

Oct. 13, 1942.

F. S. BARKS ET AL

2,298,920

LUBRICATING APPARATUS

Filed May 10, 1940

2 Sheets-Sheet 1

FIG. 1.

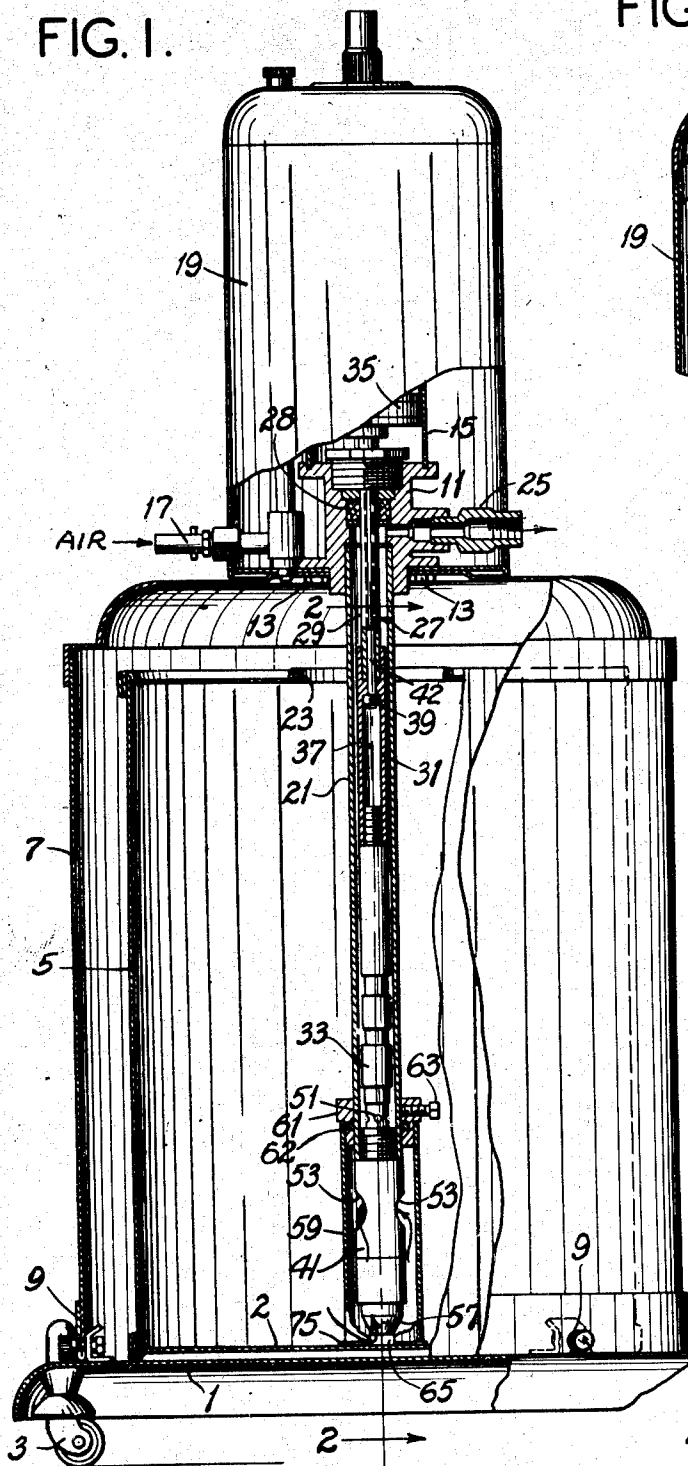


FIG. 4.

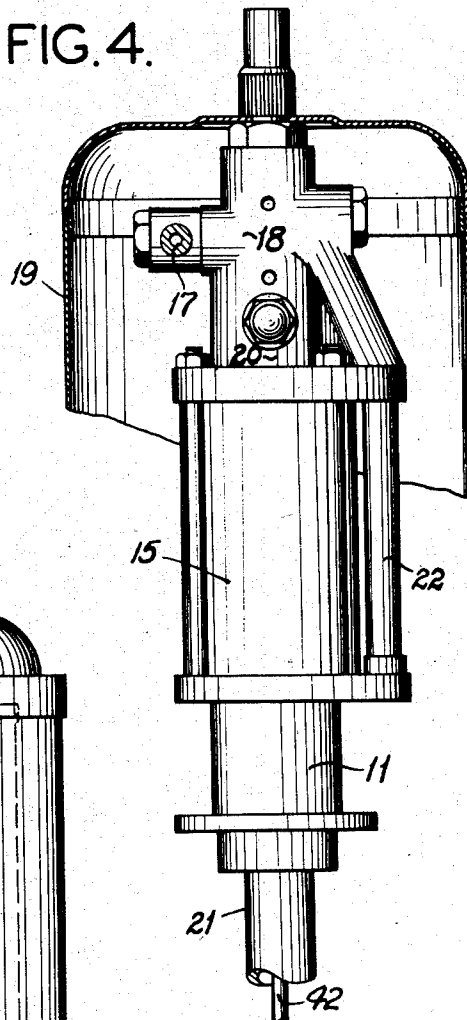
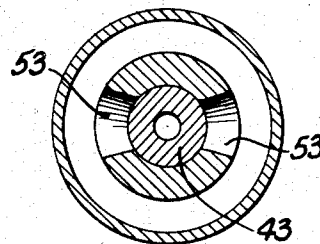


