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J. W. PRICE, JR
SEGMENTAL PACKING RING
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2,375,869

Fig. 1.

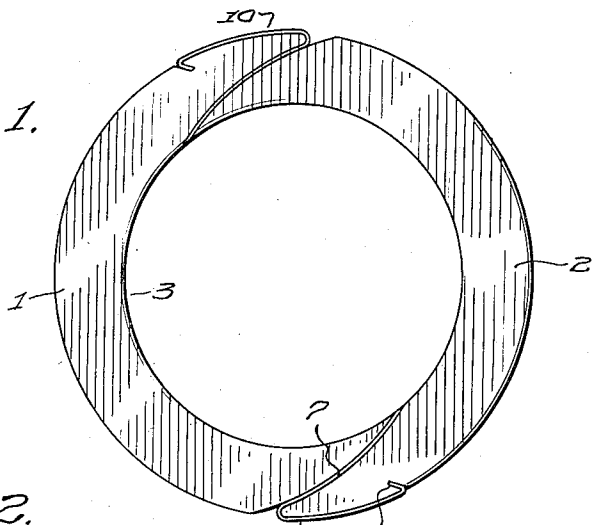


Fig. 2.

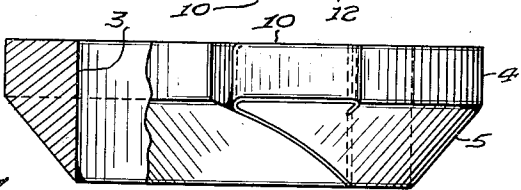


Fig. 3.

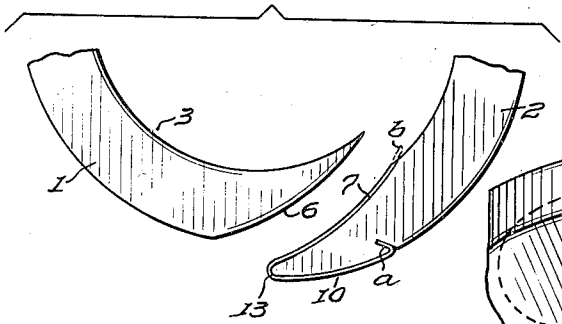


Fig. 4.

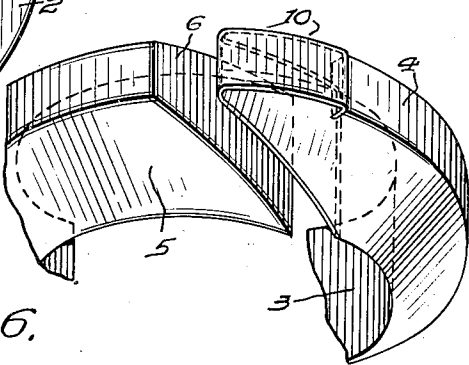


Fig. 5.

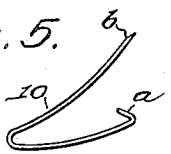
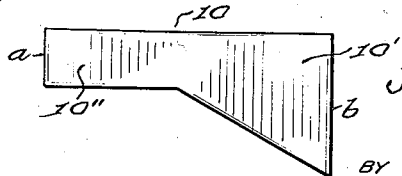


Fig. 6.



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SEGMENTAL PACKING RING

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Application November 20, 1943, Serial No. 511,188

1 Claim. (Cl. 288—13)

My invention relates to that class of metallic packing rings comprising a plurality of cooperative segments and is of particular advantage in, although not confined to, rings of the type disclosed in U. S. Patent 914,426, granted March 9, 1909, to C. W. G. King which since their invention have gone into extended use, being employed for packing, among other things, the piston rods of locomotives for which purpose they are especially well adapted. These rings comprise a plurality, usually a pair, of segments each of which is provided proximate one end with a convex outer surface and proximate its other with a concave inner one which when the ring is assembled overlaps the convex surface on the adjacent segment, the segments as a whole thus forming the complete ring. In use the ring is applied about the rod and so mounted and arranged in a supporting structure that as wear takes place between the inner surface of the ring and the rod the interfitted concavo-convex surfaces of the segments are supposed to gradually and progressively move relatively to each other and thereby decrease the internal diameter of the ring to constantly maintain a steam tight joint with the rod. In practice, however, this result is not always completely and adequately attained by reason of the fact that the mutually engaging surfaces of the segments frequently tend to gall and seize and when this occurs to any marked extent the requisite free sliding movement between the segments is partially or sometimes wholly interrupted and the ring thus prevented from properly closing about the rod to compensate for wear, which results in leakage between the ring and the rod.

