June 10, 1952 W. W. BOWMAN 2,599,686

LOTION DISPENSER

Filed July 1, 1947 2 SHEETS—SHEET 1

Fig. 1

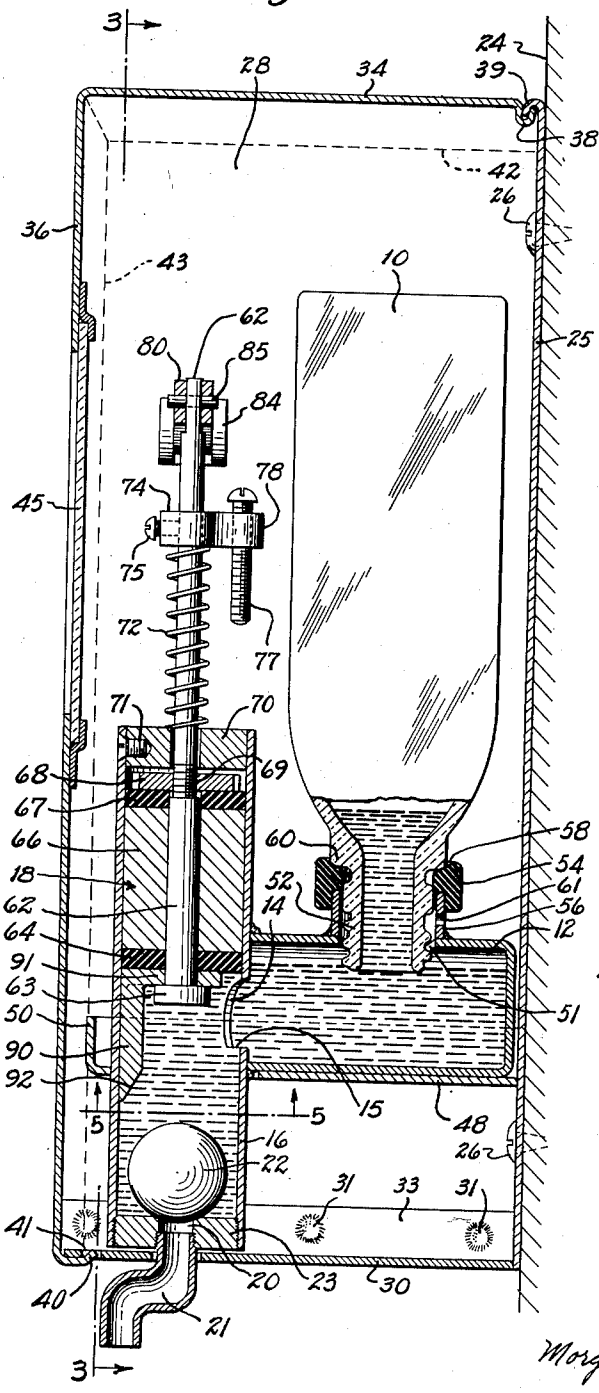
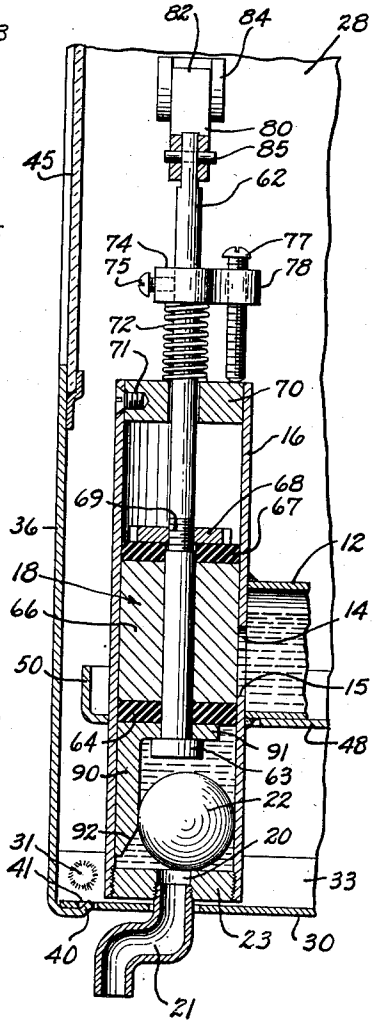


