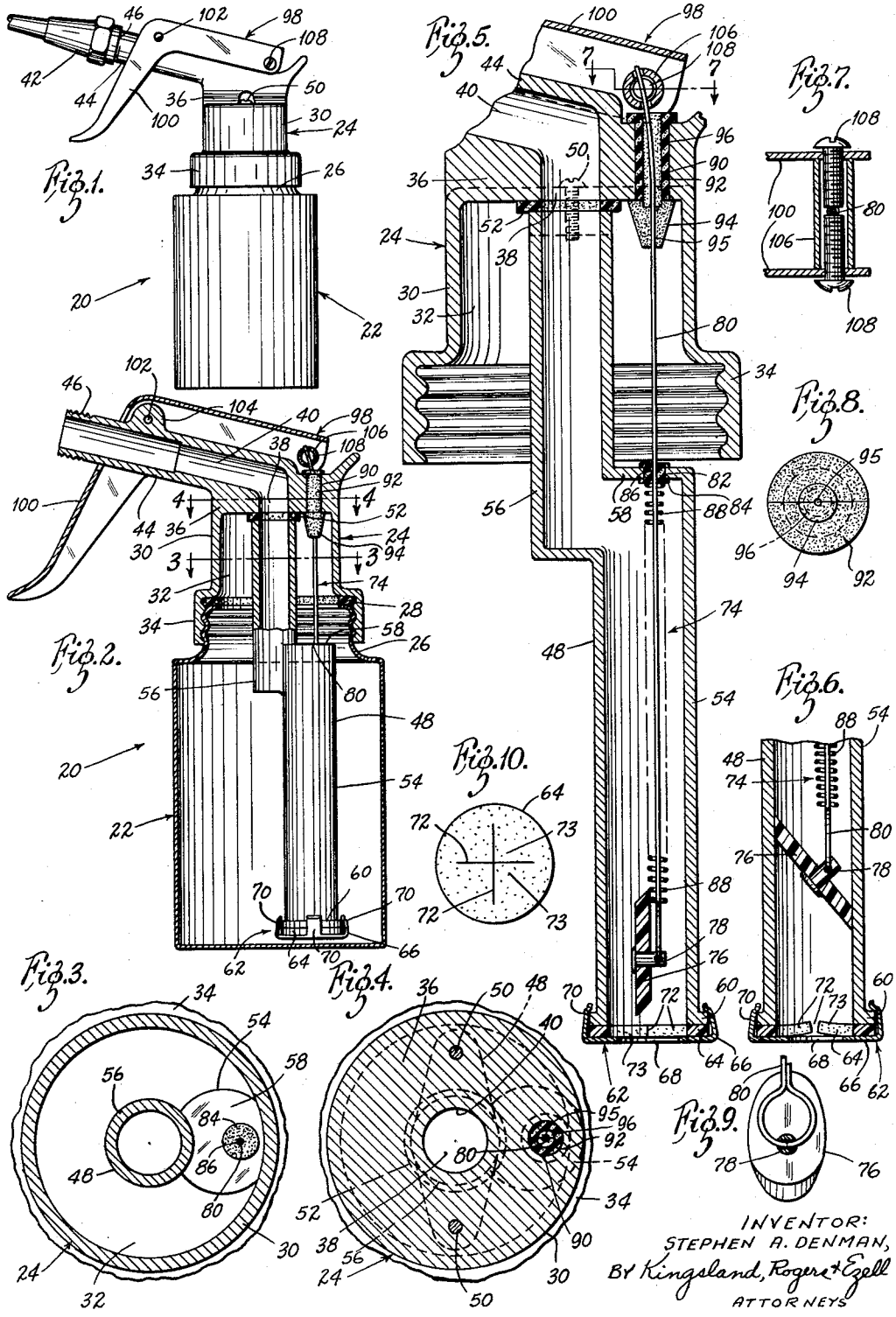
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DISPENSING DEVICE FOR RELATIVELY THICK LIQUIDS

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DISPENSING DEVICE FOR RELATIVELY THICK LIQUIDS

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Fig. 11.

