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LUBRICATING APPARATUS
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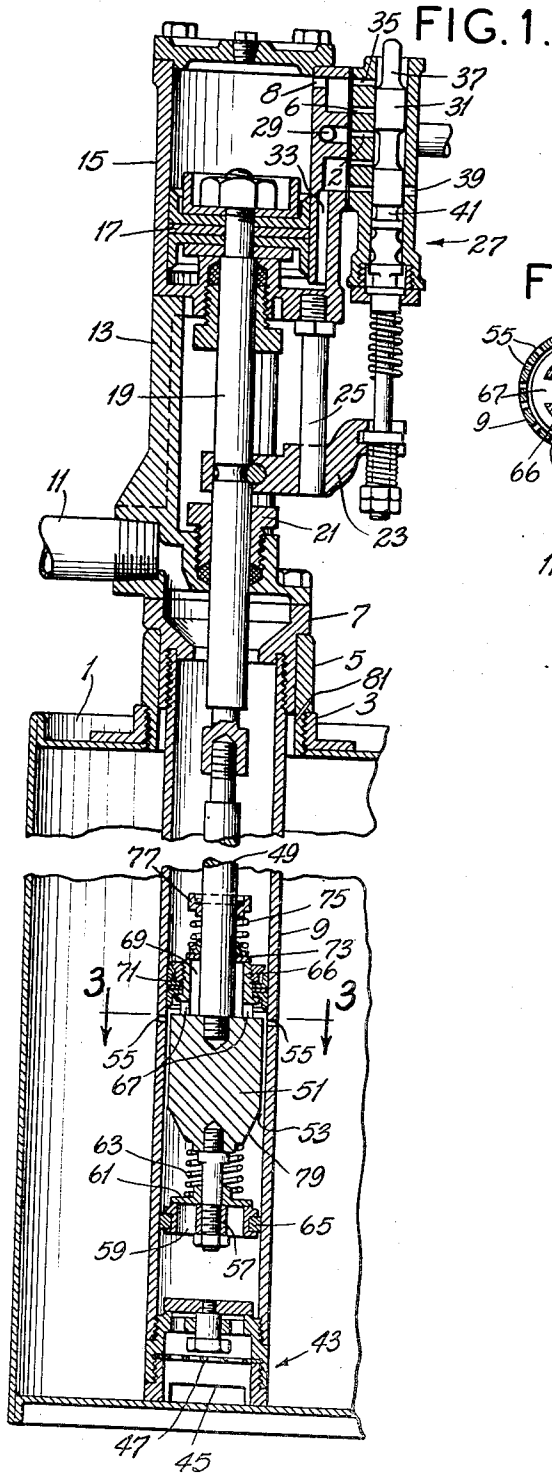


FIG. 3.

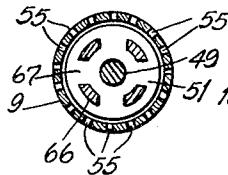
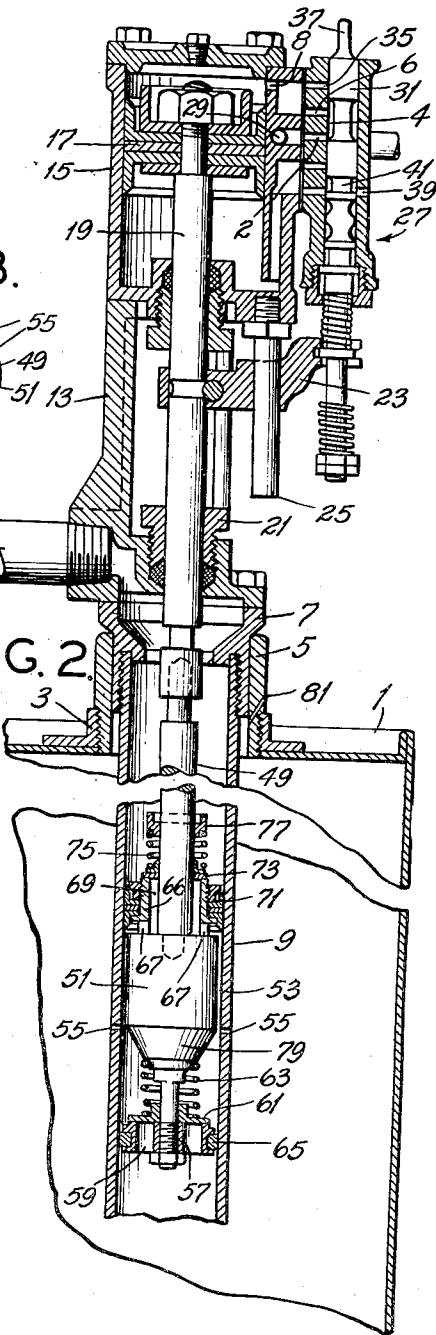


FIG. 2.



