May 22, 1934. F. S. BARKS 1,959,404

LUBRICATING APPARATUS

Filed May 27, 1931 2 Sheets-Sheet 1

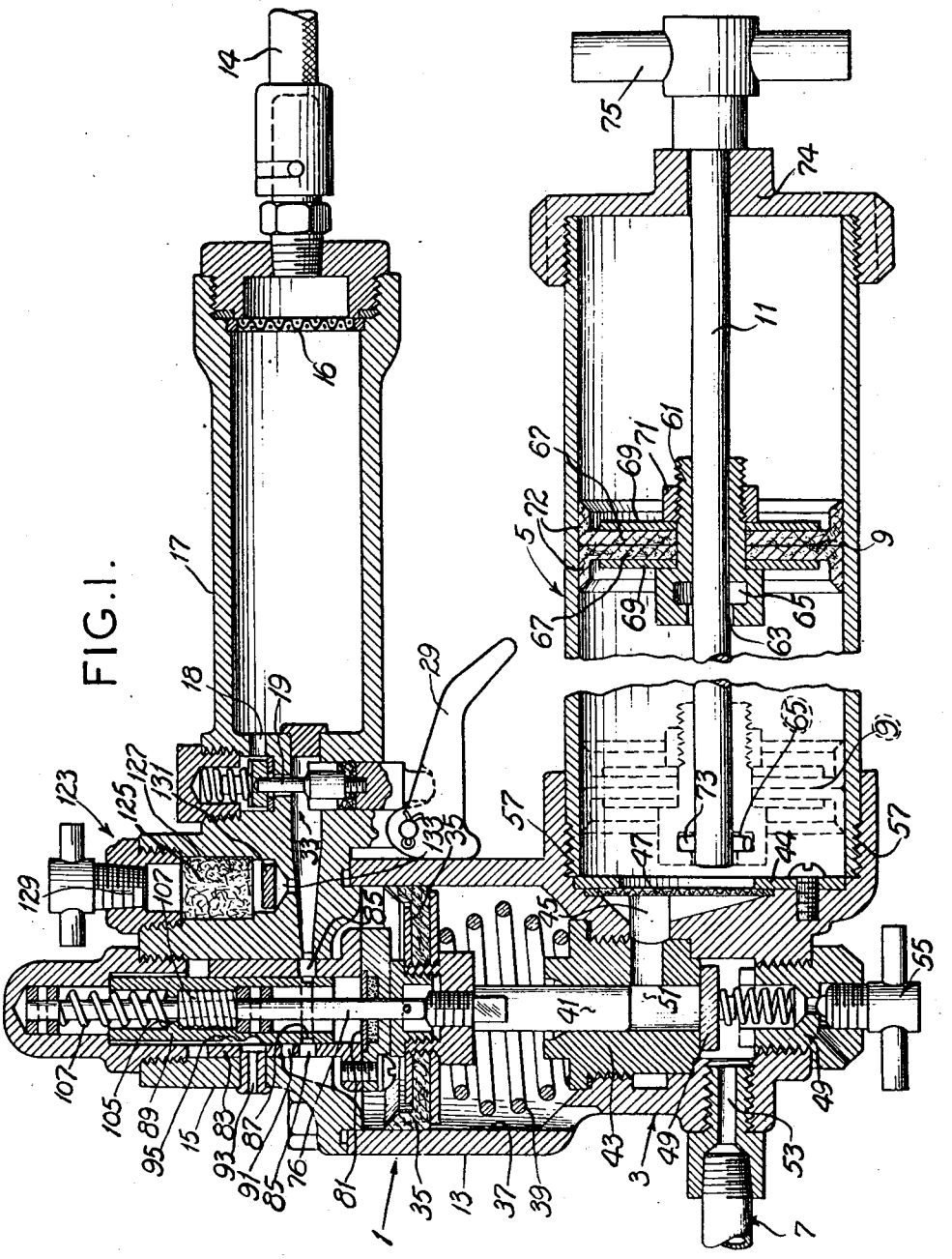


FIG. 1.