FIG. 5.



Frank S. Barks,
Victor S. Klein,
Inventors.
Haynes and Koenig
Attorneys.

Oct. 13, 1942.

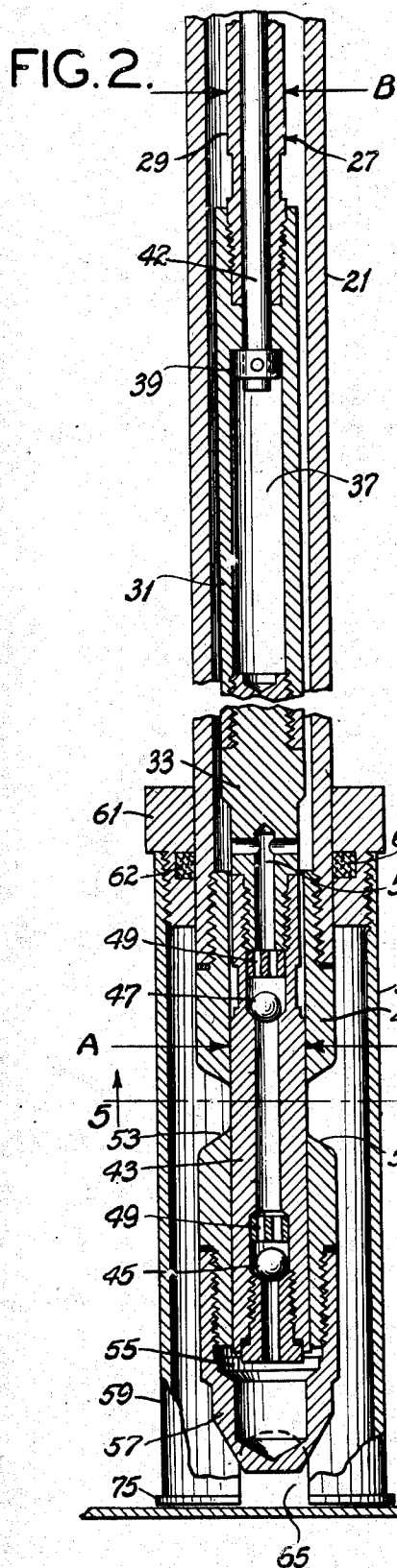
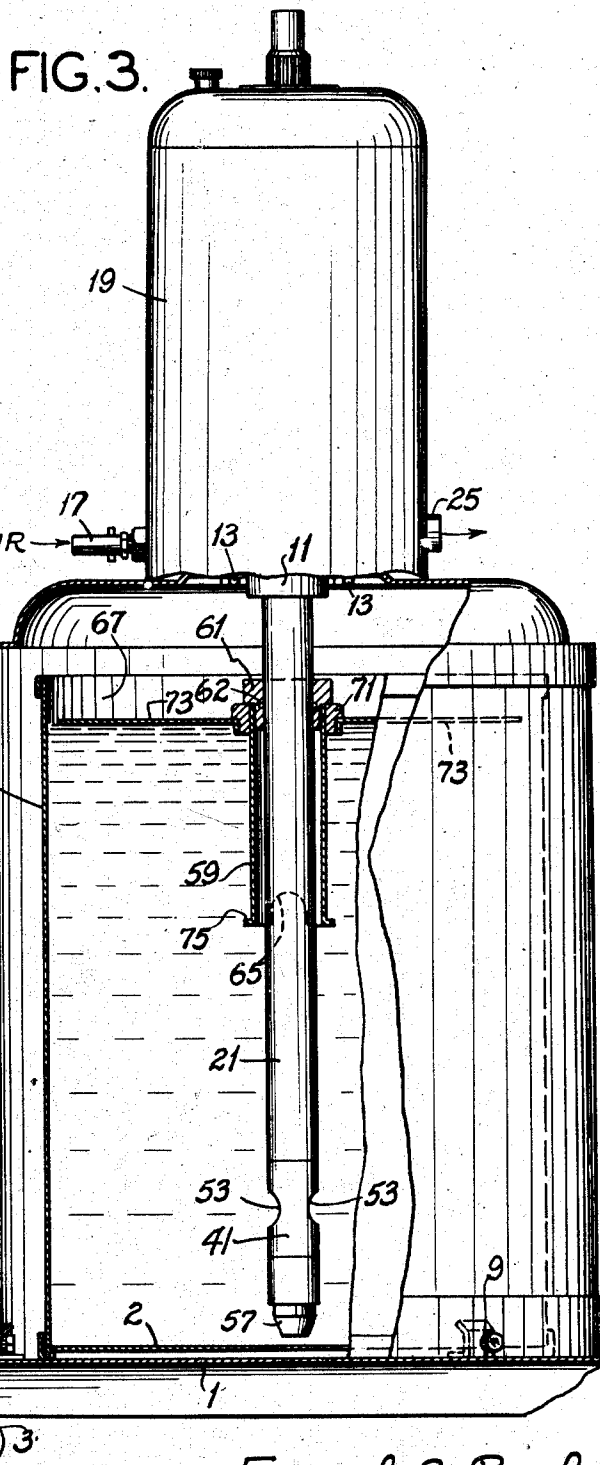
F. S. BARKS ET AL

