April 20, 1954 G. F. COUCH 2,676,069

LUBRICATING MECHANISM FOR RAILWAY VEHICLE JOURNALS

Filed Aug. 28, 1950 3 Sheets-Sheet 1

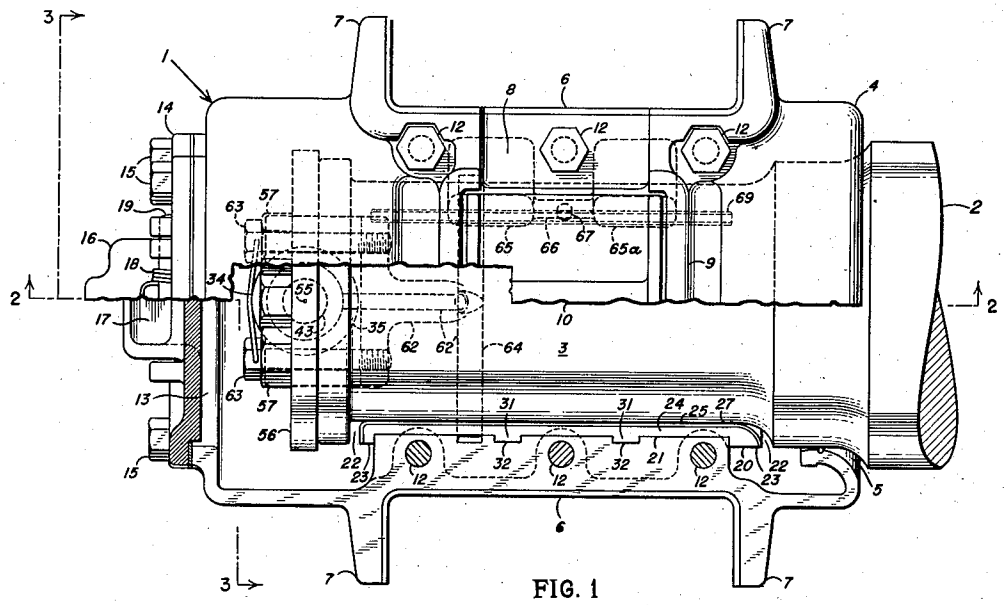


FIG. 1

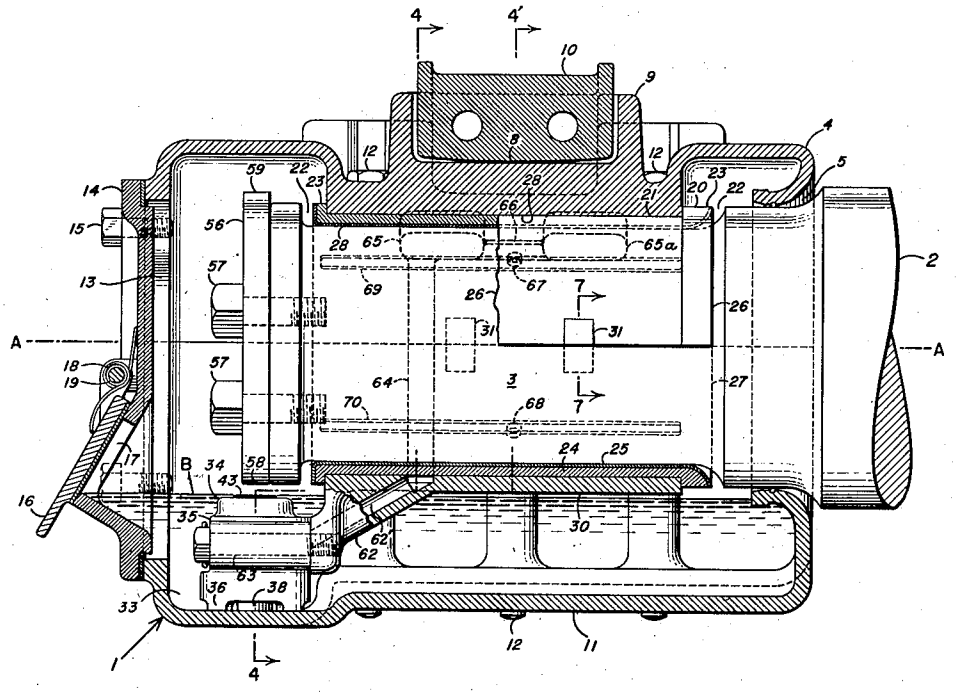


FIG. 2

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Filed Aug. 28, 1950 3 Sheets-Sheet 2

