June 20, 1933. J. J. PELOUCH ET AL 1,914,896

LUBRICANT DISPENSING APPARATUS

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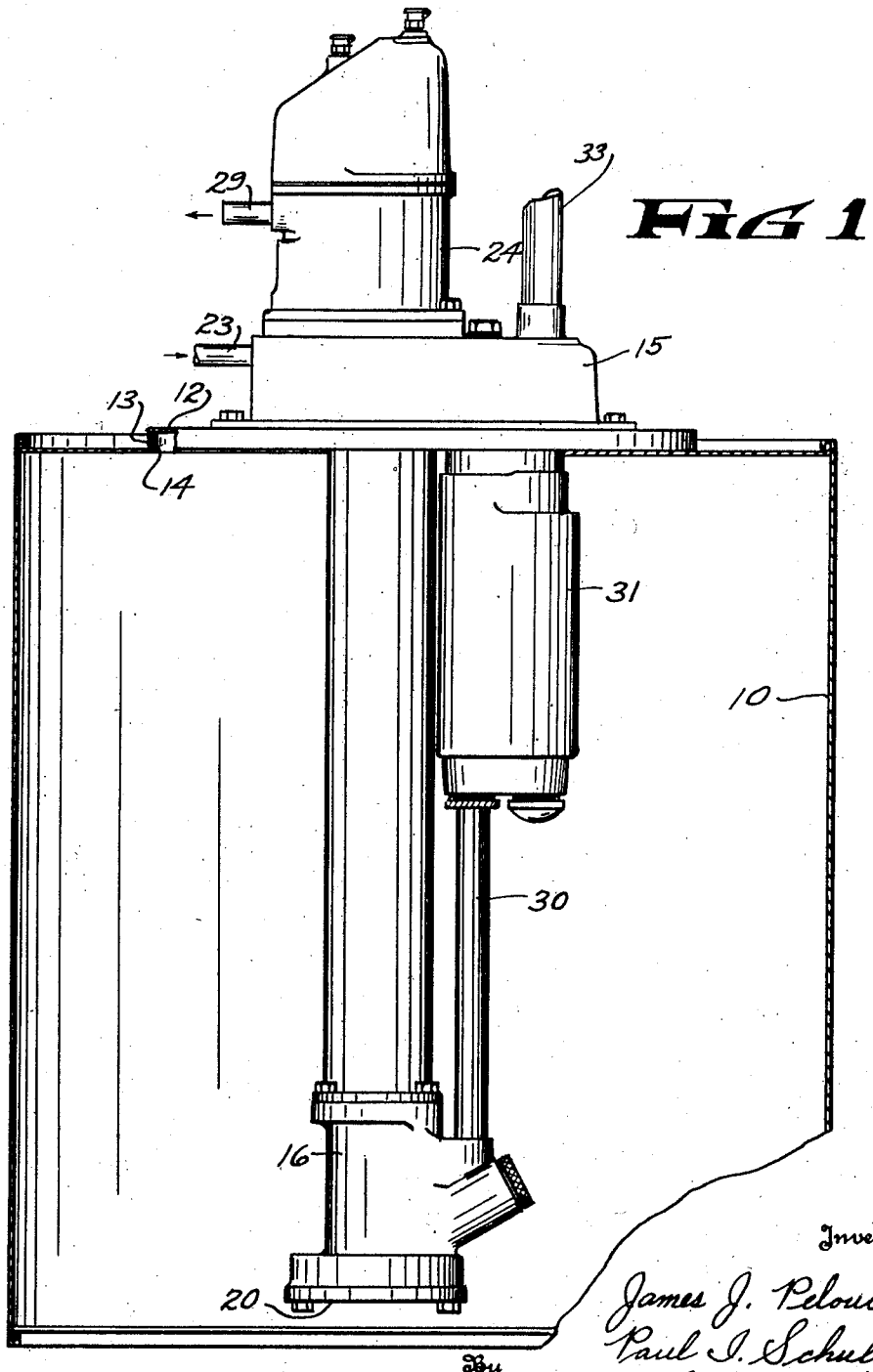


