April 11, 1939. L. C. HYATT 2,153,692

LUBRICANT CONTAINER FOR JOURNAL BOXES

Filed May 28, 1936

FIG. 1.

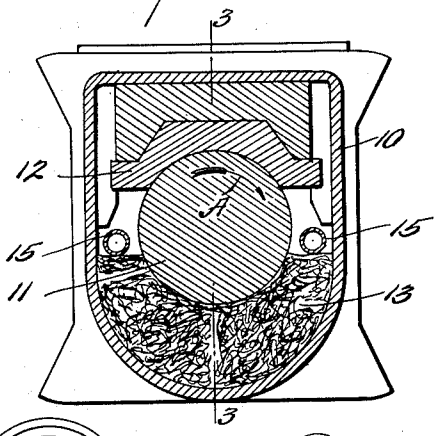
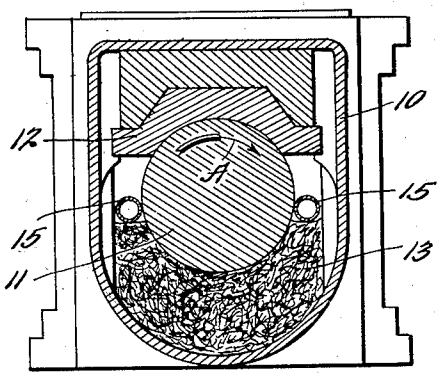


FIG. 2.



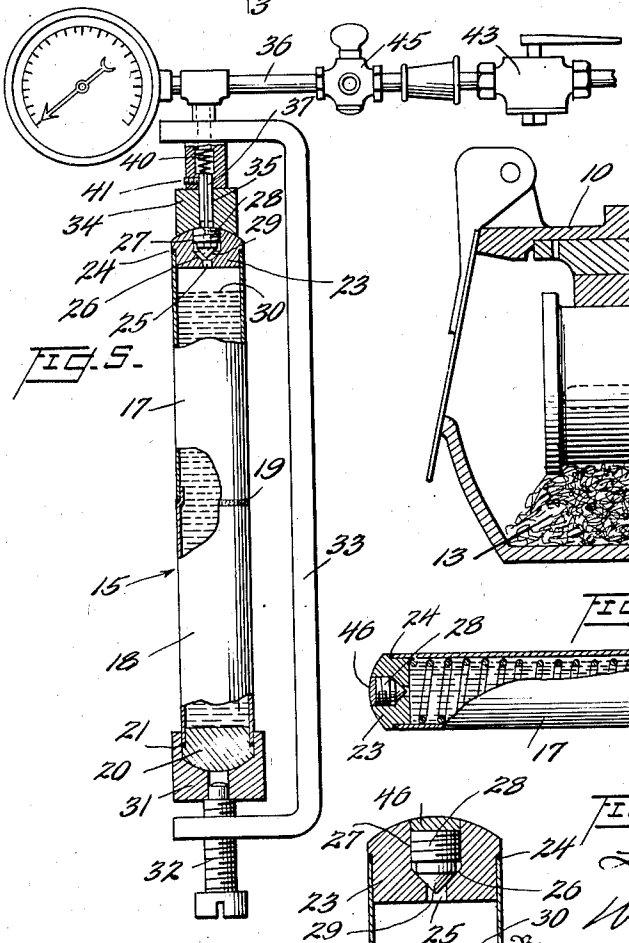


FIG. 5.

FIG. 3.

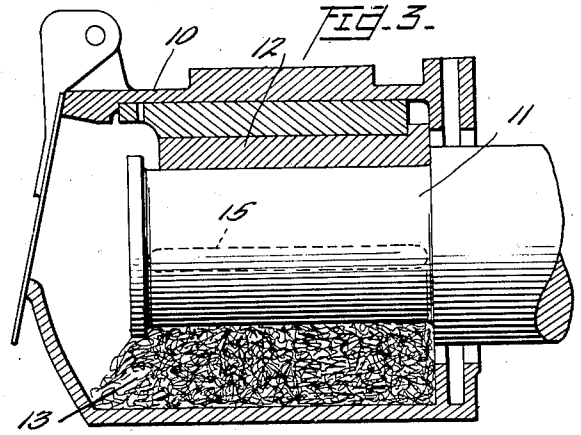


FIG. 4.