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LUBRICATING APPARATUS

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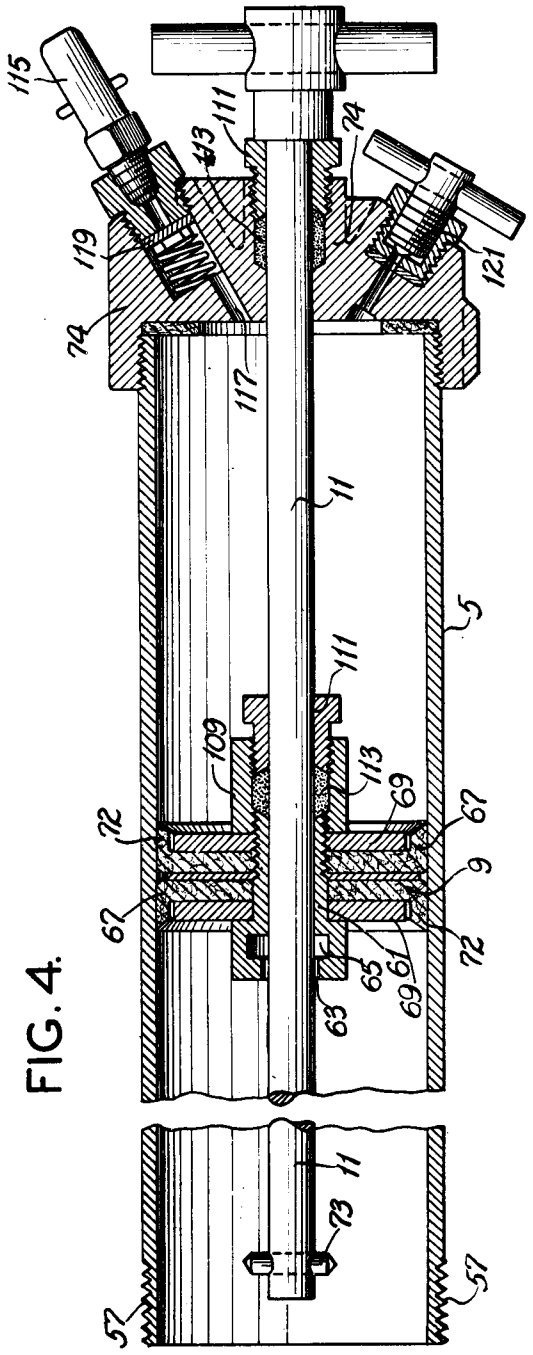


FIG. 4.

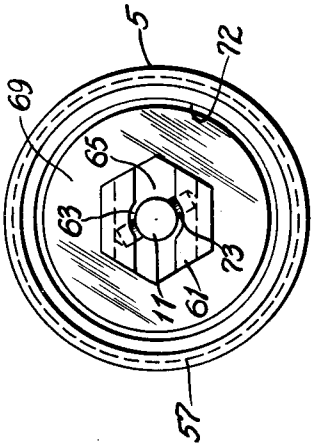


FIG. 2.

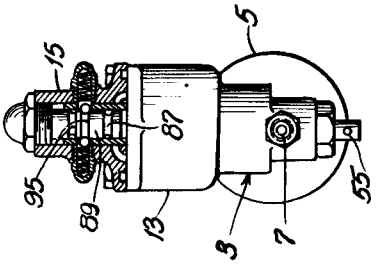


FIG. 3.

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Patented May 22, 1934 1,959,404

UNITED STATES PATENT OFFICE

1,959,404

LUBRICATING APPARATUS

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Application May 27, 1931, Serial No. 540,245

4 Claims. (Cl. 221—47.3)

This invention relates to lubricating apparatus, and with regard to certain more specific features, to portable dispensing apparatus for heavy, viscous or semi-viscous material such as grease and putty-like substances.

Among the several objects of the invention may be noted the provision of improvements in the dispensing apparatus described in my United States Patent 1,939,943, dated December 19, 1933; the provision of a fluid supply chamber which may be filled and emptied by atmospheric pressure; the provision of a supply chamber of the class described which has a double acting piston which is operable by gas pressure and/or directly by manual force; and the provision of a supply chamber for dispensing apparatus which is adapted to be filled without entrainment of air and in which air under pressure may be trapped to expedite emptying of said chamber. 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 drawings in which are illustrated several of various possible embodiments of the invention,

Fig. 1 is a longitudinal section of the apparatus, certain parts being shown in elevation;

Fig. 2 is an end elevation of a plunger of Fig. 1 showing a piston rod latched therewith;

Fig. 3 is a left end view of the apparatus certain parts being broken away; and,

Fig. 4 is a longitudinal section of a modification of a supply chamber.

