Sept. 19, 1950 G. H. ROBERTS 2,522,764

PISTON RING

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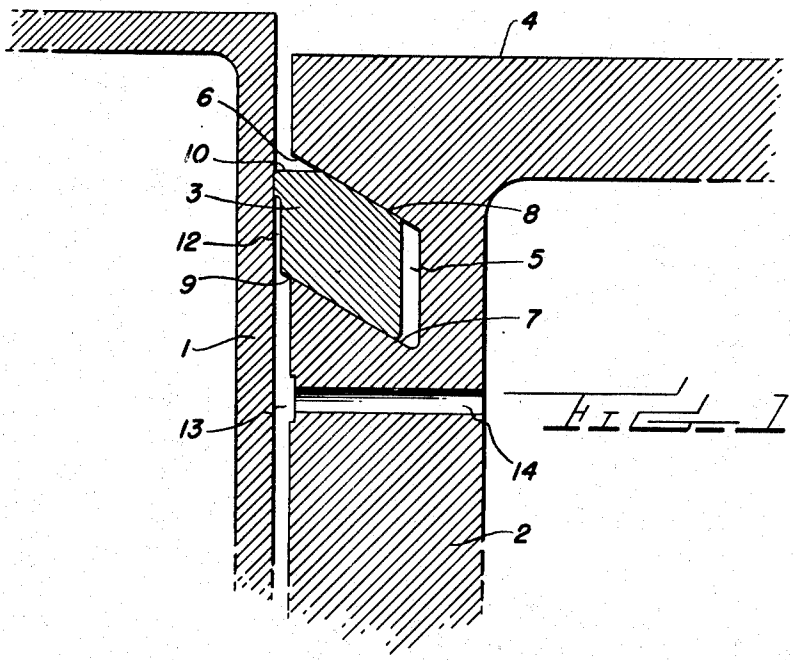


FIG. 1

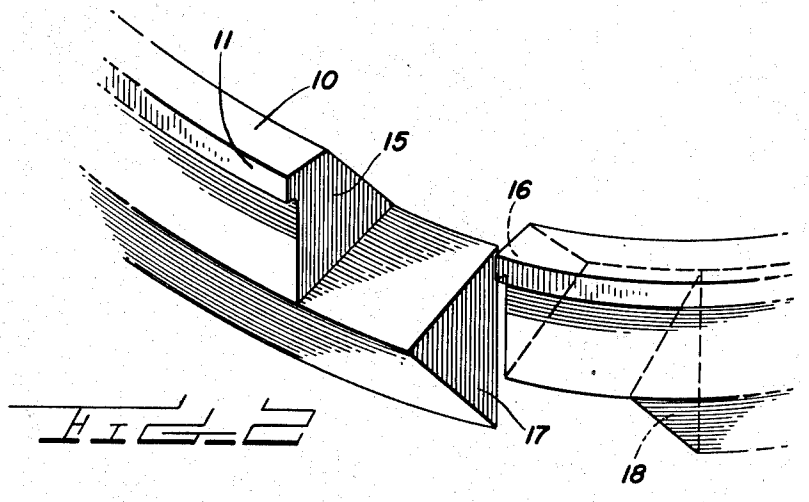


FIG. 2

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PISTON RING

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5 Claims. (Cl. 309—44)

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My present invention relates to piston rings for use in internal combustion motors, and more particularly to a ring of this type in which the action of the ring is much improved over prior devices of the same kind. Among the objects of this invention are the provision of a ring which will have, during the wearing-in process, a space for the reception of oil to provide thorough lubrication between the ring and the cylinder wall; the provision of a ring which is so constructed that there will be as little as possible of by-passing of oil around the ring during the operation of the motor; and such further objects, advantages, and capabilities as will hereafter appear and as are inherent in the construction disclosed herein. My invention further resides in the combination, construction, and arrangement of parts illustrated in the accompanying drawings and, while I have shown therein what is now regarded as the preferred embodiment of this invention, I desire the same to be understood as illustrative only and not to be interpreted in a limiting sense. The present application is, in part, a continuation of my prior application, Serial No. 564,804, filed November 23, 1944, now abandoned.

In the drawings annexed hereto and forming a part hereof,

Fig. 1 represents a fragmentary longitudinal section through a part of the piston, piston ring, and cooperating cylinder wall; and

Fig. 2 represents a fragmentary view of the two ends of a piston ring constructed in accordance with my present invention.

Reference will now be made in greater detail to the annexed drawings for a more complete description of this invention. The cylinder wall of a motor which is shown fragmentarily is denoted by the numeral 1, the piston by the numeral 2, and the piston ring by the numeral 3. It will be understood that all parts are shown magnified for clarity of disclosure. Normally the surface 4 of the piston is the upper surface thereof, although it will be understood that the piston may be used in other than a vertical position. However, in this description, it will be assumed that the piston is being used in a vertical position and that the surface 4 thereof is the upper surface.