This difficulty with rings of the type to which my invention relates doubtless arises in some part at least from the fact that all the interfitted segments are made of the same relatively soft metal, usually a mixture of lead and copper, which affords an extremely satisfactory bearing surface with the steel piston rod but an unsatisfactory one with itself.

Various attempts have therefore been made to overcome the galling and seizing of the contacting surfaces of the ring segments but as far as I am aware none of them has been fully satisfactory. Thus, for example, one or both of the said surfaces have been sprayed or plated with various metals such as Monel metal but the coatings applied in this way do not adhere with sufficient tenacity and so peel off or form balls or granules between the segments which score their surfaces and inhibit relative free sliding movement between them.

A principal object of the invention therefore is to provide an improved segmental packing ring comprising simple and effective means for preventing galling or seizing of the ring segments and assuring proper freedom of movement between them as the ring as a whole is gradually constricted about the rod with which it is associated.

A further object is the provision of a ring which can be manufactured at substantially the same cost as the rings of ordinary construction and corresponding size and which can be employed in lieu thereof without necessitating any changes in the ring supporting mechanism of the machine of which the ring forms a component operative part.

Other objects, advantages and novel features of design, construction and arrangement comprehended by the invention are hereinafter more particularly pointed out or will be apparent to those skilled in the art from the following description of one embodiment thereof as comprised in a ring of the general character disclosed in the said King Patent 914,426 and illustrated in the accompanying drawing.

In the said drawing,

Fig. 1 is a plan view of the assembled ring;

Fig. 2 is a side elevation thereof partly broken away into radial section;

Fig. 3 is a fragmentary view showing the cooperating ends of two of the segments slightly separated;

Fig. 4 is a fragmentary perspective view likewise showing the ends of two segments slightly separated;

Fig. 5 is an end view of one of the shims hereinafter described as it would appear if removed from the segment end; and

Fig. 6 is a side elevation of the shim as it is cut from the sheet.

The same parts are correspondingly designated in the different figures.

As shown, the ring comprises a pair of inter-fitting similar segments 1, 2 although it may comprise a greater number, the segments being so constructed that when assembled in operative relation they form a complete ring as shown in Figs. 1 and 2, providing a central bore 3 surrounded by a cylindrical portion 4 and a conical portion 5 in the customary manner.

Each segment is formed to provide at one end a convex face or surface 6 extending from the periphery of the segment to its inner cylindrical surface and at its other, a generally similar but concave surface 7 likewise extending from the

periphery to the inner surface and adapted to overlie surface 6 when the ends of the two segments are in juxtaposed relation after the segments are assembled.

As so far described the ring is therefore of customary construction and, when assembled about a rod or shaft, the interfitting concavo-convex end surfaces of the segments are designed to slide on each other as wear takes place between the bore of the ring and the rod so as to maintain the ring properly constricted at all times about the latter and inhibit the passage of steam or other fluid along the rod past the ring. But, as hitherto explained, the relative freedom of movement between the segments requisite for satisfactory accomplishment of this function is frequently unattained because of galling or seizing of the mutually engaging surfaces of the segments.

In accordance with my invention I attach to that end of each segment proximate its concave surface 7 an element 10 formed of sheet metal which for convenience I term a shim although its function is not strictly that of the articles which are normally characterized as such. This shim is of composition other than that of the segment and I prefer to make it of sheet copper since that metal gives most satisfactory results in practice, but other metals can be utilized if desired. Sheet copper is considerably harder than the lead-copper mixture of which the segments are usually formed yet not hard enough to injure the rod or shaft with which the ring is associated if it contacts therewith, so if some metal other than copper be employed it should be of a character such that it will neither be injuriously affected by steam or comparable fluids nor tend to score the rod to an appreciable extent.

The shim is cut from the sheet substantially to the shape shown in Fig. 6 and comprises a facing portion 10' which generally conforms in shape to the concave surface 7 on the segment and an anchoring portion 10'' which approximates in width the peripheral surface of the cylindrical part 4 of the latter. Optimum results are obtained when the shim is made relatively thin, for example .015", as the wear on its facing part is substantially negligible and thus no advantage is attained by utilizing materially thicker metal.

