Feb. 23, 1943. A. L. BOBRICK 2,311,624

LIQUID DISPENSER

Filed Aug. 16, 1940

FIG. 1.

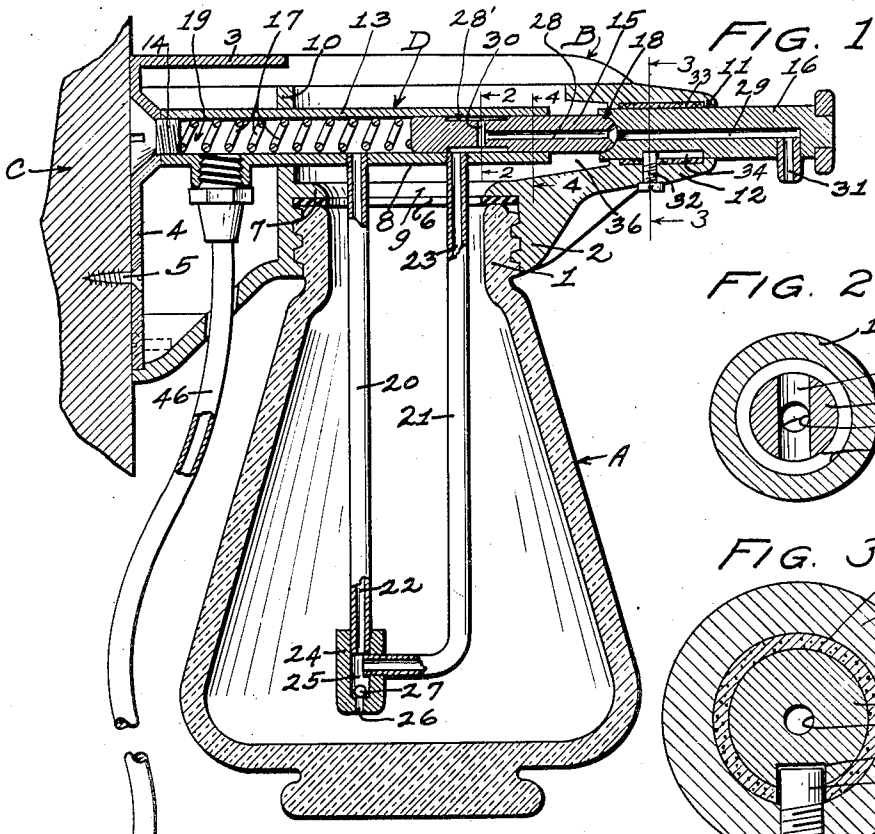


FIG. 2.

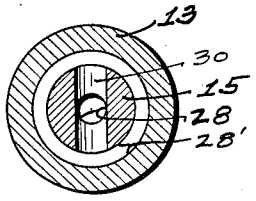


FIG. 3.

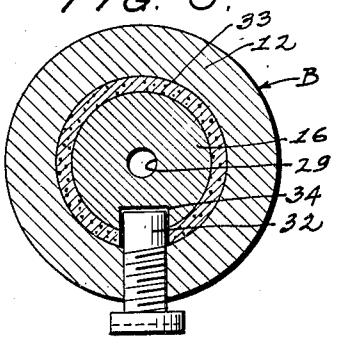
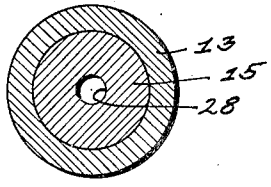
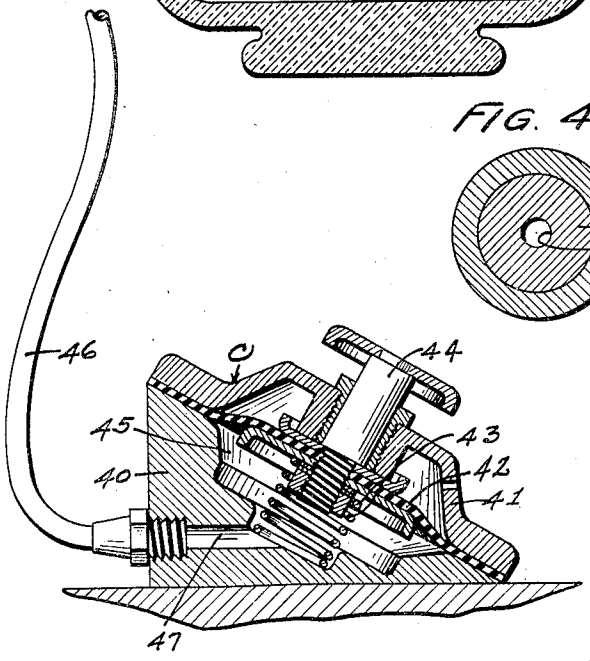


