

Oct. 21, 1930.

E. KOTTUSCH

1,778,899

PROCESS OF MANUFACTURING PISTON RINGS

Filed July 28, 1926

3 Sheets-Sheet 1

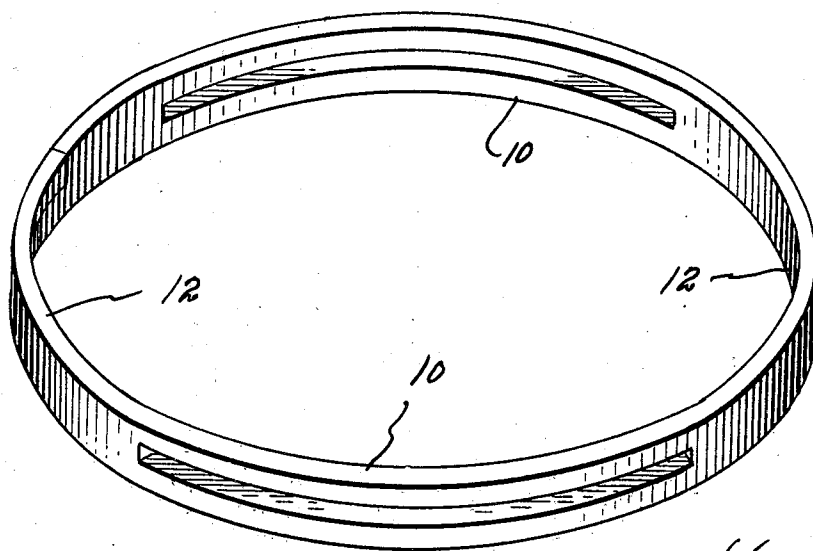


Fig. 1

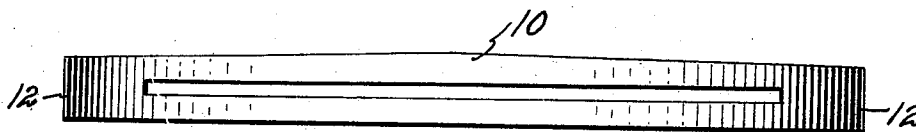


Fig. 2

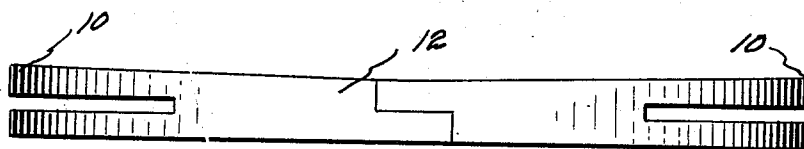


Fig. 3

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3 Sheets-Sheet 2

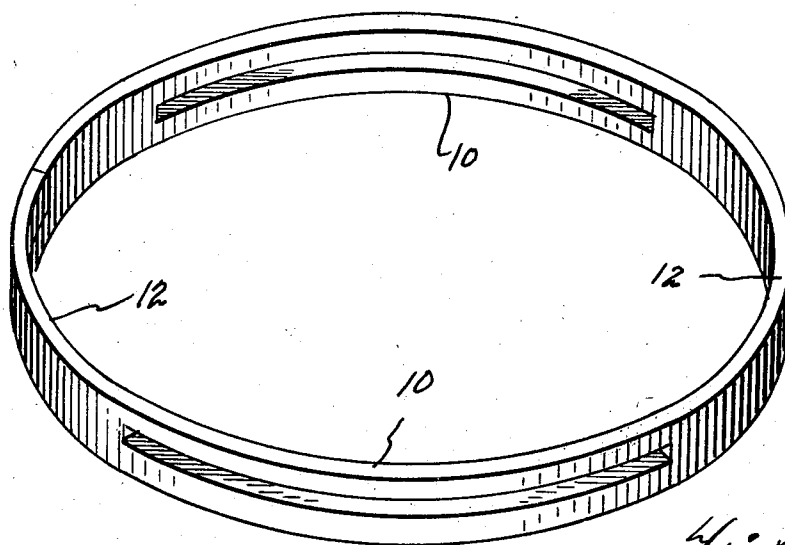


Fig. 4

