

1

2

2,926,970

JOURNAL-BEARING ASSEMBLY

Earl J. Clark, Indianapolis, Ind., assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware

Application February 20, 1956, Serial No. 566,460

8 Claims. (Cl. 308—83)

This invention relates generally to journal-bearing assemblies and more particularly to an assembly adapted for use on railroad freight cars. This invention is a continuation-in-part of that covered in my co-pending application, S.N. 529,625, filed August 22, 1955, now Patent No. 2,890,086 dated June 9, 1959.

The journal-bearing assembly disclosed in my co-pending application, S.N. 529,625, is particularly valuable for use on railway passenger cars wherein the construction of the truck is such that control of the lateral motion of the journal is required in only one direction, it being thus possible to use but a single thrust surface. The problem encountered in application to railway cars such as freight cars wherein thrust is encountered from two directions is much more complex.

In freight car construction it is common for the trucks to be assembled with side frames and bolster frames, components connecting the two side frames, in a very loose construction thus making it necessary for the bearing-journal assembly to incorporate stops on each end of the bearing to avoid excessive lateral movement of the side frames of the truck. Likewise, the pumping action of the journal in the bearing increases the tendency for loss of oil through the housing seals at the same time that the problems of stress absorption and lubrication are increased.

It is therefore an object of my invention to provide an improved bearing-journal construction wherein proper alignment between the parts is maintained at all times; it is a further object of my invention to provide an improved construction in which relatively movable parts are easily removed and replaced; it is a further object of my invention to provide a construction having improved lubricating means; it is a further object of my invention to provide an improved assembly permitting the several separate chambers to "breathe" freely to preclude loss of lubricant due to pumping action of the journal while at the same time preventing entrance of dirt to the assembly housing.

These and other objects of my invention are attained by positioning the bearing between a pair of separated thrust members, means being provided in the assembly for lubrication of the bearing at a plurality of spaced apart points, the chambers formed at the inner and outer ends of the journal being interconnected and accessible to a breather opening in the housing.

The objects and advantages of my invention will be apparent from the description which follows as read in connection with the drawing in which Figure 1 is a longitudinal section with parts broken away through a journal-bearing assembly taken on line 1—1 of Figure 2, Figure 2 is a cross-sectional view on line 2—2 with Figure 1, Figure 3 is an enlarged fragmentary view in section on line 3—3 of Figure 1.

In the drawing, an axle 1 having a journal portion 2 is rotatably supported within a bearing 3. A housing 5 surrounds the journal-bearing assembly and is provided with an annular oil seal 7 at its inner end in order to preclude

the loss of lubricant from the rear thereof. As shown on the drawing, the seal 7 contacts the smooth peripheral surface of a thrust ring for extending the life of the seal. The outer end of the housing 5 is provided with a cover plate 9 which is removably secured to the housing by means of a plurality of retainers such as threaded bolts 11. The housing 5 is provided with a plurality of cooling fins 13, shown on the drawing as being formed on the cover plate 9, in order to more readily dissipate heat formed in the bearing thus minimizing the occurrence of an over-heat condition known as "hot-box." The housing is likewise provided with a breather opening 15, shown as being formed in the cover plate 9, for the purpose of permitting the free movement of air into and out of the housing. A filter 17 is positioned within the opening 15 in order to preclude the entrance of dirt into the housing while at the same time acting as a baffle and separator for minimizing the loss of lubricant from the housing in the breathing operation. As shown on the drawing, a removable plug 19 is provided in the cover plate 9 to enable the addition of lubricant to the housing. Likewise, a sealing gasket 21 is positioned between the body 23 of the housing and the cover plate 9.

As is shown in Figures 1 and 2, the end of the axle 1 journaled within the bearing 3 is provided with a hardened wear-resistant surface, shown on the drawing as a sleeve member 25. The outer end of sleeve 25 extends beyond the end of the axle 1 for a purpose more fully set forth hereinafter, the sleeve being positioned on the journal so as to be rotatable therewith. Though this may be accomplished in any suitable manner, I have found this to be achieved simply and inexpensively by shrink-fitting the sleeve on the journal. A secondary mechanical lock may be used between the members in a manner disclosed hereinafter in order to safety the connection therebetween.