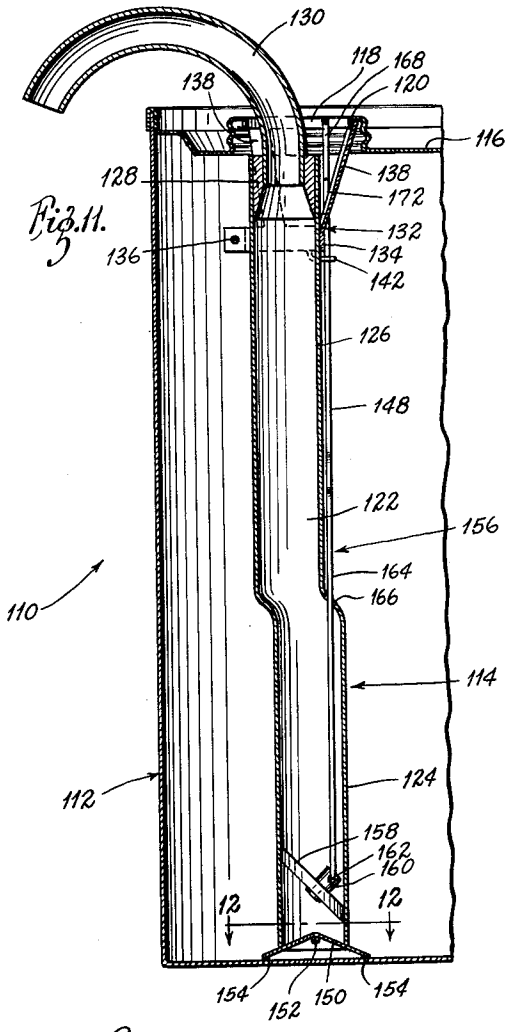


Fig. 13.

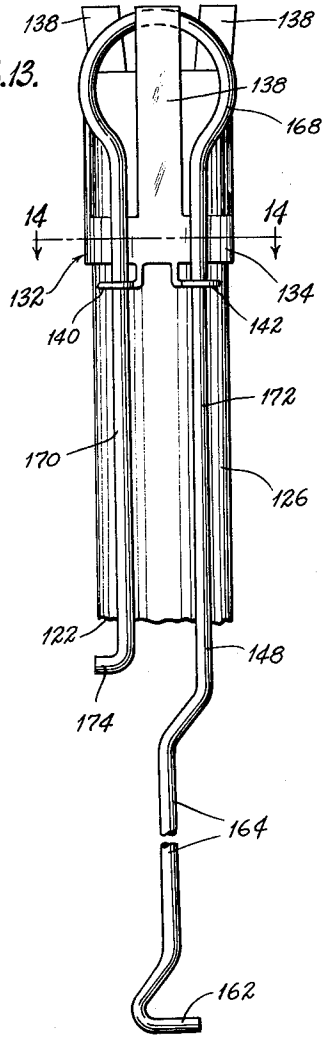


Fig. 12.

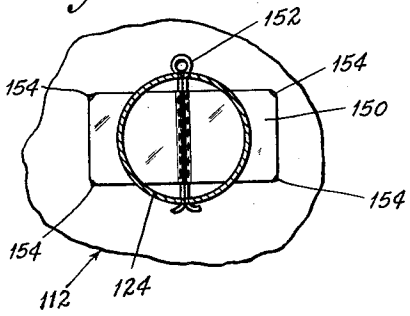
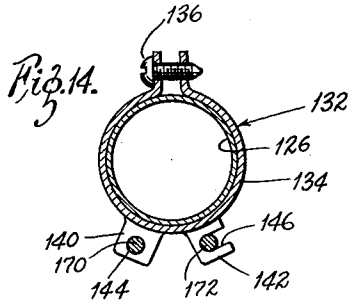


Fig. 14.



INVENTOR:
STEPHEN A. DENMAN,
BY Kingsland, Rogers & Ezell
ATTORNEYS

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DISPENSING DEVICE FOR RELATIVELY THICK LIQUIDS

Stephen A. Denman, Piqua, Ohio, assignor to Rubber-Seal Products Co., Inc., Dayton, Ohio, a corporation of Ohio

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9 Claims. (Cl. 222—341)

The present invention relates generally to liquid pumping devices, and more particularly to a hand-operated dispenser for viscous or sticky liquids.

Briefly, the invention contemplates a plunger type pump disposed in a can, or the like, which serves as a reservoir for the liquid to be dispensed. Conveniently operated either directly by hand or by a lever, the device may be screwed or otherwise attached so as to extend from the bottom of the can out the top opening thereof. The pump includes an offset lift tube which normally remains filled with the liquid and within which are incorporated the principal pumping elements. The reservoir in which the pump is disposed is not subjected to pressure, and the arrangement is generally such as to preclude the gumming-up of moving parts due to drying of the liquid thereon.

