Oct. 26, 1954 C. C. BENZ 2,692,704

PNEUMATICALLY OPERATED LIQUID PUMP

Filed Dec. 27, 1949 4 Sheets-Sheet 1

Fig. 1.

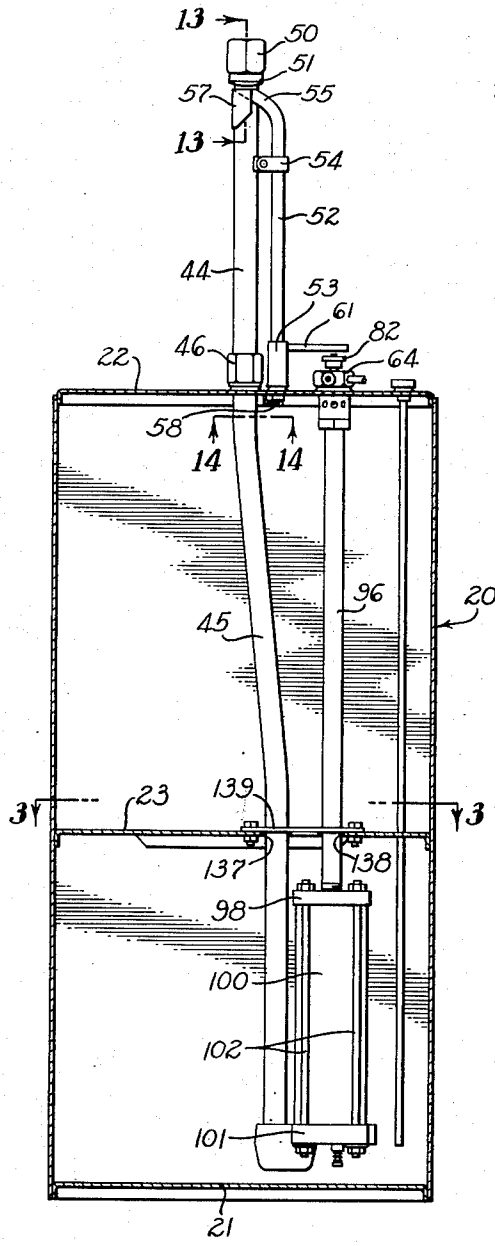


Fig. 2.

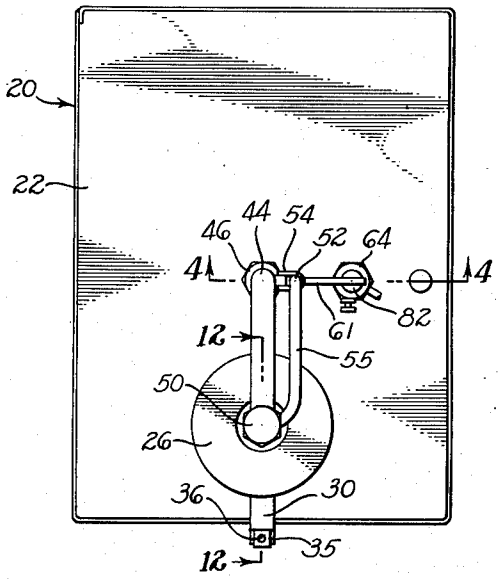
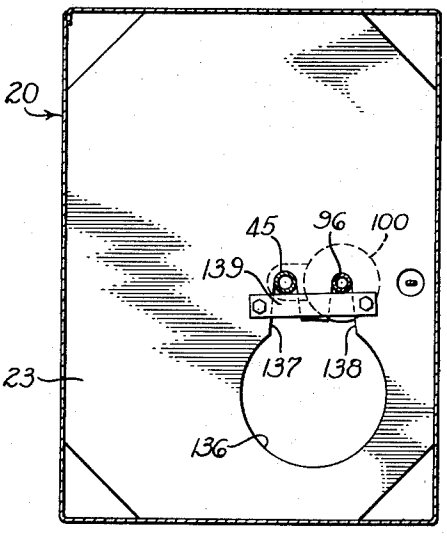


Fig. 3.



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Filed Dec. 27, 1949 4 Sheets-Sheet 2

Fig. 4.

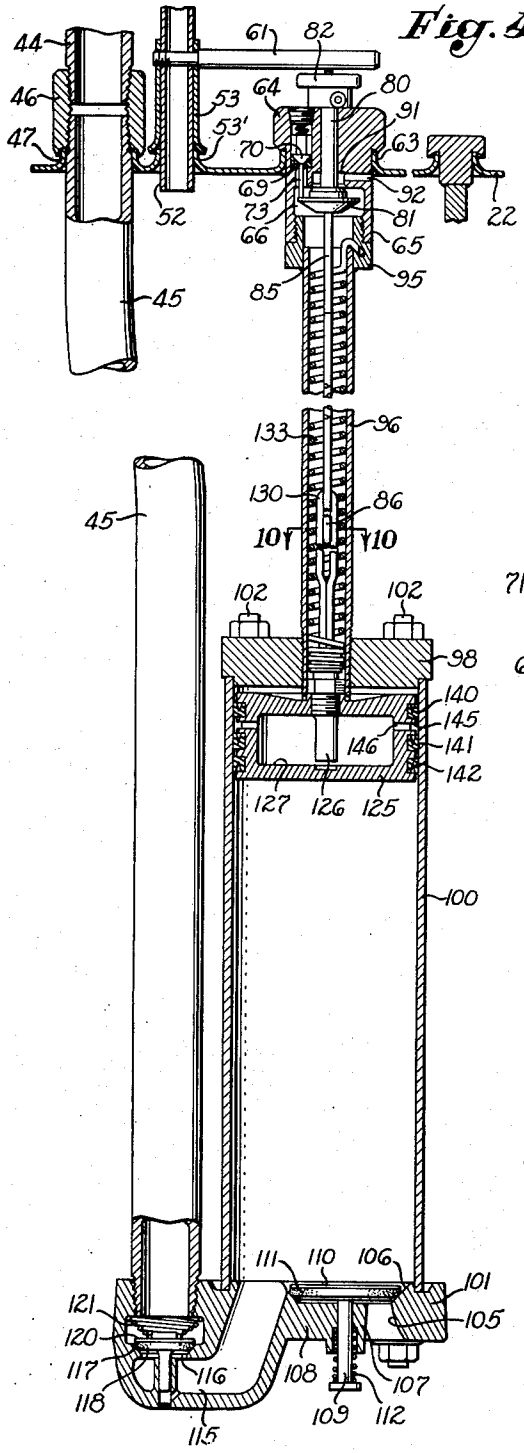


Fig. 6.

