Nov. 10, 1931. E. A. KOETHER 1,830,841

PISTON RING

Filed May 16, 1930

Fig. 1.

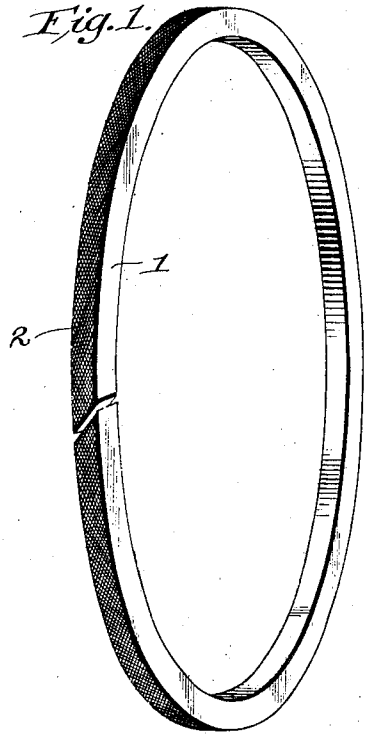


Fig. 2.

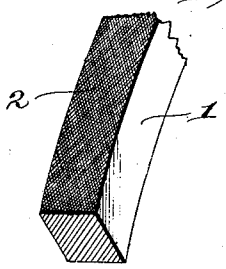


Fig. 3.



Fig. 4.

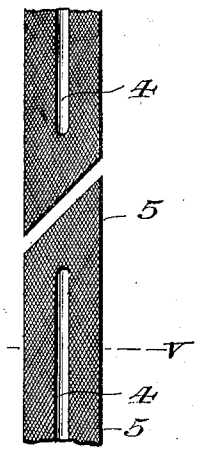


Fig. 6.

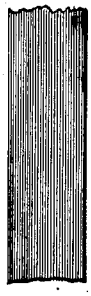


Fig. 7.

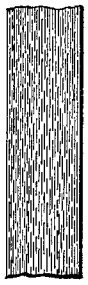
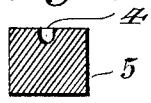


Fig. 8.



Fig. 5.



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Patented Nov. 10, 1931 1,830,841

UNITED STATES PATENT OFFICE

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PISTON RING

Application filed May 16, 1930. Serial No. 453,025.

This invention pertains to piston rings and has reference more particularly to the production of a ring which by reason of its finish, or its periphery or wearing face, will quickly seat in.

Broadly stated the invention consists in producing upon the wearing face of the ring a series of infinitesimal criss-cross grooves which have the effect, when the ring is positioned, of permitting the oil to be immediately conducted across the wearing face of the ring as well as around the ring. A ring with the criss-cross finish herein shown and described therefore gives perfect lubrication and causes an oil film to instantly form across the entire face of the ring.

The invention and several of the older methods of treating the outside or wearing face of the ring are shown in the annexed drawings wherein:

Figure 1 is a perspective view of the finished ring embodying my invention,

Figure 2 is a perspective view on an enlarged scale showing a fragment of the ring to more clearly bring out the criss-cross infinitesimal grooves,

Figure 3 is a face view of a ring having an annular groove formed in its wearing face in addition to the small or infinitesimal criss-cross grooves,

Figure 4 is a like view in which the groove which extends around the ring stops short of the joint thereof,

Figure 5 is a transverse sectional view on the line V—V of Figure 4,

Figure 6 is a face view of the working face of the section of a ring which has been machine finished with the grooves which are necessarily formed extending parallel to the side faces of the ring,

Figure 7 is a like view showing the wearing face produced by a grinder, and

Figure 8 is a similar view seeking to show the wearing surface of a lapped ring after the same has been seated in.

It is known that a ring which is provided with an annular groove appears to hold compression better than a ring without the annular groove. I am therefore of the opinion that the annular groove holds a sufficient film of oil to form an oil seal and prevent blow-by. Such a ring, however, does not work perfectly until well seated. It has been found by actual test that by means of the criss-cross finish applied to a ring in accordance with my invention, which ring may have an annular groove, the necessary oil seal is immediately formed and blow-by is at once prevented.