It is an object of the invention to provide a novel device for dispensing relatively thick liquid which utilizes a lift tube for enclosing the moving parts which are subjected to immersion in the liquid.

It is another object of the invention to provide a novel pump for handling relatively thick liquids which incorporates an offset lift tube in which essential movable parts are continuously immersed in liquid.

It is another object of the invention to provide a novel dispenser for relatively thick liquids in which the only seal subjected to positive pumping pressure is located inside the reservoir from which the liquid is pumped.

It is another object of the invention to provide a novel dispenser which incorporates an eccentrically supported movable pump disc adapted to serve both a pumping function and a valve function.

It is another object of the invention to provide a novel dispensing device for relatively thick liquids which includes a pumping assembly resiliently emplaced in a standard liquid container.

The foregoing, along with additional objects and advantages, will be apparent from the following description of a preferred embodiment of the device, as illustrated in the accompanying drawings, in which:

FIGURE 1 is a side elevation of a dispensing device conforming to the present invention, a portion of a discharge tube being broken off in order to conserve space on the drawing;

FIGURE 2 is a vertical section, partly in elevation, showing the device drawn to an enlarged scale and with the attaching means for the discharge spout also removed;

FIGURE 3 is an enlarged fragmentary section taken generally along the horizontal section line 3—3 of FIGURE 2;

FIGURE 4 is an enlarged fragmentary section taken generally along the horizontal section line 4—4 of FIGURE 2;

FIGURE 5 is a vertical section taken on a medial plane through a pumping assembly and drawn to a further enlarged scale;

FIGURE 6 is a fragmentary vertical section similar to the lower end of FIGURE 5, but showing the parts in moved position;

FIGURE 7 is a fragmentary horizontal section taken generally along the section line 7—7 of FIGURE 5;

FIGURE 8 is a top plan view of a removed liquid seal;

FIGURE 9 is a top plan view of a removed pump disc assembly;

FIGURE 10 is a top plan view of a removed inlet valve;

FIGURE 11 is a vertical section showing a modified pumping assembly resiliently retained in a standard liquid container shown fragmentarily;

FIGURE 12 is an enlarged fragmentary view taken generally along the horizontal section line 12—12 of FIGURE 11;

FIGURE 13 is a fragmentary side elevation showing the upper end of the modified pump assembly with its discharge spout removed; and

FIGURE 14 is a horizontal section taken generally along the line 14—14 of FIGURE 13.

Referring more particularly to the details of the drawings, a dispensing device designated generally by the numeral 20 comprises a reservoir 22 and a pumping assembly 24. As illustrated, the reservoir 22 may take the form of a simple can or jar having a threaded neck 26 upon which the pumping assembly 24 is removably mounted. A gasket 28 is provided as a seal against leakage at the threaded joint.

The pumping assembly 24 includes a main housing 30 formed, as by casting, to serve as a cover for the top opening of the reservoir 22. This housing 30 defines an internal cavity 32 which extends a substantial distance above an internally threaded enlargement 34 adapted to fit the neck of the reservoir. The cavity 32 terminates at an upper wall portion 36 having a central upper opening 38 which communicates via an angular passage 40 with a discharge tube assembly 42. As is clear from FIGURES 1 and 2, the passage 40 extends through a spout portion 44 integral with the cap portion of the housing 30 and having a threaded end 46 for accommodation of the conventional tube assembly 42.

A lift tube 48 formed to the offset configuration clearly illustrated in the drawing has its upper flanged end secured, as by screws 50, to the underneath side of the housing wall 36 in communication with the opening 38. A gasket 52 is employed to prevent leakage at this joint. The tube 48 includes a lower inlet extension 54 having a smooth cylindrical interior and an upper outlet extension 56 which serves both to space the lower extension 54 downwardly beyond the lower end of the housing 30 and at the same time to communicate the interior of the lower extension 54 with the opening 38 into the passage 40. The upper end of the lower extension 54 is defined by a horizontal wall portion 58 and the lower end is provided with an external flange 60.

A foot valve assembly 62 includes a valve disc 64 disposed flush against the lower end of the extension 54 and retained by a clip 66 having a central aperture 68 and spring-like fingers 70. The fingers 70 are formed for retentive engagement with the aforementioned flange 60.

