Machining simple connecting rods

AN ADVANTAGE of the single-web crankshaft with open crankpin-and of certain built-up types-is that the connecting rod can have a solid big-end eye, which simplifies its construction, makes for strength, and reduces bulk and weight-all important factors, and particularly so for high-speed engines and for two-stroke engines where dead space in the crankcase should be kept to a minimum.

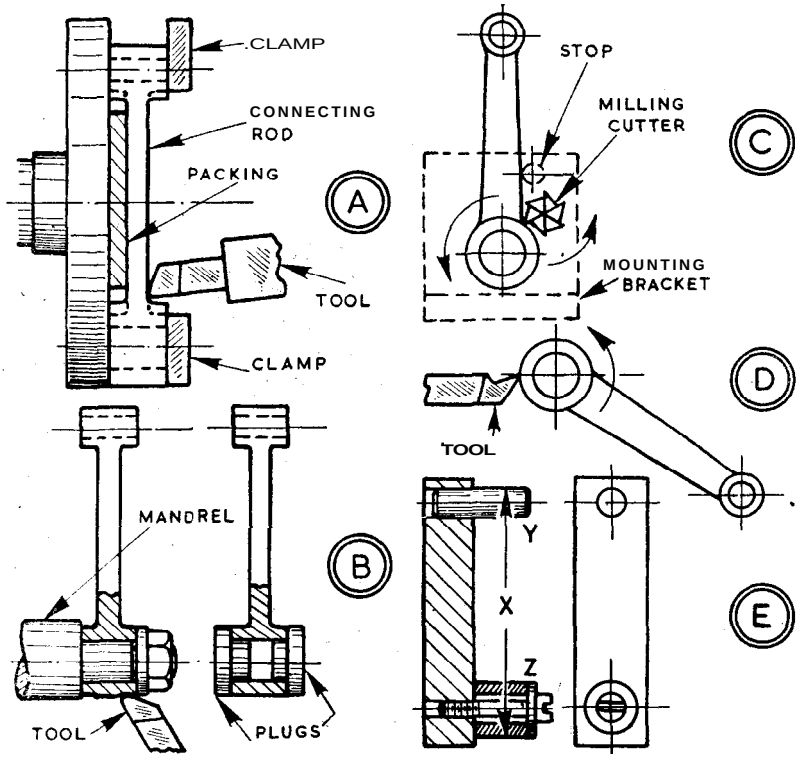
In the interest of reducing the weight of the connecting rod, while retaining a high degree of strength, duralumin is often used in model petrol engines, and in itself provides a good bearing on soft-steel or hard-steel gudgeon pins and crankpins. Steel may be used, but it is heavier, and the eyes require bushing with bronze, brass, or duralumin-except in some instances where the gudgeon pin may be a fixture in the small end and oscillate in the piston bosses.

Brass or bronze may also be used for the connecting rods of simple engines, of moderate speed and power, and both are heavier than steel, though neither requires bushing expressly, but only to facilitate overhaul when wear occurs, thus avoiding renewal of the whole connecting rod.

The simplest section for the length of a connecting rod is a rectangular one with rounded sides; and on a weight/strength basis it lacks little beside the familiar I-section, which is milled each side to leave a narrow central web. The connecting rod of rectangular section, however, can be entirely finished by turning methods and some handwork-without the need for milling where there are no facilities for this.

Using a piece of suitable flat bar to make the comecting rod, it is faced flat one side by filing or machining a light cut, in the four-jaw chuck. Then the centres of small and big ends are marked, and these bores machined, clampmg the bar to the lathe faceplate-preferably leaving the bores undersize for final finishing later by machining or reaming.

For machining the web, the bar is centralised and clamped, and facing cuts taken across. Final smoothing may be done with a file, with the bar removed ; and for machining the opposite side of it, a piece of packing of appropriate thickness should be clamped against the faceplate, as at A, to provide support for the web.



Removing surplus material

The small-end and big-end bosses, which will be circular, can be produced partly by sawmg and filing, partly by machining. Sawing and filing are recommended for removing the surplus material; and for holding. the connecting rod securely in the vice. without risk of damage, suitable hardened steel plugs should be made for each end, as at ***B.*** Following this, the connecting rod is mounted on a mandrel in the chuck (one mandrel for each end), and the bosses are turned back to the web-slightly tapering them towards the outside if required.

Surplus material along the edges of the web can also be removed by carefully sawing and filing; and eventually there will remain only material on the bosses in line with the web. Plugs can then be used as filing guides-particularly where the outside edges of the bosses are tapered, as with larger plugs, the file will clear except at the centre.

Alternatively, material in line with the web can be milled or " turned " off. For milling, as at C, the mill is run in the chuck, and the connecting rod mounted on a bracket on the topslide. A stop prevents the cutter gathering on to the web; with a light feed, the connecting rod is pulled round by hand. For "turning," as at ***D,*** the connecting rod is on a mandrel in the chuck, which is pulled round by hand for each cut.

Connecting rod centres may be accurately obtained, as at ***E,*** using a plug Y in one bore, for dimension X to be measured over a hollow "button" Z, which is then set to run truly for machining the other bore.