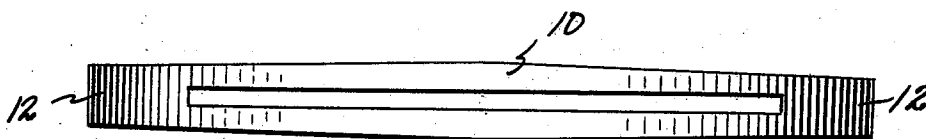


Fig. 5

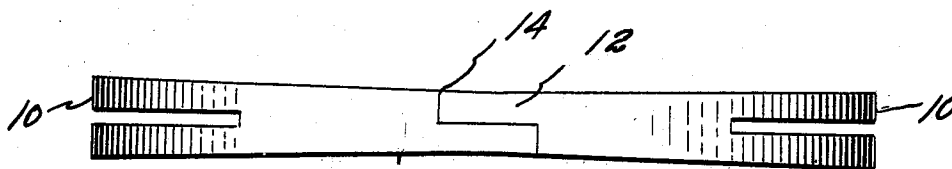


Fig. 6

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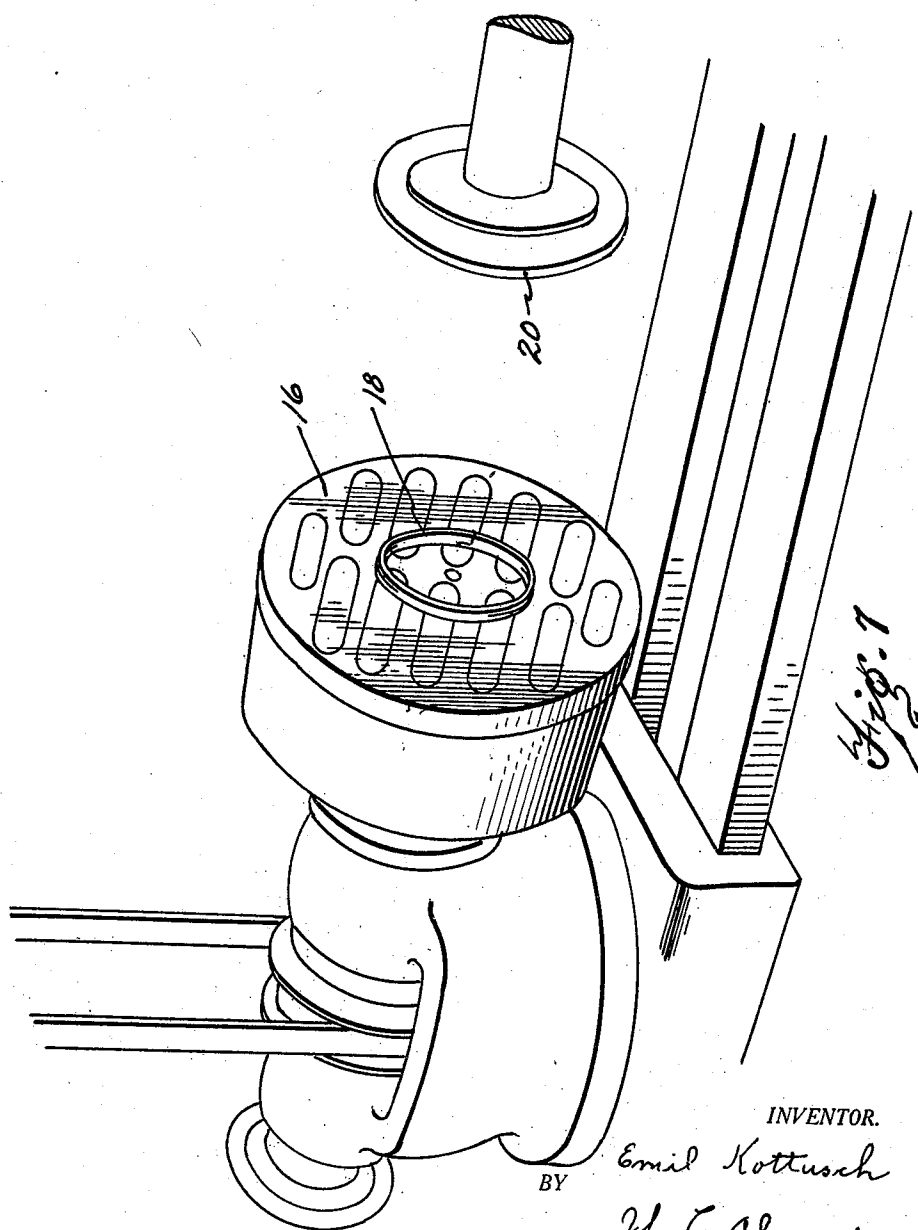
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3 Sheets-Sheet 3



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PROCESS OF MANUFACTURING PISTON RINGS

Application filed July 28, 1926. Serial No. 125,459.

