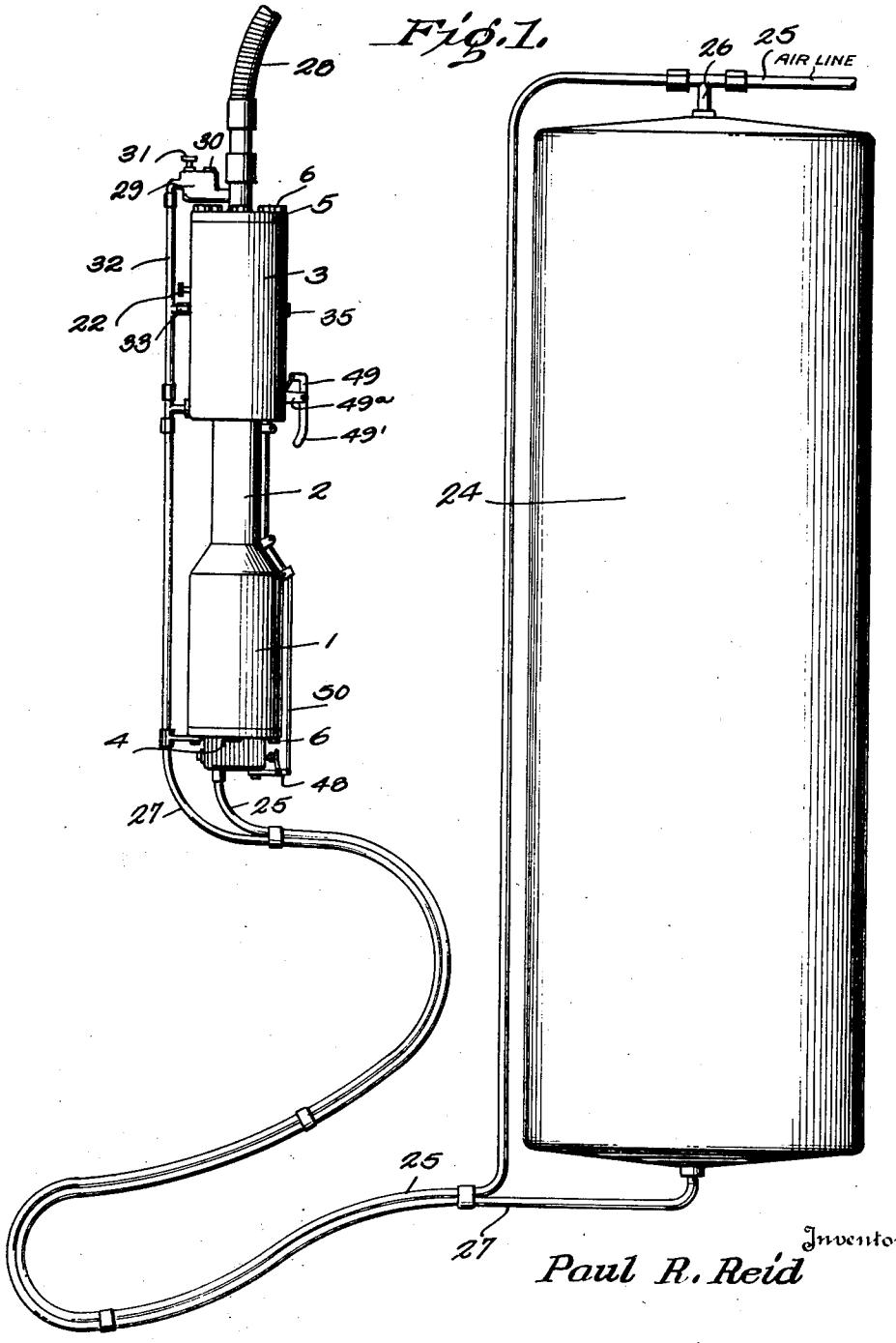
Sept. 16, 1930. P. R. REID 1,775,946

LUBRICATING APPARATUS

Filed Oct. 22, 1928 2 Sheets-Sheet 1

Fig. 1.