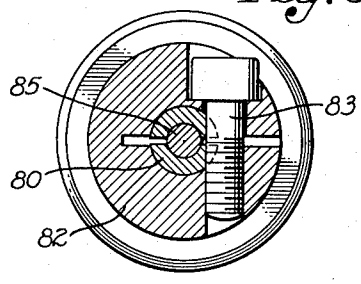


Fig. 7.

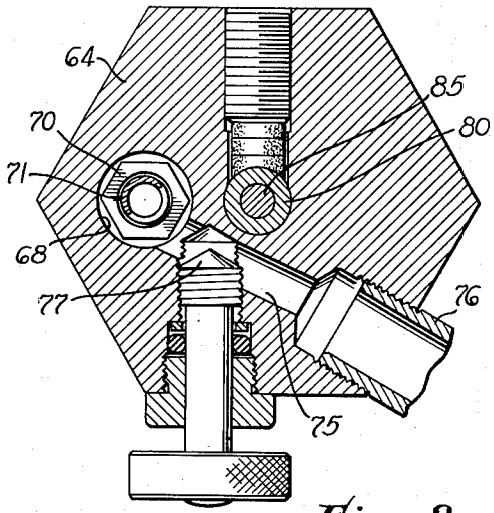
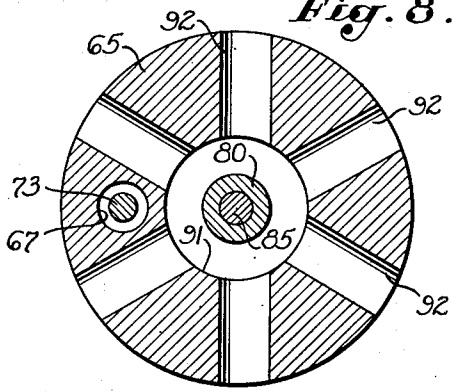


Fig. 8.



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Oct. 26, 1954 C. C. BENZ 2,692,704

PNEUMATICALLY OPERATED LIQUID PUMP

Filed Dec. 27, 1949 4 Sheets-Sheet 3

Fig. 10.

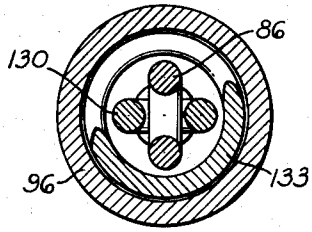


Fig. 9.

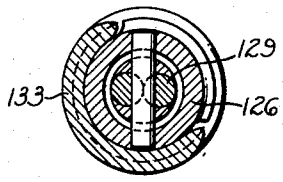


Fig. 5.

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Filed Dec. 27, 1949 4 Sheets-Sheet 4

Fig. 11.

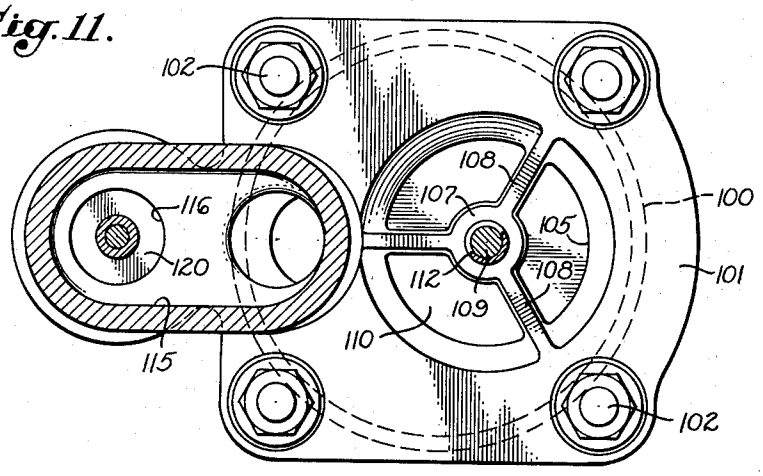


Fig. 12.

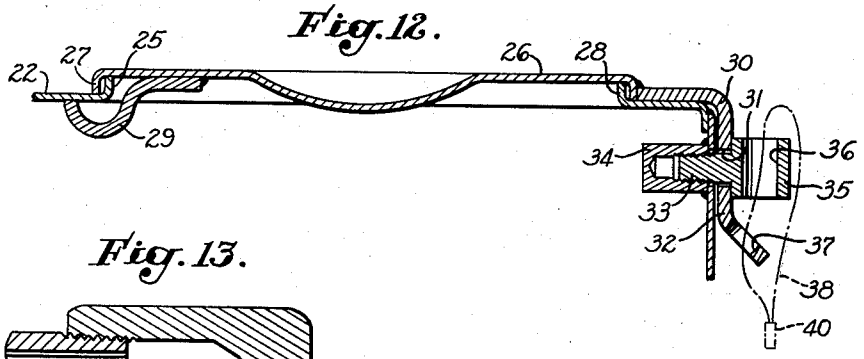


Fig. 13.

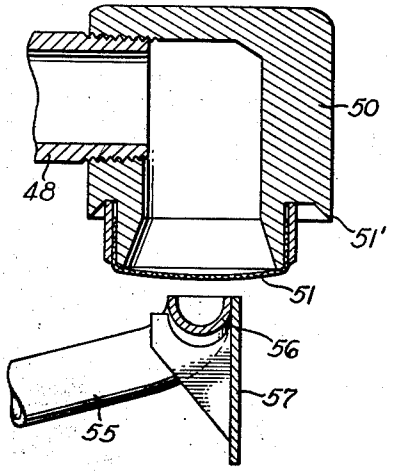
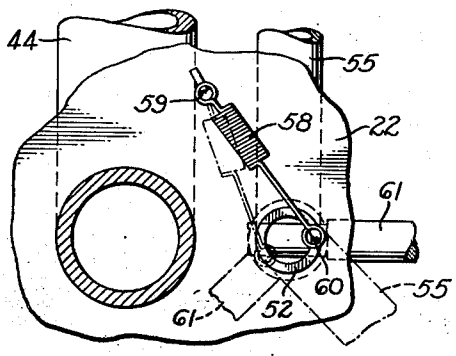


Fig. 14.