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LUBRICATING APPARATUS

Application filed January 18, 1932. Serial No. 587,279.

This invention relates to lubricating apparatus, and with regard to certain more specific features, to apparatus of this class for effecting a delivery of lubricant.

Among the several objects of the invention may be noted the provision of improved pumping means for lubricants such as grease and the like which may carry entrained air and the like and which should preferably have said air removed therefrom; the provision of apparatus of the class described which is particularly useful in connection with metering apparatus wherein air should be eliminated to prevent false reading at the meter; the provision of apparatus of this class which eliminates air pockets in the compression line, thereby preventing undesirable resiliency when pumping against high resistances; and the provision of apparatus of this class which is simple to manufacture and which is trouble proof in operation. Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly comprises the elements and combinations of elements, features of construction, and arrangements of parts which will be exemplified in the structure hereinafter described, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawing, in which is illustrated one of various possible embodiments of the invention,

Fig. 1 is a vertical section taken through the apparatus;

Fig. 2 is a view similar to Fig. 1, showing an alternative position; and,

Fig. 3 is a horizontal section taken substantially along line 3—3 of Fig. 1.

Similar reference characters indicate corresponding parts throughout the several views of the drawing.

Referring now more particularly to Fig. 1, there is shown at numeral 1, a barrel of a class in which lubricants and the like are ordinarily delivered. This barrel carries a bushing 3 adapted to have threaded therein a closing cap. When the barrel 1 is received full, said cap is removed, and a bushing 5 screwed therein. This bushing 5 has for its purpose the

receiving of an outlet connection 7 associated with a pump barrel or tube 9, the latter being adapted to enter the lower reaches of the barrel 1.

Associated with the outlet member 7 is a grease outlet 11 which is in connection with a suitable line for effecting grease delivery. This delivery may be effected at atmospheric or super-atmospheric pressure and often it is made through metering apparatus. The metering apparatus is generally of the class which operates on a volume basis and therefore, if any of the volume passing there-through comprises foreign material such as entrained air, a false reading will result. It is one of the purposes of this invention to eliminate false readings due to entrained air.

Above the member 7 is a supporting structure 13 for an air pump cylinder 15 having therein a reciprocating piston 17 which has a piston rod 19 extending down into said cylinder 9, the rod 19 passing through a stuffing gland 21.

The piston rod 19 carries a cross head 23 which rides on a guide 25. The purpose of the cross head 23 is to drive a full-stroke valve gear 27. The valve gear 27 makes inlet and exhaust connection on opposite sides of the piston 17 for purposes of reciprocating it.

Full-stroke valve gear of this general class has already been described in connection with my copending patent application, Serial No. 290,379, filed July 5, 1928, for pump, issued as Patent No. 1,858,979, dated May 17, 1932. It will here suffice to state that the inlet for air is brought into one side of the valve gear, as shown at numeral 29. When the valve stem 31 is in a position such as shown in Fig. 1, air may flow through passage 33 to the lower side of the piston 17, thus tending to lift the piston. Exhaust occurs from the upper side of the piston 17 through the outlet 35 and out around the end 37 of the stem 31.

In its alternate position (Fig. 2), the stem 31 covers the outlet port 35, air being then charged above the piston 17 through ports 2, 4, 6 and 8 and exhaust occurring from below the piston 17 through a port 39 opposite

which at this time is located a recess 41 in the valve stem 31.

A check or foot valve 43 at the lower end of the cylinder 9 permits entry of grease but prevents reverse exit therethrough. A castellated open bottom 45 to the cylinder 9 permits entry of grease into the cylinder 9 from below, even though the cylinder 9 be resting on the bottom of the barrel 1. A strainer 47 ensures that foreign material will not clog the operation.

From the piston rod 19 there extends downwardly an extension 49 to the lower end of which is fastened a spreader 51. An annular clearance 53 is provided between the spreader 51 and the cylinder 9. The clearance 53 is of such a degree that the cross section of the annulus formed thereby is, in view of the internal diameter of the cylinder 9, great enough to transmit all of the grease which it is within the capacity of the machine to pump. At the same time, the clearance is such that grease or the like passing between the spreader 51 and the cylinder 9 is spread out into a substantially thin film. Hence any air or other air entrained in the grease is also spread out into a thin film.

In the cylinder 9 is located a series of peripheral openings 55, located near the upper end of the spreader 51 when the spreader is down. The stroke of the pump is such that the lower end of the spreader is located near said openings when the pump plunger is up, as shown in Fig. 2.