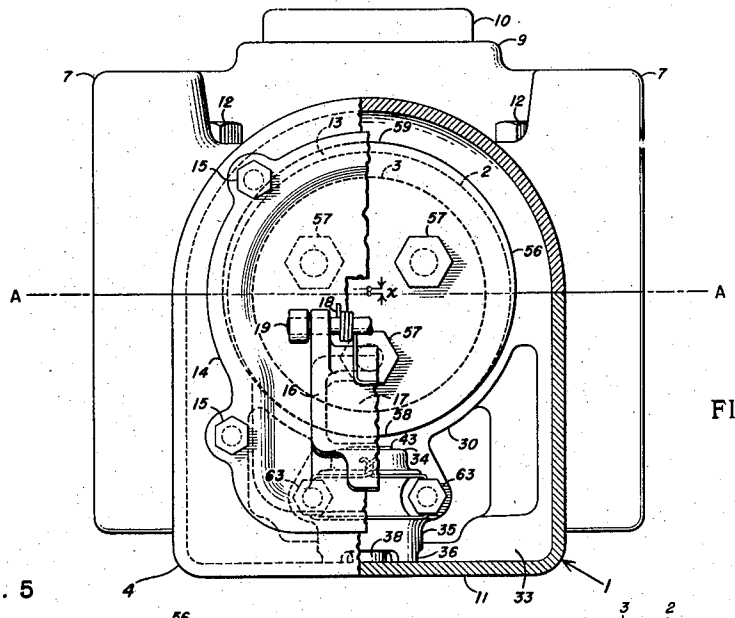


FIG. 3

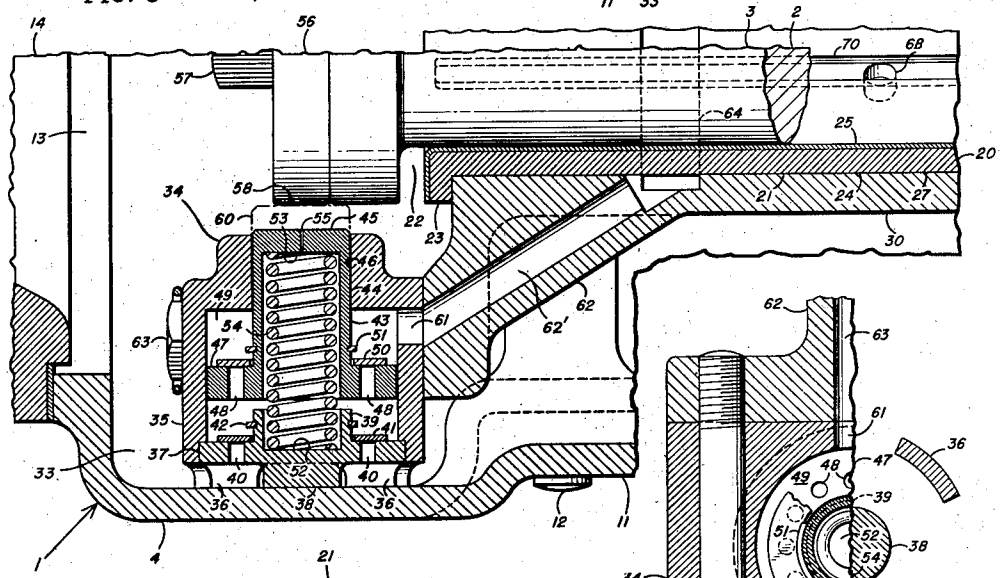


FIG. 5

FIG. 6

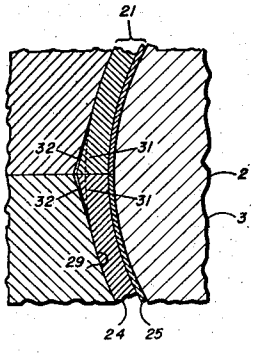


FIG. 7

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LUBRICATING MECHANISM FOR RAILWAY VEHICLE JOURNALS

Filed Aug. 28, 1950 3 Sheets-Sheet 3

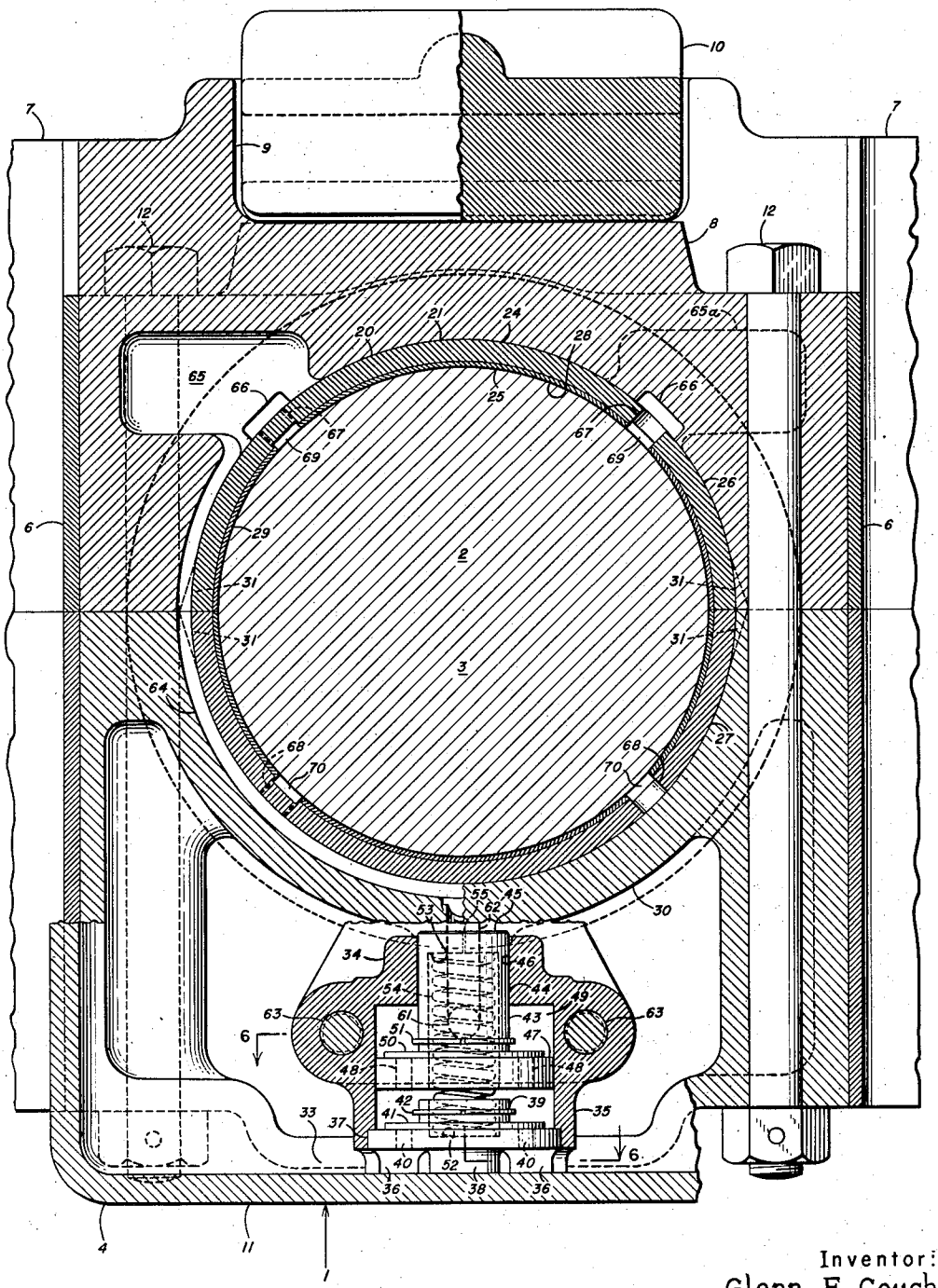


FIG. 4

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LUBRICATING MECHANISM FOR RAILWAY VEHICLE JOURNALS

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Application August 28, 1950, Serial No. 181,844

11 Claims. (Cl. 308—84)

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This invention pertains to a lubricating mechanism for a railway vehicle journal and more particularly to a fluid pressure type thereof.

An object of the invention is the provision, in a railway vehicle journal box, of an improved lubricating mechanism capable of feeding a lubricant under pressure to a bearing surface of an axle or journal.

A further object of the invention is the provision, in a railway vehicle journal box, of an improved lubricating mechanism arranged to feed a lubricant under pressure to an isolated chamber which is in restricted communication with a bearing surface of a journal and shell.