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UNITED STATES PATENT OFFICE

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PNEUMATICALLY OPERATED LIQUID PUMP

Cyril C. Benz, Los Angeles, Calif.

Application December 27, 1949, Serial No. 135,204

11 Claims. (Cl. 222—109)

1

This invention relates generally to the liquid dispensing art, and particularly to a metering pump which is adapted for use in dispensing measured quantities of lubricating oil from a drum or barrel in which the pump is incorporated. However, the pump forming the subject matter of this application is equally adaptable in dispensing measured quantities of various other liquids from other containers, and the invention is therefore not to be regarded as limited to the exact application to use hereinafter referred to.

Lubricating and other oils are usually stored in steel drums in automobile servicing stations and it is the usual practice to dispense the oil into a pouring can by means of a conventional manually operable pump mounted on the drum and having a rotatable operating handle. As is well known, such a dispensing operation is somewhat laborious and time-consuming so that the rate at which the vehicles can be serviced is minimized and the cost of operating a busy service station is accordingly increased. Another disadvantage of such conventional hand-operated oil-dispensing pumps resides in the fact that the operator must watch carefully the level of the oil dispensed into the pouring can so as to avoid underfilling or overfilling thereof.

It is therefore an object of the present invention to obviate the disadvantages of previous oil metering and dispensing means by providing a pump which is adapted for use in connection with a drum and which functions to dispense accurately a predetermined quantity of oil from the drum in a minimum period of time.

Another object is to provide a pump of the character referred to which is fluid operated, preferably by pneumatic pressure so that it may be connected to the usual supply of compressed air in an automobile service station or garage to be operated thereby.

Another object is to provide a metering pump which includes a vertical piston disposed within the drum and a piston slidable in the cylinder, said piston being operative upon upward movement to draw oil into the cylinder through a check-valve in the lower end thereof and to force the oil upwardly from the cylinder through a delivery tube when the piston is forced downwardly.

Another object is to provide a metering pump in which the piston is forced downwardly through an operative stroke in response to the introduction of compressed air into the upper end of the cylinder, and in which the piston is moved to its upper position to perform a suction stroke so

2

as to draw a fresh charge of oil into the cylinder, through the medium of spring means.

Another object is to provide a device of the type indicated in which the cylinder is suspended from an air tube which, in turn, is carried by a valve body disposed in an aperture of and supported by the top wall of the drum, an air valve of the poppet type being slidable within the body to control the injection of air into the cylinder by way of the air tube. A related object is to provide a manually operated valve-actuator which is slidable axially of the valve body and operative, when raised, to open the air valve to admit compressed air into the upper end of the cylinder, and adapted when released by the operator to disengage the air valve so as to permit the latter to close. A further related object is to provide a valve body having an air vent passage communicating between the interior of the air tube and the atmosphere, this passage being normally open prior to opening of the air valve and the dispensing stroke of the piston, but adapted to be closed by a poppet valve head carried by the manually operable valve actuator when the latter is raised, so as to retain the operating air within the cylinder and air tube.

Another object is to provide a device of the class specified which includes a "lost motion" link connection between the valve actuator and the piston by which the valve head of the actuator is unseated as the piston reaches the end of its discharge stroke so as to vent the upper end of the cylinder to the atmosphere and thus allow the piston to return to its upper position.

A further object is to provide adjustable stop means for limiting the upward sliding movement of the piston so as to control with precision the volume of oil drawn into the cylinder and, consequently, that dispensed during the discharge stroke of the piston. By this provision, the effective volume of the cylinder can be varied accurately by merely rotating the air tube with respect to the cylinder and this is accomplished from outside the drum without disconnecting the pump device.

Another object is to provide means for varying the rate of air flow into the cylinder so as to obtain the desired rate of delivery of the oil into a pouring can or other container to effect rapid filling of the container without excessive splashing.

Another important object is to provide means for sealing the piston against passage of oil therearound to the upper portion of the cylinder. Since it is impossible to completely seal a piston

to positively eliminate such leakage, the present invention provides means for trapping oil escaping upwardly around the piston so as to avoid passage thereof into the upper end of the cylinder, and this is a related object of the invention.

Another object is to provide sealing means for guarding against leakage of air from the upper end of the cylinder to the lower end thereof, which would reduce the amount of oil dispensed by the pump.

A further object is to provide means to prevent manipulation of the actuator when a container is not in place beneath the delivery nozzle to receive the oil dispensed from the drum.

A further object is to provide an oil drum and pump combination in which the entire pump assembly is merely suspended from the top head of the drum and retained in place by means disposed within the drum.

Further objects will appear from the following specification, and from the drawings which are intended for the purpose of illustration only, and in which:

Fig. 1 is a vertical sectional view through the present improved oil drum and dispensing pump;

Fig. 2 is a plan view of the same;

Fig. 3 is a sectional plan view, taken on line 3—3 of Fig. 1;

Fig. 4 is an enlarged vertical sectional view of the pump device, taken on line 4—4 of Fig. 2, with the metering piston shown at the upper end of its suction stroke;

Fig. 5 is a further enlarged view, similar to Fig. 4 but showing the piston near the lower end of its discharge stroke;

Fig. 6 is a cross-sectional view, taken on line 6—6 of Fig. 5;

Fig. 7 is a cross-sectional view, taken on line 7—7 of Fig. 5;

Fig. 8 is a cross-sectional view, taken on line 8—8 of Fig. 5;

Fig. 9 is a cross-sectional view, taken on line 9—9 of Fig. 5;

Fig. 10 is a cross-sectional view, taken on line 10—10 of Fig. 4;

Fig. 11 is a cross-sectional view, taken on line 11—11 of Fig. 5;

Fig. 12 is a cross-sectional view, taken on line 12—12 of Fig. 2;

Fig. 13 is a cross-sectional view, taken on line 13—13 of Fig. 1; and

Fig. 14 is a cross-sectional view, taken on line 14—14 of Fig. 1.

