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H. P. PHILLIPS

2,544,353

PISTON RING

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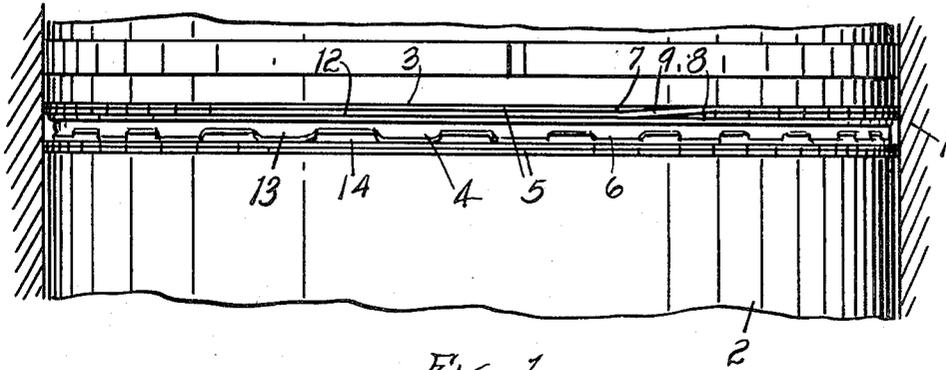


FIG. 1

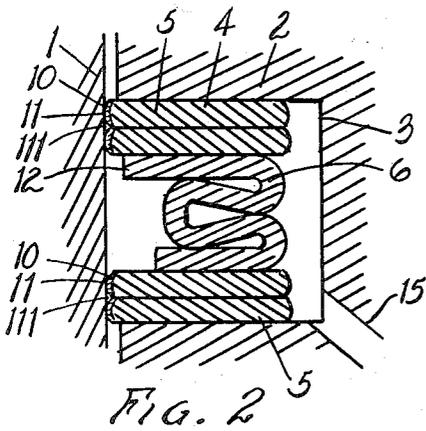


FIG. 2

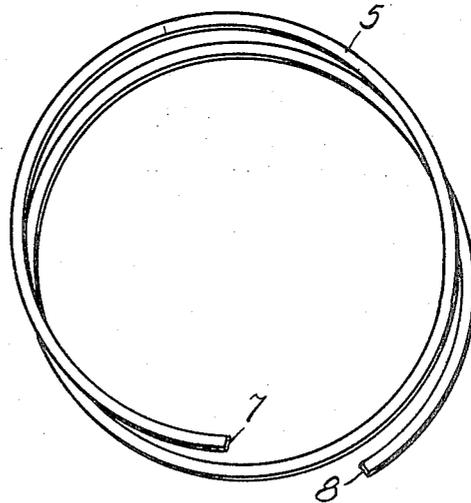


FIG. 3

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UNITED STATES PATENT OFFICE

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PISTON RING

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2 Claims. (Cl. 309—45)

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This invention relates to improvements in piston rings.

The main objects of the invention are:

First, to provide a piston ring assembly which is highly efficient from the standpoint of effective sealing and oil control.

Second, to provide a ring assembly in which there is no gap opening thereby providing effective sealing and preventing "blow by."

Third, to provide a ring assembly which provides improved tensioning of the ring segments against a cylinder wall.

Fourth, to provide a ring assembly of the above type in which the parts thereof may be readily and cheaply fabricated and readily assembled in a piston ring groove.

Objects relating to details and economies of my invention will appear from the description to follow. The invention is pointed out and defined in the claims.

A preferred embodiment of my invention is illustrated in the accompanying drawing in which:

Fig. 1 is a fragmentary view of a piston, ring and cylinder in assembled relation, the piston and ring being shown in side elevation and the cylinder being shown in section.

Fig. 2 is an enlarged fragmentary view showing in vertical section the piston, ring and cylinder in assembled relation.

Fig. 3 is a perspective view of one of the cylinder wall engaging side members of the ring assembly.

In considering the accompanying drawing it should be borne in mind that no attempt has been made to show the parts in their relative proportion and where associated with the piston to show the clearances and relative dimensions.

In the embodiment of the invention illustrated 1 designates the cylinder and 2 the piston of an internal combustion engine. The piston is provided with a groove 3 in which is disposed the ring assembly designated generally by the numeral 4.