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Fig. 2.

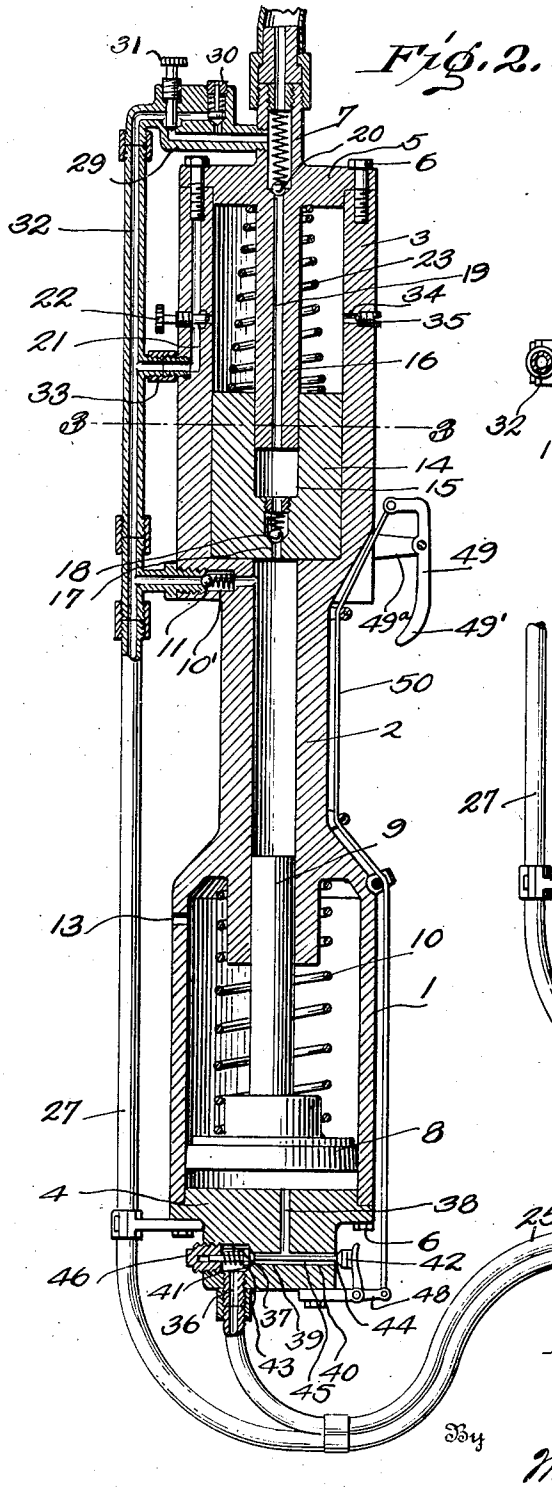


Fig. 3.

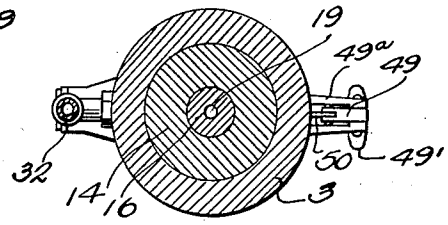
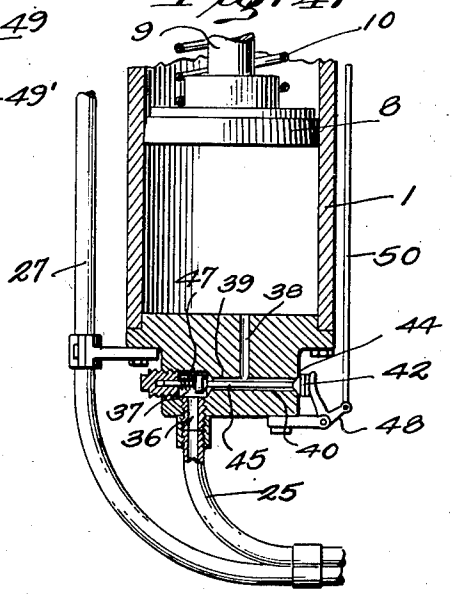


Fig. 4.