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

Referring now more particularly to Fig. 1 there is shown at numeral 1 an air engine adapted to operate a pump 3, which pumps fluid, such as grease, putty or like heavy material contained in a supply chamber 5, into a pressure line 7 which leads to apparatus to be supplied with the grease or the like. As described in said patent, a single acting plunger 9 slidable in the chamber 5, was forced toward the outlet of the chamber 5, by means of a spring. I have in certain instances, found it distinctly advantageous to operate a double acting rather than a single acting plunger, when dispensing relatively less viscous fluids, by means of the atmospheric pressure on the top of the plunger and to fill the chamber by atmospheric pressure by drawing the piston back into the container. Further, if the pump 3 loses its prime, I have found it advantageous to adapt the piston 9 to manual operation by means of a piston rod 11 whereby the fluid in the chamber 5 may be forced therefrom by manually forcing the engaged rod and plunger in the chamber 5. In instances where relatively viscous fluid is to be dispensed I have adapted the chamber 5 to force the plunger 9 by means of entrapped gas under relatively high pressure.

A complete description of the engine 1 and pump 3 is contained in my said Patent 1,939,943, and only a brief description of the pump and engine is necessary herein for the sake of clarity.

The engine 1 comprises a body portion 13 which has a cap portion 15, the latter having a longitudinal extension 17 which serves as an air passage and as a grip for the hand of an operator. The grip 17 includes an air strainer 16 at the inlet and an outlet port 18 communicating with a spring seated line valve 19. As clearly shown in Fig. 1, the line valve 19 is operated by a trigger 29, and is adapted when open to allow air to pass from said port 18 to a passage 33 leading to an automatic full stroke valve in the cap 15 by means of which air is intermittently forced behind a piston 35 which rides in a cylinder 37 formed interiorly of the body portion 13. This air is intermittently exhausted by means of said valve from behind the piston 35, the piston being returned to an initial position by means of a compression spring 39 positioned behind it in the cylinder 37.

The automatic valve comprises a control stem 76 loosely coupled with the piston 35. The stem 76 passes through a packing gland 81, said gland being affixed to a stationary ported sleeve 83 provided with oppositely disposed inlet ports 85 which are adapted to be put into communication with one another by a groove 87 of a central slidable sleeve 89 located in the fixed sleeve 83 and controlled by the stem 76. The ports 85 are also adapted to be cut out of communication with one another by said sleeve 89, when the sleeve is in its lower and alternative position. One of the ports 85 is in communication with the passage 33 and thus as is shown in Fig. 1, the air in the passage 33 is permitted to flow through the ports 85, past the groove 87 to a position behind the piston 35, whereby the piston is forced down against the reaction of the spring 39. In this way a stroke of the piston 35 is completed by the pressure of the air which is admitted through

the outlet 18 past the line valve 19, through the passage 33, the ports 85 and the groove 87.

In order that the piston 35 may be returned to its initial position as shown in Fig. 1 for another power stroke, the stationary sleeve 83 is also provided with outlet ports 91, the lower one of which communicates with the cylinder 37 above the piston 35, and the upper one of which communicates with an exhaust port 93 in the cap 15. To cooperate with the ports 91 and 93, the movable sleeve 89 is provided with grooves 95 which communicate with one another by reason of the fact that sleeve 89 is smaller in diameter at, between, and above the said grooves 95, whereas below the grooves 95 the sleeve 89 exactly fits the sleeve 83 for sliding and sealing contacts.

In the uppermost position of said sliding sleeve 89 communication between the ports 85 is established, but communication between the ports 91 and 93 is cut off. In the lowermost and alternative position of the sleeve 89, however, the ports 85 are cut off from one another and the ports 91 and 93 are in communication.

The sleeve 89 shifts to its alternative position rapidly and only as the piston 35 reaches the very ends of its strokes. This shifting is accomplished by means of the stem 76 attached to the piston 35 and movable therewith, which carries springs 107 which alternately act on a flange 105 of the sleeve 85. The movement of the sleeve 89 from one position to another is retarded until the piston 35 reaches the end of its stroke by means of detents or the like which act on the grooves 95 (Fig. 3).

At numeral 123 (Fig. 1) there is shown an automatic oiling means adapted to supply oil to the various parts of the engine 1. The oiler comprises a felt pad 125 mounted in a bore 127, which at one end is covered by a plug 129, and at the other end by a disc 131 which is slightly smaller than the bore. A passage 133 connects the bore 127 and the passage 33. The felt is seeped with oil and as gas under pressure is admitted to the passage 33 it forces the disc 131 against the pad 125 and forces some oil out which oil drips into the passage 33 and is carried by the air to the various parts of the engine.

