BEGINNER'S WORKSHOP

Single-web CRANKSHAFTS

by GEOMETER

THE SIMPLEST TYPE of crankshaft for a single-cylinder engine consists of a mainshaft, a web, and a crankpin, and may be known variously as a single-web crankshaft, a cantilever crankshaft, or an overhung crankshaft.

For the model engineer and the constructor of small commercial engines-Moped two-strokes in particular-such a crankshaft has several advantages': it can be built up with much greater facility than the double web type and the parts can be hardened to resist wear, with the minimum risk of warping in the process.

Even as a one-piece-from-the-solid construction it is stilleasier to machine than the double-web type. The single mainshaft involves no major problems of bearing alignment; and one long main bearing may be used instead of two separate ones in engines not requiring auxiliary drives.

In two-stroke engines, a single-web crankshaft actually improves efficiency by avoiding waste volume in the crankcase which would occur in the region of the second web. This is because a two-stroke engine induces gas via the crankcase, and suction or reduction of pressure as the piston ascends and compression or rise of pressure as it descends are dependent on the volume of the crankcase. The smaller the volume, the greater the difference between these pressures.

In its most elementary form a single-web crankshaft may consist of a long and a short length of steel rod, soldered into holes drilled in a disc or strip of steel. Where equipment is available for silver soldering or brazing, a stronger job can be made. In a lathe, mainshaft and crankpin may be shouldered down then brazed into the web from the ends, or simply riveted in, as at ***A***. If the web is fairly wide and the holes have been reamed, mainshaft and crankpin may be slightly 'oversize and pressed in, after hardening, if required.

A satisfactory crankshaft can be made by screwing the ends of mainshaft and crankpin and tapping the web to accept them. For this, thread pitches between 26 t.p.i. (cycle rate) and 30 t.p.i. are the most suitable. The web should be fairly wide and the parts secured by locking screws or locknuts, as at B and C. Preferably, the direction of turning should be to screw the web on to the mainshaft. In assembly, mainshaft and crankpin are screwed as tightly as possible into the web; then, to take locking screws, holes are drilled and tapped on the joint line of each. After drilling and tapping the parts can be dismantled and hardened if required.

A clamped construction can be arranged, as at ***D.***. For this, the mainshaft and crankpin may be srmply shouldered down parallel and gripped in a split web by clamping bolts. Both may be hardened. The web is made by drilling two pieces of steel for bolts then clamping together for drilling, boring, or reaming the holes. On occasion the clamping bolts may intercept grooves on mainshaft and crankpin. The two web portions can be filed on abutting faces for clearance and to grip firmly.

Cotter security for screwed-in mainshaft and crankpin is possible as at ***E,*** where the view is of a section looking from the crankpin end, the action of tightening the cotters tending to pull the parts together. After drilling and tapping the web, the holes are plugged with threaded rod for drilling the cotter holes. Then the plugs are removed and filed-out cotters fitted and the tap rotated in the holes as the cotters are tightened to form threads.

A very strong petrol engine crankshaft can be made as ***F.*** with the crankpin and web machined from the solid and taper-fitted to the mainshaft, the step on the web accommodating a ball-race and the shaft being drilled for oil feed.

Connecting rod location on single-web crankshafts can be as G: (1) by a shoulder machined on the crankpin; (2) by a loose collar fixed by a taper pin; (3) by a loose washer held by a stud and nut; (4) by a stepped washer and countersunk screw.