

# PISTON REMOVAL and FITTING

By GEOMETER

**T**HE main proportions and, to some extent, the minor details of an in-line multi-cylinder engine influence the manner of dismantling and assembling when pistons have to be removed for fitting new rings or attention to small end bearings.

The bore-stroke ratio, the spacing of the cylinders, the clearance in the crankcase, the length of the connecting rods and the diameter of the crankpins may be regarded as some of the main proportions reacting on one another and affecting the issue; while details are the type of location chosen for gudgeon pins, and the jointing angle of the big-end caps.

In a major overhaul, as in original assembling, there is hardly likely to be a problem. On most engines, dismantling can be arranged for accessories to be cleared to the point where crankshaft, connecting rods and pistons remain in the block. Then the main bearing and big-end caps can be removed, the crankshaft lifted out, and the connecting rods and pistons drawn. Naturally, when assembling, the reverse order is followed.

When, however, only partial dismantling is envisaged, there can be the following possibilities according to design and details: (1) on a separate (cylinder) block engine, this can be removed complete with pistons and connecting rods; (2) on a wet sleeve engine, each sleeve can be drawn complete with piston and connecting rod. On engines with cylinders and crankcase forming a single component; (3) pistons and connecting rods can be removed downwards; (4) pistons and connecting rods can be removed upwards; (5) pistons can be removed upwards, connecting rods downwards; (6) neither pistons nor connecting rods can be removed, but rings can be taken off and fitted from the top.

Given clearance in the crankcase

## BEGINNER'S WORKSHOP

and sufficient distance between crankshaft and base of cylinders, pistons can be removed and fitted from below. On engines with restricted space, it may be necessary to position the crankwebs horizontally; or, having drawn a piston out of the cylinder, it may in some instances be placed in the crankwebs and the crankshaft turned to bring it out.

When this is not possible, and the big-end will not pass through the bore, the assemblies can sometimes be pushed upwards, and the gudgeon pins taken out—which usually demands gudgeon pins located by end-wads and circlips. Then, when assembling, a taper mandrel, as at A, pushed through first, facilitates entering the gudgeon pins.

When assemblies cannot be removed upwards or downwards, and gudgeon pins cannot be removed, pistons and connecting rods can be pushed upwards for rings to be removed and fitted, as at B. Cleaning can be effected by wiping the pistons, one end pushed out at the top, the other end pulled out at the bottom. Rings can, of course, be checked for gap clearance with the pistons down in the cylinders. Usually all rings on such pistons are above the gudgeon pins.

For scraping out a wear ridge, the piston should be slightly down the cylinder, a disc of paper laid on top, and this sealed with grease. The ridge having been removed, the chips must be wiped out, the grease and paper removed, then the piston pushed further down for the cylinder to be wiped.

On short-stroke engines of older type with somewhat slender crankshafts, relatively large bores may permit big-ends to pass through; and on modern engines employing crankshafts with mainshafts and crank pins of large diameter, angle-jointed big-ends serve the same purpose—as at C.

Split skirt pistons are always fitted for the thrust on power strokes to be taken on the solid side, as at D, X, while on angle-jointed connecting rods, the thrust is usually taken as at Y; but this is not invariable, some rods fitting the other way round.

Wet sleeves not to be removed should each, be held down by a device like tubing and a washer, as at E, to avoid disturbing the packing, which could lead to water leaks; and to be firm, each sleeve must project as Z 0.003 in. to 0.005 in. above the block face.