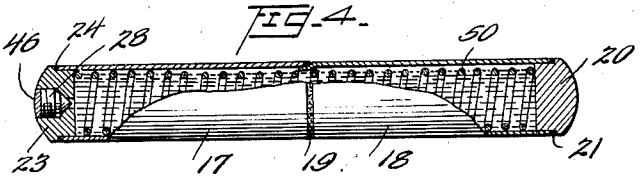


FIG. 6.

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Patented Apr. 11, 1939

2,153,692

UNITED STATES PATENT OFFICE

2,153,692

LUBRICANT CONTAINER FOR JOURNAL BOXES

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Application May 28, 1936, Serial No. 82,339

16 Claims. (Cl. 308—87)

The present invention relates to methods of and means for lubricating journals, particularly the journals of the axles of railroad and railway cars.

It is now, and has been for many years, the standard practice of those engaged in the manufacture of railway rolling stock to so design the wheeled trucks upon which the car bodies are mounted that the weight of each car body is transmitted to the supporting wheels and axles through bearings which engage the extreme ends of the axles, each axle having its end portions projecting beyond the spaced wheels mounted thereon, each such end portion being accurately machined so that its outer surface is truly cylindrical and concentric with the axles. This projecting portion is known as a journal and its load is transmitted to it through a bearing or "brass" which is provided with a cylindrical seating surface or recess, this brass being positioned above the journal and being in turn housed within a journal box which in the usual case comprises an integral portion of a truck side frame. The journal boxes being without the wheels are readily accessible for the purpose of inspection. Each journal box is furthermore so shaped as to retain a quantity of lubricant with the end in view of maintaining a film of lubricant between the bearing and the rotating journal at all times. As this lubricant must be constantly supplied during the time that the journal is rotating some means for continually transferring lubricant to the journal must be provided.

It has been customary to fill the lower part of the journal box, below the journal, with waste, or to insert therein a lubricating pad, the waste or pad as the case may be being of such nature as to draw lubricant from the bottom of the journal box and transmit it upwardly to the undersurface of the rotating journal. There are hundreds of thousands of journal box constructions of the type just above described now in use and it is only occasionally that difficulty arises in the operation of these journal boxes. One difficulty, however, which is met with not infrequently in ordinary railroad operation is brought about by the failure of the means provided in association with each journal to maintain such journal properly lubricated. It will be appreciated that the loads superposed upon railroad car journals are very great and that it is vitally necessary to maintain between the interengaging surfaces of journal and bearing a film of oil to prevent excessive wear and overheating. If this oil film breaks or fails and the metal surfaces of the bearings and journal come in direct contact with each other the heat developed from the resulting friction is very great and in a short time may effect binding of the metallic parts and possibly detrainment of the car. Under the best conditions of operation a very considerable amount of heat is developed in a journal box due to the friction between journal and bearing, the normal temperature within the journal box of a car in operation being as much as 220° F. The lubricant normally supplied is of good quality and designed and intended to maintain the proper lubricating film under all working conditions, both when the temperature of the surrounding air is quite low and when it is high. The lubricant naturally cannot be of such character that it will become too viscous at low temperatures, such as are frequently met with in winter, and for that reason a comparatively light lubricating oil is used. This oil has a tendency to break down at high temperatures and under heavy pressure and should, for any reason, the free flow of oil to the journal and bearing be intercepted or partially intercepted at any time, or should the temperature of the journal box become too high for other reasons, the relatively light oil will no longer maintain the necessary film between journal and bearing and rapid rise in temperature of the interengaging parts will result, with serious consequences. If the progress of the train having such an overheated journal or "hot box" is not halted, serious damage and even detrainment may occur, and if it is halted, objectionable delay is the result.