The pump 3 comprises a plunger 41 reciprocable with the piston 35, and in a pump bushing 43 which has a bore 51 and an inlet passage 45 in a communication with said supply chamber or cylinder 5. A suitable strainer or screen 47 is held across said passage by an anchored washer 44. A spring pressed outlet check valve 49 is used as an outlet from the bore 51 which communicates with an outlet passage 53 which in turn is connected to the pressure line 7. A manually operable release valve 55 is installed in the passage 53 for the usual purposes.

The supply chamber cylinder 5, as shown in Fig. 1, is threaded at its base 57 for manually screwing it to and unscrewing it from corresponding threads on the body 13. This cylinder 5 is provided with a follower piston 9 which rides in the cylinder 5 and also is adapted to slide on and/or be latched or locked with a control or piston rod 11. The piston rod 11 slides in a bore in a cap 74 which covers the end of the cylinder 5 opposite the threaded portion 57.

The plunger or piston 9 comprises a central sleeve 61 slidably but substantially sealingly mounted on the rod 11, and carrying relatively soft sealing washers 67 provided with flanges 72. The washers 67 are suitably mounted on the sleeve 61 by means of metal washers 69 and a nut 71 threaded on the central portion. The sleeve 61 is prevented from sliding off the rod 11 by means of a pin or stud 73 in the rod 11. The sleeve 61 also has at one end bayonet openings 63 and 65 in which the key or stud 73 is adapted to be locked by simply guiding the stud 73 into the openings 63, and then turning the rod 11 relative to the piston 9, whereby the stud 73 rotates in the opening 65 and is not permitted to be removed through the opening 63 until again properly aligned therewith. It is thus seen that by means of the rod 11 and a handle 75 connected thereon, the piston 9 may be positively and manually moved in either direction in the cylinder 5, or the rod 11 may freely pass through the sleeve 61 whereby the piston 9 is allowed to freely float in the chamber 5. Furthermore, the two washers 67 provide a double acting piston adapted to effect sealing between the piston and walls of the cylinder against fluid pressure on either side of the piston.

The operation of the dispensing apparatus as a whole is as follows:

Assume that the piston 35 and plunger 41 have made a return stroke, whereby the vacuum created in the bore 51 by the retrogression of the plunger 41 and by the sealing effect of the valve 49, has drawn grease or like fluid from the chamber 5 through the passage 45 into the bore 51. The atmospheric pressure on the side of the piston 9 away from the pump forces the grease from the chamber 5 through the passage 45 into the evacuated bore 51. If now the trigger 29 is pulled towards the handle 17, gas under pressure from a pressure line 14 enters the outlet 18, goes through the passage 33, the ports 85 and the groove 87, and forces the piston 35 down against the reaction of the spring 39. As the piston 35 goes down into the cylinder 37 it forces the plunger 41 down in the bore 51 and the fluid contained in the bore 51 is forced out past the check valve 49 and into the line 7. As the piston 35 reaches the bottom of its stroke, the spring 107 reacting on the flange 105 and compressed by the stem 76, forces the sleeve 89 to its lowermost position whereby the air from the passage 33 is cut off, and the top of the piston 35 is placed in communication with the outlet port 93 whereby the pressure of the air is released and the spring 39 returns the piston 35 to its position as shown in Fig. 1. In this way, the plunger 41 is drawn back in the bore 51 and the aforementioned vacuum is created and the atmospheric pressure operating on the piston 9 forces grease through the passage 45 into the passage 51 as the plunger 41 retires in the bore 51. As the piston 35 reaches its uppermost position, the stem 76 carrying the springs 107 reverses its action on the flange 105 of the sleeve 89 which is thrown to its uppermost and alternative position as shown in Fig. 1 whereby the communication between the passage 33 and the upperside of the piston 35 is again established and the cycle is repeated.

If sufficient air gets into the bore 51, the pump will lose its prime, inasmuch as the air in the passage 51 will be compressed and then reexpanded, thereby preventing the creation of a vacuum. If this occurs the manually operable valve 55 is opened to allow the air to be escaped. This situation also may be corrected by locking the stud 73 in the opening 65 of the sleeve 61 and manually pushing the plunger 9 to force the grease into the passage 45 and bore 51.

After the cylinder 5 has been emptied it may easily be refilled, if the fluid being dispensed is not of an exceptionally viscous nature, by simply

unscrewing the cylinder 5 from the body portion 13 putting the open end of the cylinder 5 under the surface of the fluid to be dispensed and manually pulling back the plunger 9 from the threaded end of the cylinder 5 by means of the rod 11 and handle 75. Inasmuch as the plunger 9 is double acting, because of the flanges 72 of the two washers 67, the atmospheric pressure will force the fluid to be dispensed into the chamber 5 as the piston 9 is drawn into the cylinder. Thus in this way substantially no air is entrapped between the open ends of the cylinder 5 and the piston 9. The cylinder 5 is now screwed back on the body portion 13 by the threads 57 and the rod 11 is turned to unlock the stud 73 from the openings 63 and 65 and is pushed into the cylinder 5, sliding through the sleeve 61.