2,298,920

LUBRICATING APPARATUS

Filed May 10, 1940

2 Sheets-Sheet 2



Frank S. Barks
Victor S. Klein,
Inventors.
Haynes and Koenig
attorneys.

UNITED STATES PATENT OFFICE

2,298,920

LUBRICATING APPARATUS

Frank S. Barks and Victor G. Klein, St. Louis, Mo., assignors to Lincoln Engineering Company, St. Louis, Mo., a corporation of Missouri

Application May 10, 1940, Serial No. 334,423

5 Claims. (CL 221—47.1)

This invention relates to lubricating apparatus, and with regard to certain more specific features, to lubricating pumps.

Among the several objects of the invention may be noted the provision of a lubricant pump and cover, for application to various lubricant containers for emptying purposes; the provision of a pump having means for effecting a complete and positive prime without requiring a return to the supply of a part of the priming charge; the provision of a pump of the class described which may be used substantially to empty a container either with or without a lubricant follower; and the provision of a pump of this class which includes a simplified double-action cycle. Other objects will be in part obvious and in part pointed out hereinafter.

The invention is an improvement upon the constructions shown in United States Patent 2,122,020 of Frank S. Barks, dated June 28, 1938, and United States Patent 2,136,636 of Lutwin C. Rotter, dated November 15, 1938.

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

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

Fig. 1 is a side elevation, parts being broken away to show a cross section;

Fig. 2 is an enlarged vertical section showing certain pump parts;

Fig. 3 is a view similar to Fig. 1 showing an alternative form of the invention;

Fig. 4 is a fragmentary elevation of certain engine parts within a broken-away corner, shown at right angles to Fig. 1; and,

Fig. 5 is a horizontal section taken on line 5—5 of Fig. 2.

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

In said patents, automatic prime is attached by means of the principle of returning to the supply some of the prime charge. In this invention such return is avoided and in addition simplification is accomplished.

Referring now more particularly to Fig. 1, there is shown at numeral 1 a platform which may be carried on casters 3 or the like. This platform is for the purpose of supporting a commercial lubricant container 5. It is an object

of the invention to empty the container by directly inserting therein the lance portion of a lubricant pump.

The pump is carried within a cover and support 7 which is detachably held by fastenings 9 on the platform 1. The bell-shaped member 7 is fastened to a pump outlet housing 11 by means of bolts 13. The housing 11 carries a reciprocating air-engine cylinder 15, further details of which it is unnecessary to describe herein, because it is of a known type for the purpose. Its air inlet connection is shown at 17 and the cover therefor at 19. In Fig. 4 its valve case is shown at 18 with connections 20 and 22 to opposite ends of the air cylinder. Its driving piston is shown at 35.