An added object of the invention is the provision, in a railway vehicle journal box, of a pump means operable selectively by a journal and arranged, through suitable valve means, to build up a predetermined fluid pressure in a reservoir or chamber.

A still further object of the invention is to provide an improved pump means wherein after a predetermined fluid pressure is built up in a reservoir by an action of the pump means, the latter is rendered inoperative until the value of the fluid pressure falls below a given point.

The above and numerous other objects of the invention will become apparent from the succeeding description of an exemplified form illustrated in the accompanying drawings, wherein:

Figure 1 is a partial plan and partial horizontal sectional view of a journal box assembly embodying the present invention.

Figure 2 is a longitudinal sectional view taken mainly along the lines 2—2 of Figure 1 looking in the direction of the arrows and with certain parts shown fragmentally in elevation.

Figure 3 is a vertical front view shown partially in elevation and partially in section and considered substantially on the lines 3—3 of Figure 1, looking in the direction of the arrows.

Figure 4 is an enlarged transverse vertical sectional view, the left half of the figure being taken on the lines 4—4 of Figure 2, and the right half being taken on the lines 4—4′ of Figure 2, looking in the direction of the arrows.

Figure 5 is an enlarged detail sectional view taken on the lines 2—2 of Figure 1, looking in the direction of the arrows.

Figure 6 is a horizontal detail section taken on the lines 6—6 of Figure 4, looking in the direction of the arrows.

Figure 7 is an enlarged transverse detail section taken on the lines 7—7 of Figure 2, looking in the direction of the arrows.

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Referring now in detail to the various figures of the drawings wherein like reference characters refer to like parts, the numeral 1 is employed to designate, in a somewhat general manner, a mechanism characteristic of the present invention and, more specifically, a lubricating mechanism for a railway vehicle journal. The mechanism includes, as a part of the basic structure, a railway car axle 2 having a reduced end section or journal 3. This axle has fixed thereto a car wheel, not shown, which rides or rolls on a conventional rail of railway tracks (not shown). Also, generally considered, the journal is housed by or extends into a suitable journal box 4 and more particularly through a rear access opening 5 of the journal box. For the purpose of illustration only, the journal box is of the type which is free to execute a vertical movement relative to a frame member (not shown) and toward this end the journal box has, at sides 6 thereof, guide lugs 7 adequately and suitably spaced transversely to neatly accommodate a portion of the frame member therebetween. By reason of this structure the journal box and frame member are maintained in a definite relationship during a relative vertical movement therebetween. The journal box sides are joined together adjacent upper extremities thereof by a roof or top wall 8 which is provided with an upwardly opening cradle or bed 9 accommodating a removable bearing shoe 10 therein. This bearing shoe is rockably mounted on the roof within the bed and functions as an end bearing block for an equalizing bar (not shown), so that any loads imposed on the equalizing bar will be carried to the bearing shoe and into the journal through the journal box roof and transmitted to the wheel and rail.

For the sake of convenience of assembly and disassembly the journal box is preferably made of two parts with the roof and top halves of the side walls forming an upper part or section of the journal box and lower halves of the side walls and a bottom, transverse or horizontal connecting wall 11 forming a lower part or section of the journal box. These parts preferably have their juncture or line of separation appearing at what may be considered as a horizontal plane passing through an axis of the journal and designated by a diagrammatic line marked A—A for identification; see Figures 2 and 3. The upper and lower parts or halves of the journal box are suitably locked together by means of a series or plurality of tie bolts 12 which extend in a vertical direction through the side walls above and below the roof and bottom wall to maintain the halves in as-

sembled relation to present, for all purposes and intent, a unitary structure.

The portion of the journal box which extends horizontally or laterally or outwardly of the vehicle from or beyond a free end of the journal is provided with an access opening 13 so that a service man or maintenance man may have free access to the interior of the journal box. In order to prevent the ingress of foreign matter to the interior of the journal box through this access opening, the latter is covered completely by means of a lid 14 which is removably secured to the journal box by means of holding bolts 15 suitably spaced about the lid. At times the service man will be required to add a lubricant to the journal box interior and thus, in order to avoid the necessity of removing the entire lid and holding bolts, there is provided in the lid as a part thereof, a swingable cap 16 overlying completely an aperture 17 in the lid. The cap is yieldably held in closed position over the aperture by means of a torsion spring 18 and a pintle 19. It will be very apparent that if upon inspection it is noted that the lubricant or lubricating medium (see Fig. 2) has fallen below a safe level, additional lubricant may be added to the journal box through the aperture 17.