FIG. 4.





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LIQUID DISPENSER

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14 Claims. (Cl. 221—102)

This invention relates to liquid dispensers and the principal objects are to provide a dispensing mechanism in which, for instance:

A liquid soap, antiseptic, or other solution is supported either above or below the level of the dispensing means and is forced by manually created pressure to and from the dispensing means instead of flowing by gravity as in other commercial types of dispensers;

A restricted pressure area is provided for maintaining a constant and uniform volume of liquid for delivery at each operation of the dispenser;

The dispensing mechanism is free from washers, gaskets and other sealing means which require adjustment and occasional replacement due to the deleterious action of alkali and oils, and is provided with means in lieu of such devices for draining surplus liquid back into the liquid receptacle;

The entire dispenser assembly is thoroughly scavenged after short periods of inoperation and leaves no liquid in or around the working parts which will tend to clog or impair the operation of the dispenser;

The manually operated member of the dispenser is so arranged as to eliminate accuracy and exercise of undue care in assembling the dispenser for use; and

Means is provided for optional hand or foot operation of the dispenser, or both of such means of operation.

Other and more detailed objects of my invention may appear as the description progresses.

I have shown a perfected embodiment of my invention subject to modification within the scope of the appended claims without departing from the spirit thereof, the accompanying drawing.

In said drawing:

Figure 1 is a sectional elevation of my improved dispenser adapted for hand or foot operation selectively;

Figure 2 is a transverse section of the same on line 2—2 of Figure 1;

Figure 3 is a transverse section of line 3—3 of Figure 1; and

Figure 4 is a transverse section of the same, line 4—4 of Figure 1.

Briefly described, my improved dispenser is adapted to be supported on a wall or other suitable support at a convenient distance above the level of the floor and includes a suitable receptacle A, preferably of glass, so as to render the liquid therein visible, and mounted either above or below the dispensing plane, but preferably below as shown in the drawing. Said receptacle, in the form herein shown, has a restricted neck 1 at its top which is externally threaded so as to detachably engage an internally threaded collar 2 depending from a unitary head B.

Head B has a bracket 3 which is attachable at its end 4 to a suitable supporting wall or other member, as at C, by means of screws 5, or otherwise, for rigidly holding the dispenser in position for use. Usually a gasket 6 is provided between the top of the receptacle A and a shoulder 7 of the head so as to allow more or less latitude in attaching the receptacle to the head, but not necessarily for the purpose of sealing the joint between the receptacle and head.

Head B has a central chamber 8 which is in constant communication with the interior of receptacle A by means of a central opening 9 formed inwardly of shoulder 7. Said chamber is closed at its rear extremity by means of a partition 10 and has an opening 11 at its forward end formed in a tubular extension 12.

The dispensing mechanism D includes an elongated barrel 13 which is supported in the partition 10 of the head and also may be supported additionally in the end 4 as by means of a countersunk flat head screw 14 threaded into the rear end of the barrel, as shown, and the forward portion of said barrel extends substantially forwardly of said partition but is spaced rearwardly from the inner extremity of opening 11.

