

To prevent damage to cylinder walls, the gudgeon pins of an engine must be located against axial movement or provided with soft end wads to avoid unprotected contact-which, in the case of a mishap, produces score marks or grooves resulting in loss of compression and power, to rectify which either reboring or sleeving is necessary.

Depending on the constructor's ideas and what may be most convenient, a gudgeon pin can be fixed in the piston with the small end of the connecting rod forming the bearing; or the pin can be fully floating with bearings in both connecting rod and piston; or again, it can be fixed in the connecting rod with bearings formed in the piston bosses.

A tied-in-the-piston gudgeon pin is generally located by a screw, as at A (left) and may be used on industrial engines and models. One boss of the piston is drilled and tapped, and the gudgeon pin drilled to accept the parallel turned end of the screw. In the larger sizes of application, the screw head can be drilled for a split pin, which prevents unscrewing by contact inside the piston skirt. In small sizes, the screw may be slit at the end and the legs opened inside the hollow gudgeon pin, using a small screwdriver.

A fully-floating gudgeon pin may be either located or protected at the ends. When the pin is located, the piston bosses are machined with grooves for circlips, as at A (right) which obviate endwise movement. When the pin is protected, it carries pressed-in light-alloy end wads, as at B. In the case of circlips, the gudgeon pin should fit closely between them, and with end wads, the pin should fit comfortably in the cylinder-in each instance considerable endplay being avoided to guard against any suggestion of hammering which could disturb a circlip or allow a protected pin to cause a tapping noise.

A fixed-in-the-connecting-rod gudgeon pin has a central groove, either continuous or tangential, as at C. A setscrew in the small end of the connecting rod intercepts the groove for endwise location, and has to be completely withdrawn for fitting or removing the gudgeon pin; it must also be tightened firmly for clamping. The setscrew may be fitted with a

# Gudgeon Pin Locations

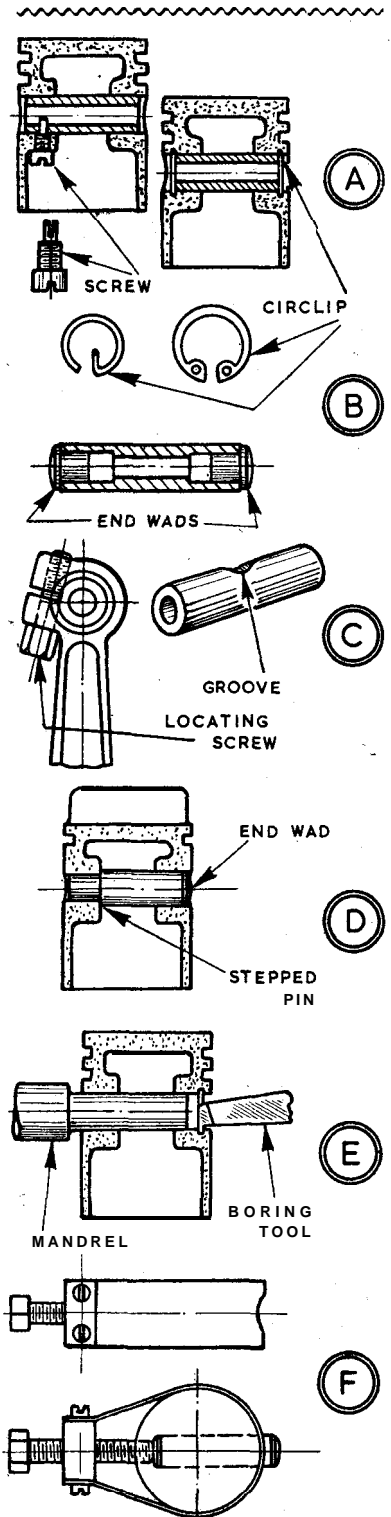
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tab-type locking washer. This type of gudgeon pin must always be below the side of the piston, when, for testing, the latter is oscillated by hand on the pin and pushed side to side for the bosses to abut to the connecting rod.

An arrangement where a gudgeon pin is located one way and protected the other is as at D. The piston bosses are of different sizes and the pin stepped to suit, the larger end carrying an end wad. Such a pin can be used on a two-stroke engine with an inlet port in the cylinder wall, the smaller end of the pin being adjacent to the port, over which it will pass, and the larger protected end traversing the plain cylinder wall.

To provide a piston with circlip grooves, a mandrel can be machined in the chuck, and the piston pushed on, as at E, to be machined with a boring tool. Car and motor-cycle pistons usually employ circlips as at B (right), and the grooves to take them are square-sided. Small pistons, however, can be fitted with circlips from coils of spring wire, one end turned in to handle with small pliers. For these, the grooves should be rounded and slightly more than semi-circular.

Gudgeon pins should be a light interference fit in alloy pistons, and a thumb-press fit in bronze bushes. Bores in pistons should be reamed when the pistons have been heated in boiling water or hot rags; for fitting gudgeon pins, both pistons and pins should be similarly heated. For removing pins, an extractor can be made, as at F, using a flexible band attached to a block tapped for a pressure screw.



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