Oct. 4, 1966 E. FUHRMANN 3,276,782

OIL REGULATION RING

Filed Dec. 6, 1965

FIG-1

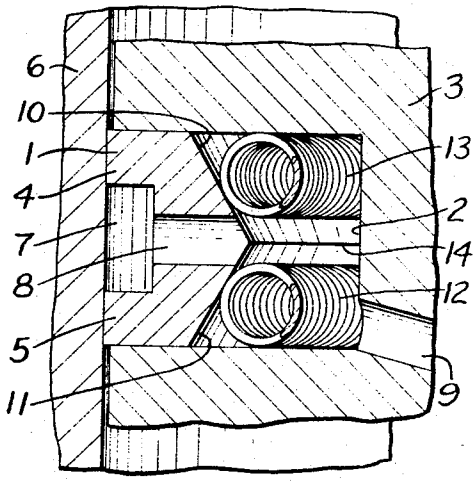


FIG-2

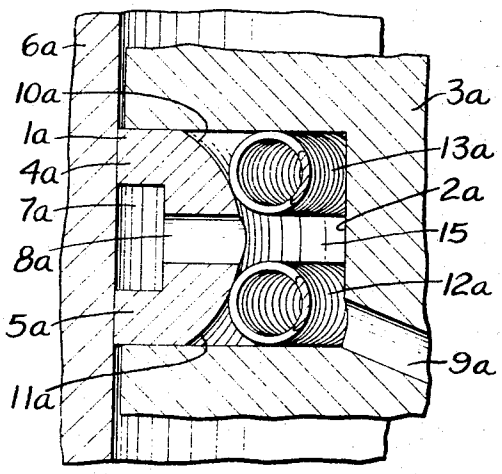


FIG-3

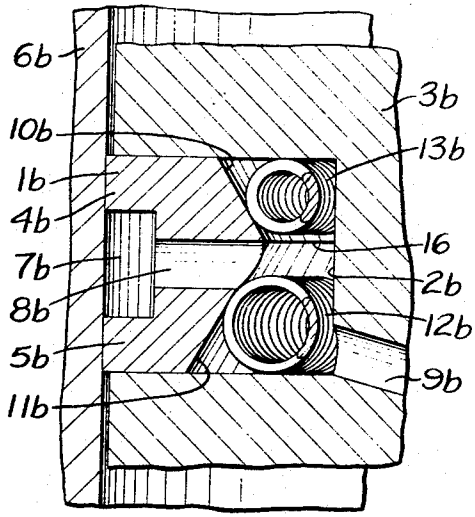
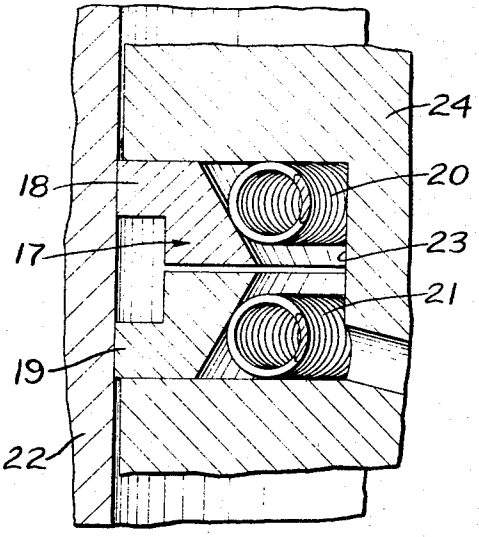


FIG-4



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OIL REGULATION RING

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8 Claims. (Cl. 277—143)

The present application is a continuation-in-part of my co-pending application, Serial No. 288,066, filed September 14, 1962, and now abandoned, title: Oil Regulation Ring.

The invention disclosed herein is concerned with an oil regulation ring, especially for use in connection with internal combustion engines, which is operatively controlled by a plurality of radially acting springs disposed in engagement with the rear face of the ring.