The present invention contemplates an improvement in the means for and method of maintaining a supply of lubricant in the journal boxes of a railway car at all times. Essentially the improvement consists in the provision of an auxiliary supply of lubricant in each journal box which auxiliary supply is made available for lubricating purposes just as soon as the temperature of the journal has risen above a predetermined point or degree. Thereupon the auxiliary supply of lubricant is released and flows into the waste or onto the lubricating pad with the result that an adequate oil film between the relatively moving parts is immediately provided and the danger of injury to these parts or the danger of detrainment avoided and without halting the operation of the train.

Devices having in view these objects, as thus above generally stated, have heretofore been designed or suggested and are known to railroad men. Nevertheless they have not been generally

adopted and placed in operation for one reason or another. It is the object of the present invention to provide a means and method for maintaining the proper supply of lubricant within a journal box at all times which has a number of advantages over those previously suggested or tried out in practice and which are of such character as to make the device practical in an operative sense and commercially useful. Thus the present invention contemplates the provision, in combination with the journal box construction and the waste or lubricating pad, of a lubricant holding container which is designed and intended to be loosely inserted within a journal box and to lie loosely upon the upper surface of the waste or pad and laterally and relatively close to the journal itself.

The container is of such character as to comprise a liquid and air-tight structure for all normal operating conditions and to retain its lubricant indefinitely under such conditions. Whenever overheating occurs, however, a fusible substance which forms an integral part of the container will be softened and the closure of the container is released to free the contained liquid. The lubricant so released is of such grade as to operate most efficiently at high temperatures with the result that the necessary oil film is immediately supplied, the friction reduced, and the journal and bearing cooled before damage is done.

The container is also so formed that it is physically separated into two or more parts when the fusible substance which secures these parts together is softened so that, when the car has moved to the next inspection point, the inspector immediately perceives upon looking into the journal box that the auxiliary supply of lubricant has been released, can remove the parts of the container and insert a fresh container, as well as take other remedial actions. The present invention also provides a container which is more positive in its action than any generally similar device heretofore suggested and which will effect discharge of its contents more exactly at a predetermined temperature than has been possible with similar devices or types heretofore suggested.

The provision of a fusible substance which will melt or soften at a predetermined temperature is not new but in combination with such a substance I provide means for positively opening the container, which means is constantly active to exert oppositely directed forces upon the container parts, but which means is inactive until the fusible substance which binds it together has been softened by heating to a certain definite temperature. Immediately upon the occurrence of this softening, however, the opening means acts and the container is disrupted. Various means may be employed to act upon the container in the manner just specified. For instance a compression spring within the container may have its ends bearing upon the separable portions thereof and, as soon as the fusible substance binding the parts together is softened to the desired extent, the spring becomes active and causes disruption of the container. Alternatively a body of air under pressure may be included within the container in addition to the body of lubricant so that there is at all times an internal force tending to disrupt the container. Just as soon as softening of the fusible alloy occurs, the container flies apart and the lubricant is immediately released. Delivery of the lubricant is effected as a sudden discharge, therefore, instead of a minor leakage, which is highly important. Accuracy of timing of the discharge with respect to the temperature is also insured and by reason of the disruption of the container and separation of its parts, a readily recognized visual signal is given the inspector who next inspects the interior of the journal box.

In its details the container itself may be varied quite considerably without departure from the invention, as will be appreciated by one skilled in the art. Two forms of the invention are, however, illustrated in the accompanying drawing and will now be described in detail, together with the method of charging.