Fig. 2



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Fig. 3

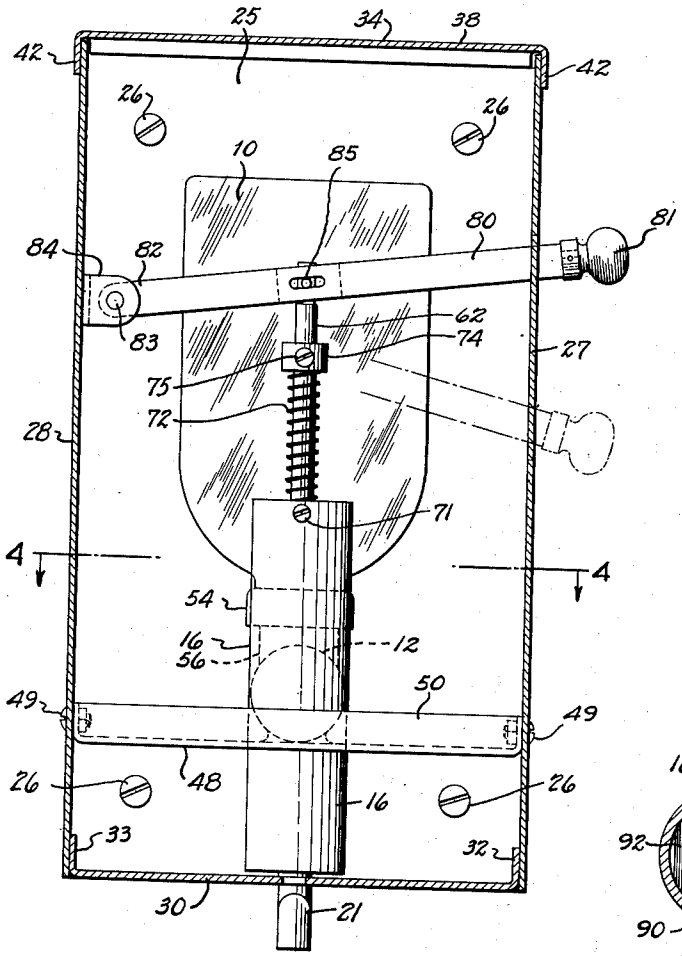
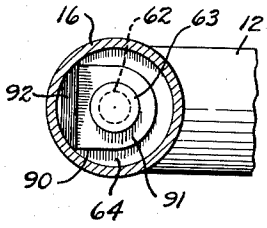


Fig. 5



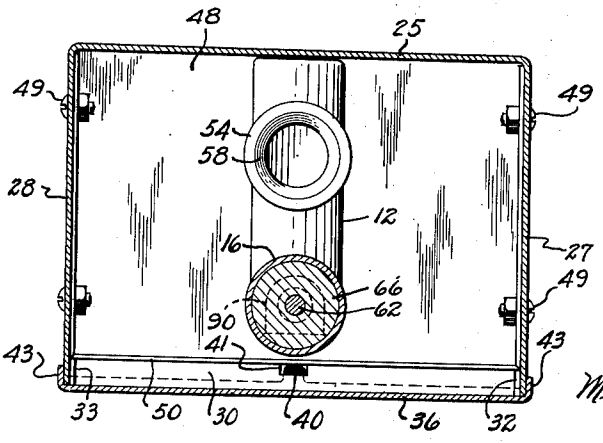


Fig. 4

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UNITED STATES PATENT OFFICE

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LOTION DISPENSER

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Application July 1, 1947, Serial No. 758,253
In Canada June 26, 1947

5 Claims. (Cl. 222—340)

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The invention relates to liquid dispensers, especially for lotions and the like.

Objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

The invention consists in the novel parts, constructions, arrangements, combinations and improvements herein shown and described.

The accompanying drawings, referred to herein and constituting a part hereof, illustrate one embodiment of the invention, and together with the description, serve to explain the principles of the invention.

Of the drawings:

Fig. 1 is a central vertical section of a mechanism embodying the invention;

Fig. 2 is a fragmentary portion of Fig. 1, showing the valve and plunger mechanism thereof in liquid dispensing position;

Fig. 3 is a vertical section on line 3—3 of Fig. 1;

Fig. 4 is a horizontal section on line 4—4 of Fig. 3; and

Fig. 5 is a horizontal section on line 5—5 of Fig. 1.