Referring to the drawings in detail, the present improved liquid metering and dispensing means includes a sheet metal tank or drum 20 which, as shown in Fig. 2 may be one of rectangular configuration, the drum having a bottom head 21 and a top head 22. The present drum also has a horizontal partition 23 disposed intermediate its upper and lower ends but in other respects the drum is similar to conventional oil drums used in automobile service stations and garages for dispensing oil into containers.

As shown in Figs. 2 and 12, the top wall or head 22 of the drum 20 is provided with a flanged filler opening 25 which is normally closed by a filler plate or cover 26. The cover 26 is of inverted dish shape and so proportioned that its depending peripheral flange 27 surrounds the upstanding circular flange 28 of the filler opening 25. The bottom of the cover 26 is a hook 29 which normally underlies the drum head 22 to retain one side of the cover in closed position. At its diametrically opposite portion the cover 26 has an angular extension 30 which overlies the upper corner of the drum and which has a hole 31 in its downwardly extending leg 32. A thumb-screw 33 passes through the hole 31 and is screwed into a boss 34 on the inner surface of the wall of the drum. The head 35 of the thumb-screw has a transverse opening 36 which aligns with an aperture 37 in the leg 32. A thin sheet metal band 38 is looped through the opening 36 and the aperture 37 and its ends are brought together and joined by a lead seal 40 at the front side of the drum so as to be visible to the consumer. By this construction, after the drum 20 has been filled with lubricating oil, the cover 26 is placed over the opening 25 as shown in Fig. 12 and retained in this closed position by the retaining screw 33, after which the sealing means 38, 40 is applied to lock the screw in place. It is thus seen that the cover 26 cannot be removed without breaking the sealing band 38 and this safeguards against refilling the drum with an inferior grade of oil. A notice calling the consumers' attention to the seal may be printed on the front side of the drum adjacent the seal.

Projecting upwardly from the top head 22 of the drum 20 is the upper, detachable extension 44 of an oil dispensing tube 45 which extends downwardly through an opening in the head 22 into the drum. The extension 44 is joined to the upper end of the tube 45 by means of a coupling 46, the lower end of which rests upon an annular flange 47 of the drum head 22 (Fig. 4). The extension 44 has a laterally bent upper end 48 (Fig. 13), to the outer end of which is detachably connected a dispensing or head nozzle 50. The nozzle 50 is, in effect, an elbow fitting which serves to direct oil, pumped upwardly through the tube 45 and extension 44, downwardly into a suitable container (not shown) which may be placed on the cover 26 beneath the nozzle. Applied to the lower end of the nozzle 50 is a screen 51 through which the oil flows, the screen being curved slightly so that oil which might drain therefrom will drip from the central portion of the screen. It is to be noted that the nozzle opening through which the oil is dispensed is considerably larger than the openings of oil spouts of conventional oil pumping devices so that a much greater rate of delivery of the oil is made possible. A film of oil which normally is present on the screen acts as a seal to prevent air from entering the delivery nozzle and tube. The nozzle 50 is provided with a depending peripheral bead 51' from which rain water may drip so as to prevent the flow thereof onto the screen 51.

A substantially vertical drain pipe 52 has its lower end projecting downwardly through a flanged opening in the drum head 22 (Fig. 4), a sleeve 53 on the pipe resting upon the annular flange 53' surrounding the opening. By this means, the drain pipe 52 is pivotally mounted, the upper portion of the pipe being rotatable in a U-shaped bracket 54 carried by the tube extension 44. The upper end of the drain pipe 52 is bent laterally in a sloping arm 55, the upper, outer portion of the arm being cut away to provide a channel 56 which is disposed beneath the screen 51 (Fig. 13) to adapt it to receive oil which drips from the nozzle following a dispensing operation, the oil thus caught flowing back into the drum 20 through the pipe 52. Since dripping of the oil occurs only at the center of the screen 51, the channel 56 of the drain pipe 52 can be located entirely inwardly of the rain water drip bead 51'. It is to be noted that the drain pipe 52 is relative-

ly small so that pouring of inferior oil into the sealed drum through this pipe is prevented. The arm 55 carries at its free end an abutment plate 57 which is adapted to be engaged by the container when the latter is placed beneath the nozzle so as to swing the drain means to inoperative position against the action of a spring 58 (Fig. 14), disposed beneath the drum head 22. The spring 58 has one end anchored to the drum head 22 at 59 and its other end connected to the lower end of the drain pipe 52 at 60. Thus, the spring 58 normally tends to retain the drain means in operative position to return dripping oil to the interior of the drum. When a container is placed in oil receiving position, the spring yields to allow the drain means to pivot to inoperative position and when the container is removed, the drain means snaps back into operative position. When it is desired to retain the drain means in inoperative position, the arm 55 is swung laterally to a location wherein the spring 58 moves across center as indicated by the dot-and-dash lines in Fig. 14. A finger 61 projects radially from the drain pipe 52 and is used for the purpose to be hereinafter explained.

Adapted to rest upon an annular flange 63 surrounding an opening in the drum head 22 is the upper head portion 64 of an element 65 which is hereinafter referred to as a valve body. The lower end of the valve body extends downwardly into the interior of the drum 20 and has an axial bore or chamber 66. The head 64 has a bore 67 extending parallel to the axis of the valve body 65 and a counterbore 68 aligned with the bore. An annular element disposed between the bore and counterbore provides an annular valve seat 69 against which the lower frusto-conical end of an air valve element 70 is adapted to seat. A spring 71 disposed between the valve element 70 and a plug 72 screwed into the upper end of the counterbore acts to normally maintain the valve element in closed position. As shown in Fig. 7, the upper portion of the valve element 70 is polygonal in cross section, thus providing segmental passages between its perimeter and the counterbore 68 through which air may pass. The valve element 70 is provided with a depending stem 73 which extends downwardly through the bore 67.

