Dec. 2, 1930. T. E. McFALL 1,783,886

PISTON RING CASTING

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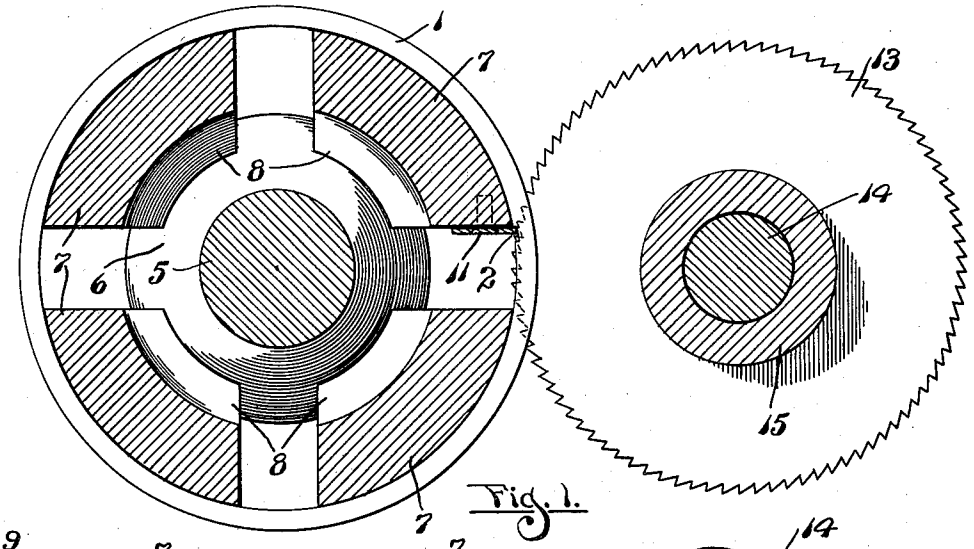


Fig. 1.

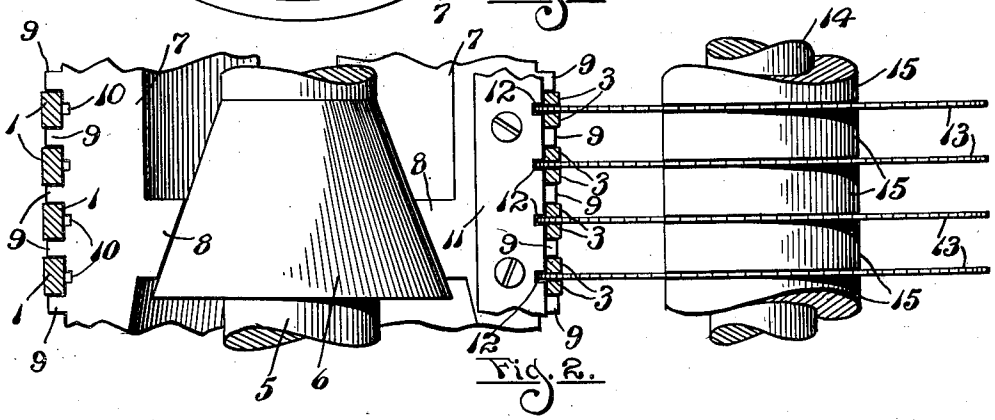


Fig. 2.

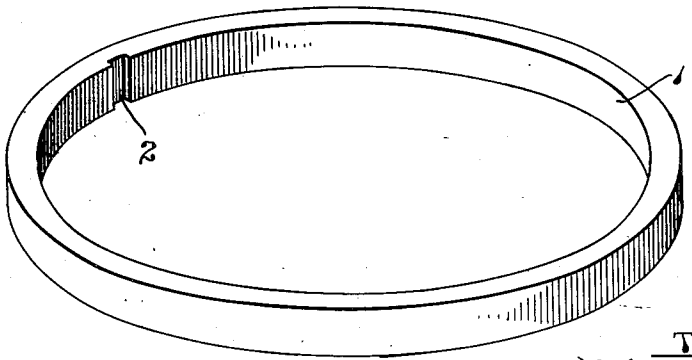


Fig. 3.