Suitable means are provided for anchoring the shim in proper position on the segment and to this end I prefer to provide the peripheral surface of the cylindrical part 4 with a transverse saw cut or other suitable slot 12 directed more or less toward the proximate end of the ring to which the shim is to be applied and thus in a non-radial direction, this slot being adapted to receive the extremity *a* of the anchoring portion 10'' of the shim which is forced into the slot and the sides of the latter then swaged down with a few light hammer blows. The body of the shim is then bent around the segment so as to bring the rest of the anchoring portion 10'' along its peripheral surface, thence over the end of the segment which is preferably slightly rounded as at 13, and finally over the concave face 7 in such manner that the shim will snugly hug the underlying portions of the segment. If preferred, however, the shim may first be bent approximately to final form as shown in Fig. 5 and then slid edgewise over the end of the segment with the extremity *a* of the anchoring portion in the slot and the walls of the latter then constricted as

just described so as to hold the shim firmly in place.

In practice the shim is preferably initially cut slightly larger in all directions than the surfaces of the segment which it is ultimately designed to overlie and trimmed off along its edges after it is secured in place so it will not overhang any portion of the segment, this trimming of all but the inner edge *b* of the shim being most conveniently effected when the ring is assembled and its outer surfaces turned to final size by the manufacturer. Normally, however, the interior of the ring is not then finished but is later bored out by the user to conform to the exact diameter of the rod with which the ring is to be associated and thus the edge *b* of the shim is allowed to extend somewhat into the bore, as indicated in dotted lines in Fig. 3, until it is finally fitted to the rod during which operation the projecting portion is of course removed.

It will now be apparent that when the segments are assembled that portion of the shim overlying the concave surface 7 of each segment engages the convex surface 6 of the proximate segment and as the shim is positively anchored to the segment to which it is attached the sliding movement between the two segments as the ring is constricted takes place between the shim and said convex surface.

As has been definitely demonstrated in actual practice, objectionable galling and seizing between the surfaces is thus reduced to a negligible degree or entirely obviated, the convex surface of each segment moving freely and smoothly on the concave surface of the shim on the adjacent one until the ring is worn so thin as to be no longer serviceable. In fact on locomotive piston rods and under similar operating conditions rings embodying my invention have shown upwards of three times the service life computed in locomotive miles of operation of ordinary rings of similar type. Thus the invention not only materially reduces the expense entailed in the purchase and installation of new rings but lessens the time in which the locomotive is out of service during a given period because of the necessity for ring replacement.

It may be noted at this point that the ring segments do not wear equally throughout the area in contact with the rod and thus decrease in radial width at a constant rate; on the contrary, the greatest wear takes place at the ends proximate their convex extremities and progressively decreases toward their other ends, with the result that ultimately the radial width of each segment at the intersection of its surface 6 with its peripheral surface is materially less than at the inner end of its concave surface 7 whereby as termination of the service life of the ring approaches a considerable part of the facing portion of each shim is entirely out of contact with what remains of surface 6 of the adjacent segment.

While I have herein described and illustrated with considerable particularity one embodiment of my invention which has proved eminently satisfactory in practice, I do not thereby desire or intend to specifically restrict myself thereto or to its use with rings of any particular type, while various changes and modifications may be made in the form, construction and assembly of the various elements if desired without departing from the spirit and scope of the invention as defined in the appended claim.

Having thus described my invention, I claim

and desire to protect by Letters Patent of the United States:

A segmental soft metal packing ring, each segment of which comprises a convex outer surface proximate one end and a concave inner surface proximate the other end, the concave surface of each segment overlapping the convex surface on the adjacent segment for relative movement therebetween to compensate for progressive wear in the bore of the ring during use, said ring having a cylindrical portion and a conical portion and provided in its cylindrical portion in each

segment with a slot extending inwardly from the peripheral portion towards the concave surface of the same, and a sheet metal shim of substantially harder metal than that of the packing ring and consisting of a tapering facing portion overlying and conforming substantially to the configuration of said concave surface, and an oblong anchoring portion overlying the periphery of the segment at said cylindrical portion and extending into said slot to anchor the shim to the segment.

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