Referring to Fig. 7, the head 64 of the valve body 65 is provided with a diagonal, air inlet passage 75 which is in fluid communication with the counterbore 68. The outer end of the passage 75 has a threaded counterbore into which is screwed an end of a pipe nipple 76, the other end of the nipple being suitably connected to a hose (not shown) which may extend from a tank or other source of compressed air. Thus, compressed air is delivered to the counterbore or air valve chamber 68 which is normally closed by the spring-actuated valve 70. A manually adjustable needle valve 77 is employed for the purpose of regulating the rate of flow of compressed air through the inlet passage 75.

Adapted to slide vertically in an axial bore 79 of the valve body 65 is a tubular valve actuator stem 80, to the lower end of which is secured, within the chamber 66, an air vent valve poppet 81. The stem 80 projects above the top of the valve body 65 and carries an actuating knob 82. As shown in Fig. 6, the stem 80 and the knob 82 are split and a binder screw 83 passing through one side of the split portion of the knob and threaded into the other side thereof binds the knob firmly in place on the stem. In addition, the stem 80 is clamped around a small pull-rod 85 which projects downwardly from the valve body 65 and which is formed with a loop 86 at its lower end. The valve poppet 81, stem 80 and knob 82 together provide a valve actuator, it being noted that the peripheral portion of the valve poppet underlies the stem 73 of the air inlet valve 70. When the knob 82 is raised manually, the valve poppet 81 engages the stem 73 and raises the valve 70 from the seat 69 so as to admit air under pressure into the chamber 66, as shown in Fig. 5. At the same time, the air vent valve poppet 81 engages an annular seat 90 and thus prevents the escape of compressed air from the chamber 66 into a compartment 91 of the valve body 65 through radial vent passages 92 (Figs. 5 and 8) to the atmosphere. When air is introduced into the device through the valve bore 67, the air vent valve 81 is held closed due to the pressure air which acts against the entire lower area of the valve 81.

Screwed into the lower end of the valve body 65 is an annular element 95 which is provided with an integral, relatively long, air tube or sleeve 96. The lower threaded end of the tube 96 is screwed into the upper end member 98 of a pneumatic cylinder 100 which also includes a lower end member 101. A series of bolts 102 connected between the end members 98 and 101 maintains the parts of the cylinder in connected relation. It is thus seen that the cylinder 100 is suspended from the air tube 96 and valve body 65 within the oil drum 20 (Fig. 1).

The lower end plate 101 of the cylinder 100 is provided with an oil inlet passage 105 formed with a tapered valve seat 106 at its upper end (Figs. 5 and 11). Disposed centrally within the opening 105 is a boss 107 supported from the end plate by webs 108. Slidable in an axial bore of the boss 107 is the stem 109 of a poppet type check-valve 110 which has a resilient peripheral ring 111 adapted to be engaged against the valve seat 106 by a spring 112. The end plate 101 is further provided with radially extending walls defining lateral and vertical oil outlet passages 115 and 116. Surrounding the passage 116 is a valve seat 117 against which a resilient ring 118 of a poppet-type check-valve 120 is normally held by means of a spring 121. The lower end of the oil-dispensing tube 45 is screwed into the passage 116 so that oil forced through the passage flows upwardly through the tube and is dispensed through the nozzle 50.

Slidably disposed within the cylinder 100 is a relatively wide, hollow piston 125. A sleeve 126 is screwed into an axial threaded hole in the upper wall of the piston and its lower end is disposed a short distance above the lower wall of the piston 125 within the reservoir 127 thereof. A ball-type check-valve 128 is provided within the sleeve 126. Connected to the upper end of the sleeve 126 is the lower end of a wire link 129 through the upper looped end 130 of which the loop portion 86 of the link 85 is hooked to provide for lost motion therebetween. It is thus seen that the piston 125 is floatingly disposed within the cylinder 100. A coil spring 133 surrounds the links 85 and 129 and has its lower end connected to the sleeve 126 and its upper end hooked through a hole in the element 95. The spring 133 functions normally to raise the piston 125 to the position illustrated in Fig. 4, but yields to allow the piston to be forced to its lowermost position shown in Fig. 5 under the action of compressed air introduced into the

upper end of the cylinder 100 in the manner to be later explained.

As will be apparent from the foregoing, when the piston 125 is slid upwardly, oil is drawn into the cylinder 100 through the passage 105, after which the check-valve 110 closes. Upon downward movement of the piston 125, the metered oil is forced from the cylinder 100 past the check-valve 120 and discharged through the delivery tube 45 and nozzle 50. It is to be noted that when the piston 125 is drawn upwardly by the spring 133, its upper end engages the lower end of the air tube or sleeve 96 which extends into the cylinder 100. Upon completion of the upward stroke of the piston 125, a predetermined volume of oil, for example a quart, will have been drawn from the drum 20 into the cylinder 100, and this amount of oil will be dispensed from the nozzle 50 when the piston is operated through its downward discharge stroke.

To effect dispensing of the exact quantity of oil, it is necessary that the displacement of the piston be such that the proper effective volume of the cylinder 100 be utilized and to obtain this exact displacement, the tube 96, together with the valve body 65, is screwed farther into or from the cylinder head 98 so as to adjust the lower extremity of the tube toward and away from the lower head 101. In order to effect such an adjustment, it is necessary that the cylinder 100 and associated parts be held against rotation and this is accomplished by means of the partition 23 of the drum 20. As shown in Figs. 1 and 3, the partition 23 has a circular opening 136 through which the lower end of the metering and dispensing device, that is, the cylinder assembly 98, 100, 101 and the lower end of the dispensing tube 45 are lowered to dispose them adjacent the bottom of the drum. The opening 136 has a pair of slot-like extensions 137 and 138 into which the respective tubes 45 and 96 can be located by moving the cylinder assembly laterally following its insertion through the opening 136. To retain the cylinder assembly in this latter location, a retainer strip 139 is bolted to the partition 23 and extends across the slots 137 and 136 to prevent displacement of the tubes 45 and 96 therefrom. It is thus seen that the cylinder assembly is held against rotation so that manual rotation of the tube 96 by means of the valve body 65 causes the tube to be adjusted axially within the cylinder 100. The entire device may be raised slightly by merely lifting the valve body 65 so as to facilitate turning of the latter.