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UNITED STATES PATENT OFFICE

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LUBRICATING APPARATUS

Application filed October 22, 1928. Serial No. 314,206.

This invention relates to an improved lubricating apparatus of the type commonly known as grease guns and particularly adapted for forcing grease to the bearings of automobiles and for like purposes.

An object of the invention is to provide an improved efficient device of the class referred to adapted to feed the grease at low and high pressures to meet the different requirements in this respect, by a relatively low primary pressure and without variation in the amount of said primary pressure, and in which the changes from low to high pressure feed, and from high to low pressure feed can be easily and quickly affected.

Further objects of the invention are to provide an improved device of this character which will be of simple, compact, relatively light construction, and to provide improved means for the reduction of pressure on the grease in tubing that may be associated with the outlet of the gun, providing for the disconnection of said tubing without loss of grease.

The invention, with other objects and advantages thereof, and the particular construction, combinations and arrangements of parts comprising the same will be understood from the hereinafter contained detail description when considered in connection with the accompanying drawings forming part hereof and illustrating one embodiment of the invention.

In the drawings:

Figure 1 is a side elevation of a lubricating apparatus constructed in accordance with the present invention.

Fig. 2 is a longitudinal section of the grease gun.

Fig. 3 is a transverse section on the line 3—3 of Figure 2.

Fig. 4 is a fragmentary longitudinal section showing the primary fluid pressure operated piston and air pressure control valve.

The invention comprehends a grease gun including a grease cylinder, a plunger actuated by a fluid pressure operated piston of greater area than the plunger, to force grease from the grease cylinder to the gun outlet, and in conjunction therewith, auxiliary pressure applying means adapted to be brought into use as desired to build up the pressure of the feed effected through the plunger. The auxiliary pressure applying means includes an auxiliary movable piston between the grease in the grease cylinder and the gun outlet subject to pressure exerted on the grease. This auxiliary piston has a cylinder on one side thereof of relatively small cross sectional size and a grease passage therethrough to said cylinder controlled by an outwardly opening check valve. Cooperating with such cylinder is a fixed piston over which said cylinder slides and which is provided with a longitudinal grease passage therethrough connected with the gun outlet. Means is provided for positively locking the auxiliary piston from movement by the pressure exerted on the grease through the plunger, and under this condition, with the auxiliary piston held stationary, grease will be forced through the passage of the auxiliary piston, through said cylinder, and the passage of the fixed piston to the outlet, by the pressure exerted by the plunger. When however the locking means of the auxiliary piston is released, the auxiliary piston moves forwardly under the pressure exerted on the grease through the plunger, the passage of the auxiliary piston is automatically closed by the check valve, and the pressure on the bottom face of the auxiliary piston is applied on the grease through the fixed piston and its cooperating cylinder, the pressure being thus multiplied through the difference in area between the face of the auxiliary piston and the smaller cross sectional size of the fixed piston and its cooperating cylinder.

While a specific embodiment of the invention is illustrated in the drawings, it will of course be understood that changes and variations in the particular construction shown, may be made and the invention embodied in other forms as will appeal to those skilled in the art and falling within the scope of the appended claims without departing from the spirit of the invention.

Referring to a detail description of the particular embodiment of the invention illustrated in the drawings, the grease gun proper

is shown as comprising cylinders 1, 2, and 3 arranged in axial alignment adjoining one another and rigidly secured together, the intermediate cylinder 2 being of less size in cross section than the cylinders 1 and 3 and constituting a handle for the device. In the present instance the cylinders 1, 2 and 3 are shown integral, the cylinders 1 and 3 having respectively end heads 4, 5, removably secured thereto by bolts 6, the end head 5 of the cylinder 3 being provided with a central opening therethrough and an adjoining tubular outlet extension 7.