It is known to use for the oil regulation, in connection with pistons of internal combustion engines, piston rings which are pressed against the cylinder wall by radially acting springs. These springs make it possible to construct the ring narrow in radial direction, thereby considerably increasing the elasticity thereof and improving its adaptability with respect to irregularities of the cylinder wall. The rings are generally constructed cross-sectionally symmetrically; however, embodiments are also known in which the spring is operatively effective at a point near a flank of the ring, the rear face of the ring being thereby of cross-sectionally angular configuration. One flank of the ring becomes wider than the other, owing to the one-sided angular configuration, such condition resulting with improper mounting in clamping of the ring in the piston groove.

It is in accordance with the invention proposed to press the oil regulating ring against the cylinder wall with the aid of a plurality of springs and to form the rear face of the ring cross-sectionally generally roof-shaped or of pointed configuration. It is, however, feasible to form the rear face of the ring arcuately. In case of the pointed configuration of the rear face of the ring, the corresponding surfaces extend advantageously symmetrically; it is, however, likewise possible to place the apex of the pointed rear face of the ring displaced with respect to the axial center line of the ring. The respective springs are in engagement, each with an inclined surface of the rear face of the ring and also in engagement with the corresponding side wall of the piston groove, thereby resulting in uniform pressure exerted on the ring. The ring flanks are of equal width and clamping or wedging of the ring is thus reliably prevented. The ring could also be split and a spring act as each part.

It is to be observed that the spacing between a plane projected through the apex of the pointed rear face of the ring and the planes of the ring flanks, is always smaller than one and one-half times the spring diameter, so as to avoid during the assembly as well as during the operation of the structure placement of both springs in engagement with only one of the inclined surfaces of the rear face of the ring.

The construction of this rear face of the ring and the arrangement of the springs, according to the invention, permits matching or adaptation of the regulating rings to given operational requirements, and avoidance of the drawbacks of previously known structures. For example, stripping of a greater amount of oil in one direction of operation of the piston, may be obtained by asymmetrical placement of the apex of the pointed rear face of the ring and/or, by using two springs of respectively different strengths. It is also feasible, in case the pressure exerted by one spring should not suffice, to wind such spring of a plurality of wires.

The invention will now be described with reference to the acommpanying drawings showing different embodiments thereof.

In the drawings, FIGURES 1, 2, 3 and 4 are sectional views showing various modifications in cross section on a piston in a cylinder.

Numeral **1** indicates the oil regulation ring which is inserted in the groove **2** of the piston **3**, such ring having two parts **4** and **5** which are in sliding engagement with the inner wall of the cylinder **6** so as to strip oil therefrom. The stripped oil flows through the recess **7** and bore **8** of the ring **1** and thence back through the duct **9** inwardly of the piston. The rear face of the ring **1** is pointedly shaped, thus forming inclined or angularly extending sides **10** and **11**, such sides being engaged by the springs **12** and **13**, respectively. The springs **12** and **13** press the ring with the parts **4** and **5** thereof uniformly against the inner wall of the cylinder **6**, thus reliably preventing clamping or wedging of the ring.

The springs are so dimensioned that they cannot move over the apex **14** of the back of the ring and thus always act on a respective axial portion of the ring. The ring is radially thin and, due to this, and to groove **7**, the portions **4** and **5** can flex relative to each other in the radial direction to follow the contour of the cylinder **6**.

In FIGURE 2, the back of the ring is arcuate with the apex **15** of the back of the ring in the axial center of the ring. In all other respects the ring is the same as that of FIGURE 1 and the same reference numerals with a subscript *a* are employed.

In FIGURE 3, the back of the ring is not symmetrical so that apex **16** is nearer one end of the ring than the other. Springs of different size can then be used to get the particular results desired. The same numerals as employed in FIGURE 1 with a subscript *b* are employed.

In FIGURE 4, the ring **17** is split to form two parts **18** and **19** which form, together, a peaked back surface which is engaged by springs **20** and **21**. The split in the ring could extend about the entire ring to form two entirely separate parts or could be interrupted to form two parts which were connected for convenience of manufacture and handling but which would operate substantially independently of each other in the cylinder **22** when mounted in groove **23** of piston **24**.

All of the rings shown and described are radially thin to the extent of being flexible to follow the cylinder contours and to fit in cylinders not perfectly round. Furthermore, particularly because of the central oil groove, the two parts of the rings are somewhat independently flexible.