Referring to Figs. 4 and 5, the hollow piston 125 is provided with sealing means to avoid leakage of oil from the lower end to the upper end of the cylinder 100. The sealing means includes resilient sealing rings 140, 141 and 142 of the so-called "cup" type which are disposed in peripheral grooves of the piston. Each sealing ring is substantially U-shape in cross section, the sides or legs of the U-section being adapted to spread apart in response to pressure exerted within the section, so as to engage the inner surfaces of the cylinder 100 and the peripheral groove in which the particular ring is disposed. The sealing rings 140 and 141 serve to seal the piston against leakage of compressed air from the upper end of the cylinder into the lower end thereof so as to avoid air bubbles in the oil dispensed by the device and thus prevent volumetric discrepancies, these rings being arranged with the legs of their U-sections directed upwardly. The sealing ring 142, on the other hand, has the legs of its U-section directed downwardly so that this ring guards against upward flow of oil past the piston. As will be apparent, the cup-shaped sealing rings 140, 141, and 142 permit the piston 125 to rotate within the cylinder 100 relative to the adjustable air tube 96 so that if the knob 82 should be rotated, the piston is likewise rotated without disturbing the adjustment of the air tube.

The piston 125 is also provided with a peripheral groove 145 disposed between the sealing rings 140 and 141, this groove communicating with the interior of reservoir 127 of the piston through apertures 146. By this provision, during each discharge stroke of the piston, any oil which may escape upwardly past the lower rings 142 and 141 can flow into the reservoir 127. When the level of the oil flowing into the piston covers the lower end of the sleeve 126, operating air, which may leak past the ring 140 and enter the piston by way of the apertures 146, forces the oil upwardly through the sleeve and past the ball check-valve 128. Since the oil is somewhat atomized by the pressure air, the globules of oil are carried upwardly through the air vent openings 91 and 92 during the return stroke of the piston to uppermost position.

The liquid metering and dispensing device having been described in detail, the method of operation thereof is explained as follows: Assuming that the present improved device is to be employed for metering and dispensing lubricating oil from the barrel or drum 20 and that the device is installed in the drum and presently inoperative, the parts of the device assume the positions shown in Figs. 1 to 4. That is to say, the drain means 52 is maintained in a position wherein its channel end 56 underlies the nozzle 50 so as to drain back into the drum 20 any oil which may drip from the nozzle. The piston 125 assumes a position wherein it abuts the lower end of the air tube 96, the piston being retained in this position under the action of the spring 133. It will be observed by reference to Fig. 4 that the pull-rod 85, the valve 81, the stem 80, and the knob 82 assume their lowermost position under the action of gravity. Thus, the air valve 70 is closed by its spring 71 and the air vent valve 81 is open. It is to be noted that when the drain means is in its operative position, its finger 61 overlies the knob 82 and thus prevents raising of the latter to a position which would operate the device to effect dispensing of a metered amount of oil directly into the drain tube 52. By this provision, dispensing of oil, when a container is not positioned to receive the same, is normally prevented. Since the piston 125 is in uppermost position, there exists a metered charge of oil in the cylinder 100, the check-valves 110 and 120 being closed.

To dispense the measured amount, for example a quart, of oil a container is first placed on the drum head 22 and moved under the spout or nozzle 50. During this movement, the container engages the abutment plate 57 of the drain pipe 52 and thus pivots the latter to inoperative position against the action of the spring 58. In this manner, the finger 61 is swung clear of the knob 82. With the container thus in place, the attendant merely grasps and raises the knob 82 to cause the air vent valve 81 to engage the seat 90 so as to close the air vent passages 91, 92. At the same time, the valve 81 engages the stem 73 of the valve 70 to raise the latter from the seat 69 so that operating air can flow from the

pipe 76, through the passage 75 and past the valve 70, into the valve body 64, and thence downwardly through the air tube 96 to impinge against the piston 125 so as to force the latter downwardly. In this manner the oil contained in the cylinder 100 is forced from the cylinder through the passage 115, valve 120, tube 45, extension 44, and nozzle 50 into the container. The downward movement of the piston 125 is relatively rapid so that the oil is dispensed into the container at a fast rate. Since the lower end of the cylinder 100 is disposed within the supply of oil in the drum 20, the presence of air in the dispensed oil is avoided and a steady, even stream of oil is caused to flow into the container so that splashing of the oil is minimized. It is to be noted that the interior of the air tube 96 and the interior of the valve body 65 are relatively small so that the "dead" air space of the device is minimized and this makes for greater efficiency.

As the piston completes its downward operating stroke under the force of operating air introduced into the upper end of the cylinder, to the position shown in Fig. 5, the lost-motion linkage 85, 129 acts to draw the valve 81 downwardly away from the seat 90 so as to open the vent passages 92 and to simultaneously shut off the flow of air into the top of the cylinder 100 through the air valve 70. As the air pressure is thus relieved, the spring 133 acts to return the floating piston from the position shown in Fig. 5 to that illustrated in Fig. 4. During this suction stroke of the piston 125, oil is drawn into the cylinder 100 through the large passage 105, the check-valve 110 opening to admit the oil. Eventually, the piston 125 reaches its uppermost position where it engages the lower end of the air tube 96 at which time the predetermined amount of oil will have been drawn into the cylinder and the check-valve 110 will close. If it becomes necessary to adjust the device to more accurately dispense the necessary amount of oil, the operator merely turns the valve body 65 so as to locate the lower end of the air tube at a greater or lesser depth within the cylinder 100. In addition, the operator may adjust the pull-rod 85 axially by simply loosening the binder screw 83 and sliding the rod, after which the screw is retightened. By so adjusting the pull-rod 85, the piston 125 may be caused to open the valve 81 at any predetermined point of its downward movement.