To the lower end of the spreader 51 is fastened an extension 57 which carries an open spider 59, the latter forming the valve seat for a one-way valve 61. The valve 61 is normally maintained on its seat by a spring 63 but when the plunger, as a whole, descends, it is forced from its seat by the pressure of lubricant trapped beneath the spider 59 because of the closing of the foot valve 43. A piston ring 65 slidably seals the spider to the cylinder 9.

Above the spreader 51 there is an extension 66 having ports 67 and an outlet 69 through which the grease is adapted to pass after having gone through the annular portion 53. Around the extension 65 is a sealing ring 71. The extension also forms a seat for a valve 73 slidably on the piston rod extension 49, said valve being normally held to a seat by a spring 75 reacting against an abutment 77 on the extensions 49.

The operation of the device is as follows:

Reciprocation of the piston 17 under action of air entering through the valve gear 27 effects reciprocation of the parts on the extension 49.

Assuming that the parts are in the position shown in Fig. 1, the next action will be an upward stroke. This effects opening of the foot valve 43 and the closing of the valve 61; also closing of the valve 73. Thus a

charge is drawn into the lower end of the cylinder 9.

At the same time, the charge which has previously passed the upper valve 73 is forced out of the upper end of the cylinder 9 and into the outlet 11.

The final positioning of parts at the end of the stroke is illustrated in Fig. 2. The next stroke will be a downward one. The foot valve 43 will close and the valve 61 and 73 will open as the charge trapped above the foot valve is compressed. This charge escapes upwardly through the openings in the spider 59, passes through the open valve 61 and around the spreader 51. As the drawing shows, the spreader 51 is downwardly tapered as illustrated at numeral 79 so that the upwardly passing charge is gradually forced out into the annular contour of the annulus 53. Thus the charge is spread out into a relatively thin film or cylinder as it passes the spreader 51.

It will be seen that any entrained air in the grease is also spread out peripherally as a whole or partial cylinder which definitely assures that it will be presented to the openings 55 to escape into the barrel. The bushing 5 has a suitable opening 81 which equalizes the pressure within the barrel with that of the atmosphere so that this escaping air is not being forced against superatmospheric pressure. The valve 73 throttles the flow of material so that a partial pressure is placed thereon while it is in the annulus 53, thus ensuring an expulsion of the air from the ports 55.

Some grease may tend to be forced from the openings 55 at the same time that air is forced therefrom; but the openings are relatively small so that air passes much more easily than the grease, the latter being restricted in its outward movement; and the amount of grease that does escape is inconsequential small. Furthermore, it merely returns to the supply and this is done before measurement thereof, so that there is no false meter reading. It will also be noted that the air under the pressure caused by the resistance of the valve 73 is compressible, while the grease therewith is not. Thus when a volume of air reaches an opening or openings 55, it escapes outwardly quickly, momentarily reducing the pressure in the annulus and permitting the grease to pass without leakage.

It will be seen from the above, that sooner or later, all of the grease, in being pumped, is presented to the openings 55 in the form of the annulus above described and any entrained air therewith automatically escapes back into the barrel 1, and the grease which is ejected into the line 11 is substantially air free. Thus it is in a better condition for subsequent use and/or passage through any metering device in connection with said line 11.

It will be noted that on the up-stroke of the device, the charge of grease between the valves 61 and 73 is under no sub-atmospheric or super-atmospheric pressure. The same is merely carried up into a new position prior to the descending stroke and consequent upward forcing.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As many changes could be made in carrying out the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. In apparatus of the class described, a reciprocating plunger, a cylinder, an inlet check valve associated therewith, said cylinder having an outlet, said reciprocating means drawing material into the cylinder and ejecting the same therefrom, a spreader located between the inlet and the outlet of said cylinder adapted to force said material to conform to a film corresponding to the shape of the interior of the cylinder, said cylinder having at least one opening where said film is formed, said spreader having an effective spreading portion adjacent said opening throughout the period of movement of material past said opening.

2. In apparatus of the class described, a reciprocating plunger, a cylinder, an inlet check valve associated therewith, said cylinder having an outlet, said reciprocating means drawing material into the cylinder and ejecting the same therefrom, a spreader located between the inlet and the outlet of said cylinder adapted to force said material to effect a film, said cylinder having at least one opening where said film is formed, said spreader having an effective spreading portion adjacent said opening throughout the period of movement of material past said opening.

3. In apparatus of the class described, a reciprocating plunger, a cylinder, an inlet check valve associated therewith, said cylinder having an outlet, said reciprocating means drawing material into the cylinder and ejecting the same therefrom, a spreader located between the inlet and the outlet of said cylinder adapted to force said material to conform to a film corresponding to the shape of the interior of the cylinder, said cylinder having at least one opening where said film is formed, and said reciprocating means carrying said spreader, said spreader having an effective spreading portion adjacent said opening throughout the period of movement of material past said opening.