In the drawing:

Figure 1 is a transverse section through a journal box of one well-known type, showing two of the improved containers positioned therein;

Figure 2 is a similar section through a slightly different form of journal box, also a well-known type, showing two of the improved containers therein;

Figure 3 is a section on line 3—3 of Figure 1, one of the containers being illustrated in dotted lines;

Figure 4 is a longitudinal section through one form of container;

Figure 5 is a view in side elevation, and of rather diagrammatic nature, of a simple form of mechanism made use of in charging one of the containers with compressed air, a somewhat different form of container from that shown in Figure 4 being also illustrated, partially in elevation and partially broken away; and

Figure 6 is a section through the end of the container shown in Figure 5 and showing on an enlarged scale the air inlet valve.

A journal box is indicated at 10, journal at 11 and bearing or "brass" at 12. The details of the journal box may vary widely and it need only be said that each box comprises a housing for the journal, brass, and the means for supplying lubricant to the surface of the rotating journal. The journal may rotate in either direction with respect to its bearing but for the purpose of this description will be deemed to be rotatable in the direction of the arrow A shown in Figure 1. A body of waste such as commonly used in journal boxes is indicated at 13, this waste resting upon the floor or bottom of the box and extending upwardly to contact with the undersurface of the journal for a substantial area, as shown, and also extending preferably upwardly along the side walls of the box and laterally of the journal. Two identical lubricant containers are indicated at 15—15, each container resting loosely upon the upper surface of the waste within the box. In the form of box shown in Figure 1 the container has more possibility of lateral movement than in the form shown in Figure 2 but in every case the container will be so designed as to fit into the box and laterally of the journal with ample clearance on either side.

The container shown in Figure 5 comprises two tubular elements or parts indicated at 17 and 18, respectively, these parts being coaxial with one another and having their inner ends telescoped as shown. They are secured together by a band of fusible metallic alloy 19 which encircles the joint between parts 17 and 18 and comprises an air and liquid-tight seal normally preventing egress of any fluid through this joint. The end of the container part 18 is provided with any suitable closure element such for instance as indicated at 20, the element 20 comprising a plug fitting into the end of the container and soldered or brazed thereto as at 21. The opposite end of

the container is likewise closed by a cylindrical plug 23 soldered or brazed to the container part 17 at 24. This end 23, however, is axially apertured, this aperture having a reduced inner end 25, a conical valve seat 26 adjacent the reduced end and an enlarged outer end 27 which is interiorly threaded for the reception of a threaded plug 28. Plug 28 has an axial extension directed inwardly of the container with a conical end surface 29 which comprises a valve for seating on the valve seat 26 and blocking the opening 25 against the egress of fluid when the valve is in seated position.

As shown in Figure 5 the container is mounted for charging with air, having been previously filled with lubricant up to the lubricant level indicated at 30. The lower end plug 20 of the container rests in a socketed abutment 31 which may be vertically adjusted by means of a screw 32, screw 32 extending through a threaded aperture in the bracket 33. Bearing upon the upper end of plug 23 is a fitting 34, having an aperture 35 which registers with the aperture in plug 23 and which communicates at its upper end with a supply line 36 for compressed air, indicated at 35. Within the duct 35 is positioned a bit 37 the lower end of which is adapted to engage within an elongated slot formed in the head of the screw plug 28 and the upper end of which is engaged by a compression spring 40 so that the bit is normally forced down into contact with the screw plug when a container is positioned as shown. The bit is either non-circular in cross-section or is prevented from rotating by other means, as for instance by means of a set screw 41 which engages within the slot in the bit.

With the screw plug 28 in its raised position air may pass through apertures formed in the screw plug and downwardly through port 25 into the upper end of the container. If the air valve 43 is opened air under pressure will pass into the container and by opening this valve the air pressure in the container is built up to a suitable degree, for instance until the air pressure is equal to a pressure of thirty pounds per square inch. The air valve will then be closed and the container revolved about its longitudinal axis manually or otherwise in the direction necessary to effect closure of the port 25 by the screw plug, the screw plug being maintained stationary during rotation of the container by reason of the bit 37 and hence moved downwardly until the valve 29 is seated on the valve seat 26. The spring 40 acts to depress the bit and to maintain engagement of the bit and plug while the container is rotating. After valve 29 is securely seated upon valve seat 26 air valve 43 is closed, vent 45 opened to permit air between plug 28 and air valve 43 to escape, and the container removed from the holding device by retraction of screws 32. It may then be tested for air leaks as for instance by being placed beneath the surface of a body of water. If there is no air leakage, a seal of hard solder, indicated at 46, is placed in the container and to prevent loosening of the plug. The container is then ready for use.