It is thus seen that at each raising of the knob 82 the oil which was previously drawn into the cylinder 100 is dispensed therefrom through the delivery tube 45 and nozzle 50, and that following each dispensing stroke and after the knob has been released, the piston 125 is drawn upwardly by the spring 133 to meter a predetermined amount of the oil for subsequent delivery to a container. It will be apparent that the operator may cause the device to dispense smaller quantities of oil by reciprocating the knob 82 at a fast rate.

In the foregoing specification the liquid metering and dispensing device has been described in connection with an oil drum for delivering oil therefrom. It will be apparent, however, that the present device is adaptable for use in measuring and dispensing other liquids, such as beverages, fruit juices, milk, etc., and the invention is therefore not to be regarded as limited to the specific adaptation to use mentioned herein, by way of example.

I claim as my invention:

1. In a liquid metering and dispensing device, the combination of: a receptacle for a liquid; a cylinder; inlet passage means communicating at one end with one end of said cylinder and communicating at its other end with the interior of said receptacle; normally closed inlet check valve means in said inlet passage means and openable by flow through said inlet passage means from said receptacle to said cylinder; discharge passage means communicating at one end with said one end of said cylinder and communicating at its other end with the exterior of said receptacle; normally closed discharge check valve means in said discharge passage means and openable by flow through said discharge passage means from said cylinder to the exterior of said receptacle; a piston reciprocable in said cylinder; resilient means operatively connected to said piston and biasing said piston in a direction from said one end of said cylinder toward the other end thereof, said piston drawing liquid from said receptacle into said cylinder through said inlet passage means upon movement of said piston in said direction by said resilient means; fluid passage means connectible to a source of operating fluid under pressure at one end and communicating at its other end with said other end of said cylinder only, whereby an operating fluid under pressure may be introduced into said other end of said cylinder to move said piston in the opposite direction in said cylinder so as to force liquid from said cylinder through said discharge passage means; normally closed fluid valve means in said fluid passage means; vent passage means communicating at one end with the exterior of said receptacle and communicating at its other end with said other end of said cylinder; normally open vent valve means in said vent passage means; control means operatively connected to said fluid valve means and said vent valve means for simultaneously opening said fluid valve means and closing said vent valve means, and for simultaneously closing said fluid valve means and opening said vent valve means; and means operatively connecting said control means and said piston for automatically closing said fluid valve means and opening said vent valve means when said piston reaches the ends of its discharge stroke in said opposite direction whereby said resilient means returns said piston to said other end of said cylinder in said direction, said fluid valve means remaining closed and said vent valve means remaining open until such time as said control means is manually actuated at some subsequent time, whereupon said piston remains at said other end of said cylinder until such subsequent time.

2. In a liquid metering and dispensing device, the combination of: a receptacle for a liquid; a cylinder; inlet passage means communicating at one end with one end of said cylinder and communicating at its other end with the interior of said receptacle; normally closed inlet check valve means in said inlet passage means and openable by flow through said inlet passage means from said receptacle to said cylinder; discharge passage means communicating at one end with said one end of said cylinder and communicating at its other end with the exterior of said receptacle; normally closed discharge check valve means in said discharge passage means and openable by flow through said discharge passage means from said cylinder to the exterior of said receptacle; a piston reciprocable in said cylinder; resilient

means operatively connected to said piston and biasing said piston in a direction from said one end of said cylinder toward the other end thereof, said piston drawing liquid from said receptacle into said cylinder through said inlet passage means upon movement of said piston in said direction by said resilient means; fluid passage means connectible to a source of operating fluid under pressure at one end and communicating at its other end with said other end of said cylinder, whereby an operating fluid under pressure may be introduced into said other end of said cylinder to move said piston in the opposite direction in said cylinder so as to force liquid from said cylinder through said discharge passage means; normally closed fluid valve means in said fluid passage means; vent passage means communicating at one end with the exterior of said receptacle and communicating at its other end with said other end of said cylinder; normally open vent valve means in said vent passage means; control means operatively connected to said fluid valve means and said vent valve means for simultaneously opening said fluid valve means and closing said vent valve means, and for simultaneously closing said fluid valve means and opening said vent valve means; spring means operatively connected to said fluid valve means and said vent valve means for biasing said fluid valve means closed and said vent valve means open; and hydraulic means exposed to and actuable by operating fluid under pressure in said fluid passage means intermediate said fluid valve means and said cylinder for maintaining said fluid valve means open and said vent valve means closed in opposition to the action of said spring means, said hydraulic means being operatively connected to said fluid valve means and said vent valve means.

3. A device as defined in claim 2 wherein said fluid valve means includes an annular seat in said fluid passage means and a valve member engageable with said annular seat, and wherein said vent valve means includes another annular seat in said vent passage means and another valve member engageable with said other annular seat, said hydraulic means including a surface of one of said valve members exposed to operating fluid under pressure in said fluid passage means intermediate said fluid valve means and said cylinder.

4. In a valve device for a liquid metering and dispensing apparatus which includes a cylinder having a piston reciprocable therein and which includes fluid passage means and vent passage means communicating with one end of said cylinder to deliver operating fluid under pressure to said one end of said cylinder and exhaust spent operating fluid therefrom, respectively, the combination of: normally closed fluid valve means in said fluid passage means, said fluid valve means including a first annular seat in said fluid passage and a first valve member engageable with said first annular seat; spring means engaging said first valve member for biasing it into engagement with said first annular seat; normally open vent valve means in said vent passage means, said vent valve means including a second annular seat in said vent passage means and a second valve member engageable with said second annular seat, said first and second valve members being movable toward their respective open and closed positions in opposite directions and said second valve member engaging said first valve member to move said first valve member to its open position in opposition to the action of said spring means upon movement of said second valve member from its open position to its closed position; and control means connected to said second valve member for moving it from its open position to its closed position.

5. A device as defined in claim 2 including a valve body containing said fluid valve means and said vent valve means, said fluid passage means and said vent passage means including a tube common thereto and connected at one end to said valve body and extending into said other end of said cylinder, said tube being threadedly connected to said cylinder so that said other end thereof provides an adjustable stop for said piston to limit movement of said piston during the intake stroke thereof in said opposite direction.