The primary object of the invention is to provide an improved manually operated dispenser for liquids, such as hand lotions or other creamy liquids, emulsions or liquid-solid suspensions. Such liquid solutions or emulsions vary considerably in consistency from one batch to another and also within the batch, with respect to thickness, viscosity and other factors which detrimentally affect the ability to dispense them in measured quantities. The invention is directed to providing a dispensing mechanism which is simple to operate and will deliver exactly equal volume quantities of such liquid from the original bottle or container thereof, regardless of great variations in consistency and viscosity. The invention also provides a mechanism which will deliver a certain volume of such liquid cleanly, accurately, and with adequate force, while preventing all afterdrip or tendency to leak after a delivery operation. The mechanism of the invention is also adapted for coin control and its construction is so simple that it is a very inexpensive device to install and operate and requires a minimum of servicing and repair. The mechanism also permits of considerable controllable variation in the amount of liquid to be delivered by a simple adjustment of its parts.

Referring now in detail to the present preferred

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embodiment of the invention, shown by way of illustration in the accompanying drawings, a liquid container or bottle 10, for example the commercial container for a hand lotion, such as "Jergens," is removably mounted top-downward so as to feed its contents by gravity into a suitable cylindrical reservoir 12. One end of said reservoir is closed and the other end communicates by a suitable port 14 with a vertically-disposed ejection or feed cylinder 16. Said cylinder 16 is disposed at right angles to the open end of the reservoir 12 and serves to seal said end thereof except for the communicating port 14 which is formed in the wall of cylinder 16. The upper end of cylinder 16 houses the lotion ejecting piston or plunger mechanism generally indicated as 18, while the lower end thereof has an ejection orifice 20 formed in the bottom plug or disc 23 and normally closed by the displaceable valve ball 22. An angular delivery duct 21 communicates with the valve opening 20.

All the aforesaid devices are suitably housed within a rectangular cabinet adapted to be mounted on any suitable vertical or upright surface such as the wall 24.

Having generally indicated the major elements of my dispensing mechanism I shall now proceed to describe the various parts thereof in detail. Referring first to the housing or cabinet, same may be of any suitable construction preferably being formed of sheet metal plates and, as shown, the wall plate 25 is affixed to the wall 24 as by lag screws 26. The sides of the cabinet comprise vertical flanges 27 and 28 which extend forwardly from the rear plate 25. The bottom 30 is a flat plate affixed, as by spot welding 31, to the side walls 27 and 28 through upturned flanges 32 and 33, respectively. The top 34 and front wall 36 are preferably formed of one piece bent at right angles. As shown, the rear edge 38 of the top is hooked to engage a conforming tongue 39 along the top of the rear plate 25, while the bottom of the front plate 36 is provided with an upwardly turned tongue 40 to removably engage a suitable central slot 41 in the bottom plate 30. The top is provided with depending side flanges 42 which overlap the side walls 27 and 28, while the front plate 36 is provided with laterally turned overlapping side flanges 43 which also overlap said side walls. Thus the front plate and top may be snugly but easily engaged and sprung into locked contact with the fixed parts of the casing. Preferably a transparent window 45 of glass, plastic or the like is provided in the front wall 36

so as to display the lotion bottle 10 and its label and contents.

The means for supporting the liquid reservoir or cylinder 12 at the desired level comprises a horizontal platform or partition 48 which is spaced above the bottom plate 30 a substantial distance and is fixed to the side walls 27 and 28 as by screw bolts 49 engaging vertical flanges on said plate 48. The forward edge 50 of said plate is upturned and spaced inwardly from the front cover 36 as shown in Fig. 1. The cylinder 12 rests horizontally on the partition plate 48, being preferably welded thereto.

The bottle 10 is removably supported with respect to the cylinder 12 so as to communicate therewith and feed its contents thereinto. For this purpose, the upper central portion of the cylinder is provided with a circular opening 51 through which the neck 52 of the bottle can pass. The bottle is supported vertically with respect to said opening 50 by means of a rubber or other cushioned gasket 54 which is recessed to rest upon the upper edge of a cylindrical column 56 which rises from the top of the opening 51 and has the same interior diameter as said opening. The upper part of said gasket 54 is also recessed at 58 to receive and support the enlarged shoulder 60 of the bottle. A suitable vent 61 for the admission of air is provided in the cylinder 56 as shown. Thus it will be clear that the bottle can be securely but removably set in inverted position with respect to the cylinder 12 and will therefore normally keep the same filled by gravity flow.

