Dec. 6, 1927. 1,651,545

H. N. RANSOM

APPARATUS FOR LUBRICATING

Filed Nov. 23, 1921 2 Sheets-Sheet 1

Fig. 1.

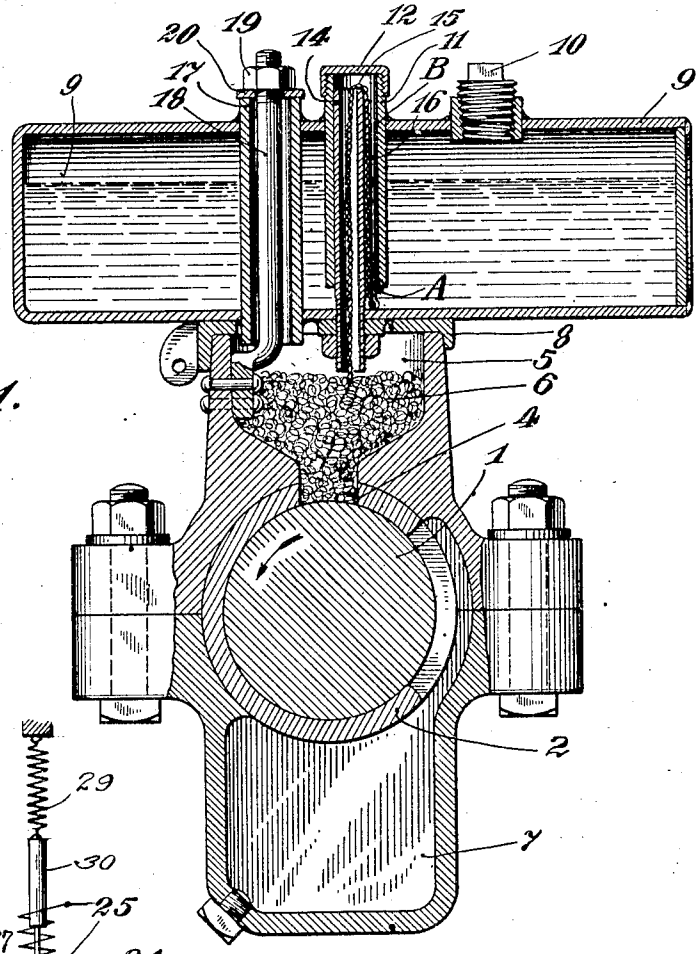
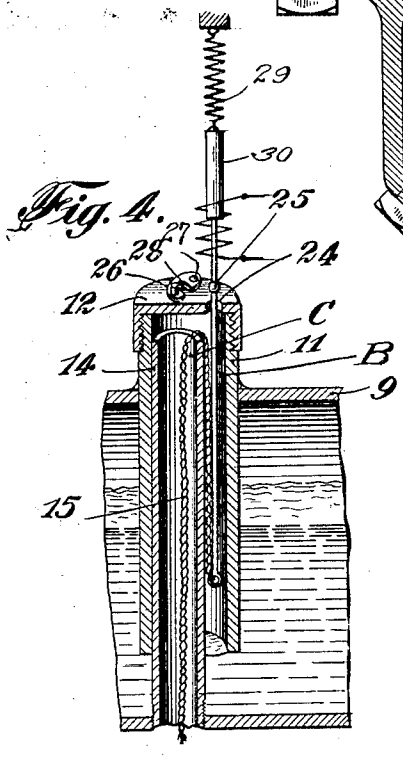


Fig. 4.