The end play of the journal within the bearing is limited by the provision of a pair of stops positioned on the journal end of the axle 1, operative on the inner and outer ends of the bearing 3. As shown on the drawing, a thrust ring 27 is shrink-fitted on the inner end portion of the journal 2 in such position as to present a hardened face 29 spaced apart from and adapted for cooperative action with the inner end 31 of the bearing 3. Similarly, a thrust plate 33 is removably secured on the outer end of the axle 1 by means of a plurality of bolts 35, the bolts being safetied against loosening under operating conditions by any suitable means such as lock washers 37. The hardened thrust surface 39 of thrust plate 33 is likewise spaced apart from the adjacent outer end surface 41 of the bearing 3 in order to permit a controlled amount of end play, the desired spacing being obtained by a spacer plate 43 positioned between thrust plate 33 and the end surface of the journal 2. A plurality of spaced apart ears 45 are formed on the periphery of the plate 43 in such position as to engage with receiving slots formed in the outer end portion of the sleeve 25 extending beyond the journal end surface. In this manner, the sleeve 25 is mechanically locked and safetied to the journal.

The lubrication of the contacting surfaces of the bearing 3 and the sleeve 25 is achieved in the manner clearly shown in Figures 1 and 2. As shown on the drawing, an opening 47 is provided in the lower portion of the bearing 3, the opening extending longitudinally between end portions of the bearing. A wick-type lubricator 49 is positioned within the lower portion of the housing 5 and extends from the lubricant reservoir therein through the opening 47 into contact with the surface of sleeve 25, lubricant being drawn up through the wick material by capillary action. As shown in Figures 1 and 2, the lubricator 49 consists of a plurality of felt pads 51 positioned within a holder 53, the bottom portion of the pads

extending through the holder into the lubricant. A plurality of separator plates 55 are positioned between the separate pads, the combination of pads and separator plates being retained in fixed position within the holder by a means of a pair of tubular rivets or pins 57 extending between the ends of the holder. The lubricator is maintained against the sleeve with a desired amount of pressure by means of a plurality of springs 59.

Similarly, lubrication of the thrust surfaces 29 and 39 and of the end surfaces 31 and 41 of the bearings is obtained by means of wicking-type lubricators. As shown in Figure 1, wicks 61 and 63 extend from the lubricant reservoir in the bottom portion of the housing 5 up into grooves 65 and 67 formed, respectively, in the lower end surfaces 31 and 41 of the bearing 3. The wicks 61 and 63 are removably retained within grooves 65 and 67 by means of a snap-in tie clip 69, the sides of which clamp into the wicks, as shown in Figure 3. In this manner, the lubricators are maintained in operative position while at the same time being readily removable for replacement.

Excess lubricant from the thrust ring 27 and the bearing end surface 31 is collected in an annular channel 71 formed at the inner end of the housing by the housing 5, the oil seal 7, the thrust ring 27, and bearing 3. The lubricant collected in this manner is conducted into the lower portion of housing 5. In order to preclude the loss of lubricant from channel 71 due to pumping action caused by axial movement of the journal in the bearing 3, I have found it necessary to interconnect the channel 71 with the chamber formed at the front portion of the housing which front chamber is vented through opening 15 formed in the cover plate 9 of the housing. As shown in Figures 1 and 2, this interconnection is made possible by providing interconnecting channels 73 in the bearing member 3.

As is clearly disclosed on the drawing, the bearing 3 is in intimate contact with the housing 5 over the greater portion of its surface. In this manner the dissipation of heat generated in the bearing is greatly facilitated. As is shown in Figure 2, the bearing 3 is locked to the housing 5 by means of a pair of steel dowel members 75. Both the bearing 3 and the housing 5 are provided with correspondingly positioned openings for the reception of the dowels 75. Inasmuch as the bearing 3 must withstand thrust from two directions in addition to withstanding the frictional drag due to the rotation of the journal 2 therein, the dowels 75 are relatively large diameter members and are so dimensioned as to extend through substantially the whole thickness of the bearing. However, since the opening in the bearing extends completely through the member, it is apparent that a chamber 77 is formed within the opening between the sleeve 25 and the inner end of the dowels 75. These chambers 77 function as reservoirs for excess lubricant and lubricant vapors thus assuring adequate lubrication of the journal. As shown on the drawing, each dowel 75 is provided with an O ring seal 79 which serves to preclude the loss of the lubricant through the dowel openings. Member 81 is a wedge device to hold the housing 5 against rotational movement.