6. In a liquid metering and dispensing device, the combination of: a receptacle for a liquid; a cylinder; inlet passage means communicating at one end with one end of said cylinder and communicating at its other end with the interior of said receptacle; normally closed inlet check valve means in said inlet passage means and openable by flow through said inlet passage means from said receptacle to said cylinder; discharge passage means communicating at one end with said one end of said cylinder and communicating at its other end with the exterior of said receptacle; normally closed discharge check valve means in said discharge passage means and openable by flow through said discharge passage means from said cylinder to the exterior of said receptacle; a piston reciprocable in said cylinder; resilient means operatively connected to said piston and biasing said piston in a direction from said one end of said cylinder toward the other end thereof, said piston drawing liquid from said receptacle into said cylinder through said inlet passage means upon movement of said piston in said direction by said resilient means; fluid passage means connectible to a source of operating fluid under pressure at one end and communicating at its other end with said other end of said cylinder, whereby an operating fluid under pressure may be introduced into said other end of said cylinder to move said piston in the opposite direction in said cylinder so as to force liquid from said cylinder through said discharge passage means; normally closed fluid valve means in said fluid passage means; vent passage means communicating at one end with the exterior of said receptacle and communicating at its other end with said other end of said cylinder; normally open vent valve means in said vent passage means; control means operatively connected to said fluid valve means and said vent valve means for simultaneously opening said fluid valve means and closing said vent valve means, and for simultaneously closing said fluid valve means and opening said vent valve means; a nozzle connected to said other end of said discharge passage means; and a drain tube mounted on said receptacle and communicating at one end with the interior of said receptacle, said drain tube being movable from an operative position wherein the other end thereof is disposed below said nozzle to receive liquid dripping therefrom to an inoperative position wherein said other end thereof is spaced from said nozzle, said drain tube including an abutment element adapted to be engaged by a container placed beneath said

nozzle so as to move said drain tube to said inoperative position.

7. In a liquid metering and dispensing device, the combination of: a receptacle for a liquid; a cylinder; inlet passage means communicating at one end with one end of said cylinder and communicating at its other end with the interior of said receptacle; normally closed inlet check valve means in said inlet passage means and openable by flow through said inlet passage means from said receptacle to said cylinder; discharge passage means communicating at one end with said one end of said cylinder and communicating at its other end with the exterior of said receptacle; normally closed discharge check valve means in said discharge passage means and openable by flow through said discharge passage means from said cylinder to the exterior of said receptacle; a piston reciprocable in said cylinder; resilient means operatively connected to said piston and biasing said piston in a direction from said one end of said cylinder toward the other end thereof, said piston drawing liquid from said receptacle into said cylinder through said inlet passage means upon movement of said piston in said direction by said resilient means; fluid passage means connectible to a source of operating fluid under pressure at one end and communicating at its other end with said other end of said cylinder, whereby an operating fluid under pressure may be introduced into said other end of said cylinder to move said piston in the opposite direction in said cylinder so as to force liquid from said cylinder through said discharge passage means; normally closed fluid valve means in said fluid passage means; vent passage means communicating at one end with the exterior of said receptacle and communicating at its other end with said other end of said cylinder; normally open vent valve means in said vent passage means; control means operatively connected to said fluid valve means and said vent valve means for simultaneously opening said fluid valve means and closing said vent valve means, and for simultaneously closing said fluid valve means and opening said vent valve means; a nozzle connected to said other end of said discharge passage means; and a drain tube mounted on said receptacle and communicating at one end with the interior of said receptacle, said drain tube being movable from an operative position wherein the other end thereof is disposed below said nozzle to receive liquid dripping therefrom to an inoperative position wherein said other end thereof is spaced from said nozzle, said drain tube having an element which overlies said control means when said drain tube is in said operative position so as to prevent actuation of said control means.

8. In a liquid metering and dispensing device, the combination of: a receptacle for a liquid; a vertical cylinder; inlet passage means communicating at one end with one end of said cylinder and communicating at its other end with the interior of said receptacle; normally closed inlet check valve means in said inlet passage means and openable by flow through said inlet passage means from said receptacle to said cylinder; discharge passage means communicating at one end with said one end of said cylinder and communicating at its other end with the exterior of said receptacle; normally closed discharge check valve means in said discharge passage means and openable by flow through said discharge passage means from said cylinder to the exterior of said receptacle; a piston reciprocable in said cylinder, said piston being hollow and having radial passages in its peripheral wall and an axial passage in its top wall with a check valve in said axial passage exposed to fluid pressure in the upper end of said cylinder, said check valve preventing ingress of pressure fluid into said piston during the discharge stroke of said piston but permitting egress during the suction stroke of said piston of pressure fluid and liquid entering said piston through said radial passages; resilient means operatively connected to said piston and biasing said piston in a direction from said one end of said cylinder toward the other end thereof, said piston drawing liquid from said receptacle into said cylinder through said inlet passage means upon movement of said piston in said direction by said resilient means; fluid passage means connectible to a source of operating fluid under pressure at one end and communicating at its other end with said other end of said cylinder, whereby an operating fluid under pressure may be introduced into said other end of said cylinder to move said piston in the opposite direction in said cylinder so as to force liquid from said cylinder through said discharge passage means; normally closed fluid valve means in said fluid passage means; vent passage means communicating at one end with the exterior of said receptacle and communicating at its other end with said other end of said cylinder; normally open vent valve means in said vent passage means; and control means operatively connected to said fluid valve means and said vent valve means for simultaneously opening said fluid valve means and closing said vent valve means, and for simultaneously closing said fluid valve means and opening said vent valve means.

9. A device as defined in claim 8 in which said piston is provided with peripheral sealing rings, at least one sealing ring being disposed between said radial passages and said top wall and at least two sealing rings being disposed between said radial passages and the bottom wall of said piston.

10. A device as defined in claim 9 in which each of said sealing rings is resilient and of U-shaped cross section.

11. A device as defined in claim 10 which includes a sleeve carried by said top wall and extending downwardly into said piston with its lower end disposed adjacent the bottom wall of said piston, said check-valve being within said sleeve, said resilient means consisting of a tension spring having its lower end connected to said sleeve and having its upper end connected to said fluid passage means.

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