Dec. 8, 1931. E. J. BULLARD 1,835,139

PISTON RING

Filed Oct. 27, 1928

Fig. 1.

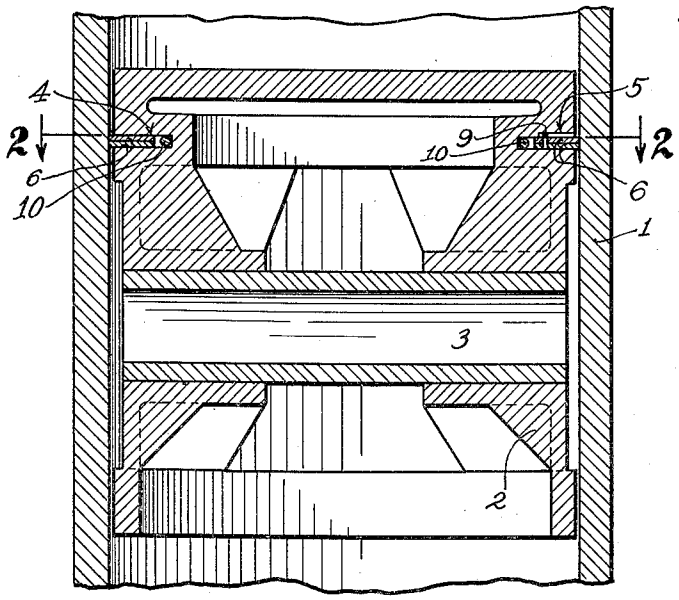


Fig. 3.

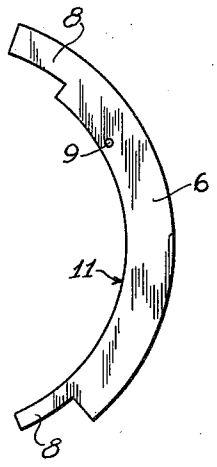


Fig. 4.

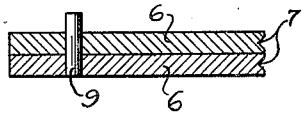
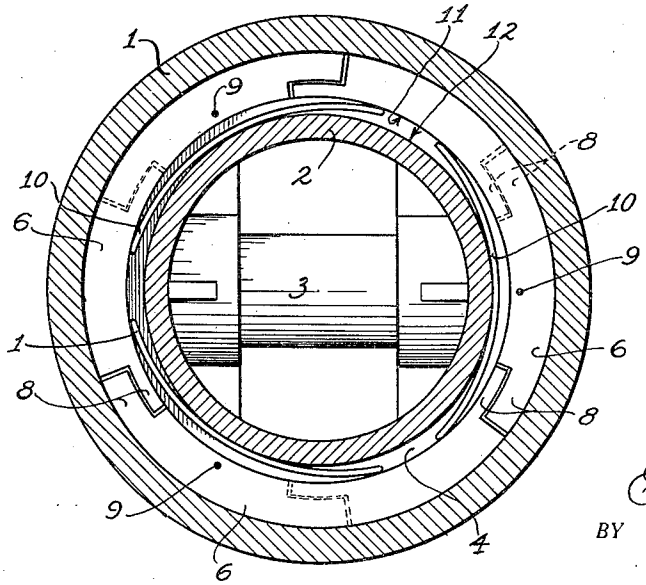


Fig. 2.



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UNITED STATES PATENT OFFICE

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PISTON RING

Application filed October 27, 1928. Serial No. 315,402.

The present invention relates to improvements in piston rings designed primarily for use in internal combustion motors to maintain an effective seal between the cylinder wall and piston while the latter is operating in the cylinder under pressure.

One of the principal objects of the invention is to provide a ring consisting of arcuate sections arranged that they form a circular body with the sections interlocking at corresponding ends, there being provided pressure means in rear of the sections to provide an equal pressure on the surface of the completed ring.

A further object is to provide a sectional ring consisting of superimposed series of arcuate plates arranged with the ends of the plates of the respective series in relative staggered interfitting relation.

A further object is to provide a fulcrum connection between certain of the plates of the superimposed series, the fulcrum connections affording guides for controlling the radial movement of the plates in their piston receiving slot and precluding circumferential movement of the plates within the slot.

A further object is to provide a spring means for acting on the inner edges of the arcuate plates to force the outer edges thereof into uniform frictional contact with the cylinder wall.

Another object is to groove or channel the outer edge of the plates to enable the same to rapidly seat and seal against the cylinder wall on their initial installation.

With the above mentioned and other objects in view, the invention consists in the novel construction and combination of parts hereinafter described, illustrated in the accompanying drawings and pointed out in the claims hereto appended; it being understood that various changes in the form, proportion, size and minor details of construction within the scope of the claims may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawings:—

Figure 1 is a view in vertical section of the preferred embodiment of my invention as applied to a reciprocating piston.