From the foregoing it will be apparent that the present construction incorporates a housing having a removable cover plate, which housing surrounds the journal. Loss of lubricant from the housing is substantially eliminated by the provision of oil seals between the housing and the axle, as well as between all separate and separable portions thereof. The use of an annular bearing maintains proper journal and bearing alignment as distinguished from conventional designs which incorporate a sectional, pad-type, bearing in which the journal is free to roll out of the bearing under impact conditions. The use of a hardened and replaceable sleeve substantially reduces wear and scoring of the journal. Effective lubrication of the bearing is achieved by means of a wick maintained in contact with the journal under controlled pressure. Adequate lubrication is assured by the pro-

vision of auxiliary oil reservoirs positioned about the surface of the journal. Journal end play control is achieved through the use of a pair of spaced apart, hardened thrust members operating on the ends of the bearing, the thrust surfaces being lubricated by readily removable wicks. A cool running bearing is achieved through the use of an annular bearing having a large area of contact with the housing for good heat transfer between the members, the removal of heat from the housing being facilitated by the use of heat dissipating fins on the housing. The proximity of lubricant to the bearing and the splashing of lubricant thereon likewise aids in the transfer of heat from the bearing to the housing. The loss of lubricant from the housing is further minimized through the use of a breather opening in the housing, the separate chambers within the housing which are open to pumping action of the axle being interconnected and open to the breather opening to minimize pressure differentials.

While I have disclosed my invention in terms of a preferred embodiment, it should be understood that such modifications thereof as may be apparent to those skilled in the art are within the intended scope of the claims which follow.

What is claimed is:

1. A journal and bearing assembly comprising an axle, a journal on said axle having a hardened wear-resistant sleeve secured thereon, a bearing positioned about said sleeve, the lower portion of said bearing having an opening therein, a lubricator positioned in contact with said sleeve through said opening, a thrust ring positioned adjacent the inner end of said journal, a thrust plate positioned adjacent the outer end of said journal, said bearing being positioned between said ring and said plate with the ends thereof in alignment with a corresponding surface of said ring and said plate, a housing surrounding said journal, bearing, and lubricator, an oil seal provided between the inner end of said housing and said axle to preclude loss of lubricant, filter means provided in an opening in said housing to enable breathing action between the interior of said housing and the atmosphere, said filter means being interconnected with the separate chambers formed within said housing, a pair of lubricators positioned within said housing adjacent the thrust surfaces of said ring and said plate for lubricating said surfaces, and a retainer clip secured to the upper end of each said ring and plate lubricators, said clip and lubricator being adapted to be positioned within a groove formed in the lower end surface of said bearing.

2. A journal and bearing assembly comprising an axle, a journal on said axle having a hardened wear-resistant sleeve secured on the surface thereof, an annular bearing positioned about said sleeve, the lower portion of said bearing having an opening therein, a wick-type lubricator positioned in contact with said sleeve through said opening, a thrust ring positioned on said axle adjacent the inner end of said sleeve, a thrust plate positioned on the outer end of said journal, a spacer plate interposed between said thrust plate and the end of said journal, at least one ear formed integrally with said spacer plate and engaged with correspondingly positioned slots formed in the end of said sleeve, said bearing being positioned between said ring and said plate with the ends thereof in alignment with a surface of said ring and said plate, a housing surrounding said journal, bearing and lubricator, an oil seal provided between the inner end of said housing and said ring to preclude loss of lubricant, a filter provided in an opening in said housing to permit the passage of air therethrough while retaining lubricant in the housing, a pair of wick-type lubricators positioned within said housing adjacent the thrust surfaces of said ring and said thrust plate for lubricating said surfaces, a spring clip secured to the upper end of each said ring and plate lubricators, said clip and lubricator being adapted to be snapped into position within a groove

5

formed on the lower end surfaces of said bearing, and said bearing being provided with at least one passage extending from end-to-end thereof for the purpose of interconnecting the chambers formed at the inner and outer ends of said housing and separated by said bearing.

3. A journal and bearing assembly as set forth in claim 1 wherein said housing and said bearing are provided with axially aligned openings, a dowel extending through the aligned openings to interconnect the bearing with the housing and prevent relative rotational and longitudinal movement therebetween, the inner end of said dowel being spaced from the surface of said sleeve thus forming a lubricant reservoir in said bearing to insure adequate lubrication.

