March 11, 1930. J. H. STANFIELD 1,749,894

PISTON RING

Filed Sept. 30, 1929

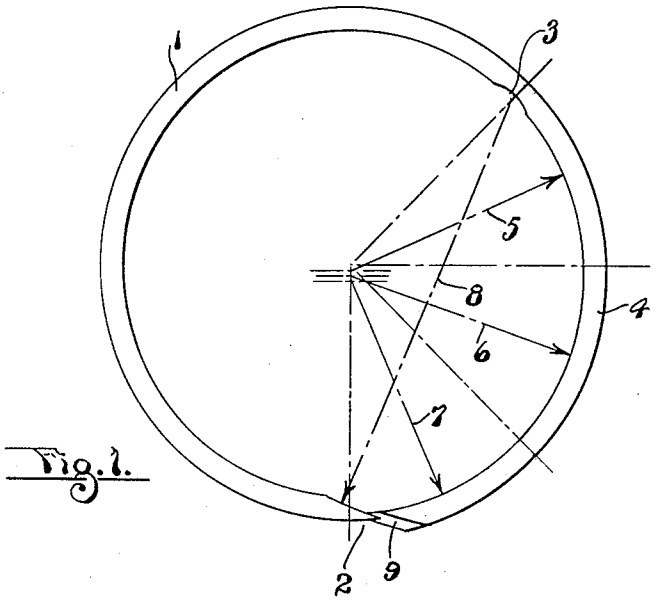


Fig. 1.

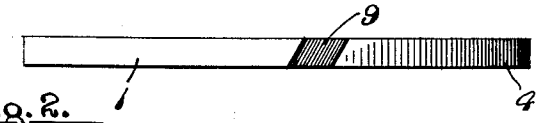


Fig. 2.

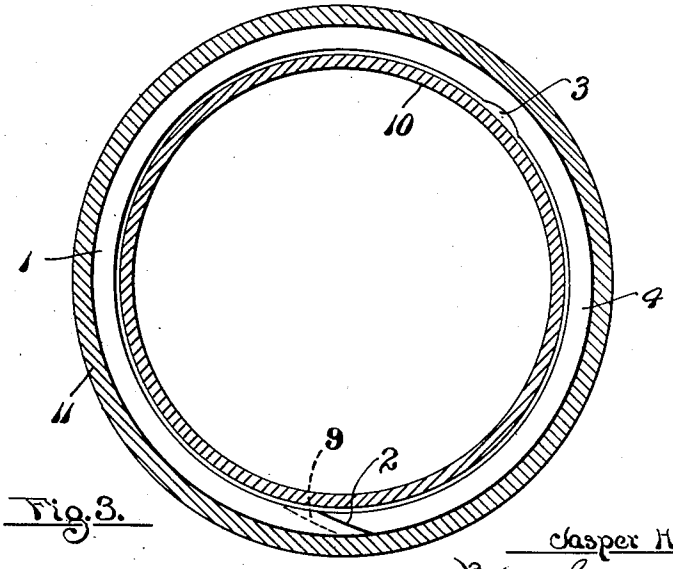


Fig. 3.

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Patented Mar. 11, 1930 1,749,894

UNITED STATES PATENT OFFICE

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PISTON RING

Application filed September 30, 1929. Serial No. 396,069.

This invention relates to piston rings and is more particularly concerned with a piston ring so constructed that when it is in use in a cylinder and, in the course of time, wears at its outer curved surface and the ring expands to conform to the inner walls of the cylinder, the gap or parting in the ring is not opened but remains in the same fully closed relation which it has when the ring is new.

In the ordinary type of piston ring, particularly those which have the usual diagonal cut therethrough to make the parting or gap in a side of the ring, when the ring is new and is placed in an engine cylinder around a piston the gap or parting is completely closed, that is, closed to the extent that the adjacent ends of the ring at the parting are not spaced apart more than the tolerance limit permitted in rings of this character. Such limit is ordinarily two thousandths of an inch. But when the ring wears and expands from its inherent tendency toward expansion, with such expansion this gap or parting opens. In the course of time the parting may open a considerable amount and permit the passage of lubricating oil in an upward direction and the gases of combustion in a downward direction.