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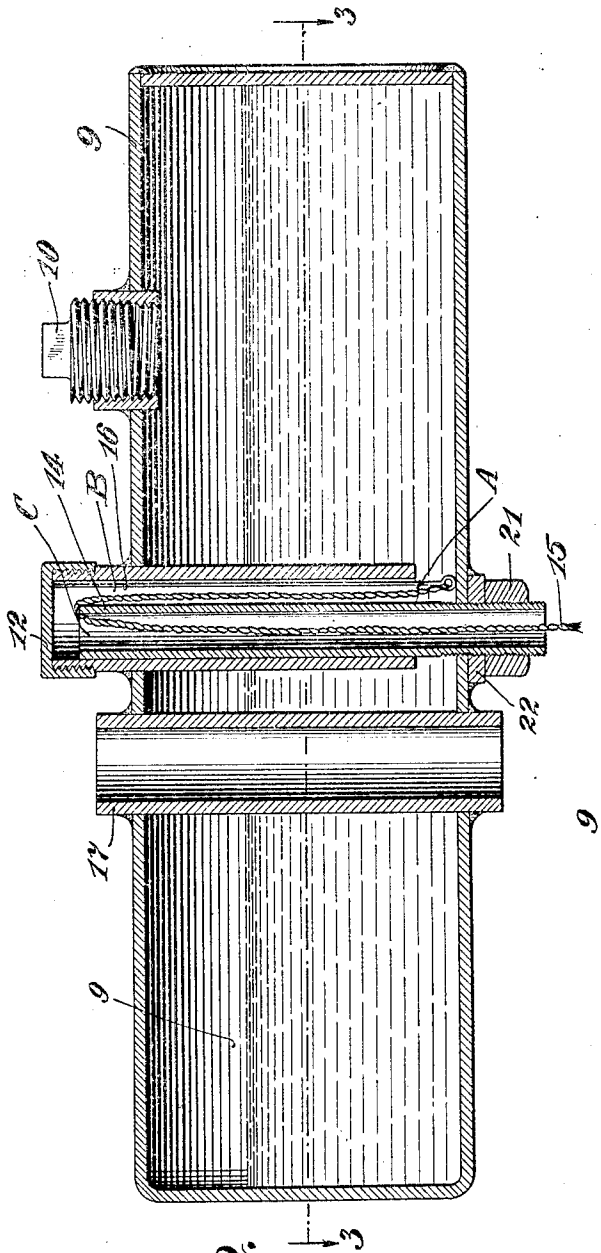


Fig. 2.

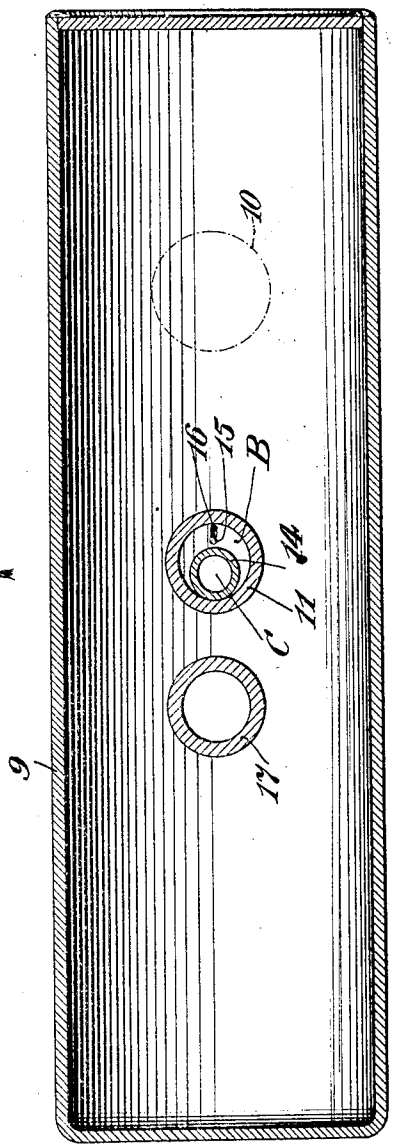


Fig. 3.

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR LUBRICATING.

Application filed November 23, 1921. Serial No. 517,187.

This invention relates to lubrication and more specially to a method and apparatus for controlling the feed of a lubricant.

The principal object of the present invention is the feed of lubricant from a relatively large source of supply in a predetermined constant manner by a simple and efficient means requiring a minimum amount of attention.

A still further and important object of the present invention is the feed of a lubricant by capillary attraction from a submerged surface of liquid lubricant in such manner as to obtain substantially predetermined quantities of lubricant under varied conditions as to the height of the lubricant in the reservoir.

A still further object of the present invention is a system of lubrication wherein the supply of lubricant is maintained by means of a partial vacuum and the lubricant is fed through an open conduit by means of a suitable wick much smaller than the conduit and from a submerged surface near the bottom of the source of supply.