Two containers are placed in each axle box, one on each side of the axle, resting freely on the upper surface of the waste as previously described. Normally they will remain so positioned indefinitely and will only function when overheating occurs. It is found that where the axle is rotating, for instance in the direction of the arrow A, the right hand side of the axle box (Figure 1) will be more highly heated under normal conditions than will be the left hand side. Hence when there is a tendency for a hot box to occur and the temperature of the journal rises, the right hand container will be the first to discharge and frequently the hot box is completely arrested by the discharge of one container so that a saving of the more expensive lubricant within the other container is effected. Delivery of the lubricant is effected as previously described, the fusible alloy 19 being gradually softened as the heat increases and, at the predetermined temperature desired, being torn apart by the pressure of the compressed air within the container, the two ends of the container being projected in opposite directions and the liquid lubricant therein immediately finding its way into the waste 13.

Instead of charging the container with compressed air a spring such as indicated at 50 in Figure 4 may be included therein, this spring being a coiled compression spring extending longitudinally of the container and having its ends bearing respectively upon the inner surfaces of the container plugs. The action of the spring, however, is the same as is the action of the compressed air when fusion or softening of the fusible alloy occurs, the container parts being projected in opposite directions and the lubricant being immediately released. Other types of containers all embodying the essentials of the invention may be devised to fit varying circumstances, as will be apparent to one skilled in the art.

Thus the container may be fabricated either wholly or in large part of fusible metal or of material other than metal which, when raised to a predetermined temperature will soften or melt and release the container lubricant, the pressure being exerted preferably by a contained gas. Various wax-like compositions may be made use of in constructing containers which will soften throughout or in large part and the internal pressure may be developed by a substance sealed within the container which, when heated in the predetermined temperature, will suddenly evolve gas in substantial quantities to cause a sudden pressure increase. One piece containers, entirely sealed throughout, may be fabricated of such material.

Where metal is used it is also possible to fabricate a container of one piece, the ends being flattened or otherwise closed after charging, the container wall having a materially weakened portion adapted to be disrupted upon the development of sufficient pressure within the container. If desired clips of various kinds may be employed to retain the containers in definite positions within axle boxes though in the average case such appliances will not be necessary. It will also be apparent that various gases may be used, instead of air, within the containers, for example carbon monoxide. Likewise various alternative methods of placing gas under pressure may be employed. Thus where a container of ductile metal is used it may be charged with lubricant and gas under atmospheric pressure, sealed, and thereafter deformed so that the cubic volume is reduced, thus increasing the internal pressure to the desired extent.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A liquid-tight container for enclosing a fluid lubricant to be supplied to an overheated journal, said container comprising two parts secured to-

gether by a substance fusible at a temperature slightly higher than the normal running temperature of the journal, whereby the parts become separable when the fusible substance softens, to permit discharge of the lubricant.

2. A liquid-tight container for enclosing and retaining under normal conditions a fluid lubricant to be supplied to a journal when overheated, said container comprising an elongated tube formed in two parts, said parts being secured together by a substance fusible at a temperature slightly higher than the normal running temperature of the journal, whereby the parts become separable when the fusible substance softens, to permit discharge of the lubricant.

3. A liquid-tight container for enclosing and retaining under normal conditions a fluid lubricant to be supplied to a journal when overheated, said container comprising an elongated tube formed of two overlapping tubular sections, said sections being secured rigidly together by a band of metal encircling the annular joint between the said sections and fused to both sections, the said metal band being fusible at a temperature slightly higher than the normal running temperature of the journal, whereby the parts become separable when the fusible band softens, to permit discharge of lubricant.