Within the cylinder 1 is a piston 8 to which is secured a plunger 9 operating in the grease cylinder 2, the area of the face of the piston 8 being substantially greater than the face of the plunger and said piston being operated by air pressure in a forward direction to actuate the plunger 9 to force grease from the cylinder 2 toward the outlet 7, the cylinder 2 having a grease inlet 10′ controlled by an inwardly opening spring check valve 11 of conventional form. 10 designates a coiled spring to return the piston 8 to its rearward position when the air pressure on the same is relieved, and the cylinder is provided with a breather port 13 in its upper part.

Within the cylinder 3, which is of greater interior diameter than that of the grease cylinder 2 and in direct communication therewith, is the movable auxiliary piston 14 said auxiliary piston having on one side thereof a cylinder 15 sliding over a cooperating fixed piston 16 on the end head 5. The auxiliary piston 14 has a passage 17 therethrough leading to the interior of the cylinder 15 and controlled by an outwardly opening check valve 18, and the fixed piston 16 has a longitudinal passage 19 connecting with the gun outlet 7 and controlled by an outwardly opening check valve 20. Means is provided for positively locking the auxiliary piston 14 in its rearmost position, the position shown in Figure 2 of the drawings. This locking means comprises a body of liquid introduced within the cylinder 3 and completely filling the space between the end wall 5 of the cylinder and said piston. The cylinder 3 is provided with a passage 21 through its side wall for the introduction and withdrawal of said liquid body, said passage being controlled by a hand operated valve 22. When the auxiliary piston is locked against movement by the pressure exerted on the grease by the plunger 9, grease will be forced from the cylinder 2 through the outlet passage 17 of the auxiliary piston 14, through the cylinder 18, and the passage 19 of the fixed piston 16 to the gun outlet 7 by the pressure exerted through the plunger 9. By opening the passage 21 through the valve 22 the liquid locking medium within the cylinder 3 can escape from the cylinder. Under this condition, the auxiliary piston 14 will be forced forwardly by the pressure of the grease, the check valve 18 will close, and the pressure on the grease within the cylinder 15 will be considerably increased, the pressure being built up through the difference in the cross sectional size of the cylinder 15 and the bottom face of the auxiliary piston 14. The relative areas of the air pressure operated piston 8 and the plunger 9, as shown in the present instance, is about seventeen to one, and between the bottom face of the auxiliary piston 14 and the cross sectional size of the cylinder 15 is approximately fifteen to one, so that with a pressure of air of say one hundred pounds per square inch on the piston 8 this will be multiplied through the plunger 9 to about seventeen hundred pounds pressure, and the pressure will be further built up, when the auxiliary piston 14 is brought into operation, up to around twenty five thousand five hundred pounds pressure. Within the cylinder 3 is a spring 23 adapted to exert just sufficient pressure upon the auxiliary piston 14 to return the same to its rearmost position when the pressure thereon is reduced as the plunger 9 is retracted.

As will be understood the difference in the areas of the piston 8 and plunger 9, and the bottom face of the auxiliary piston 14 and cross sectional size of the cylinder 15 may be varied to multiply the pressure to different extents as occasion may require, and of course the length and capacity of the grease cylinder 2, which acts as a measuring vessel, and the stroke of the actuating piston 8, may also be changed to meet different demands.