4. In apparatus of the class described, a reciprocating plunger, a cylinder, an inlet check

valve associated therewith, said cylinder having an outlet, said reciprocating means drawing material into the cylinder and ejecting the same therefrom, a spreader located between the inlet and the outlet of said cylinder adapted to force said material to conform to a film corresponding to the shape of the interior of the cylinder, said cylinder having at least one opening where said film is formed, and said reciprocating means carrying said spreader and means effecting passage of material through the plunger and past the spreader, said spreader having an effective spreading portion adjacent said opening throughout the period of movement of material past said opening.

5. In apparatus of the class described, a reciprocating plunger, a cylinder, an inlet check valve associated therewith, said cylinder having an outlet, said reciprocating means drawing material into the cylinder and ejecting the same therefrom, a spreader located between the inlet and the outlet of said cylinder adapted to force said material to conform to a film corresponding to the shape of the interior of the cylinder, said cylinder having at least one opening where said film is formed and means between the spreader and the cylinder outlet for causing a pressure upon the material in said film.

6. In apparatus of the class described, a reciprocating plunger, a cylinder, an inlet check valve associated therewith, said cylinder having an outlet, said reciprocating means drawing material into the cylinder and ejecting the same therefrom, a spreader located between the inlet and the outlet of said cylinder adapted to force said material to conform to a film corresponding to the shape of the interior of the cylinder, said cylinder having at least one opening where said film is formed, said reciprocating means carrying said spreader and means on said plunger adapted to cause pressure on the material in said film.

7. In apparatus of the class described, a cylinder, an inlet check valve in said cylinder, said cylinder having an outlet, reciprocating means in said cylinder comprising a plunger having a spreader adapted to force material passing through the cylinder to effect a film conforming to the shape of the cylinder, said cylinder having at least one opening where the film is formed.

8. In apparatus of the class described, a cylinder, an inlet check valve in said cylinder, said cylinder having an outlet, reciprocating means in said cylinder comprising a plunger having a spreader adapted to force material passing through the cylinder to effect a film conforming to the shape of the cylinder, said cylinder having at least one opening where the film is formed, check valves on the plunger permitting flow of material in the same direction as does said inlet check valve, one of the check valves on

the plunger being adjacent said inlet check valve of the cylinder and the other being adjacent the cylinder outlet, with respect to said spreader.

9. In apparatus of the class described, a cylinder, an inlet check valve in said cylinder, said cylinder having an outlet, reciprocating means in said cylinder comprising a plunger having a spreader adapted to force material passing through the cylinder to effect a film conforming to the shape of the cylinder, said cylinder having at least one opening where the film is formed, check valves on the plunger permitting flow of material in the same direction as does said inlet check valve, one of the check valves on the plunger being adjacent said inlet check valve of the cylinder and the other being adjacent the cylinder outlet with respect to said spreader, whereby pressure is placed on the material in the film as it passes said opening.

10. In apparatus of the class described, a cylinder, a reciprocating plunger in said cylinder, an inlet check valve, said cylinder having an outlet in communication therewith, reciprocation of the plunger drawing material into the cylinder and ejecting the material therefrom, at least one opening in communication with the cylinder and a spreader adapted to force all pumped material into a film adjacent to said opening to effect escape of air or the like from the grease through said outlets.

11. In apparatus of the class described, a cylinder, a reciprocating plunger in said cylinder, an inlet check valve, said cylinder having an outlet in communication therewith, reciprocation of the plunger drawing material into the cylinder and ejecting the material therefrom, at least one opening in communication with a cylinder and a spreader adapted to force all pumped material into a film adjacent to said opening to effect escape of air or the like from the material through said opening and resistance means between said opening and said outlet adapted to place said entrained air under pressure at the opening whereby it is forced from said opening.

12. In apparatus of the class described, a cylinder, a reciprocating plunger in said cylinder, an inlet check valve, said cylinder having a material outlet in communication therewith, reciprocation of the plunger drawing material into the cylinder and ejecting the material therefrom, at least one air opening in communication with a cylinder and a spreader adapted to force all pumped material into a film adjacent to said outlet to effect escape of air or the like from the material through said opening and resistance means between the air opening and the material outlet adapted to place said entrained air under pressure whereby it is forced from said air opening, said air opening being small

enough to permit easy escape of air but to resist escape of substantial amounts of material.

In testimony whereof, I have signed my name to this specification this 15th day of January, 1932.

FRANK S. BARKS.

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