It will be understood that this invention is susceptible to modification in order to adapt it to different usages and conditions; and accordingly, it is desired to comprehend such modifications within this invention as may fall within the scope of the appended claims.

I claim:

1. A piston provided with an oil regulating ring groove, in combination with an oil regulating ring positioned in said groove, the outer surface of said ring having spaced peripheral sliding surfaces separated by a peripheral recess, and the inner surface of said ring having convergent surfaces in the radially outer directions of the ring and forming a ridge therebetween, each of said converging surfaces coacting with the adjacent side of the groove to form a circumferential spring receiving pocket, an endless closely coiled compression spring positioned in each of said pockets and contacting one of said converging surface and the adjacent side of the groove and exerting pressure on the ring to press the adjacent one of said sliding surface outwardly, said ring having passage means

therethrough from the recess to the spring receiving pockets to drain oil from the recess, said ring being thin in the radial direction so as to be flexible under the influence of said springs and a confining cylinder wall, each said spring having a cross sectional diameter large enough to prevent the other spring from moving over said ridge and into the same pocket therewith.

2. The combination according to claim 1 in which said ring includes bore means leading from said groove to the inside of the ring to drain oil from the groove into the circumferential groove of said piston, each said spring having a cross sectional diameter less than the axial distance from the adjacent one of the top and bottom walls of the ring to said apex but greater than one half said distance.

3. The combination according to claim 2 wherein the inner side of said ring is arcuate in cross section.

4. The combination according to claim 2 wherein the inner side of said ring is V shaped in cross section.

5. The combination according to claim 4 with the apex of said V being nearer one of said top and bottom walls of the ring than the other thereof.

6. In combination; an oil regulation ring for disposal in a groove of a piston and spring means inside the ring exerting outwardly directed pressure on said ring, said ring comprising axially spaced parallel leg parts having cylindrical outer faces for engagement with the wall of a cylinder in which the piston carrying the ring is disposed, said leg parts being spaced apart so as to be close by the opposite side walls of the groove, said ring also comprising an axial part connecting said leg parts and spaced radially inwardly from said outer faces of said leg parts so as to define an annular groove around the outer side of the ring, said axial part being bored radially of the ring to drain oil from said groove, the inner side of the ring being convex toward the bottom of the groove with the apex thereof near the axial center of the ring, and said spring means comprising a pair of radially flexible annular compression springs on opposite sides of said apex bearing on the inner side of the ring and on the side walls of the groove, each said spring means comprising an endless coiled spring having closely spaced convolutions which engage the inner side of the ring at closely spaced points therealong, said leg parts and axial part of said ring being sufficiently thin in the radial direction as to be flexible and thereby conform to a cylinder wall under the influence of said spring means, each said spring means having a cross sectional diameter less than the axial distance from one side of the ring to said apex but greater than one half said distance.

7. The combination according to claim 6 in which said ring has radial circumferentially extending incision means therein between the top and bottom faces substantially dividing the ring into upper and lower portions each of which is biased radially by a respective one of said compression springs positioned on the radially inner side of said ring.

8. A piston provided with an oil regulating ring groove, in combination with an oil regulating ring positioned in said groove, the outer surface of said ring having spaced peripheral sliding surfaces separated by a peripheral recess, and the inner surface of said ring having convergent surfaces in the radially outer directions of the ring and forming a ridge therebetween, each of said converging surfaces coacting with the adjacent side of the groove to form a circumferential spring receiving pocket, an endless closely coiled compression spring positioned in each of said pockets and contacting one of said converging surface and the adjacent side of the groove and exerting pressure on the ring to press the adjacent one of said sliding surface outwardly, said ring having passage means therethrough from the recess to the spring receiving pockets to drain oil from the recess, said ring being thin in the radial direction so as to be flexible under the influence of said springs and a confining cylinder wall, each said spring having a cross sectional diameter large enough to prevent the other spring from moving over said ridge and into the same pocket therewith, said ring having radial circumferentially extending incision means therein between the top and bottom faces substantially dividing the ring into upper and lower portions each of which is biased radially by a respective one of said compression spring positioned on the radially inner side of said ring.

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