A hand operated plunger is associated with the barrel 13 and may be of unitary or sectional form but, as shown, consists of two cooperating members 15 and 16, the member 15 being slidable in the barrel and the adjacent ends of said members being in abutting engagement. A compression spring 17 is held in the barrel between the inner end of screw 14 and the rear end of member 15 and tends to constantly urge the plunger members 15 and 16 outwardly to normal positions of rest but is compressible when pressure is applied to the member 16, for the purpose hereinafter described. The sectional form of plunger is desirable in order to eliminate excess accuracy in alining the plunger bearings, the outer end of member 15 being rounded, as at 18, and the adjacent end of member 16 being slightly cupped to form a seat for the end 18. Thus, regardless of any slight misalinement of the members 15 and 16, operation of the dispenser will not be impaired or prevented. However, when the plunger bearings are accurately alined, a single piece plunger may obviously be used in lieu of the sectional form.

By reference to the drawing it will be noted that the barrel 13 has a pressure chamber 19 intermediate the rear end thereof and the rear end of plunger member 15, in which chamber the spring 17 is held. Said barrel is provided with two depending tubes 20 and 21 of small and substantially the same sized bores 22 and 23, respectively. The upper ends of said tubes are suitably attached to barrel 13 so that their bores will communicate with the interior of said barrel, the bore 22 being constantly in communication with the chamber 19 at a point rearwardly of member 15 while bore 23 of tube 21 is open to the interior of the barrel at the periphery of plunger 15.

Said tubes 20 and 21 extend downwardly into receptacle A and are connected with a submerged valve body 24 having a chamber 25 in communication with the lower ends of both of said tubes and also to the receptacle by means of a port 26 the opening and closing of which relative to the liquid in the receptacle is controlled by a ball check valve 27. The lower end of tube 21 is extended slightly into chamber 25 so as to provide a means for preventing the elevation of ball valve 27 to a point sufficient to close passage 22 in tube 20. The plungers 15 and 16 are provided with longitudinally alined and constantly communicating passages 28 and 29 and passage 28 is open to a peripheral channel 28' on plunger 15 by means of a transverse port 30, while the outer end of passage 29 is open to the atmosphere through a dispensing spout 31 carried by member 16.

The member 16 is held against rotation in its support by means of a set screw 32 which forms a key and engages a channel 34, formed on the periphery of member 16. At the outer end of and around the barrel 13, I provide in the extension 12 of head B a chamber 36 which is open to chamber 8 and also to the interior of the receptacle A so that any liquid which may leak from barrel 13 around plunger 15 will be exhausted from the end of the barrel into said chamber 36 and will drain by gravity back into the receptacle, no pressure being created or present in chamber 36 tending to force any of the liquid outwardly through extension 12 around the plunger 16.

For the purpose of adapting my dispenser to operation by foot pressure, I may employ a diaphragm pump as at C which is adapted to be mounted in a convenient position on the floor beneath the dispenser and includes a base 40 and a removable top 41 suitably held together and providing an internal compartment which is subdivided by a diaphragm 42 held between the members 40 and 41 at its margins and spring urged to a normal position by means of a compression spring 43. Said diaphragm is depressed as by means of a plunger 44 slidably supported in the top member 41 so as to create pressure when depressed by the foot of an operator in a chamber 45. Pressure thus created is transferred from chamber 45 to barrel 13 by means of a flexible tubular connection 46 connecting an outlet 47 from chamber 45 with the pressure chamber 19 of barrel 13.

Thus, when pressure is created in chamber 19 of the barrrel, either by the inward movement of plungers 15 and 16 by hand pressure, or by depression of plunger 44 by foot pressure, the pressure in chamber 19 is communicated to the bore 22 of tube 21, thus serving to close check valve 27 and forcing a measured quantity of liquid which is resident in the chamber 25 of valve body 24, upwardly through and from the bore 23 of the tube 21, and thence through passages 23', 30 and 28 of plunger 15 and passages 29 and outlet 31 of plunger 16 at each dispensing operation.