My invention relates to an improved process of manufacturing piston packing rings.

The main object of the present invention is to provide an efficient method whereby may be expedited the manufacture of a packing ring adaptable particularly for use in the grooves of an internal combustion engine piston and, which ring is so constructed that it yieldingly engages both the side walls of the groove within which it is seated, as well as against the wall of the cylinder, in a manner to prevent leakage of compression or oil pumping and accomplishes these desirable results without the employment of auxiliary spring devices of any character whatsoever.

As illustrated in the accompanying drawings, my improved packing ring is shown as provided with radially longitudinally slitted portions adjacent to the solid portions of the ring structure, which longitudinally slitted portions have an axial dimension greater than that of the solid portions so that when the packing ring is disposed within a groove of a piston the slitted portions of the ring snugly engage the side walls of the groove. A preferred construction is to provide opposed slitted portions separated by opposed solid portions and to so form each axial face of the ring that it tapers from a point midway each slitted portion to a point of least axial dimension midway each solid portion.

The object of the present invention is to provide a new method or process for making my improved packing ring, whereby its manufacture is greatly facilitated and cheapened and production increased through the development of the improved method of its construction which forms the subject of the present application, and which method or process consists in providing a ring blank with the desired number of longitudinally slitted portions, supporting this blank with one axial face upon a suitable support which is of such a character that the ring structure is subjected to the influence of a magnetic field whereby the slitted portion or portions of the ring are drawn together toward the supported axial face, and then passing a forming tool over the exposed axial face along a path paralleling an axial plane of the ring, said

tool removing material from the solid portion or portions of the ring in excess of that removed from the slitted portion.

The ring may then be reversed upon its support and the opposite axial face subjected to the same treatment, and upon the completion of the forming operations and the removal of the ring from said support, said ring will assume the form shown in Figures 5 and 6.

Other objects and advantages of my present improved method of manufacture will more fully appear from the following description, appended claims, and accompanying drawings, in which:

Figure 1 is a perspective view of my improved packing ring, illustrative of a step in the process of its manufacture;

Fig. 2 is a side elevation of the ring illustrating a further step;

Fig. 3 is a side elevation of the packing ring shown in Figure 2 and taken at right angles to that view;

Fig. 4 is a perspective view similar to that of Figure 1;

Fig. 5 is a side elevation illustrative of another step in the process;

Fig. 6 is a side elevation of the ring shown in Figure 5 and taken at an angle of 90° with respect thereto; and

Fig. 7 is a perspective view of suitable means for use in carrying out the process embodying the present invention.

In Figs. 1, 2, and 3, of the drawing I have shown my improved packing ring with one axial face only cut away to provide the slitted portions with a greater axial dimension than the solid portions, while in Figs. 4, 5, and 6, I have shown both axial faces of the ring so cut away.

In Figs. 1 and 4 I show a ring blank provided with longitudinally slitted portions 10 on opposite sides of a diameter of the ring. These slitted portions are separated by intervening solid portions 12. One of the solid portions is cut transversely in any desired manner as at 14 to make the split in the ring. The ring shown in Figures 1 and 4 has a substantially uniform axial dimension throughout its circumference.

It is my desire to so shape the ring structure that it will have a greater axial dimension midway the slitted portions than at the solid portions. This may be accomplished by grinding away either one or both of the axial faces of the ring as hereinafter described.

I have developed an improved method of shaping either one or both of the axial faces of the ring which consists in supporting the ring upon one axial face on a magnetic chuck structure indicated in Fig. 7 at 16, and the ring is indicated at 18 in this figure. The ring, under the influence of the magnetic field, responds in such a manner that the slitted portions of the ring are drawn together toward the chuck.