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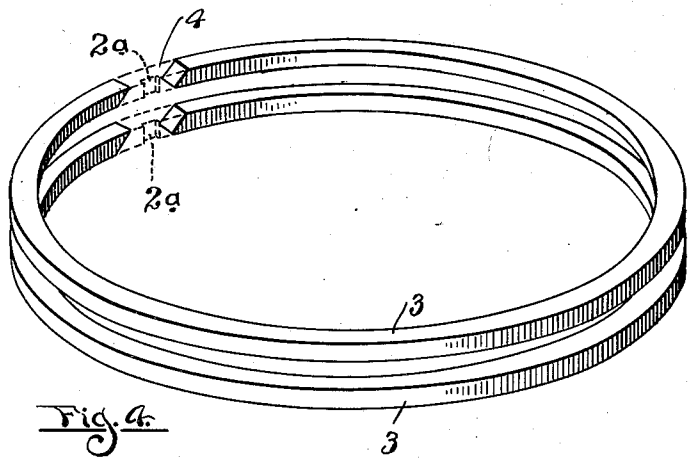


Fig. 4.

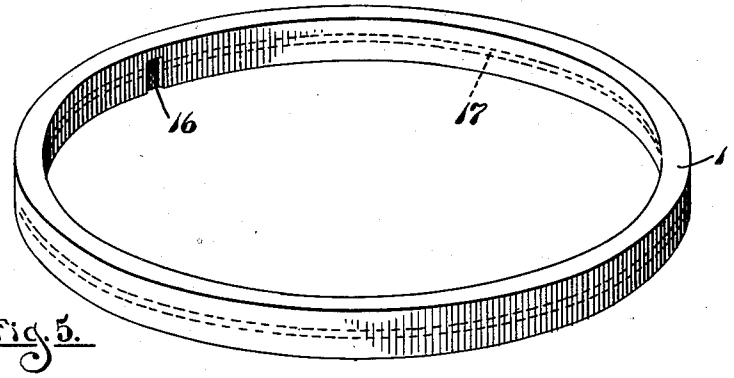


Fig. 5.

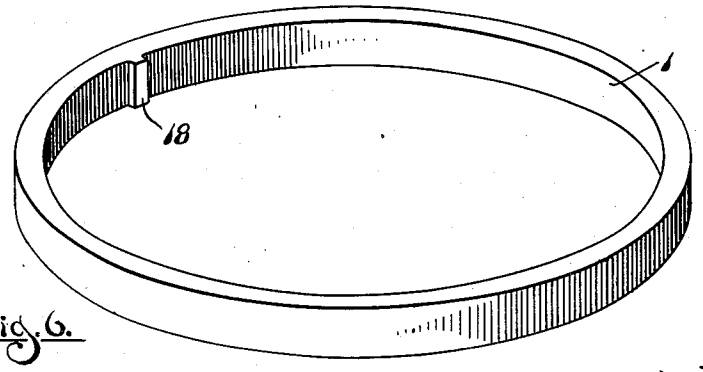


Fig. 6.

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UNITED STATES PATENT OFFICE

THURLOW E. McFALL, OF SPARTA, MICHIGAN

PISTON-RING CASTING

Application filed February 17, 1930. Serial No. 429,001.

This invention relates to piston rings, being more particularly concerned with a novel construction of piston ring casting.

I have heretofore made application for a patent on a process of piston ring casting which was filed March 5, 1929, Ser. No. 344,373. My prior invention was directed to the making of a piston ring casting of a width such that when it was cut or split midway between its opposite parallel flat sides two ring castings were produced from each of which a piston ring was readily made, both rings being of uniform character throughout and the defects, waste and the like coming from individually casting ring castings of the very narrow widths of rings now used thereby avoided, with an exceptional advantage from the standpoint of economy, and with a further advantage of elimination of combined carbon and iron hard spots either in the body or adjacent the surface of the ring casting, prevalent where the rings of narrow width are individually cast, and which serve to destroy machining tools and at the same time destroy the usefulness of the rings for internal combustion engine purposes.