Adjacent the upper end of the piston, I cut a parallel walled ring groove, the upper and lower walls of which make an angle of approximately sixty-five degrees (65°) with the direction of the axis of the piston and, likewise, with the inner face of the cylinder wall.

It is clear that the upper and lower surfaces 8 and 9 of the ring 3 are parallel, with the exception

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of a narrow surface 10 formed by chamfering the upper outer edge of the ring to a plane substantially perpendicular to the axis of the ring. In general, the ring has, in cross-section, a parallelogram form but there are two slight departures from this, one being the result of the formation of the surface 10 and the other the formation of the rib 11 around the upper edge of the ring. This latter is the result of the removing from the outer lower portion of the ring of an amount which reduces the overall diameter of the ring by from two to four thousandths of an inch, which produces, between the ring 3 and the wall 1, a cavity 12, bounded at the top by the rib 11 and extending to the bottom of the ring, this cavity having a depth of from one to two thousandths of an inch. Since the last mentioned portion of the ring is held away from the cylinder wall 1 by the rib 11, the cavity 12 remains as a receptacle for lubricating oil collected therein during the downward movement of the piston. Since the rib 11 is only about one-fifth of the width of the ring, this oil is in a position to lubricate the contacting surfaces of the ring and cylinder wall as the piston reciprocates. Thus, there is substantially no metal-to-metal contact of the ring and wall during the wearing-in process, the surfaces being substantially completely lubricated while this is going on. Because of the lubrication between the metal surfaces, there is substantially no scoring or scratching thereof and, therefore, little or nothing to be worn away in the removal of scratches from the cylinder wall. Making use of the rib 11 reduces the time necessary for the wearing-in process to take place. When the rib 11 is worn off so that the entire outer face of the ring wipes against the cylinder wall, the contacting surfaces have been worn glass-smooth so that they fit each other perfectly, and there is substantially no loss of oil or pressure due to the by-passing thereof between the ring and cylinder.

In order that excess oil collecting between the piston and cylinder may escape, there is formed around the piston a shallow groove 13 which is connected to the interior cavity of the piston by a plurality of holes 14 which extend through the piston wall. During the downward motion of the piston, the rib 11 of the ring 10 wipes most of the oil off the cylinder surface, and this collects below the ring, between the piston and cylinder wall. This oil may escape through the openings 14 into the interior of the piston.

Instead of the ordinary step-cut, as shown at 24 in Fig. 3 of Elliott Patent No. 1,386,998, I provide a diagonal cut, by which I mean that

the abutting faces of the two ends of the ring connect the upper inner edge with the lower outer edge of the ring, thus providing a seal which substantially prevents oil passing between the inner and outer surfaces of the ring, even though the gap between the shoulders 15 and 16 and between the shoulders 17 and 18 be substantial. The reason for this is that the oil must pass between the overlapped ends of the ring, and these fit so closely together that it is practically impossible for oil to pass through between them.

Having now described my invention, I claim:

1. A piston and ring assembly for use in an internal combustion motor comprising a piston having a groove in its lateral wall adjacent the inner face of the piston contacted by the gases of combustion, the upper and lower faces of said groove being parallel and making with the cylinder wall an angle of approximately sixty-five degrees (65°), a piston ring having parallel upper and lower walls fitting in said groove, the upper outer edge of said ring being chamfered to a plane substantially perpendicular to the axis of the piston, and the outer surface of the ring being removed with the exception of the upper approximately one-fifth (1/5) to reduce the overall diameter of the ring in its lower part in the neighborhood of two thousandths of an inch (.002") to four thousandths of an inch (.004").

2. An internal combustion motor piston ring of approximately trapezoidal cross-section having its upper outer edge chamfered to an approximate plane substantially perpendicular to the axis of the ring, the outer wall of the ring being, in part, removed to reduce the overall diameter of the ring an amount equal to approximately three thousandths of an inch (.003"), except approximately the upper one-fifth (1/5) of the thickness of the ring longitudinally of the axis of the ring which projects outwardly beyond the main body wall to contact the cylinder wall

in a narrow band whereby to form between the main part of the outer wall of the ring and the cylinder wall a channel for the reception of lubricating oil.

3. A piston ring of non-rectangular cross-section in which the major part of the inner and outer walls of the ring are substantially parallel with the axis of the ring, and the major part of the top and bottom walls thereof are parallel and are diagonal to the said axis, said ring having a step-cut gap in which the transverse walls of the gap are connected by walls which connect the upper inner angle of the ring with the lower outer angle thereof.

4. A structure as defined by claim 3 having a temporary, thin rib around the outer face of the ring at its upper edge.

5. A structure as defined by claim 3 in which the upper outer corner of the ring comprises a narrow flat face substantially perpendicular to the axis of the ring.

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