In accordance with the invention, means are provided for forcing or ejecting measured quantities of fluid from the interior of dispensing cylinder 16, which forms a chamber normally charged with liquid from cylinder 12 by means of the intercommunicating port 14. As embodied, the ejecting means comprises a plunger or piston having a central actuating rod 62, the lower end of which is provided with an enlarged head 63 above which is mounted a fluid-tight gasket or piston head 64. Said gasket bears tightly against the inner smooth walls of the cylinder 16 and lies against the bottom face of a tubular metal cylinder 66 which closely but slidably fits the interior cylinder 16 and surrounds the plunger rod 62. An upper sealing gasket 67 is seated on the upper face of cylinder 66 and is held in tight contact with same by means of a nut 68 which engages the threaded portion 69 of rod 62. The upper end of cylinder 16 is closed by a centrally bored plug 70 fixed thereto by tap screw 71, the central bore of said plug providing ample clearance for sliding movement of the piston rod 62.

Means are provided for controlling the sliding motion of the plunger with respect to the fixed cylinder 16. Said means comprises a helical spring 72, the lower end of which rests on the top of plug 70, and the upper end engages the lower surface of an adjustable bracket 74 which is apertured to engage the upper portion of rod 62 and is fixed in adjusted position thereon by set screw 75. It will be understood that said spring connection acts normally to urge the plunger to its uppermost stroke limit, that is, to the position shown in Fig. 1. Means for controlling the length of the downward stroke and for regulating the same comprises adjustment screw 77 which threadingly engages a suitable bore in the extended portion 78 of bracket 74. On the down stroke of the plunger the bottom end of screw 77 comes in contact with the top surface of plug 70 and it will be understood that the length of said stroke may be regulated within the limits of said adjusting screw 77.

The invention contemplates employment of any suitable manually-actuated means for operating the piston plunger 18. For this purpose there is conventionally shown an operating lever 80, one end of which projects through a suitable slot in the side wall 27 of the cabinet and is provided with an operating knob 81. The other or fixed end 82 of said lever is pivotally connected by pin 83 to bracket 84 on the opposite side wall 28 of the cabinet and engages the upper end of rod 62 by a suitable pin and slot connection 85 as shown. It will be understood that downward stroke of the lever 80 to the lower position shown in Fig. 3 will cause the piston 18 and its associated parts to travel downwardly within the cylinder 16 to the limit of stroke permitted by the adjusting screw 77 and that said lever, plunger and associated parts will return to the original position upon release.

It will be understood that the invention contemplates the use of suitable coin-controlled means for releasing the lever 80 for actuation upon deposit of a coin in the controlling mechanism (not shown). Also suitable means (not shown) will be provided for insuring a full return stroke of the piston and lever and a locking thereof in the uppermost position so that a second down stroke cannot be made in whole or in part until a second coin has been deposited. These devices constitute no portion of the invention here claimed and for purposes of the present disclosure may be regarded as conventional.

Referring now to those features of the invention related to the actuation of the ball valve and ejection of a supply of lotion through the opening 20, it will be clear from the drawings that the ball 22 normally rests by gravity in its seat, sealing the opening 20 from above. In accordance with the invention it is desired to displace the ball from its seat when the plunger 18 has reached a point in its downward stroke at which ejecting pressure may be exerted on the liquid in cylinder 16. For this purpose means are provided whereby the downward movement of plunger 18 will cause ball 22 to be displaced from its seat at the desired point and to maintain said displacement while ejecting pressure is being exerted on the liquid in the cylinder. For this purpose a ball-displacing member 90, comprising an upper horizontal arm 91 is fixed to the lower end of piston rod 62 being apertured and engaging the end of said rod between the head 63 and the bottom gasket 64. The vertically-disposed portion 90 of said ball-displacing member extends downwardly along the inner wall of the cylinder 16 and the inner lower end thereof is bevelled at 92 to form a cam to engage and displace the ball from its closed position (Fig. 1) to the fully opened position (Fig. 2).