The grease is supplied to the cylinder 2 under pressure from a tank 24. 25 designates a conduit leading from any suitable source of compressed air supply (not shown). A branch pipe 26 from the conduit 25 connects with the top of the tank 24, and 27 is a grease conduit leading from the bottom of the tank 24 to the inlet passage 10′ of the cylinder 2. Connected to the outlet 7 is a flexible high pressure delivery hose 28 which has at its outer end a conventional form of nozzle or coupling member (not shown). In order to protect the delivery hose 28 against excessive pressure and to reduce the pressure in said hose and permit the same to be disconnected from the outlet 7 without loss of grease, a relief pipe 29 with an automatically acting relief valve 30 and a hand operated relief valve 31, is provided. The relief pipe 29 leading from the outlet 7 has a connection 32 with the grease conduit 27, so that when the automatically actuating relief valve 30 opens or the hand operated relief valve 31 is opened, the grease escaping through the outlets associated with the valves, is returned to the grease conduit 27.

Provision is made for supplying grease to the cylinder 3 from the grease pipe line 27

to serve as the liquid locking medium for the auxiliary piston 14 and for the return of the grease from the cylinder 3 back to the grease pipe line 27, by a pipe connection 33 between the pipe connection 32 and the passage 21 in the cylinder wall. The cylinder 3 is also provided with a vent passage 34 closed by a removable plug 35 providing for drawing off or permitting the escape of any air that may become trapped in the cylinder 3 between the end wall 5 and the auxiliary piston 14.

Any suitable means may be employed for controlling the admission and exhaust of air pressure to and from the cylinder 1. In the particular construction shown, the flexible compressed air supply conduit 25 is connected to a nipple 36 on the head 4 of the cylinder 1. The nipple 36 leads to a valve chamber 37 in the head 4. 38 is a vertical passage extending inwardly from the interior of the cylinder 1. A transverse duct extends from said chamber to the exterior of the head 4, the inner part 39 of said duct connecting the chamber 37 with the vertical duct 38 for the admission of compressed air to the cylinder 1, and the outer part 40 of the duct leading from the vertical duct 38 forming an exhaust passage. Valves 41 and 42 cooperating with seats 43, 44, are adapted to control the inlet duct part 39 and the exhaust passage 44. The valves 41 and 42 are on a stem 45 having its inner end slidably engaging a guide groove in a removable plug 46. The arrangement of the valves 41 and 42 on the stem 45 is such that when one of said valves is opened the other will be closed, a spring 47 interposed between the valve 41 and the plug 46 serving to normally hold the valve 41 to its seat 43 to cut off communication between the chamber 37 and the inner duct portion 39, and to hold the valve 42 off of its seat in open position. The valve device is operated to open communication between the air supply conduit 25 and the vertical passage 38, and to simultaneously close the exhaust passage 40, through the medium of an angle lever 48 pivotally connected with a bracket on the head 4, and a trigger 49 mounted on a bracket 49a adjacent the handle 2 of the gun, one end of said trigger being connected with one end of the angle lever 48 by a cable, as shown. As will be understood when the end 49′ of the trigger 49 is pressed inwardly by the thumb of the operator, the valve device will be forced inwardly against the tension of the spring 47 to open the valve 41 and close the valve 42. When the trigger 49 is released by the operator, the valve device is moved outwardly by the spring 47 to close inlet duct part 39 and open the exhaust passage 40.

It will be noted that by the particular construction and arrangement of parts hereinbefore set forth, a simple, efficient grease gun is provided that is adapted to feed the grease at low and high pressures, and which provides for easily changing from low to high pressure, and high pressure to low pressure feed, and the device is of a compact, relatively light, practical construction convenient for use.

What I claim is:

1. A grease gun including a grease chamber, an outlet, means for forcing the grease from the grease chamber toward said outlet, a movable piston between the grease chamber and the outlet subject to pressure exerted on the grease, said piston having a cylinder on one side thereof of less cross sectional size than said piston and having a grease passage therethrough to said cylinder, a fixed piston over which said cylinder slides having a longitudinal grease passage therethrough connected with the gun outlet, means for locking said piston from movement against the pressure exerted on the grease, a check valve for the grease passage of the movable piston adapted to open when said piston is held locked from movement and to close when the locking means is released and the piston is moved forwardly by the pressure exerted on the grease in the grease chamber, said locking means including a cylinder in which said movable piston slides adapted to contain a body of liquid at one side of said piston, said cylinder having a passage providing for the introduction of said liquid into and its escape from said cylinder, and a control valve for said passage.