The valve disc 64 is preferably constructed from flexible sheet material, such as polyethylene, for example. As best shown in FIGURE 10, crossed slits 72 are provided so as to define integral quadrants 73 in symmetry with the circular configuration of the disc 64. The slits 72 extend somewhat less than the full diameter of the disc 64, and, from FIGURES 5 and 6, it will be seen that the actual length of the slits 72 is approximately equal to the internal diameter of the tube extension 54. From the latter figures also, it will be observed that the diameter of the aperture 68 in the clip 66 is less than the inside diameter of the extension 54 and, hence, less than the length of the slits 72.

The pump assembly 24 incorporates a movable lift assembly 74 which extends substantially the full vertical length of the device 20. The assembly 74 includes a lift disc 76, shown removed in FIGURE 9, and being formed

actually more to an oval than to circular shape. The oval shape of the member 76 is such, and the peripheral edge of this member is so formed, that a flush peripheral engagement is made with the interior of the extension tube 54 when the member 76 is disposed in the angular position illustrated in FIGURE 6. The disc member 76 is preferably constructed of material, such as nylon, for example, which may have smooth sliding nonbinding engagement with the tube interior while in this angled position.

The lift disc 76 is provided with an attachment 78 which is eccentric with respect to the disc portion, being offset in the elongated direction of the oval configuration of the member 76. The lower end of a lift rod or wire 80 is secured to the connecting member 78 so that, as is clear from FIGURES 5 and 6, the weight of the lift disc 76, or any upward pull on the rod 80 tends to cause the member 76 to occupy the position illustrated in FIGURE 6.

The lift rod 80 extends upwardly within the tube extension 54 parallel with the axis of this tube and passes through an aperture 82 formed in the wall portion 58. A grommet 84 lines the aperture 82 and is provided with a passage which fits snugly around the rod 80 to form a sliding seal. A compression spring 88 is disposed on that portion of the rod 80 within the lower tube extension 54 and acts between the stationary wall 58 and the lower looped end of the rod 80 to bias the latter in a downward direction.

Above the horizontal wall 58, the rod 80 extends upwardly parallel to, but outside of, the upper tube extension 56 and passes through the wall 36 of the housing 30. A passage 90 in the wall 36 is provided with an elongated grommet 92, shown removed in FIGURE 8, which is generally sleeve-like, but which has a depending conical portion 94 which is split vertically into separate halves. This split portion 94 is provided with a passage 95 which is smaller in diameter than the rod 80, but which accommodates the latter member through slight separation of the halves. The portion of the member 92 above the conical portion 94 has an enlarged passage 96.

The upper end of the rod 80 is secured to a trigger assembly 98 which includes a trigger 100 pivoted by means of a pin 102 to a lug portion 104 integral with the spout 44 of the housing 30. The trigger, formed generally as illustrated, has a U-shaped after portion which accommodates a sleeve 106 drilled to receive the rod 80 as illustrated in FIGURES 5 and 7. A pair of screws 108 inserted from opposite sides of the trigger 100 into opposite ends of the sleeve 106 serve to secure the rod 80 in appropriate adjusted position.

In using the device 20 to dispense a relatively thick liquid contained in the reservoir 22, the pumping assembly 24 is of course mounted in place with at least a portion of the lower extension tube 54 immersed in the liquid. An operator may then grasp the housing assembly 30 in one hand in a manner to engage the trigger 100 with the fingers, whereupon back and forth pivotal movement of the trigger 100 will be effective to pump liquid from within the reservoir 22 upwardly through the lift tube 48, the passage 40, and the discharge tube assembly 42.

As is clear from the drawing, a counterclockwise pivotal movement of the trigger 100 will cause the lift rod 80 to be moved upwardly against the biasing action of the spring 88 and to carry along with it the lift disc 76. Due to the eccentric attachment of the rod 80 to the disc 76, the latter takes the position illustrated in FIGURE 6 so as to make snug peripheral engagement with the interior of the tube extension 54. Thus, upward movement of this disc 76 tends to create a vacuum in the portion of the tube extension 54 therebelow and the liquid is drawn in through the lower end of the tube past the inlet valve 64. By virtue of the flexibility of the material of the valve 64, the quadrants 73 defined by the slits 72 are enabled to open slightly, as illustrated in FIGURE 6, for this influx of liquid.

Upon release of the trigger 100, the spring 88 is effective to return all of the parts to the original position shown in FIGURES 1, 2 and 5 of the drawing, and this reverse or downward movement of the rod 80, along with the resistance offered by the liquid on the underneath side of the lift disc 76, is effective to pivot the latter to the position shown in FIGURE 5. At the same time, the weight of the liquid above the foot valve 64 causes the quadrants 73 to close and the valve 64 thus to retain the liquid thereabove. As is clear from FIGURE 5, the valve is prevented from opening in a reverse or downward direction by the lower disc portion of the clip 66 which extends inwardly beyond the outer ends of the slits 72 to provide support for the quadrants 73.