4. A journal and bearing assembly comprising an axle, a journal on said axle having a hardened wear resistant surface, a bearing positioned about said surface, means for applying lubricant to said journal, a pair of spaced apart hardened thrust members on said axle, said bearing being positioned about said journal between said thrust members with the ends thereof in alignment with a surface of said thrust members, a housing surrounding said journal, bearing, lubricating means and thrust members, an oil seal provided on the inner end of said housing and cooperating with said axle to preclude the loss of lubricant from said housing, and wick-type lubricators retained in respective spring clips adapted to be snapped into position in grooves formed in the lower end surface of said bearing for applying lubricant to the surface of each thrust member in alignment with the ends of said bearing.

5. A journal and bearing assembly comprising an axle, a journal on said axle having a hardened wear resistant surface, a bearing positioned about said surface, the lower portion of said bearing having an opening therein, means for applying lubricant to said journal through said opening, at least one hardened thrust member on said axle, the end of said bearing adjacent said thrust member being in alignment with the surface thereof, a housing surrounding said journal, bearing, lubricating means and thrust member, an oil seal provided on the inner end of said housing and cooperating with said axle to preclude the loss of lubricant from said housing, said housing being divided into separate chambers at the inner and outer ends of said journal, the chamber formed on the outer end of said journal being interconnected with the atmosphere to reduce pressure differentials between the interior thereof and the atmosphere, and a passage interconnecting said separate chambers formed within said housing to substantially preclude the formation of differential pressures therebetween, said passage extending through said bearing.

6. A device as set forth in claim 5 provided further with a lubricator positioned within a groove formed in the lower end surface of said bearing for applying lubricant to the surface of said thrust member in alignment with the end of said bearing, said lubricator being positioned in said groove to be radially co-extensive with and to contact the surface of said thrust member which contacts said bearing.

7. A journal and bearing assembly comprising an axle, a journal on said axle having a hardened wear resistant sleeve secured thereon, a bearing positioned about said sleeve, the lower portion of said bearing having an opening therein, a lubricator positioned in contact with said

6

sleeve through said opening, a thrust ring positioned adjacent the inner end of said journal, a thrust plate positioned adjacent the outer end of said journal, said bearing being positioned between said ring and said plate with the ends thereof in alignment with a corresponding surface of said ring and said plate, a housing surrounding said journal, bearing, and lubricator and being separated into two separate chambers, one chamber at the outer end of said journal and the other chamber at the inner end of said journal, an oil seal provided between the inner end of said housing and said axle to preclude loss of lubricant, an opening provided in said housing to enable breathing action between the interior of said housing and the atmosphere, a pair of lubricators positioned within said housing adjacent and radially coextensive with the thrust surfaces of said ring and said plate for contacting and lubricating the portion of said surfaces contacting said bearing, and said bearing being provided with at least two passages extending longitudinally thereof for the purpose of interconnecting said opening and the chambers formed at the inner and outer ends of said housing.

8. A journal and bearing assembly comprising an axle, a journal on said axle having a hardened wear resistant sleeve secured thereon, a bearing positioned about said sleeve, the lower portion of said bearing having an opening therein, a lubricator positioned in contact with said sleeve through said opening, a thrust ring positioned adjacent the inner end of said journal, a thrust plate positioned adjacent the outer end of said journal, said bearing being positioned between said ring and said plate with the ends thereof in alignment with a corresponding surface of said ring and said plate, a housing surrounding said journal, bearing, and lubricator and being separated into two separate chambers, one chamber at the outer end of said journal and the other chamber at the inner end of said journal, an oil seal provided between the inner end of said housing and said axle to preclude loss of lubricant, an opening provided in said housing to enable breathing action between the interior of said housing and the atmosphere, a pair of lubricators positioned within said housing adjacent the thrust surfaces of said ring and said plate for lubricating said surfaces, said bearing assembly being provided with at least one passage extending from end-to-end thereof for the purpose of interconnecting the chambers formed at the inner and outer ends of said housing, and a spacer plate between said thrust plate and the end surface of said journal in order to control the amount of end play in said assembly.

References Cited in the file of this patent

UNITED STATES PATENTS

274,159	Whiting	Mar. 20, 1883
1,251,183	Crist	Dec. 25, 1917
1,416,884	Schmidt	May 23, 1922
1,636,100	McCune	July 19, 1927
2,720,431	Browne et al.	Oct. 11, 1955
2,754,161	Bouvat-Martin	July 10, 1956
2,785,020	Browne	Mar. 12, 1957
2,827,343	Cox	Mar. 18, 1958

FOREIGN PATENTS

432,521	Great Britain	July 29, 1935
663,743	Great Britain	Dec. 27, 1951
1,081,818	France	June 16, 1954