2. A grease gun including a grease cylinder, an outlet, means for supplying grease to said cylinder, a pressure actuated plunger operating in said cylinder to force grease toward the outlet, a second cylinder in axial alignment with and adjoining said grease cylinder, a movable piston in said second cylinder between the grease in the grease cylinder and the gun outlet subject to pressure exerted on the grease, said piston having a cylinder on one side thereof of less cross sectional size than said piston and having a grease passage therethrough to said cylinder, a fixed piston over which said cylinder slides having a longitudinal grease passage therethrough connected with the gun outlet, means for locking said piston from movement, said locking means including a body of liquid in said second cylinder at one side of said movable piston, a passage providing for the introduction of the liquid into and its escape from said cylinder, and a control valve for said passage, and a check valve for the grease passage of said movable piston adapted to open when said movable piston is held locked from movement and to close when said locking means is released.

3. A grease gun including a grease cylinder, an outlet, means for supplying grease

to said cylinder, a pressure actuated plunger operating in said cylinder to force grease toward the outlet, a second cylinder in axial alignment with and adjoining said grease cylinder, a movable piston in said second cylinder between the grease in the grease cylinder and the gun outlet subject to pressure exerted on the grease, said piston having a cylinder on one side thereof of less cross sectional size than said piston and having a grease passage therethrough to said cylinder, a fixed piston over which said cylinder slides having a longitudinal grease passage therethrough connected with the gun outlet, means for locking said piston from movement, said locking means including a body of liquid in said second cylinder at one side of said movable piston, a passage providing for the introduction of the liquid into and its escape from said cylinder, a control valve for said passage, and a check valve for the grease passage of said movable piston adapted to open when said movable piston is held locked from movement and to close when said locking means is released, and a coiled spring interposed between the movable piston and one end of its cylinder to return the piston to rearward position after forward movement by the pressure exerted on the grease.

4. A grease gun including a grease chamber, an outlet, means for supplying grease to said grease chamber, said means including a grease reservoir and a pipe connection therefrom to the grease chamber, means for forcing grease from the grease chamber toward said outlet, a cylinder between the gun outlet and said grease chamber, a movable piston in said cylinder, said piston having a cylinder on one side thereof of less cross sectional size than said piston and having a grease passage therethrough to said last mentioned cylinder, a fixed piston over which said last mentioned cylinder slides having a longitudinal grease passage therethrough connected with the gun outlet, means for locking said movable piston from movement, said means including a valve controlled pipe connection between the first mentioned cylinder and the pipe connection leading from the grease reservoir to the grease chamber, said valve controlled pipe connection providing for the introduction of a body of lubricant into the said first mentioned cylinder at one side of the piston therein from the pipe connection leading from the grease reservoir to the grease chamber, and for the escape of lubricant from said first mentioned cylinder back into said last mentioned pipe connection.

5. A grease gun including a grease chamber, an outlet, a delivery hose connected with said outlet, means for forcing grease from the grease chamber toward said outlet, a cylinder between the gun outlet and said grease chamber, a movable piston in said cylinder, said piston having a cylinder on one side thereof of less cross sectional size than said piston and having a grease passage therethrough to said last mentioned cylinder, a fixed piston over which said last mentioned cylinder slides having a longitudinal grease passage therethrough connected with the gun outlet, a grease reservoir, and means for locking said movable piston from movement, said means including a valve controlled pipe connection between said first mentioned cylinder and the grease reservoir, said valve controlled pipe connection providing for the introduction of a body of lubricant from the grease reservoir into said first mentioned cylinder at one side of the piston therein, and for the return of said lubricant from said first mentioned cylinder back into said pipe connection.

In testimony whereof I hereunto affix my signature.

PAUL R. REID.