4. A liquid-tight container for enclosing and normally retaining a fluid lubricant to be supplied to a journal when overheated, said container comprising two parts secured together by a fusible substance, and means associated with the container for separating said parts when said substance is softened by heat.

5. A liquid-tight container for enclosing and normally retaining a fluid lubricant to be supplied to a journal when overheated, said container comprising two parts secured together by a fusible substance, and means normally tending to separate said parts, said means becoming effective when said substance becomes softened by heat.

6. A liquid-tight container for enclosing and normally retaining a fluid lubricant to be supplied to a journal when overheated, said container comprising two parts secured together by a fusible substance, and spring means normally tending to separate said parts, said spring effecting such separation when the said substance becomes softened by heat.

7. A liquid-tight container for enclosing and normally retaining a fluid lubricant to be supplied to a journal when overheated, said container comprising two parts secured together by a fusible substance, and a coiled compression spring within the container and having its ends bearing against said parts, respectively, said spring being effective to separate the parts to permit the discharge of lubricant when the said substance becomes sufficiently softened by heat.

8. A device of the class described comprising a two part liquid and air-tight container enclosing a body of liquid lubricant and a body of air under pressure, said parts being secured together by a band of fusible solder adapted to be softened by heat to permit the compressed air to separate the parts and permit discharge of the lubricant.

9. A device of the class described comprising a liquid and air-tight container having a fusible seal and containing a body of liquid lubricant and a body of air under pressure.

10. A device of the class described comprising, in combination, a sealed container or envelope which is liquid-tight at temperatures existing in journal boxes under normal operating conditions and at least a portion of which weakens when subjected to higher temperatures, a body of lubricant within said container, and a pressure means also associated with said container, said pressure means automatically acting to unseal the container when the container becomes weakened due to rise in temperature, so as to permit outflow of the lubricant.

11. A device of the class described comprising in combination, a sealed container or envelope which is liquid-tight at temperatures existing in journal boxes under normal operating conditions and at least a portion of which weakens when subjected to higher temperatures, a body of lubricant within said container, and a pressure means also within said container which automatically acts to unseal the container when the latter becomes weakened due to rise in temperature, so as to permit outflow of the lubricant.

12. A device of the class described comprising in combination, a container or envelope which is liquid-tight at temperatures existing in journal boxes under normal operating conditions and which weakens when subjected to higher temperatures, a body of lubricant within said container, and an expansible element also within the container and normally pressing against the wall thereof, said element automatically acting to disrupt the container wall when the container becomes weakened due to rise in temperature, so as to permit outflow of the lubricant.

13. A device of the class described comprising in combination, a sealed container or envelope which is liquid-tight at temperatures existing in journal boxes under normal operating conditions and at least a portion of which weakens when subjected to higher temperatures, a body of lubricant within said container, and a body of gas under pressure also within the container and normally exerting pressure against the wall thereof, said gas automatically acting to unseal the container when it becomes weakened due to rise in temperature, so as to permit outflow of the lubricant.

14. The combination set forth in claim 11 in which the container is fabricated entirely of a wax-like substance.

15. The combination set forth in claim 11 in which said pressure means is normally inactive but becomes active when the temperature thereof is raised above a predetermined point.

16. A device of the class described comprising a sealed container enclosing a fluid lubricant to be applied to an overheated journal or the like, and a pressure means within the container for unsealing the container and effecting release of the lubricant when the temperature of the container is increased to a predetermined degree, at least a portion of said container being fabricated of a substance which weakens with increase of temperature, the enclosed pressure means being of such character as to maintain its pressure producing capacity despite increase in temperature, whereby the pressure means acts to unseal the container when the temperature of the container is raised to a predetermined degree, thus permitting discharge of the lubricant from the container.

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