Another and still further object of the present invention is a system of lubrication wherein the lubricant is fed through an open conduit by means of a suitable wick much smaller than the conduit and from a submerged surface under zero hydrostatic head and near the bottom of the source of the supply.

Another and still further object of the present invention is a system of lubrication wherein the lubricant is fed through an open conduit by means of a suitable wick much smaller than the conduit and from a surface under zero hydrostatic head and near the bottom of the source of supply and wherein the said surface is maintained at a substantially constant level.

A still further and important object of the present invention is a system of lubrication for car journal boxes and the like and wherein the lubricant is fed from a suitable sealed container through a relatively small wick mounted in a relatively large inverted U-shaped passageway.

Another and further object of the present invention is to provide means for regulating the flow of lubricant in a device of the character specified by regulating the number of strands in a wick mounted to feed upwardly from the suboil surface, and then downwardly to the place of delivery.

Another and still further object of the present invention is the provision of means for regulating the flow of lubricants, which comprises providing a sub-surface of oil or the like, under a zero hydrostatic head and feeding the oil upwardly by a wick which is led from the surface upwardly over a wall and then downwardly to the point of delivery and wherein the regulation of flow is obtained by raising or lowering the wall over which the said wick passes.

Other and further objects of the present invention will in part be obvious and will in part be pointed out hereinafter by reference to the accompanying drawings wherein like parts are represented by like characters throughout the several figures thereof.

Figure 1 illustrates one adaptation of the present invention as applied to an old type of bearing for electric railway motors.

Figure 2 is an enlarged view through one adaptation of the present invention.

Figure 3 is a sectional view on line 3—3 Figure 2.

Figure 4 illustrates a construction by means of which feed of lubricant can be automatically stopped when desired.

Heretofore in the art of lubricating railway journal boxes on high speed motors for electric railways or the like it has been customary to provide a relatively large oil pocket adjacent the journal box. This oil pocket is provided with a window leading to the journal box and the pocket is adapted to be filled with waste.

This pocket is of such size as to hold lubricant intended to supply lubrication for several days. Obviously the bearing is over lubricated when the pocket is first properly filled and it is under lubricated when the pocket is nearly empty and requires refilling.

Under this old system of lubrication motors were inspected and the oil was usually replenished every night, or at least every other night. The ordinary motor bearing ordinarily is allowed about one and one-half gills of oil in ten days. Under the old practice if the bearing ran dry the cotton waste would be burned up and it has been

the practice to replace waste four or five times per year. Furthermore, bearings are liable to be covered with grit and sand and the workmen very frequently knock this dirt into the waste cup. A very small amount of this dirt will quickly cause the bearing to tend to cut and heat.

Practical demonstration with the present system shows that a feed of three-fourths of a gill of oil in every ten days is ample for the ordinary street railway motor bearing providing this feed can be maintained with certainty. In view of the fact that the present system insures accuracy of feed it is entirely practical to run such a motor on the basis of three-fourths of a gill in ten days. By providing a medium sized reservoir it is necessary to fill the reservoir but once in two months. This leaves a sufficient amount of oil at the end of that time to insure the bearing will never run dry. By this method it has been found that the cotton waste may be used in such bearings for at least one and one-half years without replacement, because the waste is at all times properly filled with oil.

The liquid is maintained in a sealed container and preferably under a vacuum. Therefore it is free from deterioration by evaporation or collection of dust or contamination from any outside source. The liquid is removed from this source of supply in such manner that lubricant is taken only as it is used by the bearing. In the form of the invention herein disclosed this result is accomplished by drawing the lubricant upwardly by capillary attraction from a sub-surface that is maintained at a constant level and at zero or neutral hydrostatic head so that substantially constant conditions of feed are maintained irrespective of the height of the liquid in the reservoir. After the liquid is raised by capillary attraction to the predetermined height it is then permitted to flow by gravity to the place of use. Since the movement of the liquid due to capillary attraction through a wick is dependent upon differential conditions, it follows that if the wick is saturated then substantially no liquid flow takes place in the wick. On the other hand if the liquid is being used up or taken away from one portion of the wick for example the lower end thereof, there is a movement of liquid to supply the deficiency. In view of this fact it therefore follows that unless the bearing is drawing lubricant substantially no liquid is being fed through applicant's feed wick. On the other hand if the bearing draws lubricant rapidly then it will be fed more rapidly.