FIG 1

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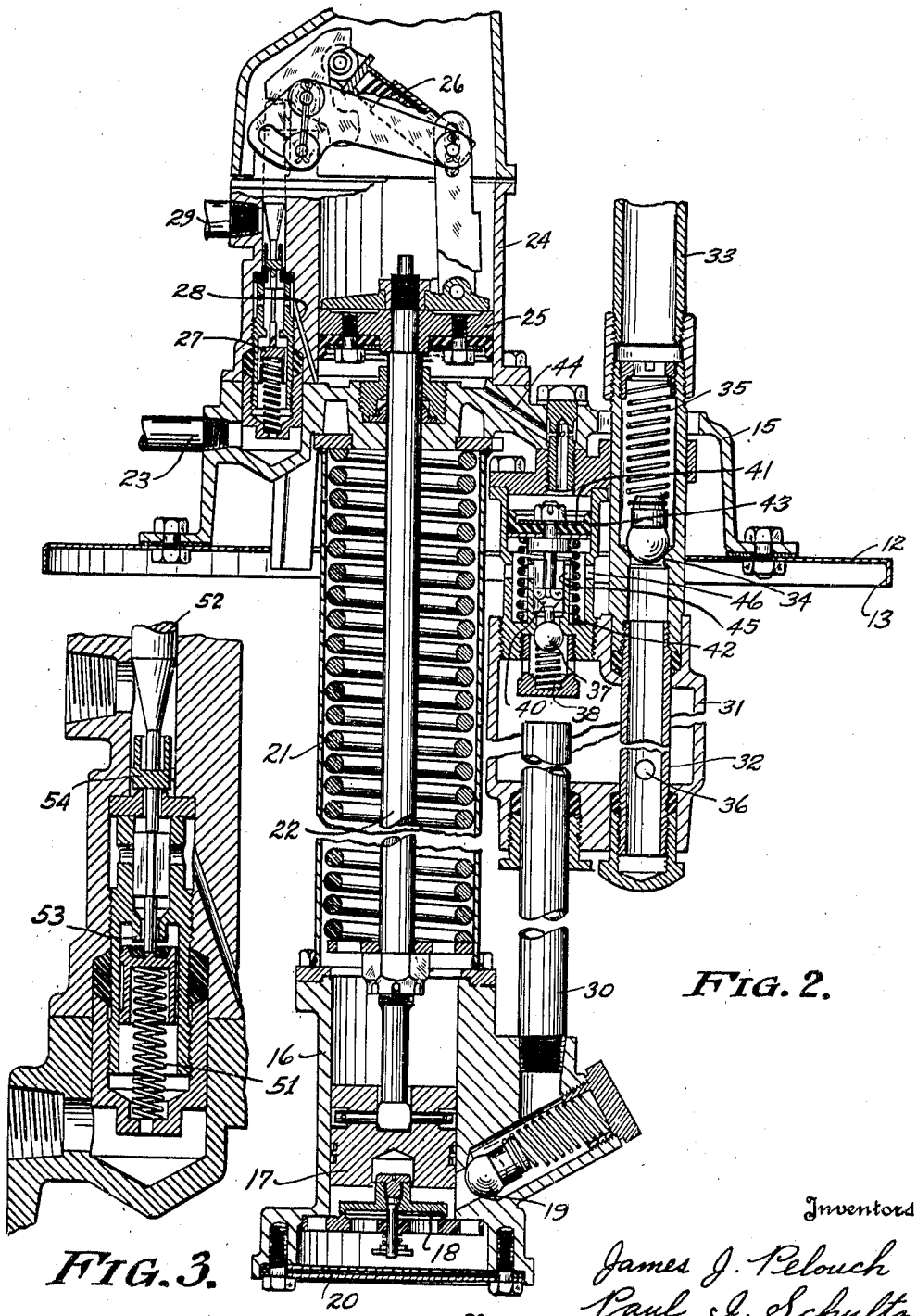


FIG. 2.