At any time however, the rod 11 may be drawn and locked with the plunger 9 to add manual pressure to the atmospheric pressures to force the grease into the passage 45 and into the bore 51.

An alternative way of filling the chamber 5 which is offered by the invention without including air between the piston 9 and the open end of the cylinder 5 is to lock the rod 11 with the plunger 9, move the plunger to the open end of the cylinder, and then force grease into the cylinder gradually forcing the piston 9 back as the cylinder 5 is filled. It is thus seen that no air pockets are formed in the material filling the cylinder 5. This method is preferable when exceedingly viscous materials are being dispensed.

An advantage of this modification of the invention is that a supply chamber has been provided for a dispensing apparatus which, though ordinarily adapted to supply grease by means of atmospheric pressure to the pump, may also employ manual force to aid such supply. Further by means of the double acting piston 9 and the rod 11 two improved methods of refilling the cylinder 5 are provided.

In the event that the fluid which is being dispensed is more viscous it may become necessary to employ additional pressure over that of the atmosphere to automatically force the grease into the passage 45 and into the bore 51. I have provided for such a chamber 5 as shown in Fig. 4. In this modification the piston 9 comprises the same center sleeve 61 and washers 67, but the nut 71 is replaced by a second sleeve 109 adapted to thread on the sleeve 61 and lock the washers 67 together. Packing 113 is forced against the sleeve 109 and the rod 11 by means of a packing nut 111 threaded into the sleeve 109. Like packing 113 seals the rod 11 at the cap 74 and is packed by a second packing nut 111. The cap 74 also carries a quick detachable air hose coupling 115 which communicates with the inside of the cylinder 5 through a passage 117, but which is prevented from communication between the cylinder 5 and the coupling 115 by means of the check valve 119 inserted between the coupling 115 and the passage 117. A second and manually operable valve 121 is adapted to connect the inside of the cylinder 5 with the atmosphere.

The operation of this modification of the chamber 5 is as follows:

The cylinder 5 is screwed on to the body portion 13 by means of the threads 57 after it has been suitably filled with grease. Then the air hose 14 is attached to the coupler 115 for a few moments and then detached and returned to its coupler on the handle 17. In this way compressed air from the hose 14 passes the check valve 119, and enters the cylinder 5 through the passage 117 and, being entrapped between the piston 9 and the cap 74, expands and reacts against the piston 9 to force it and the grease towards the passage 45. The check valve 119 and the packings 113, prevent the escape of the compressed gas thus entrapped in the cylinder 5. Thus a high pressure considerably above that of atmospheric pressure may be employed to force the grease or like fluid from the cylinder 5 into the passage 45 to feed the pump 3.

In the event, after the cylinder 5 has been emptied of grease, that a high gas pressure is still maintained in the cylinder 5 the manually operable valve 121 is unscrewed to release the pressure. The cylinder is again filled as hereinbefore described and again air is entrapped and expanded to force the grease or other fluid into the passage 45.

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

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

I claim:

1. In dispensing apparatus, a material supply chamber, a piston slidable in and sealed against the walls of said chamber, said chamber carrying a charge of material ahead of said piston, an air connection to said chamber behind said piston whereby air under pressure may be introduced, said connection including means for removably applying an air hose, an automatically reciprocable air pump adapted to receive material from said chamber and eject the same, a compressed air connection for said reciprocable air pump, said last-named connection and said connection on the chamber being adapted to interchangeably receive the same air hose coupling.

2. In dispensing apparatus, a pump, a supply chamber for delivering material to said pump, a pressure piston in said supply chamber, an air connection for said pump and an independent air connection for said chamber behind said piston, said connections being adapted to interchangeably receive in connection therewith the coupling end of an air line.

3. In dispensing apparatus, a pump, a supply chamber for delivering material to said pump, an air connection for said pump and an independent air connection for said chamber, said connections being adapted to interchangeably receive in connection therewith the coupling end of an air line.

4. In a portable grease gun, a pump, a supply chamber for delivering material to said pump, an air connection for said pump and an independent air connection for said chamber, said connections being adapted to interchangeably receive in connection therewith the coupling end of an air line.

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