Any liquid which may be expelled from barrel 13 around plunger 15 will be exhausted into chamber 36 of the head B and will drain by gravity therefrom into the receptacle. Upon release of the plunger 16, or 44, as the case may be, and a consequent absence of pressure in chamber 19 of the barrel, as well as in tubes 20 and 21, the liquid then in said barrel and tubes will seek its own level and gradually lower its level to correspond to the level of the liquid in the receptacle, except that with respect to tube 21, given a sufficient period of time between successive operations, the tube 21 will be substantially void of liquid in all but the extreme lower portion thereof.

Thus, it may be noted, upon the lowering of the level of the liquid in tubes 20 and 21, particularly the latter, a partial vacuum is created in said tube 21 which, together with gravitational force, tends to induce a flow of any liquid remaining in barrel 13 and in and around the plunger 15 downwardly into tube 21, thus scavenging the operating parts of the dispensing mechanism after a short interval of time following each operation and leaving them free and clear of liquid which tend after a time, to congeal and impair the operation of the dispenser.

Thus, the form of dispenser shown will prevent an accumulation of liquid in and around the operating plunger and also eliminate the forcible expulsion of liquid around the plunger, which frequently occurs in dispensers when no means is provided for scavenging the mechanism.

The elimination of washers in connection with the plungers, which usually swell and become impaired due to the action of alkali and certain oils thereon, removes the necessity for frequent servicing and replacements.

I have shown in the drawing, though it is not at all times necessary, an annular packing 33 around the plunger 16, but in lieu of said packing, a bushing or other expedient may be employed when necessary.

What I claim as new is:

1. A liquid dispenser comprising: a body forming a support, a liquid receptacle detachably held on said body, and a dispensing mechanism carried by said body and including a barrel having a pressure chamber therein, a plunger slidable in said barrel for creating pressure in said chamber, a valve submerged in the liquid of said receptacle and having separate spaced connections with said barrel, and means embodied in said plunger and cooperating with said spaced connection for forcing a volume of liquid outwardly through said plunger when the same is moved in a direction to create pressure and effective upon a reverse movement of said plunger for evacuating said barrel, plunger and connections of liquid remaining therein after each operation.

2. A liquid dispenser comprising: a body, a liquid receptacle carried thereby, and dispensing mechanism carried by said body including a pressure chamber externally of said receptacle, a manually operable member for creating pressure in said chamber, a valve submerged in the

liquid of said receptacle, and cooperating means connecting said valve with said chamber and with a delivery outlet in said operating member, for dispensing quantities of liquid at each operation of the dispenser.

3. A liquid dispenser comprising: a body, an associated liquid receptacle, a pressure chamber in said body externally of said receptacle, an operating member associated with said chamber for creating pressure therein when said member is moved in a given direction, means including a valve depending from said chamber into the liquid of said receptacle, a dispensing outlet being connected with said valve and controlled by said operating member and effective for dispensing a quantity of liquid at each such movement of said operating member and for evacuating the dispensing means of liquid upon a reverse movement of said operating member.

4. A liquid dispenser comprising: a body, a liquid receptacle carried thereby, and a dispensing mechanism carried by said body including a pressure chamber externally of said receptacle, a manually operable member for creating pressure in said chamber, a valve submerged in the liquid of said receptacle, and cooperating means connecting said valve with said chamber and with a delivery outlet in said operating member, for dispensing quantities of liquid at each operation of the dispenser, and means for restoring said operating member to normal position at the completion of each operation thereof.

5. A liquid dispenser comprising: a body, an associated receptacle for liquid, a cylinder in said body having a pressure chamber, a manually operated member operable relative to and for creating pressure in said chamber, a check valve submerged in the liquid of said receptacle, a pair of tubular connections between said cylinder and said check valve, said operating member embodying means for dispensing the liquid therefrom, said operating member being effective on a pressure creating movement to dispense the liquid therefrom and on a reverse movement for effecting an evacuation of liquid from said connections.