A forming tool 20 is then passed over the exposed axial face of the ring. The solid portions of the ring will, it will be apparent, be first engaged by the forming tool and a greater amount of material will be worn therefrom than from the slitted portions due to the fixed position of these portions. The forming operation may be continued as desired. Upon completion of the forming operation on the one axial face, the ring may be reversed upon its support and the opposite axial face similarly finished. It is optional whether or not both axial faces be treated in this manner. In Figs. 2 and 3 the completed ring structure shows solid portions 12 and slitted portions 10. In these figures of the drawing the slitted portions have been surfaced in the manner described on one axial face only. In Figs. 5 and 6 the complete ring structure illustrated shows solid portions 12 and slitted portions 10 which have been surfaced on both axial faces in the manner described.

What I claim is:

1. That step in the method of forming a packing ring with opposed radially longitudinally slitted portions of greater axial dimension than intervening solid portions, which consists in supporting the ring upon one axial face and subjecting the same on the side of said supported axial face to the influence of a magnetic field sufficient to draw the unsupported slitted portions of the ring toward the supported portions and toward the supported face, passing a forming tool over the exposed axial face of the ring along a path parallel to an axial plane of the ring to remove material from the solid portions of the ring in excess of that removed from the slitted portions and removing the ring from its support upon the completion of the forming operation.

2. That step in the process of forming a packing ring with a radially slitted portion of greater axial dimension than an adjacent solid portion, which consists in supporting the ring upon one axial face, subjecting the same while in place upon said support, to the

influence of a magnetic field sufficient to draw the unsupported part of the slitted portion of the ring toward the supported part, and then removing metal from the exposed axial face of the ring to form an axial face lying in a plane at right angles to the ring axis.

3. That step in the process of forming a packing ring with a radially longitudinally slitted portion of greater axial dimension than an adjacent solid portion which consists in supporting the ring upon one axial face within the influence of a magnetic field sufficient to draw the separate parts of the slitted portion of the ring together toward the supported face, passing a forming tool over the exposed axial face of the ring along a path parallel to an axial plane of the ring to remove material from the slitted portion of the ring in excess of that removed from the solid portion and removing the ring from the support upon the completion of the forming operation.

4. The method of forming an axial face of a ring having a radially longitudinally slitted portion so that such slitted portion of the ring will have an axial dimension greater than the axial dimension of an adjacent solid portion which consists in magnetically drawing the separate parts of the slitted portion toward each other and passing a forming tool over an axial face of the ring.

5. That method of forming an axial face of a packing ring having a radially longitudinally slitted portion adjacent to a solid portion so that such axial face will present an irregular contour, which consists in magnetically drawing one part of the slitted portion out of its normal axial plane and passing a forming tool throughout such normal axial plane over such axial face of the ring.

6. The herein described method of making piston rings, which consists in slitting a ring blank circumferentially into a succession of arcuate slots with interspaced unslit portions, and thereafter grinding one edge of the ring.

7. The herein described method of making piston rings, which consists in slitting a ring blank circumferentially into a succession of arcuate slots with interspaced unslit portions; and thereafter grinding one edge of the ring; while the opposite edge of the ring is supported against distortion or flexing.

8. The herein described method of making piston rings, which consists in slitting a ring blank circumferentially into a succession of arcuate slots with interspaced unslit portions, thereafter supporting the ring blank upon a flat surface and holding it in position on said surface by magnetism, and grinding the exposed edge of the ring while the ring is magnetically held in position.

9. The herein described method of making piston rings, which consists in circumferen-

5 tially slotting a ring blank to form therein a succession of arcuate slots with interspaced unslit portions, magnetically holding the thus slit ring for engagement with a flat unyielding surface, and grinding the exposed edge of the ring while thus held firmly in position.

10 10. The herein described method of making piston rings, which consists in slotting a ring blank circumferentially to form in the blank a succession of spaced apart arcuate slots, thereafter grinding one edge of the ring blank while magnetically acting upon the blank to draw those portions of the blank contiguous to the slots in a direction away from the grinding tool.

15 11. The herein described method of making piston rings which consists in forming in the circumference of a ring blank a succession of arcuate slots positioned with their contiguous ends spaced apart and the slots being of uniform width throughout, and thereafter surfacing one edge of the blank.

20 In testimony whereof, I sign this specification.

25 EMIL KOTTUSCH.

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