Since the amount of flow of a particular oil is dependent upon the amount of wicking, as one factor, the flow may be regulated or predetermined by the number of strands of yarn in the wick. Since the height to which the oil is led is another factor of the amount of feed, the quantity of oil fed may also be regulated by raising or lowering the high point of the wick. By means of regulating these two simple factors a constant predetermined feed may be obtained.

In view of the fact that the feed is determined by capillary attraction which feeds the oil upwardly through a wick from a sub-surface, it is very easy to provide for lifting the end of the wick from the sub-surface and thereby completely breaking the oil feed when the journal or bearing is not in use. As above stated substantially no feed takes place after the cotton waste is thoroughly saturated but where the journal is standing and particularly where the bearing is worn, oil is liable to slowly escape from around the journal. While this loss is small nevertheless it may be completely avoided by lifting the immersed end of the wick as specified.

Referring now to the drawings a shaft 1 is mounted in a bearing 2 which is provided on one side with a window 4 which leads to a pocket 5 filled with cotton waste 6 and an overflow drip cup 7 is provided at a point below the bearing. The construction so far described is merely illustrative of a standard type of motor bearing to which the present invention has been adapted. In bearings made for the use of the present invention the old drip oil cup 7 may be omitted.

A lid 8 is arranged over the pocket 5 and carries a container 9 which is fixedly secured thereto by welding or otherwise and is provided with permanently closed ends so that the container is a closed vessel. While a cylindrical container is illustrated this container may be of any desired shape or size to fit within the space in which it is adapted to be used, but the cylindrical form has been found to be economical to make and strong in use. An opening leads into the container and may be closed by a suitable screw plug 10 which preferably is slightly tapered in order to maintain a tight fit after probable wear. An inverted tube 11 terminates near the bottom of the reservoir 9 and leads upwardly through the top of the reservoir and is covered by a cap 12. A smaller tube 14 with the upper end arranged above the top wall of the reservoir extends downwardly through the bottom of the reservoir and the lid. Both ends of this tube are open. A wick 15 is attached to a wire 16 which is inserted in the tube 11 alongside the small tube 14 and the other end of the wick is dropped through the tube 14 so that it rests upon the cotton waste 6. This wick may be of different materials but lightly twisted wool strands have proven very satisfactory. The wire 16 is a very con-

venient means for removing or inspecting the wick.

A tube 17 may be welded across the cylinder 9 and may comprise a passageway for the stay bolt 18 that may be riveted to the side wall of the cup 5. Where old bearings are being equipped the openings for the hinge bracket rivets may be conveniently used as rivet openings for the stay bolt 18.

The space B between the inner wall of the tube 11 and the outer wall of the tube 14 when taken with the opening C in the tube 14 forms approximately a U-shaped passageway for the wick 15 which hangs pendant over the wall of the tube 14.

It will particularly be noted that the U-shaped passageway B—C is relatively large as compared to the strands of the wick so that there is substantially no compression of the wick and the capillary action in the wick is therefore a free action, and not a throttled or restricted action. This wick is of sufficient length to lightly rest upon the waste 6 in the pocket 5 and to comprise means for leading lubricant from the reservoir 9 to maintain the waste at the proper degree of moisture.

Prior to the beginning of the operation of the device the lid 8 and connected parts are removed from the pocket 5 and the reservoir 9 may be taken to an oil house where it may be substantially filled with oil. The plug 10 is inserted and the lid is replaced in position by inserting the stay bolt 18 through the tube 17 and tightening the nut 19 upon the locking washer 20. Since the upper end of the tube 14 is above the top wall of the container 9, no oil will escape from the device, when carried upright even when it is completely filled, other than the amount which will feed from the wick. When the device is filled the oil level in the tube 11 will be the same as the level in the reservoir. This oil in the tube continues to feed through the wick rather rapidly until the surface of the oil in the tube reaches the lower end of the tube 11 adjacent the bottom of the reservoir. From this time on this submerged surface A from which the wick supplies oil is maintained at the inner end of this tube 11 due to the partial vacuum being formed above the main oil surface in the reservoir. As the wick feeds the oil from this surface A the major surface in the reservoir gradually lowers and consequently increases the partial vacuum in the reservoir above the main surface. When this happens the surface A at the end of the tube slightly lowers until a bubble of air escapes from the end of the tube through the oil to the upper surface and into the space above the oil in the reservoir. This action continues until the oil is used up.