6. A liquid dispenser comprising: a body, an associated receptacle for liquid, a cylinder in said body having a pressure chamber, a manually operated member operable relative to and for creating pressure in said chamber, a check valve submerged in the liquid of said receptacle, a pair of tubular connections between said cylinder and said check valve, said operating member embodying means effective on a pressure creating movement to dispense the liquid therefrom and on a reverse movement for effecting an evacuation of liquid from said connections, and a chamber formed in said body adjacent said cylinder and for receiving surplus liquid from said cylinder.

7. A liquid dispenser comprising: a body, a liquid receptacle carried thereby, and a dispensing mechanism carried by said body including a pressure chamber, a manually operable member for creating pressure in said chamber, a valve submerged in the liquid of said receptacle, and cooperating means connecting said valve with said chamber and with a delivery outlet in said operating member, for dispensing quantities of liquid at each operation of the dispenser, and cooperating means in said chamber and said operating member and their connections for scavenging the mechanism of liquid resident therein at the completion of each operation.

8. A liquid dispenser comprising: a body, an associated liquid receptacle, a cylinder in said body having a pressure chamber, a hand operated member slidable in said cylinder provided with outlet means, a foot operated member, a pressure chamber associated therewith and in communication with the pressure chamber of said cylinder, a check valve submerged in the liquid of said receptacle and having separate connections with the pressure chamber of said cylinder and with said outlet means, whereby upon the operation of said hand or foot operated means a quantity of liquid will be dispensed.

9. A liquid dispenser comprising: a body attachable to a wall or the like, a liquid receptacle supported on said body below the dispensing plane, and a dispensing mechanism on said body and including a cylinder having a pressure chamber therein, a plunger slidable in said cylinder and embodying outlet means for the liquid to be dispensed, a check valve submerged in the liquid of said receptacle, a pressure tube connecting said pressure chamber with said valve, a delivery tube connecting said valve with said outlet means, for dispensing quantities of liquid through and from said plunger at each pressure stroke thereof; and means for urging said plunger to normal outward position for inducing a flow of surplus liquid from said cylinder and said plunger on each reverse stroke of said plunger.

10. A liquid dispenser comprising: a body, a liquid receptacle supported thereon below the dispensing plane, and a dispensing mechanism including a cylinder having a pressure chamber, a plunger slidable in said cylinder and having a delivery passage, an operating member slidable in said body abutting the adjacent end of said plunger and having outlet means forming a continuation of the passage in said plunger, a check valve submerged in the liquid of said receptacle, and means connecting said pressure chamber with said valve, separate means for connecting the pressure chamber with said plunger with said valve, for dispensing quantities of liquid at each operation of said plunger.

11. A liquid dispenser comprising: a body, a liquid receptacle supported thereon below the dispensing plane, and dispensing means including a cylinder having a pressure chamber, a manually operated member slidable in said cylinder and having outlet means therein for the liquid to be dispensed, a valve body submerged in the liquid of said receptacle and having a delivery chamber separately connected with said pressure chamber and with the outlet means of said operating member, and a check valve in said valve body below said connections with said pressure chamber and said operating member.

12. A liquid dispenser comprising: a body, a liquid receptacle supported thereon below the dispensing plane, and dispensing means including a cylinder having a pressure chamber, a manually operated member slidable in said cylinder and having outlet means therein for the liquid to be dispensed, a valve body submerged in the liquid of said receptacle and having a delivery chamber separately connected with said pressure chamber and with the outlet means of said operating member, and a check valve in said valve body below said connections with said pressure chamber and said operating member for controlling the dispensing of quantities of liquid at each operation of the dispenser, and means in said cylinder for restoring said plunger to normal position at the completion of each dispensing operation.