Fastened into the lower end of the housing 11 is a transmission tube 21 of a lance-type of pump operated by the piston 35. This tube and attached parts are adapted to be thrust into the opening 23 of the lubricant container 5. The inside of the cylinder 21 communicates through housing 11 with a lubricant outlet 25 to which is attached a suitable valved hose (not shown).

The lubricant pump is detailed in Fig. 2, and comprises a piston rod 27, which is made in three sections 29, 31 and 33 extending from the piston 35 of the air engine 15. Only the section 29 passes through a packing gland 28, the parts 31 and 33 being extensions through the transmission tube or cylinder 21. Reciprocation in the usual way of the piston 35 results in reciprocation of the piston rod parts 29, 31 and 33.

The rod extension 31 is hollow as indicated at 37 for effecting a lost-motion connection with a head 39 of a valve stem 42. The valve stem 42 passes through the hollow portion of 29 and 35 to the valve gear of the engine 15, whereby the valve gear is reset at the ends of the stroke of piston 35, so as to reverse piston movement. The action is due to cooperation between the head 39 and the ends of 37. Lost-motion valve-operating arrangements being known in the art, further description is not herein made.

The lower end of the transmission cylinder 21 has threaded thereto a pump cylinder 41 in which reciprocates a pump piston or plunger 43, the latter being threaded at the lower end of the lowermost rod extension 33. The piston 43 is hollow, its lower end including a ball check valve 45 and having at its upper end a second ball-check valve 47. Both of the valves will transmit lubricant upwardly but will prevent downward movement. The reason for two valves is to increase reliability from the viewpoint of

valve sticking due to foreign material. The outlet of each valve is covered by a grid member 49 which permits lubricant to pass when the valve is open and holds the ball portion prisoner. The outlet of the upper valve is shown at 51 and communicates with the interior of the transmission cylinder 21.

The cylinder 41 has a lower dead end 57 and at a region spaced from this end is provided with inlet openings 53. This makes a priming cup out of the cylinder parts below the openings 53. These openings are uncovered by upward movement of the plunger 43. The vacuum thus drawn under the plunger in the dead end 57 results in an inrush of fluid into the openings 53 to fill the empty inner chamber 55. Then upon downward movement of the piston plunger 43, a priming charge of lubricant is trapped in the chamber 55 and positively forced by compression through the valves 45 and 47 to a position within the transmission cylinder 21. None flows back to the source.

The area of the cross section at A of the plunger 43 is substantially twice that of the area of cross section at B of the piston rod member 29. Thus, upon the downstroke, after closure of ports 53, lubricant is simply transferred from the chamber 55 through the check valves 45 and 47 to a point in the cylinder 21 and above plunger 43. The intrusive action of the rod with section B sends out a charge through the outlet 25. Hence on the downstroke the plunger 43 does not cause direct discharge to the outlet, but the rod 29 does.

Upon an upward stroke, the volume lost by outward movement of the rod 29 (of section B) is made up for by the fact that the plunger 43 (of section A) delivers enough charge to make up for this loss of volume, and also enough to force out a charge from outlet 25. In other words, the volumetric displacement of the plunger 43 is about twice that of the rod 29. Upon the downstroke of plunger 43, it simply moves from a position above the next priming charge to a position below that charge. The ratio of 2:1 above mentioned need only be substantial in order to obtain substantially the same amount of fluid from the outlet 25 upon each pulsation. It will be understood that the fact that the plunger 43 crosses the inlet 53 in moving downwardly causes some unbalance in this respect, but if desired, this can be corrected by suitably adjusting the ratio of the values of cross sections A and B.

This constitutes an improvement upon said Barks Patent 2,122,020 and the said Rotter Patent 2,136,636, in avoiding passage of some of the priming charge back to the lubricant supply. The present construction is also simpler.

Since the inlets 53 are spaced some distance from dead end 57, and it is desired to empty a lubricant barrel substantially completely, there is provided a skirt 59 which is threaded upon a collar 61 held in place by a set screw 63 and sealed by packing 62. The lower end of the skirt 59 is notched with inlets as shown at 65. The skirt 59 functions as a tube whose inlet 65 is near the bottom of a container, which will act as a guide lift for fluid up to the inlet 53. This occurs due to atmospheric pressure acting on the surface of the lubricant or fluid as suction is brought about by the pump.

In Figure 3 is shown an alternative form of the invention in which like numerals designate like parts. In the case of Fig. 1, the opening 23 of the lubricant container 5 is not large enough

to accommodate insertion of a follower piston. Some lubricant containers are large enough for this purpose, as shown in Fig. 3. In this case the large opening is shown at numeral 67.