In Figure 2, the tube 14 is screw threaded through the bottom wall of the cylinder and is held in place by a lock nut 21 which seats against a boss 22. This permits the tube 14 to be raised or lowered relatively to the lower end of the tube 11. This raises or lowers the high point of the wick relatively to the oil surface A thereby regulating the oil flow accordingly.

If the motor stands and no oil is drawn in the bearing, the wick 15 becomes saturated and substantially no feed takes place. Due to surface tension, atmospheric pressure usually slightly over-balances the hydrostatic head and the surface A is normally concave, and this holds back slightly the oil feed when the oil is not being used. As soon as the motor starts to run and starts to draw oil from the waste 5 the lubricant is drawn from the lower end of the wick and capillary attraction tends to overcome the differential in the wick by supplying new lubricant from the reservoir 9.

Figure 4 shows a construction wherein the cover 12 is provided with an opening 24 and the rod 16 carries a collar 25. When it is desired to completely stop the flow the rod 16 is lifted until the collar 25 clears the top when the clip 26, which is pivoted at 27, is swung over the wire with the slot 28 receiving the wire. When the wire is released the collar acts as a support to hold the lower end of the wick 15 clear of the oil sub-surface A thus completely stopping the flow.

In Figure 4 a stopping device is also illustrated which is especially adaptable for electrical machinery. In this adaptation the wire 16 is normally raised by a spring 29, the wire 16 carries a soft iron bar 30 that extends partly within a solenoid. Normally when the electrical machine is not running the spring 20 holds the wick out of the oil, but as soon as the electrical current comes on the solenoid is energized and pulls the bar 30 into the coils of the solenoid thus stretching the spring and lowering the lower end of the wire into the oil so that the oil feed may begin. The raising and lowering of the wick may be accomplished by other mechanical or electrical devices as may be desired.

Thus exactly the right amount of lubricant may be supplied economically and because of the fact that the submerged surface A is considerably below the upper end of the tube 14, it follows that jolts, jars, and shocks do not splash lubricant out of the container so that oil is not wasted in this way. Furthermore in view of the fact that the surface A is maintained at substantially a constant level irrespective of the height of the upper surface, it follows that the feed of the oil is not affected by the head level of the liquid in the reservoir. It will further be noted that the surface A, is always located at the point where the outer atmosphere balances the hydrostatic head of oil in the reservoir, (otherwise bubbles will rise from the surface A)

so that this surface not only is at a substantially constant level but is at a zero or neutral hydrostatic head.

Having thus described my invention, what I claim is:

1. A device of the character described the combination of a supply for lubrication, a wick adapted to lead lubricant from said supply, and a wick support comprising means adapted to secure one end of the wick submerged in the oil, and automatic means to maintain said support with the end of the wick raised from the oil when desired.

2. In a device of the character described a supply of lubricant, means to maintain a surface of said lubricant under zero hydrostatic head and at a constant level, feeding means to raise said lubricant from said surface, and an automatic control for said feeding means whereby said feeding means is automatically rendered ineffective when the need for lubrication ceases.

3. In a device of the character described a supply of lubricant, means to maintain a surface of said said lubricant under zero hydrostatic head and at a constant level, feeding means to raise said lubricant from said surface, and an automatic control for said feeding means whereby said feeding means is normally inoperative and is automatically rendered operative when need for lubrication arises.

4. In a device of the character described, the combination of a supply of lubricant, a wick adapted to lead lubricant from said supply and a wick support comprising electrical means adapted to secure one end of the wick in the lubricant with means to maintain said support with the end of the wick raised from the oil when desired.

5. In a device of the character described, the combination of a supply of lubricant, a wick adapted to lead lubricant from said supply and a wick support comprising electro-magnetic means adapted to submerge one end of the wick in the lubricant with means to maintain said support with the end of the wick raised from the oil when the electro-magnetic means is deenergized.

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