The present invention is a further step in perfecting the invention I have previously made, above identified. Ring castings, as now almost universally made, are of an out-of-round character. The patterns for the ring castings, first of circular form, are parted at one side and segments or gap pieces, so called, inserted between the two ends of each of the ring patterns at the partings thereby distorting the patterns to an out-of-round condition. The ring castings made from a pattern of this type are accordingly out-of-round to the extent produced by the insertion by the segment or gap piece. In finishing the rings for use in internal combustion engines the castings have a part cut therefrom directly at said inserted segment of the pattern, reproduced in the casting; so that when the segment has been removed the ring casting may have its ends brought together and assume a perfectly circular form. It is of course to be understood throughout that the usual allowances for shrinkage of metal in cooling and for the machining operations required are made in producing the pattern for the ring casting.

My invention is directed to an exceedingly practical yet very simple improvement on the double ring castings whereby when the same are sawed or otherwise split midway between their flat sides, the two ring castings produced will be both marked at the proper places where the segment is to be removed. A further object of the invention is to provide the ring castings with this mark and make use thereof in maintaining a double ring casting against movement on the arbor which holds them during the sawing operation whereby a double ring casting is split midway between its parallel flat sides to produce two ring castings.

An understanding of the invention may be had from the following description taken in connection with the accompanying drawings, in which,

Fig. 1 is a partial vertical section and elevation showing the manner in which the ring castings may be split.

Fig. 2 is a partial plan and horizontal sectional view of the structure shown in Fig. 1.

Fig. 3 is a perspective view of the double ring casting of my invention.

Fig. 4 illustrates the same split midway between its parallel upper and lower sides, and indicates the segments removed therefrom to form the partings or gaps in the piston rings, and

Figs. 5 and 6 are perspective views, similar to Fig. 3, illustrating other forms in which the invention may be embodied.

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

The ring casting indicated at 1 in Fig. 3 is a casting which, when split midway between its upper and lower flat sides, provides two ring castings from each of which a piston ring may be made. In the preferred form of my invention at the inner side of the ring casting 1 a vertical groove 2 is made which extends the full distance between the upper and lower sides of the casting. This groove marks the place where the gap piece or segment is to be cut from the ring casting and is ordinarily disposed directly

at the gate where the molten metal passes into the ring shaped mold to make the casting. With a groove, such as indicated at 2, in the double ring casting thus made, when the casting is split midway between its sides it forms two rings 3 as shown in Fig. 4. In Fig. 4 there is also an indication of the segments or gap pieces as having been cut away and removed, the parts which are cut away being shown in dotted lines, and it is evident that both of the ring castings 3, formed by splitting a single ring casting 1, are marked at their inner sides with one-half of the groove 2, each half of the groove being shown in dotted lines in Fig. 4 at 2*a*.

Accordingly with my invention and with the marking grooves 2*a* at the places where the segments or gap pieces in the castings are to be removed, the ring castings 3 continue to be marked after they have been produced by splitting a double ring casting 1 and there is no danger of any loss of good ring castings from an inability to know where to remove the segment or gap pieces for the ring parting. It is further evident that in the matter of casting the ring castings 1, the groove is formed when the ring casting is molded and cast, it being evident that the pattern may be drawn upwardly from the sand, the pattern being grooved at its inner side similar to that in the casting at 2 which does not interfere with the sand of the mold when the pattern is drawn.

This form of ring casting has another very desirable utilitarian feature. In the splitting of the double ring castings *i* to two parts it is designed that they shall be placed around an expanding arbor structure and held thereon while the splitting of the double ring castings 1 is performed by a gang saw assembly. The arbor includes a longitudinal shaft 5 on which, at spaced apart points, enlarged cone sections 6 are provided. Around the central shaft are a plurality of separated expanding arbor members 7 lying parallel to the shaft 5 and formed at their inner sides with inwardly extending projections 8 having cooperating conical surfaces to bear against the conical part 6 of the shaft 5 (see Fig. 2). The outer sides of the expanding arbor members 7 present surfaces substantially sectors of a cylinder on which a plurality of ring casting receiving grooves are made between outwardly extending flanges 9; and at the bottom of the grooves are slots 10 the purpose of which will hereafter appear. The ring castings 1 may be placed over the expanding arbor members 7 when the arbor is collapsed and adjusted to the grooves between the flanges 9 and then, by expanding the arbor by a lengthwise movement of the shaft 5 or an equivalent lengthwise movement of the members 7, the rings are received in the grooves of the arbor members 7 and properly positioned for the action of the cutting saws thereon.