Because of the particular composition of the journal box and axle it is believed necessary to introduce, into the combination being considered, a bearing medium between these two components so as to present a structure capable of adequately affording a relatively free running movement of the axle. Many different structures present themselves for the fulfillment of this function, however, it is preferred at the present writing to employ a bearing member 20 comprising a cylindrical shell or collar 21. This shell is preferably made as a thin walled component and arranged to encircle completely the journal with sufficient clearance provided at the ends of the shell as at 22 to allow the journal to move axially thereof relative to the related structure to accommodate service movements to which it will be subjected. By referring particularly to Figure 2 of the drawings, it will be noted that the shell has, at its lateral ends outstanding abutments 23 which overlap related parts of the journal box and thus the journal box and shell are locked together as a unit to move thus during all service actions. The shell may be made up of an outer jacket 24 of any desirable material such as brass, and this jacket may be lined as at 25 with any of the well known so-called softer metals such as Babbitt or white metal. The shell is, because of its design, formed as a multi-part unit in order to associate it in full bearing relation with the journal and, as such, it is formed with a top or upper part, half or segment 26 and a bottom or lower part, half or segment 27.

Because of the thinness of the shell, fully adequate for the complete performance of its office, it is desirable to form the interior of the journal box in such a manner so as to bear fully against the shell and thus, so far as the top half is concerned allow the journal box to transmit its vertical load completely to this top half of the shell. So far as the lower half is concerned the journal box should maintain this half of the shell also in full bearing relation with the journal for the purpose to be made hereinafter apparent. Toward the fulfillment of this result the top wall is provided with a downwardly facing, concave, cylindrical surface 28 arranged to bear fully downwardly against the top shell half and the side walls are also provided with concave surfaces 29 forming cylindrical continuations of the surface 28 to bear inwardly against the top and bottom shell halves. Growing out of the side walls of the journal box is a lower sling or curved inner wall 30 which, in effect, bridges the side walls below the horizontal plane A—A and is spaced a predetermined distance above bottom wall 11. This curved inner wall functions to maintain the shell lower half in elevated position in full bearing relation with the journal.

For the successful operation of the mechanism it is necessary to introduce into the shell-journal box relationship, a feature which will prevent a rotary motion of the shell relative to the journal box. As will be noted by referring particularly to Figure 4 of the drawings, the shell halves are counterparts of one another since the line of separation between the segments is coincident with the horizontal plane A—A and the meeting edges of the segments are thickened or shouldered in local or spaced areas 31. The related journal box side walls are provided with suitable recesses or undercuts 32 to accommodate the spaced areas and thus, by this arrangement the shell is definitely locked against rotation relative to the journal box.

Like all journal-bearing relationships that are subjected to concentrated loads such as in the instant case it is desirable and believed necessary to arrange for the administration of a suitable lubricant to this relationship and toward this end, a lubricating pressure system or force feed has been introduced into the present structure. The bottom connecting wall of the journal box together with the side walls form a well in which the lubricant is held and for the purpose of illustration only the lubricant can be raised to a limit indicated by the diagrammatic line B, see Figure 2. What may be considered the lower forward extremity of the journal box is further lowered to form a sump 33 insuring a concentration or supply of lubricant in a local area. Positioned in a plane or area below the axle and adjacent the lower front extremity of the journal box is a pump 34 having a body or casing 35 of substantially hollow form. The lower extremity of the casing is completely open and provided with a plurality of circumferentially spaced, downstanding feet or legs 36 resting upon the journal box bottom connecting wall in the area of the sump so as to allow the lubricant to find its way to the interior of the casing. Associated with the lower extremity of the casing is a closing plate or disk 37 fitting neatly in a suitable counterbore to form a part of the pump body. In order to insure the retention of the closing plate in fixed position it is formed with a downstanding pillar or stud 38 resting upon the journal box bottom wall. Disposed axially of the disk is an annular collar 39 upstanding from the closing plate and forming a part thereof. A series of holes or inlet ports 40 are arranged in the closing plate in a somewhat circular formation and positioned between a periphery of the disk and the annular collar to allow, upon occasion, the passage of lubricant from the sump to the interior of the pump body through the closing plate. These inlet ports 40 are at times or normally masked or blocked off by a lower valve or washer 41 which, in response to fluid action, is arranged to be guided vertically by the collar away from the plate 37 to uncover the disk holes. The upward vertical travel of the lower valve is limited by the presence of a suitable snap ring 42 asso-

ciated with the collar and spaced a predetermined distance above the lower valve.

