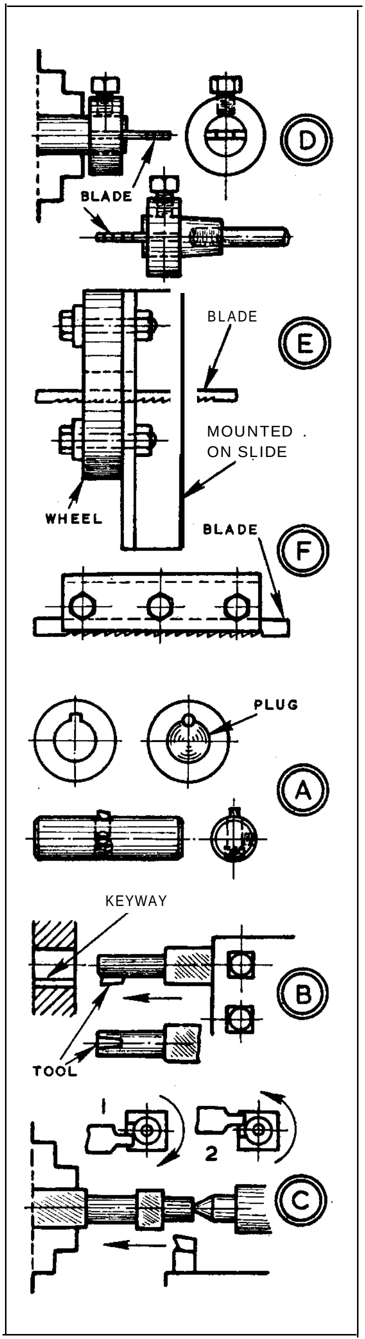
Obviously, for a simple model, a grubscrew or cross-pin may be quite efficient and admissible for securing a component to a shaft; equally obviously, for a large model or piece of equipment, for a scale model, or for a model which merely represents good general practice, a key is essential.

Methods of cutting

In many cases, cutting the keyway in the bore of the part to fit on the shaft presents the practical problem -especially when the bore is so small that means which are possible in larger sizes cannot be employed.

In large sizes, keyway cutting in a bore can be a shaping operation, using a long tool through the component, or a broaching operation if components are numerous. As a hand operation, it can be performed in certain cases by hacksawing, filing and chiselling, the final sizing of the keyway being done with a tool in a mandrel or drift which is driven through the bore.

In small sizes, when handsawing, filing and chiselling either cannot be employed or would be likely to lead to errors, drilling can be substituted as the roughing operation, with finishing done as before with a tool in a mandrel. A well-fitting plug of the same material should be fitted in the bore of the component, then a hole of suitable size can be drilled. as at *A*. With the component in an independent chuck, the jaws can be manipulated for off-set then the centring and drilling done from the tailstock. Alternatively, the drilling can be done on the table of a drilling machine. Adjustment for the finishing tool in the mandrel can be provided through a backing screw in sizes which admit of it. Otherwise, the tool must be carefully tapped out for each of the three or four passes that are made-and each time the holding grubscrew securely retightened.



Cutting in the lathe

Keyway cutting in the lathe can be done with a tool as at B, made from square silver steel rod. It is mounted on the slide which is reciprocated by saddle feed, cross-feed putting on cut. Often back-gear can be engaged .to lock the lathe spindle; or a holding bar can be fitted from a chuck holding screw to the headstock or lathe bed.

Steps in making the planing tool are as at C. Held in the four-jaw chuck, the material is faced, centred, and supported from the tailstock. The end is turned down to the size of the shank, and this is machined with right and left-hand tools. Surplus material where the actual cutting tool is to be, can be removed by filing or grinding. Then with a planing tool on the slide, set below centre (1), and above centre (2),. the remaining surplus can be " mbbled " away, slowly turning the chuck. Final finishing is done by filing, then the tool hardened and tempered.

Given a metal-cutting blade, a tiny keyway can be sawn in a bore in the lathe, holding the blade between chuck and tailstock, and mounting the component on angle iron on the slide. Plugs filed half-through, plus half the thickness of the blade, hold it for tightly tensioning with loose pieces and collars, as at D- the tail-stock plug being secured wrth a rod and nut. The mounted angle iron can be centred and drilled from the chuck, and a plug used to locate-the component for setting up for sawing, as at *E*.

For brass and aluminium components, a blade can be of mild steel strip, case-hardened-during which process it can be clamped between plates, as at *F*, to obviate warping.