FIG. 3.

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UNITED STATES PATENT OFFICE

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LUBRICANT DISPENSING APPARATUS

Application filed June 10, 1931. Serial No. 543,266.

This invention relates to fluid dispensing apparatus and particularly to devices that are adapted for use in dispensing lubricant in garages, service stations and the like. The invention is particularly concerned with a construction of a grease pump which is adapted to be inserted through the usual opening in the top of a grease drum, and which is arranged to be automatically operated to eject grease from the drum whenever the discharge valve is opened.

Heretofore, one device of this kind has embodied a reciprocating pump which has utilized resilient means for drawing grease into the pump and air actuated means for expelling it therefrom. In practice, it has been found however that the suction is relatively fast while the discharge operation is relatively slow. Furthermore, the lubricant in the discharge conduit is always under pressure even though the discharge valve is closed. Accordingly, the air being on for a relatively long period of time, has a tendency to escape and thereby cause objectionable leakage, which amounts to an appreciable item during the life of the pump.

Manually operated devices of this kind have been used for dispensing lubricant from a container directly into the transmission and differential housings of a motor vehicle but they have been objectionable, for each stroke of a hand operated plunger has been regarded as having dispensed a measured quantity of lubricant, for which the customer has been charged at a definite rate per stroke. The possibility of the customer being defrauded by such procedure has led to the adoption of meters that are placed in the discharge conduit, but another difficulty has arisen in that any air that is trapped will register as lubricant while passing therethrough. Many efforts have been made to guard against the possibility of air flowing through the meter such as the utilization of a float that moves downwardly with the lubricant as the level drops in the drum. The various degrees of plasticity of the lubricant makes such arrangement impractical, for the movement of the float is too sluggish for the rapid operation of the valve controlled thereby. A further objection to the use of a float is the fact that considerable lubricant must be left in the drum to permit actuation of the float. Thus, it is impossible to remove substantially all of the lubricant from the drum.

One of the objects of the present invention therefore is to make a lubricant pump, which may be mounted on the top of a drum, and inserted into the lubricant through the usual opening, and which may be pneumatically operated without necessitating the use of air during the discharging stroke of the plunger.

A further object is to provide means for eliminating air in the discharge line so that the meter will accurately register the amount of lubricant flowing therethrough. In this connection, my invention contemplates the provision of apparatus whereby substantially all of the lubricant in the drum may be removed therefrom by the normal operation of the pump.

Referring now to the drawings, Fig. 1 is a vertical section through a grease drum having a device embodying my invention thereon; Fig. 2 is a vertical section through the device, and Fig. 3 is a fragmentary vertical section on an enlarged scale of a portion of Fig. 2.

We have shown our invention in connection with a drum 10 that is adapted to hold lubricant, and particularly that having the consistency which makes it suitable for transmission in motor vehicles. Such drum has an opening 11 in the top thereof, which is normally arranged to be closed by a cover (not shown). The device of our invention embodies a pump that is adapted to be inserted into the drum and to be suspended from the top thereof. In the preferred form thereof, the apparatus is mounted upon a plate 12, which is provided with a circular flange 13 that is adapted to extend outside the flange 14 which extends around the drum opening 11. Attached to the plate, we provide a base 15, from which the pump and valve mechanism is suspended. Such mechanism includes a cylinder 16, a piston 17, an intake valve 18 and a discharge valve 19. A strainer 20 is then disposed across the bot-

tom of the cylinder, wherefore the extreme lower end of the pump may be positioned in close proximity to the bottom of the drum.