Figure 2 is a transverse section on line 2—2 of Fig. 1, viewed in the direction of the arrow.

Figure 3 is a view in plan of one of the arcuate plates.

Figure 4 is a transverse sectional view through the fulcrum point of two plates arranged in superimposed relation.

In the drawings, wherein like characters of reference designate corresponding parts,—1 indicates a suitable cylinder within which is reciprocably mounted a piston 2, having a wrist pin 3, of the conventional type.

The piston 2 is circumferentially grooved at 4, the groove being illustrated as rather narrow in width, but of considerable depth. The upper wall surface of the groove 4, at suitable points, is inwardly slotted at 5, affording radial guides.

The ring in the present embodiment comprises a plurality of arcuate plates 6, each longitudinally grooved on its outer edge at 7. Each plate at its opposite ends is provided with a tongue 8. Each tongue 8 is of a width less than that of the plate 6 and the tongues are located one on each side of a line disposed longitudinally of the plate 6, their reversed positioning being clearly illustrated in Fig. 3.

When in use and a single series of plates 6 is employed, the same are positioned within the groove 4 in circular formation with the tongues 8 at adjacent ends of successive plates projecting beyond each other, with the plates in a common plane. Thus, a broken or interlocking joint is provided between adjacent ends of successive plates of the ring with corresponding ends of successive plates bearing on the inner edge of each other.

In this single embodiment installation, a fulcrum pin 9 projecting into the slot 5 affords a means for radially guiding the respective plates and precludes the longitudinal movement of the plates within the groove 4.

Suitable elongated bar springs 10 positioned preferably one between the inner edge 11 of the respective plates 6 and the inner edge 12 of the groove 4, with the center of the spring bearing on the edge 12 at a point in radial alignment with the pin 9 of its

respective plate and with its opposite ends bearing on the inner edges of adjacent plates, serve to force the outer edges of the plates into frictional contact with the inner wall surface of the cylinder 1, and exert a uniform pressure on the respective plates.

While I have preferably described the installation of a single layer of plates, the preferred installation is as illustrated, consisting of plates arranged in groups, and the plates of each group in superimposed relation.

Thus, there is provided superimposed rings of duplicate construction, arranged with the ends of the plates of the adjacent rings in staggered relation.

In the preferred embodiment, the superimposed plates 6 of each group are disposed in partial overlapping relation with a pin 9 affording a fulcrum connection therebetween, and with the projecting portion of the pin operating within one of the slots 5. In this type of installation, each spring 10 effectively acts on four plates exerting uniform outward pressure thereon to uniformally expand the ring structure.

I claim:—

1. The combination with a cylinder and a piston therefor having a ring groove, one wall of which is radially slotted, of a piston ring in said groove comprising a plurality of duplicate plates arcuate in plan, arranged in superimposed series with the ends of the plates of a given series overlapping, fulcrum pins passing transversely through certain plates of the respective series to provide fulcrum points therebetween, the ends of said pins projecting beyond the faces of plates of the same series for reception in said radial slots of the ring groove to preclude circumferential movement of the ring in the groove, and spring means within the base of the ring groove to hold said plates outwardly against the cylinder wall.

2. A piston ring mountable in a ring groove of a piston, comprising a plural series of rings arranged in superimposed relation, each ring consisting of a plurality of arcuate plates longitudinally recessed at their ends and arranged in end to end circle forming relation, with a portion of the adjacent ends of adjacent plates extending into the recess of the next adjacent plate forming a slidable arcuate joint the faces of which are concentric with the outer face of the plates, the plates of the respective series being arranged in relative overlying relation to present the joints in staggered relation, and a fulcrum pin passing transversely through overlying plates of the respective rings near their overlying ends to provide fulcrum points therebetween and afford a single point of fulcrum for each plate, and a bowed leaf spring means associated with said ring forming plates so as to have interterminal bearing against the inner wall of the ring groove and having each of its opposite ends bearing against separate adjacent segments of the ring forming plates.

3. A piston ring structure comprising superimposed rings each consisting of a plurality of segmental plates having their opposite ends longitudinally recessed from opposite edges of the plate and providing longitudinally extending tongues whose side edge walls are concentric with the outer edge wall of the plate, said plates disposed in superimposed layers, the plates of each layer arranged in end to end circle forming relation with the tongues of adjacent ends of adjacent plates of each layer slidably engaging each other affording an interlocking joint, the joints of the plates of the respective layers being arranged in vertically staggered relation, and a connection between overlying plates of the respective layers affording relative pivotal movement, and leaf spring means associated with said ring forming plates, said spring means bearing centrally against the inner wall of the ring groove and having each of its opposite ends bearing against a separate segment of the ring forming plates.

In testimony whereof I have signed my name to this specification.

EARL J. BULLARD.