My improved ring assembly comprises a pair of spaced thin steel expansible upper and lower ring side members 5 and a spacer member 6 for axially spacing the upper and lower side members. Each side member is formed of one continuous piece of flat steel stock coiled edgewise into slightly less than two complete coils, the ends 7 and 8 of each side member being circumferentially separated as shown in Figs. 1 and 3. The flat stock is of high unit contact steel and is relatively thin being between approximately .010 and .020 of an inch in thickness, and preferably

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approximately .013 of an inch in thickness. Use of this very thin steel facilitates the production of the ring side members without preformed kinks between the ends 7 and 8 thereof, before installation of the ring side members into the ring groove. The ring side members by reason of their thinness assume the kink formation between the ends 7 and 8 as shown at 9 in Fig. 1 after installation into the ring groove. Also such degree of thinness facilitates the production of nearly two complete turns in each of the side members 5 without increasing the axial dimension of the ring groove and without reducing the axial dimension of the spacer member 6. The use of two coils in each ring side member and the use of one such ring side member above the spacer member and another below the spacer member eliminates the necessity of an inner or expander ring and avoids groove depth problems. The cylinder wall engaging faces of the ring side members 5 are chrome plated, the plating 10 having the cylinder wall engaging surface thereof curved in the arc of a circle, the radius of the arc of curvature being not greater than approximately .045 of an inch to provide a hair line contact 11 with the cylinder wall. The outwardly curved surfaces of the adjacent superimposed convolutions provides an annular oil receiving pocket 111 therebetween.

The spacer member 6 is of the split annular expansible type disclosed in my Patent No. 2,404,862 of July 30, 1946. It is formed of ductile sheet steel, folded upon itself into a plurality of integrally connected plies or folds disposed in side by side relation, the upper ply 12 being flat and supportingly engaging the upper ring side member 5, and the remaining lower plies being conformed to provide alternate spacer and drainage reaches 13 and 14 respectively. The drain reaches 14 provide passageways through the ring assembly for passage of oil therethrough to the rear of the assembly and then to the oil drain openings 15 in the piston wall.

I have described and illustrated an embodiment or adaptation of my invention which I find highly satisfactory. I have not attempted to illustrate or describe other embodiments or adaptations which I contemplate as it is believed that this disclosure will enable those skilled in the art to embody or adapt my improvements as may be desired.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. A piston ring assembly comprising spaced 55
expansible side ring members and a spacer mem-

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ber intermediate said side ring members, each side ring member comprising a relatively thin ribbon-like strip of metal coiled edgewise into two substantially complete superimposed convolutions the ends of the coiled strip being circumferentially spaced and a central portion of the strip being disposed circumferentially between said ends, said central portion and the adjoining portions thereto disposed in overlapping relation to the ends of the side member having a substantially uniform vertical rise throughout the length of said central and adjoining portions prior to installation of the ring member into a ring groove, said strip of metal being relatively thin to facilitate ready flexure of the same at the ends of said central portion adjacent the ends of the side member when the side member is installed in a ring groove, the outer edge of the coiled strip being chrome plated and curved outwardly to provide a hair line contact with a cylinder wall, the outwardly curved surfaces of the superimposed convolutions providing an oil pocket therebetween.

2. A piston ring assembly comprising spaced expansible side ring members and a spacer member intermediate said side ring members, each side ring member comprising a relatively thin ribbon-like strip of metal coiled edgewise into two substantially complete superimposed convolutions the ends of the coiled strip being circumferentially spaced and a central portion of the strip being disposed circumferentially between said ends, said central portion and the adjoining portions thereto disposed in overlapping relation

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to the ends of the side member having a substantially uniform vertical rise throughout the length of said central and adjoining portions prior to installation of the ring member into a ring groove, said strip of metal being relatively thin to facilitate ready flexure of the same at the ends of said central portion adjacent the ends of the side member when the side member is installed in a ring groove, the outer edge of the coiled strip being curved outwardly to provide a hair line contact with a cylinder wall, the outwardly curved surfaces of the superimposed convolutions providing an oil pocket therebetween.

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