The piston is normally urged in the discharge direction by a coiled spring 21, which surrounds a piston rod 22. The suction stroke is obtained by the utilization of a single acting air engine, which is mounted upon the base 15 and which is adapted to be connected through a conduit 23 with the source of air supply. Parts of the air engine include a cylinder 24, a piston 25, an off center valve tripping mechanism 26, and pneumatic valve mechanism indicated in general at 27. The piston 25 is rigidly connected to the piston rod 22, and air for actuating the piston to compress the spring 21 is caused to enter the cylinder 24 through a passageway 28. When the piston reaches the limit of the upward stroke, it trips the mechanism 26, thus allowing the spring 51 to move the rod 52 upwardly, thereby closing the inlet valve 53, and automatically opening the exhaust valve 54, and allowing air within the cylinder 24 to be discharged through the passageway and the port 29. Then when the piston reaches the limit of the downward stroke, the mechanism 26 is tripped in the opposite direction, whereby the exhaust valve is closed and air is admitted through the conduit 23 and the intake valve to the cylinder 24. The piston 17 is therefore pneumatically moved to draw in lubricant, and is resiliently moved in the opposite direction to expel the lubricant. Furthermore, such operation occurs automatically so long as the valves which control the conduit 23 and the discharge conduit from the pump are open.

Leading from the discharge valve 19 we provide a discharge conduit 30, which extends upwardly and terminates within a chamber 31. Such chamber is in turn suspended from the base 15, and has a second conduit 32 therein, which extends from the interior thereof and communicates with a conduit 33, through which lubricant may be conducted to a bearing or other part to be lubricated. A check valve 34 is disposed between the conduits 32 and 33 and is normally held closed by a spring 35. Lubricant within the chamber is caused to enter the conduit 32 through openings 36.

The inverted relationship between the conduits in the chamber 31 provides a tortuous path that acts as a trap through which the material must flow between the pump and the final discharge opening. We utilize such trap for releasing any and all air that may be pumped with the lubricant into the chamber 31, so that lubricant only will be discharged through the conduits 32 and 33.

The principle of our concept is based upon the fact that the air, which may be trapped within the lubricant will bubble through to the top of the casing 31, and collect at the highest point therein. We then provide mechanism for opening a valve 37 to release the collected air at certain intervals. Such valve is normally closed by a spring 38 but is adapted to be opened whenever the rod 40 is moved downwardly, as by a piston 41 against the spring 42. Such downward movement or action occurs whenever air is admitted to the cylinder 43 in which the piston is arranged to reciprocate. A convenient means for admitting air to such cylinder embodies the utilization of a passageway 44, which connects the cylinder 24 with the cylinder 43. Thus, whenever air enters the cylinder 24 to raise the piston 25, it also enters the cylinder 23 to depress the piston 41.

Inasmuch as the valves 19 and 34 are closed automatically at the start of the suction stroke of the piston 17, it is apparent that the discharge pressure remains in the casing 31, wherefore any air that has been trapped therein is forced outwardly through the valve 37 as soon as it is opened. As the lubricant is incompressible, it is apparent that the opening of the valve will result only in the escape of the entrapped air. If there should be no air in the trap when the valve is opened, there may be a drop or two of lubricant expelled through the valve, but eventually such accumulated expelled material will find its way back into the drum through passageways 45 and 46.

In this connection, it is to be noted that the fluid expelled through the valve 37 is only actuated by the pressure within the chamber, for as soon as the piston 17 starts on a suction stroke, the valve 19 is automatically closed. The expedient therefore, of utilizing a trap in the discharge conduit, and automatically operating a valve at the highest point in the trap to release the air caught therein, has solved all difficulties which heretofore have been experienced in connection with the dispensing of plastic substances through meters or through any other measuring device without causing simultaneous expulsion of air. Further advantages are that the trap occupies only a relatively small space, that substantially the entire contents of a drum may be automatically removed, that the entrapped air is automatically discharged only during the suction stroke of the pump, wherefore there is no objectionable leakage during the pressure stroke of the pump.

We claim:

1. In combination, a fluid container having an opening in the top thereof, a reciprocating pump adapted to be inserted into the drum through said opening, and to be suspended from the top of the container, the

pump including a cylinder having an inlet opening adjacent the bottom end thereof a single acting air engine disposed above the container for drawing fluid into the pump, resilient means for expelling it therefrom and a discharge conduit extending upwardly and through said opening and terminating outside the drum.