It will be understood that as soon as the end 92 of the member 90 comes in contact with the ball, the valve begins to open and liquid ejected from the opening 20. The parts are so positioned with relation to each other that the displacement of the ball begins to take place just as the lower face of the piston gasket 64 passes the flat bottom edge 15 of the port 14. As soon as this point is reached in the downward travel of the piston, communication between the bottle 10 and reservoir 12 and the lower part of cylinder 16 is cut off so that the full downward hydraulic pressure of the piston is exerted on that column of liquid chambered below the lip 15 of the port 14. Thus

that measured column of liquid is forceably ejected through the bottom opening 20 of the cylinder chamber for as long a time as the downward stroke of the piston continues.

Further in accordance with the invention, any tendency of liquid to drip out of the opening 20 after the down stroke of the plunger is completed is automatically prevented. That is, the upward stroke of the plunger through the chamber constituting the lower portion of cylinder 16 before the gasket 64 clears the lip 15 exerts an upward suction action on said chamber. This suction effect serves to draw up into the cylinder any residual liquid in the discharge opening 20 and duct 21 which may remain therein after the forced ejection on the down stroke. During this upward suction stroke the ball 22 remains displaced from the opening 20 because the displacing member 90 is in contact with the ball and also because the suction tends to lift it from its seat. Consequently all drip and excess liquid about the opening 20 and duct 21 are cleared away on the return or suction stroke of the plunger. When the gasket 64 moves past the lip 15 of opening 14 the suction is broken; the ball rolls back by gravity into its seat sealing the opening 20 and liquid in the reservoir 12 fills the lower portion of cylinder 16 and re-establishes the condition illustrated in Fig. 1. The vent 61 adjacent the neck of the bottle maintains atmospheric pressure on the liquid in the reservoir 12 at all times.

The invention in its broader aspects is not limited to the specific mechanisms shown and described but departures may be made therefrom within the scope of the accompanying claims without departing from the principles of the invention and without sacrificing its chief advantages.

What I claim is:

1. A liquid dispenser including in combination a reservoir for holding liquid to be dispensed, a chamber communicating with the reservoir for receiving a measured quantity of liquid therefrom, a piston movable into the chamber for forcing liquid from the chamber, a liquid outlet from the chamber, a valve for normally closing said outlet, a member operated by movement of the piston into the chamber for opening the valve, said member acting to hold the valve open during a part of the return movement of the piston from the chamber, the valve being detached from the piston and movable relatively thereto, the piston and chamber being arranged to create suction within the chamber during said return stroke so as to retract partially expelled liquid from the outlet.

2. In a liquid dispensing apparatus, a liquid receiving chamber having an outlet, a gravity-operated valve normally closing said outlet, an ejector movable in said chamber to discharge liquid therefrom by hydraulic pressure and through said outlet when said valve is opened,

and means on said ejector to open said valve at the inception of movement of said ejector, said valve being movable relatively to the ejector in its opening and closing movements.

3. In a liquid dispensing apparatus, a liquid receiving chamber having an outlet, a ball valve normally closing said outlet, an ejector movable in said chamber to discharge liquid therefrom by hydraulic pressure and through said outlet when said valve is opened, means on said ejector normally out of contact with the ball valve but movable with the ejector to engage the ball to open said valve at the inception of movement of said ejector, and means for holding said valve open during a part of the return movement of the ejector.

4. In a liquid dispensing apparatus, a liquid receiving chamber having an outlet, a gravity-operated valve normally closing said outlet, an ejector movable in said chamber to discharge liquid therefrom by hydraulic pressure and through said outlet when said valve is opened, and a cam extending from one end of said ejector and engageable with said valve to open the same when said ejector is moved to discharge liquid from said chamber.

5. In an apparatus for dispensing hand lotion constituting a relatively viscous liquid, in combination, supply means for a quantity of lotion, a measuring chamber connected to the supply means, an outlet from the chamber wherethrough lotion can flow by gravity, a ball normally closing said outlet, a plunger movable into and out of the chamber for forcing a measured quantity of liquid through the outlet, a member connected to the plunger and movable to engage and displace the ball from the outlet upon discharging movement of the plunger, said member also engaging the ball and holding same away from the outlet during a portion of the return stroke of the plunger whereby suction created by said return stroke will act to draw liquid back through the outlet against gravity and prevent dripping thereof, said member being freed from contact with the ball during the final part of the withdrawing movement of the plunger to permit the ball to reseat at the outlet.

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