The sleeve skirt 59 in this case is again threaded to a collar 61 having a sliding packing 62, but in this case the collar 61 slides and is not held by any set screw.

Sliding on the outside of the tube 59 is a second collar 71 upon which is threaded a follower piston 73. This piston 73 extends out to a point near the cylindric inner surface of the drum 5.

Assuming the lubricant to be grease in the barrel 5 (Fig. 3), when the cylinder 21 is inserted, the follower 73 is held upon the top of the grease, and the tube 59 pierces through the grease, as shown. Then as lubricant is withdrawn through the openings 53, the level of the lubricant descends and the follower 73 prevents air cratering. The follower descends as the lubricant level descends, and so also does the cylinder 59, until finally the lower end of the cylinder rests upon the bottom 2 of the tank 5 and ensures the substantially complete emptying of lubricant. At this stage the continued air pressure and emptying sends the follower 73 downward from the top to the bottom of skirt 59, so that the collar 71 slides down to a stop 75, quite near the bottom of the container. Thus, there is assurance not only of substantially complete emptying of the container, but also follower action substantially to the bottom.

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 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 drawings shall be interpreted as illustrative and not in a limiting sense.

We claim:

1. A double-acting pump comprising a pump cylinder having reception inlets spaced from a dead end, a co-axial transmission cylinder supporting the pump cylinder, a hollow plunger in the pump cylinder, a check valve opening in a direction for movement of fluid only from said dead end through the plunger to the transmission cylinder, said transmission cylinder having an outlet at the end opposite the pump, a piston rod reciprocating into and out of the transmission cylinder and connected to said plunger, the cross-sectional area of the outside of the plunger being substantially twice that of the outside of said rod at the point where it enters the transmission cylinder, a cylindric sleeve spaced from the pump cylinder and covering said suction inlet and having an inlet opening spaced from said suction inlet, said sleeve being slidable on said transmission cylinder, and a follower slidable on the sleeve.

2. A pump comprising a cylinder having at least one suction port spaced from a dead end, a sleeve enclosed at one end and slidably sealed to said cylinder and adapted spacedly to cover said suction port, said sleeve having at least one inlet opening at its other end, said last-named opening being movable with respect to said dead end, and a follower slidable on said sleeve and movable from an upper point thereon to a point near said inlet opening.

3. A lance type of pump for containers of various depths comprising a pump cylinder of fixed length for insertion into container and

having at least one suction port spaced from a dead lower end, a sleeve which at its upper portion slides with respect to the pump cylinder, said upper portion being slidably sealed to said cylinder to form a suction-tight sliding connection above said port, the portion of the sleeve below the sliding seal being spaced from the pump cylinder, the lower end of said sleeve being movable toward engagement with the bottoms of containers of various lengths while said upper portion of the sleeve maintains said sliding seal with respect to the cylinder above the suction port, said sleeve being open endwise at its bottom and having at least one side inlet at its lower end forming an extension from said endwise opening, whereby material may be withdrawn from the container through said suction port substantially down to the bottom of the container without said pump losing prime through the slidable seal between the pump cylinder and said sleeve.

4. A lance type of pump for containers of various depths comprising a pump cylinder of fixed length for insertion into the containers and having at least one lateral suction port spaced from a lower dead end, a sliding sleeve around said cylinder and spaced therefrom, which sleeve at its upper end is closed and at its lower end is open, packing means carried by the sleeve and located between said sleeve and the cylinder at said closed upper end of the sleeve, said pack-

ing means insuring a seal at any position of the sleeve on the cylinder, the seal being always above the suction port, said lower open end of the sleeve being movable toward juxtaposition with the bottoms of the containers of various lengths.

5. A double acting pump, comprising a pump cylinder having a dead end and a reception inlet spaced from said dead end, thereby providing a priming cup between said inlet and said dead end, a transmission cylinder in coaxial communication at one end with the pump cylinder, a hollow plunger crossing the inlet, a check valve permitting movement of fluid from the priming cup only through the plunger to the transmission cylinder, said transmission cylinder having a fluid outlet, and a piston rod attached to said hollow plunger and passing through said transmission cylinder, the piston rod being ported so that in all positions the rod forms a communication between the hollow plunger and the transmission cylinder, the transmission cylinder at its other end having a sliding sealing connection with the piston rod, the area of the outer cross section of the plunger being greater by a ratio of substantially 2:1 than that of the outer cross section of the piston rod in the region where the piston rod reciprocates into and out of the transmission cylinder.

FRANK S. BARKS.
VICTOR G. KLEIN.