With my invention the wear which takes place at the outer curved surfaces of the ring does not affect the distance between the ends of the ring at the parting but the ends remain in their close and intimate relation irrespective of the amount or degree of wear which takes place. The invention which I have made produces this effect in a very simple yet practical manner, an understanding of which may be had from the following description taken in connection with the accompanying drawing, in which,

Fig. 1 is a plan view of the ring casting from which the ring is made.

Fig. 2 is an elevation thereof, and

Fig. 3 is a plan view and section showing the ring located in a piston ring groove and within a cylinder.

Like reference characters refer to like parts in the different figures of the drawing.

The ring casting from which the ring is made is preferably formed of two sections. One section indicated at 1 is of a uniform radius extending from the point 2, where the parting or gap is to be, to the point 3 and in practice including substantially 225 degrees of a complete circle. It is of course, to be understood that such arc of the complete circle may be varied within proper limits and is not to be strictly limited to 225 degrees. The remainder of the ring casting indicated at 4 extending from the point 3 to the parting or gap is formed with progressively increasing radii which are designated at 5, 6 and 7, so that the end of the section 4 of the casting at the parting is set out from the adjacent end of the uniform radius section 1. The two adjacent end portions of the sections 1 and 4 are joined together by approximately one sixteenth of an inch thickness of metal in the ring casting.

In making the ring from this ring casting the upper and lower parallel sides of the ring casting are first properly machined and then the gap is cut at the point 2 by means of a circular cut on a radius substantially that indicated at 8 from adjacent the point 3 to the place where the parting in the ring is made, whereby the adjacent ends 9 of the ring at said parting are cut in the arc of a circle. At the same time preferably the cutting saw or other device which is used to make the gap is positioned at an acute angle to the horizontal upper and lower sides of the ring so that the ends 9 of the ring at the parting are not only in the arc of a circle but are inclined to the parallel upper and lower sides of the ring.

The ring casting is then finished in accordance with usual practice in manufacturing piston rings by compressing the parted casting to circular form and holding it on an arbor or mandrel and the outer curved surface of the ring casting is then turned and machined to proper size and finish. In practice it is desirable to cut a small depth of metal from the inner side of the ring adjacent the point 3 or where the curvature of the ring casting begins to progressively increase.

The ring as thus made may be very readily

placed in a ring groove of a piston, such as 10 shown in Fig. 3, and compressed so as to enter a cylinder 11. The outer curved surface of the ring in the compressed state form a perfect circle so that the ring bears against the inner walls of the piston at all points, the tendency of the section 4 of the ring to spring outward forcing the ring at the opposite side against the wall of the piston as is evident. As the ring wears at its outer curved sides the section 4 moves outwardly but inasmuch as the parting surfaces at the ends of the ring at 9 are in the arc of a circle about which the free end of ring section 4 moves, such surfaces 9 at the ring parting do not separate but remain as closely together as they were when the ring was new and first placed in the cylinder.

The construction of ring described is of simple character yet is particularly practical. The invention is defined in the appended claims and is to be considered comprehensive of all forms of structure coming within their scope.

I claim:

1. A piston ring of substantially circular form, including one ring segment having a common radius and a second ring segment integral with and extending from the first ring segment of a varying and increasing radius, said piston ring having a parting at one side at the free end of said second named segment of the ring, said parting being in the arc of a circle having a center about which said second segment of the ring bends when the ring is compressed to circular form for entrance into a cylinder.

2. A construction having the elements in combination defined in claim 1, said parting in addition to being cut in an arc of a circle being also located in a plane disposed at an acute angle to the planes of the horizontal flat sides of the ring.

3. In a piston ring structure having a parting at one side, a ring segment extending away from said parting and normally springing outward but being compressible inward to form a circle with the remainder of the ring, said parting being cut so as to permit inward and outward movement of said ring segment without separation thereof from the end of the ring at the opposite side of said parting.

In testimony whereof I affix my signature.

JASPER H. STANFIELD.