PISTON RINGS

BEGINNER'S WORKSHOP

By GEOMETER

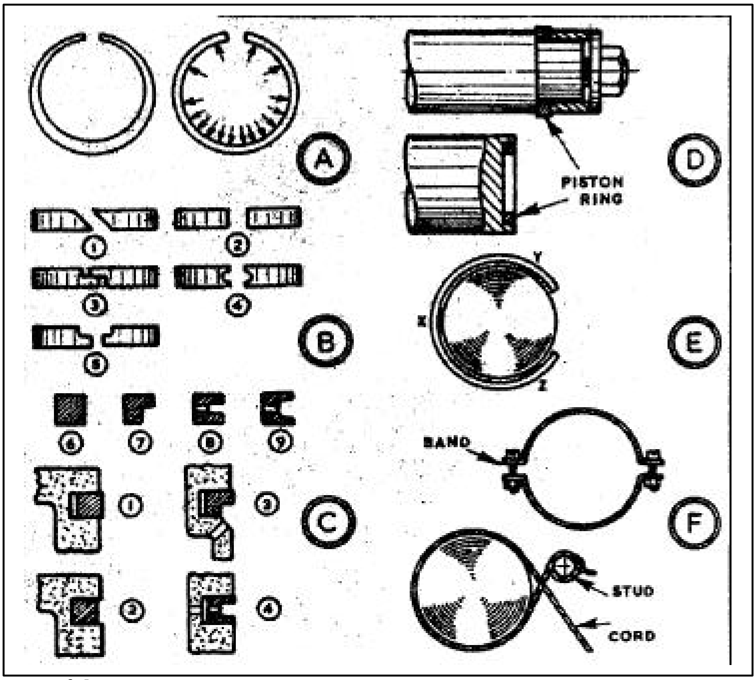
THE original and main purpose of piston rings, whether on steam or internal combustion engines, has always been to prevent pressure leakage or blow-by from the working side of the cylinder to the exhaust side or crank chamber, as the case may be; though hardly less important, with single-acting sump-lubricated engines, is control of oil, which is accomplished through special types of rings.

Double-acting steam engines, petroil lubricated two-stroke engines, and four-stroke engines running on splash or total-loss lubrication, need only pressure or compression rings; but four-stroke engines as in cars and modern motor-cycles, also require oil control rings-at least one on each piston, the two types being distinct.

The modern pressure or compression ring. particularly the commercial product, is of uniform section; and to ensure uniform outward thrust at all points on its circumference is usually " hammered " internally. as examination will often show-the hammering being heavier and more concentrated away from the gap, as at A, right. To some extent, however, the same effect of uniform outward pressure can be achieved by machining rings eccentrically. as at A. left. which at one time was done for large rings, and may still be employed in model sizes.

Ring joints may be as at B: (1) scarf joint; (2) plain butt joint; (3) stepped joint, to avoid a gap for blow-by. At the present time, the plain butt joint is perhaps the most common, with adaptations when a ring must be located as on a two stroke engine; (4) location on a central peg in the groove; (5) location on a peg in the top edge of the groove.

Sections of rings are: (6) square or rectangular for pressure or compression rings; (7) stepped for oil control; (8) slotted for oil control; (9) grooved for oil control-giving a more powerful action.



Standard fittings for piston rings are as at C, in square-sided grooves with clearance at the bottom. In normal use, rings may stand slightly proud of the surface (1): but it should be possible. for testing to push a ring-with a finger all round below the surface (2), failing which it might not be possible to fit the piston to the cylinder. Below a stepped ring, the edge of the groove is chamfered (3), and the chamfer drilled with oil drain holes; and for slotted or grooved rings, the bottom of the groove is drilled (4).

Cast iron is usually employed for piston rings, except special commercial types for oil control, which are of spring steel. For model rings, particularly of steam engines, hard brass or bronze can be used, neither of which is so easily broken as cast iron in small sections-nor subject to rusting.

In making small rings, which is practicable down to about 3/4 in. dia., the material, whatever is used, is finished in the bore and the outside left oversize. Each ring is faced smooth at the front, and then parted off carefully. if desired slightly overwidth.

A piece is cut out at the joint, then the ring closed and mounted on a mandrel, as at D, for finishing the outside. This ensures correct diameter with a certain degree of springiness but it will be realized the original boring must be nominally oversize to allow for contraction when the piece is cut out at the joint.

For reducing to width, a ring can be placed in a recessed mandrel, as at ***D,*** bottom, and lapped or rubbed on fine emery cloth. Clearance at the gap may be given by filing 0.003 in. per inch of bore diameter (air-cooled i.c. engines. 0.004in. to 0.005in.) In fitting rings, three strips of thin metal can be used to bridge top grooves, as at ***E, x, y.*** z-a method also employed for removal. To fit pistons to cylinders, a metal band, as at ***F,*** will compress rings; or on car engines-pushing down from the top a piece of cord can be attached to a stud, wrapped round a ring and the end pulled.