Movably associated with the pump body is a piston or plunger 43 having a cylindrical shank 44, hollow in formation and closed at its uper end by an end wall 45. The plunger shank fits neatly through a suitable accommodating opening 46 in the pump body and is arranged for reciprocal movement in a vertical direction along a fixed path. What may be considered as the lower extremity of the piston shank is a radial circular flange 47 having a sliding fit with the inner surface of the pump body. This radial flange is provided with a series or plurality of holes or by-pass port 48 arranged in a circular fashion and functioning as a means whereby, under certain conditions lubricant may pass through the circular flange to an upper area 49 of the pump body. Extending about the piston shank in a guided manner is an upper valve plate 50 arranged to rest upon the piston radial flange to function, at certain intervals, as a barrier to arrest the re-passage of lubricant through the by-pass ports. The top valve is also limited in its vertical travel relative to the piston and accordingly a snap ring 51 is interlocked with the piston shank a predetermined distance above the normal or illustrated position of the top valve. A movement of the top valve vertically against the snap ring 51 will allow the free passage of lubricant from a lower area of the pump to the upper area of the pump.

For the purpose of effecting a reciprocal movement of the piston the disk collar defines a spring seat 52 and the hollow piston presents a spring seat 53 vertically spaced and acted upon by a coil or helical spring 54. This coil spring is under an initial predetermined compression and under certain operating conditions of the pump maintains the piston in an extended or projected position. The coil spring at all times tends to urge the piston outwardly or upwardly of the pump body. So as to avoid building up fluid pressure within the piston to negate or decrease the value of the coil spring, a bleed port 55 is present in the piston end wall 45.

The coil spring is employed to urge the piston in one direction only as noted from the above, and a drive plate or cam 56 is employed to urge the piston in an opposite direction or one inwardly of the pump body. This drive plate is removably mounted on a free end of the journal by means of rotatable elements or holding bolts 57. Also the drive plate is eccentrically mounted relative to the journal and because of this arrangement as the drive plate moves from what may be considered its low area 58 to what may be considered as its high area 59 the piston is moved from its elevated position illustrated by diagrammatic lines 60 in Figure 5 only to its withdrawn or retracted position as illustrated by full lines in Figures 2 to 5. The full reciprocal movement of the piston is represented by twice the distance marked X in Figure 3 or a distance properly considered the eccentric throw. It may be well to state here that the pump body is provided with a single exhaust port 61 situated in the upper area of the body and directed inwardly of the journal box. Accordingly when the piston is extended and then driven by a rotary motion of the drive plate to a retracted position, lubricant trapped between the closing plate 37 and circular flange 47 will elevate the top valve and permit the lubricant to flow into the upper area of the pump body. As the driving action of the drive plate is lessened or removed the coil spring will again move the piston from retracted to extended position. This piston action will force the lubricant out of the upper area through the exhaust port and at the same time the lower valve will be elevated allowing the area between the closing plate and circular flange to become again charged by lubricant passing from the sump through the inlet ports. Thus, during each cycle of the eccentric, the body upper area will be fully charged with and partially exhausted of lubricant and the exhausted lubricant will pass or be expelled through the discharge port.

The journal box curved sling or inner wall is provided with a forwardly directed snoot or spout 62 downstanding in a direction toward the pump or sump and to this spout, the pump is removably secured by means of bolts 63. Substantially centrally disposed of the snoot is a feed line or confined duct 62' which is continued upwardly on opposite directions about the shell as an open recess 64 along the inner surface of the sling and side walls. This open circular recess has its open side closed by the presence of the shell and thus functions as a continuous conduit capable of conveying the lubricant under pressure from the pump.

At each side area forming the juncture of the journal box roof and side walls there are present a pair of transversely spaced chambers, reservoirs or compartments 65 and 65*a* which are supplied lubricant under pressure from the pump through the confined duct 62' and 64. In actual practice it is preferred to have the confined duct communicate with the reservoirs 65 and then have the related compartments 65 and 65*a* joined by a connecting duct 66 so that a charging of one compartment at one side of the journal box will result in charging both related compartments and the connecting duct.