Metal saws acting upon the rings are liable to encounter some resistance and the friction is considerable, so that it is very desirable to hold the ring castings against any movement about the expanding arbor. To this end a flat metal plate 11 is connected to the arbor members 7 at a side thereof, as shown in Figs. 1 and 2, and projects a short distance beyond the bottoms of the groove in said section, the distance which it projects being substantially equal to the depth of the groove 2 in a ring casting 1. Therefore by locating the ring castings so that the grooves 2 are positioned at the outer edge of the plate 11, said plate enters the grooves and upon the expansion of the arbor the ring castings are held positively against any turning movement around the arbor. The outer edge of the plate 11 is formed with a plurality of spaced apart slots 12 which come into conjunction with the grooves 10 in the arbor member 7 to which it is attached.

The ring castings, after being placed upon the arbor and the arbor expanded, are split midway between their flat sides preferably by the gang saw construction wherein a plurality of metal saws 13 are located around a shaft 14 and spaced from each other by collars 15 around the shaft. In practice these collars 15 may extend out further than shown in the drawing, or so that when the saws pass through the ring castings the outer curved surface of the collars will be spaced only a very short distance from the outer curved surfaces of the castings. The grooves 10 and 12 in the arbor members 7 and in the plate 11 respectively are for the purpose of permitting the saws to pass completely through the ring castings 1 and divide the same without sawing into the arbor 7 and the plate 11.

It is therefore evident that a double ring casting such as indicated at 1 formed with a groove at its inner side like that indicated at 2 is of great value in the practical production and machining operations required to divide a double ring casting into two practical piston ring castings of narrow width.

Fig. 5 shows a slight modification of the structure from that shown in Fig. 3 in that the groove at 2 does not extend entirely to the upper side of the double ring casting 1. The groove 16 there shown extends from the lower side of the ring casting more than one-half the distance to the upper side so that when the casting is divided on the dotted lines indicated at 17 both ring castings produced will still have an indicating mark thereon to tell where the segment or gap piece should be cut away. The invention accordingly is in no sense limited to the marking groove at the inner side of the ring extending the full distance between the opposite flat sides of the ring; but it is only

necessary that it shall extend far enough that both halves 3 of the double ring casting 1 still carry a proper mark for guidance in the further manufacturing process.

In Fig. 6 instead of a groove 2 there is shown a projection 18 which also may extend either the full height of the ring or only a part of the height of the same as the slot 16 does in Fig. 5; and it is also apparent that whether the marking device be on the inner or on the outer side of the ring it is also comprehended by my invention. In fact the invention is not to be restricted to specific structural details disclosed but is to be comprehensive of all forms coming within the scope of the claims appended hereto which define the invention.

I claim:

1. A piston ring casting adapted to be split between its opposed parallel sides into two ring castings, said piston ring casting at a side thereof having a marking means extending from one side of the casting across the plane in which the casting is split to make two ring castings, for the purposes described.

2. A piston ring casting adapted to be split substantially midway between its opposed flat sides to make two ring castings, and a marking means on said ring casting at each side of a central plane located substantially midway between the opposite flat sides of the ring casting, whereby when the ring casting is split into two parts each part thereof will carry a marking indication, for the purposes described.

3. A piston ring casting having a groove at one point at its inner side, said groove extending from one flat side of the ring casting to the other parallel flat side thereof.

4. A piston ring casting having a transverse groove at a point at its inner side extending from the lower flat side of the casting to and across a plane midway between the upper and lower flat sides of the ring casting.

5. A piston ring casting having a groove at one point at a curved side thereof, said groove extending from one flat side of the ring casting to the other parallel flat side thereof.

6. A piston ring casting adapted to be split between its opposite parallel sides into two ring castings, said piston ring casting having marking means appearing at both sides of the splitting plane and said marking means extending into a different plane than the surface on which it is located.

7. A piston ring casting adapted to be split between its opposite parallel sides into two ring castings, said piston ring casting having a rib appearing at both sides of the splitting plane.

8. A piston ring casting adapted to be split between its opposite parallel sides into two ring castings, said piston ring casting having a groove appearing at both sides of the splitting plane.

In testimony whereof I affix my signature.

THURLOW E. McFALL.