In the drawings 1 denotes a split ring, the outer wearing face or periphery 2 whereof is provided with a series of infinitesimal grooves or channels preferably extending in a criss-cross direction with reference to each other and at an angle to the axis of the ring.

One method of producing these criss-cross elements is as follows: After the side faces of the rings are completely finished the rings are split and loaded on an arbor and closed in a flexible core-box. Such box closes up the rings and they are then clamped in such position on the arbor. The rings are rough and are finish turned on the periphery. While still on the arbor the criss-cross finish is produced. This is effected by placing the arbor in a lathe running at a slow speed and an abrasive block of very fine grade carborundum is then moved back and forth lengthwise of the arbor and over and in contact with the rings.

In Figure 3 a section of a split ring is shown with the criss-cross finish and an annular groove of channel 3 which extends entirely around.

In Figures 4 and 5 the ring is provided with a groove or channel 4 which stops short of the split joint formed in the ring.

The finish, as above set forth, may be reproduced in other manners but it will be noted that it differs from the ordinary finishes as shown in Figures 6 and 7.

In Figure 6 the ring is subjected to a turning action and as a consequence a series of grooves are formed about the same and substantially parallel to the side walls of the ring.

In Figure 7 it is sought to show a surface which is produced by the action of a grinder.

In Figure 8 the ring surface is shown in a series of infinitesimal grooves extending

across its face parallel to the axis of the ring. Such a surface will inhere after a lapped ring has been seated in by use. In fact any piston ring will, after it has been in use for a time, present a surface similar to that shown in Figure 8.

With the finish shown in Figure 6 it will be appreciated that the oil will be impeded in its progress across the face of the ring. The same is true with the structure as shown in Figure 7 in which there is a series of interrupted grooves extending circumferentially of the ring. Consequently these two structures will not act with the oil to properly lubricate the parts when the ring is first placed in position.

A ring produced with the above described finish upon its wearing face will, as above noted, readily seat in and by reason of the fact that the oil can pass from one edge to the other the parts are thoroughly lubricated and oil is present in a quantity sufficient to prevent blow-bys. Of course after the ring has worn or been seated in, these diagonal or criss-cross grooves may, and in all probability will, disappear and the ring when examined will present a wearing surface similar to that shown in Figure 8. By utilizing the criss-cross infinitesimal grooves with the circumferentially extending ordinary deep groove the oil will at once be passed by the criss-cross grooves to the circumferential groove, hence the ring will be provided with oil sufficient to effect proper operation at the outset. The presence of the circumferentially extending groove is, however, not necessary or essential to the broad underlying invention. It will be appreciated, of course, that the criss-cross grooves may be formed in any manner or by any method.

What is claimed is:

1. As a new article of manufacture, a piston ring having its peripheral face provided with a series of criss-cross grooves extending from edge to edge of the ring.

2. As a new article of manufacture, a piston ring having a series of intersecting grooves formed upon the wearing face of the ring, said grooves extending in a direction angular to the axis of the ring and extending entirely across the face thereof.

3. As a new article of manufacture, a piston ring having a series of infinitesimal grooves on its wearing face, said grooves extending entirely across said face and in a direction angular to the axis of the ring.

4. As a new article of manufacture, a piston ring having a series of infinitesimal grooves formed on its wearing face, said grooves being arranged in a cross-cross relation.

5. A piston ring having a circumferentially extending groove formed in its wearing face and a series of infinitesimal grooves arranged in criss-cross relation on said face to one side at least of said groove and the adjacent edge of the ring, said infinitesimal grooves extending from the ring edge to the adjacent edge of the groove.

6. As a new article of manufacture, a piston ring having upon its working face a series of infinitesimal criss-cross grooves.

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

EMIL A. KOETHER.