Quadrantly spaced about the shell are located a plurality of ingress ports or passageways 67 and 68; the passageway 67 being present in the upper shell segment and in communication with the connecting ducts while the passageway 68 is present in the lower shell segment and blocked off from receiving any lubricant by the sling or inner wall. Since the carrying load is imposed only on the upper shell segment this application is concerned with the complete lubrication of this top segment; however, if preferred, it is obvious that proper conduits can be provided to supply a lubricant directly to the lower shell segment without depending upon the journal carrying the lubricant to this lower segment. Since the shell segments are counterparts of one another, the segments can be rotated until the lower segment becomes the upper segment and, at which time, the ingress ports 68 would be in direct communication with the connecting duct. In any event both segments will be properly lubricated even with the force feed being applied directly to the top segment only. The top segment, in alignment with the ingress ports 67, is provided with spaced longitudinally or transversely directed recesses or grooves 69 functioning as lubricant supply ducts in direct communication with the passageway 69 and the bearing surface of the journal so that any lubricant forced into the chambers will find its way to the journal. The lower segment is also provided with recesses or grooves 70 and while this segment is occupying the lower position

of the pair, some lubricant will find its way into these grooves 70 to be retained therein for insuring a supply, however small, of lubricant for the bottom segment journal lubrication.

By now considering the entire arrangement and construction set forth above it will be noted that the intercommunicating ports, ducts, passageway and reservoirs between the journal and pump are substantially confined or function as definite conduits or conveyances of lubricant from the pump to the journal. Under operating conditions of the pump, which is self-priming because it is submerged below the lubricant level, the drive plate and coil spring will cause the piston to move in a reciprocal manner to charge the conveyances with fluid pressure. When this fluid pressure has attained a certain value, what may be considered as back pressure in the conduits and pump upper area will negative the value of the coil spring and such back pressure will hold the piston or plunger in a retracted or withdrawn position as illustrated in the drawings. In this withdrawn position the piston is out of operating engagement by the drive plate and thus the pump is not operated or in other words is rendered inoperative. Lubricant is still being supplied to the journal because of the fluid pressure in the conduits between the pump and journal but the pump is not rendered operative again until the value of the fluid pressure falls below the value of the coil spring. Merely by way of example and not intended as a limitation, it is at present believed sufficient to attain a fluid pressure in the nature of fifty pounds to overcome the value of the coil spring.

By this arrangement it will be further noted that lubricant will be constantly supplied to the journal without the necessity of the pump operating constantly but merely selectively and therefore this arrangement will, obviously, materially prolong the life of the entire assemblage.

From the above it will be noted still further that various changes and alterations may be made to the illustrated and described exemplification of this invention without departing from the spirit of the invention or scope of the appended claims.

I claim:

1. In a railway car axle lubricating mechanism of a journal box, the combination of, a lined shell sleeved over said axle within said journal box, a chamber in an upper area of said journal box and in communication with an interior surface of said shell, pump means within said journal box and below said axle, said pump means being in communication with said chamber and arranged to supply a lubricant to said chamber, a reciprocal plunger in said pump means, spaced valves in said pump means actuated by reciprocal action of said plunger, means operated by said axle for displacing said plunger, and means associated with said plunger for opposing displacement thereof, said opposing means and valves being so arranged and constructed that a predetermined pressure is built up in said chamber to have said valves lock said plunger in a displaced position.

2. In a railway car axle lubricating mechanism of a journal box, the combination of, an interiorly grooved lined shell encirling said axle within said journal box, a chamber in said journal box and in communication with said shell groove, pump means in a lubricant well of said journal box and in lubricant supplying communication with said chamber, a reciprocal plunger in said pump means, valve means actuated by an action of said plunger, and rotatable operating means fixed to said axle for selectively retracting said plunger, and means associated with said plunger for yieldably opposing displacement thereof by said operating means; said opposing and valve means being so arranged and constructed that a predetermined fluid pressure is built up in said chamber so that said valve means will lock said plunger in a retracted position.

3. In a railway car axle lubricating mechanism of a journal box, the combination of, an interiorly grooved shell encircling said axle within said journal box, a chamber in said journal box in communication with said shell groove, pump means in a lubricant well of said journal box and in lubricant supplying communication with said chamber, a spring-urged plunger reciprocal in said pump means, valve means actuated by movement of said plunger, and rotatable means fixed to said axle for selectively reciprocating said plunger; said plunger and valve means being so arranged and constructed that when a predetermined fluid pressure is built up in said chamber said plunger will be rendered inoperative.

