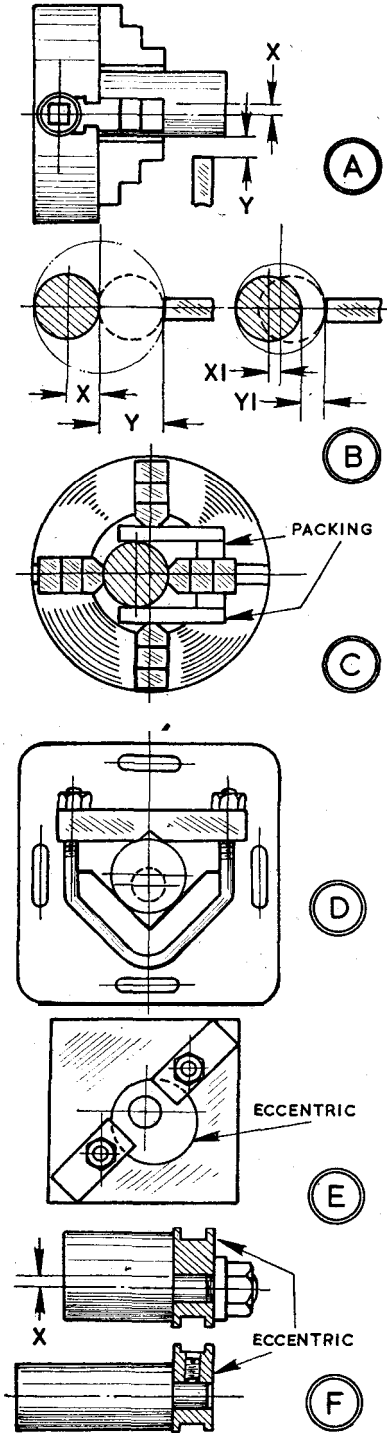
By GEOMETER

ECCENTRIC MOTIONS AND SET-UPS



MOTIONS employing eccentrics are common in applied mechanics and can be arranged in several ways.

First, in conjunction with a connecting rod, an eccentric gives straight-line motion to a spindle or plunger. Second, without any intermediary, an eccentric gives straight-line motion to a spring-loaded tappet in a guide. Third, using a pivoted lever, an eccentric gives circular motion to its free end through a small arc-and such a lever may be spring-loaded like the tappet for return, or this may be arranged by employmg a connecting rod between the eccentric and the free end of the lever.

The first application is normal for operation of the slide valve of a steam engine, or the plunger of a feed pump; while the other two applications are normal for operating the petrol pumps of car engines.

Basically, eccentric motion is the same as that of a crank-connecting-rod system, with the difference, however, that for most practical purposes the mechanism is non-reversible.

This is to say that, while a crank-shaft can be turned to operate a piston, or a piston pushed to turn a crankshaft, only an eccentric can be turned to operate a spindle or plunger. Neither can be pushed to turn the eccentric, owing to the friction involved in the disproportion of the considerable diameter to the small throw.

Setting up bar

Since an eccentric is circular, a loose one to fix on a shaft with a grubscrew can be machined in a straightforward manner in a lathe. A four-jaw independent chuck is employed to set up the round steel bar for the outside to be turned to size and the bearing surface machined. Then the whole bar is displaced eccentrically in the chuck for drilling and reaming the bore-or drilling and finishing with a boring tool.

The off-set of the bore (or throw) in relation to the outside diameter is normally obtained in one of two ways. With the bar held in the chuck, as at A, the off-set required is X, and is obtained by regulating the chuck jaws. Rotating chuck and bar, and bringing a flat-ended tool or pointer just to touch the high spot, then rotating a half-turn to find the low spot, a gap, Y, is left, and this is twice X.

Thus, Y can be measured with a small rule-or a piece of material of suitable thickness or diameter can be used as a gauge (a drill shank, for example).

This is true whatever the size or off-set, as at B. If the shaded bar is displaced so its side is on the chuck axis, the displacement is equal to the radius X, and when the chuck is rotated the gap is equal to the diameter Y. At a smaller off-set of the bar, Xl is half Yl.

The second way of obtaining the off-set or throw is to mark the bar while laid in V-blocks, centre-punch the position, then bring this spinning true in the chuck.

If the off-set is kept in line with a pair of chuck jaws, the position of these on the chuck face serves as a guide in preliminary setting-the face may be ringed for reference, or a small rule may be used to check movement of the jaws.

For a considerable off-set? packing is advisable between two jaws and the bar, as at C, to avoid side thrust on the jaws and admit of proper adjustment. Strips of paper between the packing and surfaces, in conjunction with firm tightening, will avoid slip. Packing may also be used when fouling of jaws would otherwise occur.

A bar may be set up in a V-angle plate, ***D,*** for machining or boring eccentrically, the angle plate being mounted on the lathe faceplate and adjusted accordingly. Again, a single eccentric can be bored clamped to a flat plate, this held in a four-jaw chuck.

An eccentric mandrel, ***F*** (top), can be used for machining outsides after boring when several- eccentrics are being made; and for facing ends, eccentrics can be pressed or held by a grubscrew on a simple mandrel (bottom). ❑