2. In combination, a reciprocating pump, a discharge conduit therefor, an air trap in said conduit, a valve in the trap, and means for opening said valve at each intake stroke of the pump.

3. A device of the character described, comprising in combination, a reciprocating pump, means for automatically operating the pump, means for causing the material operated on by the pump to flow in a tortuous path and a valve in said means, said valve being disposed in the upper part of said means, means for normally holding the valve in closed position, and other means for automatically unseating the valve at each stroke of the pump in one direction to expel air that may be discharged by the pump.

4. A device of the character described comprising in combination, a reciprocating pump adapted to be inserted into a fluid container, a discharge conduit leading from the pump and extending through the container, a valve within the discharge conduit operable on one stroke of the pump to entrap air, and means for automatically opening the valve on the other stroke of the pump to release the entrapped air.

5. In a device of the character described, the combination with a fluid container, of a pump suspended from the container and adapted to be immersed into the lubricant therein, pneumatic means for operating the pump, a discharge conduit leading from the pump, a valve within the discharge conduit for releasing air that may be carried into the conduit with the lubricant during the operation of the pump, and means for operating said valve substantially simultaneously with said penumatic means, and at each stroke thereof.

6. In a device of the character described, the combination with a lubricant container of a reciprocating pump adapted to be supported by the container, and a pump adapted to be immersed in the lubricant therein, resilient means for operating the pump in one direction, pneumatic means for operating it in the reverse direction, means connected to the discharge side of the pump for entrapping air that may be carried through the pump with the lubricant, and means for automatically releasing the entrapped air at each pneumatically operated stroke of the pump.

7. In a device of the character described, the combination with a lubricant container, of a reciprocating pump adapted to be carried thereby and to be immersed within the lubricant, pneumatically operated means for actuating the pump, an air trap connected to the discharge side of said pump, and pneumatically operated means for automatically releasing the air in said trap, at each stroke of the pump.

8. In a device of the character described, the combination with a fluid container, of a pump, a discharge conduit leading from the pump, an air trap associated with said conduit, a valve in said trap and automatic means for periodically operating, said valve to release air in the trap, at each stroke of the pump.

9. In a device of the character described, the combination with a lubricant container, of a reciprocating pump adapted to be immersed within the lubricant, a discharge conduit connected to the pump, a plurality of check valves in said conduit, an air trap in the conduit between said valves, and a third valve in the air trap, and means for opening the third valve at each intake stroke of the pump when the other two valves are closed, whereby the pressure in the conduit operates to expel entrapped air through the third valve.

10. In a device of the character described, the combination of a fluid container, a pump adapted to be immersed therein, said pump including a cylinder and piston, pneumatically operated means for moving the piston in one direction, an air trap connected to the discharge side of said pump, and mechanism associated with the trap and pneumatically operable substantially simultaneously with said means to release entrapped air from the discharge conduit.

11. In a device of the character described, the combination with a fluid container, of a pump carried thereby, and adapted to be immersed in the fluid therein, said pump including a piston and cylinder, said piston being pneumatically movable in one direction, and resiliently operated in the other direction, an air trap connected to the discharge side of the pump, a valve for releasing air that may be entrapped in said trap and pneumatically operated means for operating said valve, said last named means being operated simultaneously with each pneumatically operated stroke of said piston.

12. A pump of the character described, comprising in combination, a lubricant container, a member adapted to be supported by the container, a discharge conduit for the pump, an air trap within said conduit and having a valve therein, said member having two cylinders in the upper portion thereof, and a third cylinder in the lower portion thereof, a piston in each of said cylinders, means for connecting the piston in the lower cylinder with the piston in one of the upper cylinders, the other upper piston having means for engaging said valve and unseating

it and thereby releasing entrapped air in the discharge conduit, a source of air under pressure in communication with the two upper cylinders, and mechanism operated by one of the upper pistons for controlling the flow of air into said cylinders, whereby the pistons in the upper cylinders are actuated substantially simultaneously.

In witness whereof we hereunto affix our signatures.

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