4. In a railway car axle lubricating mechanism of a journal box, the combination of, an interiorly grooved shell encircling said axle within said journal box, a chamber in said journal box in communication with said shell groove, pump means in a lubricant well of said journal box and in lubricant supplying communication with said chamber, reciprocal means in said pump arranged to supply lubricant under pressure to said chamber, rotatable means fixed to said axle and arranged to selectively operate said reciprocal means and means associated with said reciprocal means for opposing operation thereof by said rotatable means; said opposing means and chamber being so arranged and constructed that a predetermined pressure built up in said chamber will render said reciprocal means inoperative.

5. In a railway car axle lubricating mechanism of a journal box, the combination of, an interiorly grooved cylindrical shell encircling completely said axle within said journal box, said shell being formed by a multiplicity of parts and locked to said journal box against rotation relative thereto, a chamber in said journal box and in restricted communication with an interior of said shell, pump means in said journal box spaced from and in restricted lubricant supplying communication with said chamber, rotatable means fixed to said axle for selectively charging said pump means and means associated with said pump means and opposing said rotatable means for supplying lubricant under pressure to said chamber; said supplying means and chamber being so arranged and constructed that predetermined fluid pressure in said chamber will render said pump means inoperative.

6. In a railway car axle lubricating mechanism of a journal box, the combination of, a cylindrical shell encircling completely said axle within said journal box, said shell being multipart and locked to said journal box against rotation relative thereto, an isolated chamber in said journal box and in restricted communication with an interior of said shell, pump means in said journal box below said axle and in confined communication with said chamber, and eccentric rotatable means fixed to said axle and arranged to engage and energize said pump means, said pump means on deenergization forcing lubricant

to said chamber for lubricating an interior of said shell.

7. In a railway car axle lubricating mechanism of a journal box, the combination of, a multipart cylindrical thin-walled shell encircling completely said axle within said journal box, said shell and journal box being locked against rotation of said shell relative to said journal box, an isolated chamber in said journal box in restricted communication with an interior of said shell, pump means in confined communication with said chamber for supplying fluid under pressure thereto, eccentric means rotatable with said axle for charging said pump means, and means associated with said pump means for discharging fluid to said chamber; said discharge means and chamber being so arranged and constructed that a predetermined fluid pressure in said chamber will render said pump means ineffective for supplying additional lubricant to said chamber.

8. In a railway car axle lubricating mechanism of a journal box, the combination of, a cylindrical thin wall shell completely encircling said axle, an isolated compartment in restricted communication with an interior of said shell through said thin wall, pump means, a reciprocal piston in said pump means, a plurality of valve means in said pump means, means associated with said axle for operating said piston, and a confined duct in said journal box communicating with said pump means intermediate at least one of said valve means and said operating means and leading to said compartment; said valve means being alternately opened during reciprocal movement of said piston to charge said duct and compartment.

9. In a railway car axle lubricating mechanism of a journal box, the combination of, a cylindrical shell completely encircling said axle, an isolated compartment in said journal box and in restricted communication with an interior of said shell, pump means removed from said compartment and operable by said axle, a confined duct in said journal box leading from said pump means to said compartment, a reciprocal piston in said pump means and a plurality of valve means responsive to an action of said piston and disposed on a side of said duct away from said axle; said valve means being alternately closed during reciprocal movement of said piston to charge said duct and compartment.

10. In mechanism for applying lubricant between fixed and movable members, the combination of pump means seated in a lubricant reservoir, conduit means leading from said pump means to engaging surfaces of said members, a chamber in said conduit means, piston means reciprocal in said pump means for supplying lubricant under pressure to said chamber, means connected to and operated by movement of said movable member for displacing said piston means, and means effective at a predetermined pressure of lubricant in said chamber and conduit means for holding said piston means in a displaced position.

11. In mechanism for applying lubricant between engaging surfaces of fixed and movable members, the combination of pump means seated in a lubricant reservoir, duct means leading from said pump means to said engaging surfaces, piston means reciprocal in said pump means for supplying lubricant under pressure to said duct means, a plurality of valves in said pump means and alternately openable on reciprocation of said piston means, means operated by said movable member for displacing said piston means, and means on said pump means yieldably opposing said displacing means and opposed by pressure in said conduit means for holding said piston means in a displaced position at a predetermined pressure in said conduit means.

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