Clearly, a subsequent oscillation of the trigger 100 will be effective to draw in more of the liquid into the lift tube 48, so that, eventually, the liquid will completely fill the tube 48 and the outlet passage 40 in the housing 30. Then, upon still further actuation of the trigger 100, the liquid will be discharged from the discharge tube assembly 42 during each counterclockwise oscillation of the trigger 100. The upward movement of the lift disc 76, in addition to drawing in liquid from below, lifts the liquid thereabove to effect the desired upward flow. The downward movement of this disc 76 in the vertical position of FIGURE 5 is effected without causing downward flow in the device. Thus, the disc 76 serves as its own valve and, in cooperation with the foot valve 64, produces the desired flow of liquid.

Attention is directed to the fact that the flexible valve 64, the disc member 76, the spring 88, and the lower end of the rod 80 are at all times completely immersed in the liquid retained in the lift tube 48. Furthermore, due to the snug fit of the rod 80 within the aperture 86 of the grommet 84, the portion of the rod 80 which is withdrawn upwardly from the interior of the tube 48 is wiped free of liquid. This, plus the fact that the wall 58 through which the rod 80 passes is disposed adjacent the lower opening of the housing 30, or, in other words, at a point adjacent the top opening of the container 22 and above the normal liquid level in the latter, tends to keep that portion of the rod 80 between the wall 58 of the lift tube 48 and the top wall 36 of the housing 30 normally free of liquid coating. Thus, there is little chance for the liquid to dry on this portion of the rod 80 and thereby interfere with the described operation of the device 20.

In line with the foregoing, it will be noted that the direction of offset of the lower tube extension 54 from the upper tube extension 56 is rearwardly of the extended spout portion 46, so that any forward tipping of the device 20 in use will cause the liquid to flow away from, rather than toward, the upper surfaces of the wall 58, gromet 84, and the rod 80 extending thereabove.

When the liquid from the container 22 is inadvertently splashed or otherwise caused to coat the exposed upper portion of the rod 80, it is wiped off by the split portion 94 of the upper grommet 92, as well as by the aforementioned grommet 84. Hence, although the previously mentioned location of the wall 58 high in the container 22 is in general a preferred construction, it is to be understood that in certain circumstances the wall 58 will be well below the normal liquid level in the reservoir 22. In this connection, it is evident that, where desired, a simple spacer tube may be employed between the upper end of the offset lift tube 48 and the opening 38 in the housing 30 to adapt the device 20 for use with reservoirs having greater depth than that exemplified by the illustrated container 22.

FIGURES 11 through 14 illustrate a modified dispensing device, designated generally by the numeral 110, which comprises a reservoir 112 in cooperation with a

pumping assembly **114**. While the container **112** here illustrated takes the form of a standard five gallon pail or drum, it will be obvious that reservoirs of other sizes and shapes may be substituted therefor. Preferably, however, the reservoir is provided with a cover such as **116** having a top opening **118** defined by an inturned annular flange **120**.

The pumping assembly **114** comprises a lift tube **122** which may be formed from a single length of tubing to provide a lower inlet extension **124** offset from an upper outlet extension **126**. The uppermost end of the lift tube **122** is fitted with a thimble-like adapter **128** which is slidable in the tube **122** and which secures a flexible discharge tube **130** through which the liquid is dispensed as will appear. When not in use, the discharge tube may be telescoped into the lift tube **122**.

An upper retainer **132** includes a band portion **134** similar to a C-clamp which encircles an upper portion of the lift tube **122** and is secured in place by a self-tapping screw **136**. Preferably, the retainer **132** is constructed from resilient metal, and three finger-like extensions **138** integral with the band portion **134** extend upwardly and outwardly for engagement of their free ends with the aforementioned flanged opening **118**. A pair of guide tabs **140** and **142** extend downwardly and outwardly from the band portion **134**. The tab **140** is provided with a hole **144** and the tab **142** is provided with a slot **146** for guiding engagement with a lift rod **148**.

The lowermost end of the lift tube **122** is provided with a spring lock **150** formed from a leaf of resilient spring metal. The member **150** comprises a rectangular strip of metal having a width somewhat less than the diameter of the tube **122** and which is bent in the middle and secured in the lower tube opening by means of a cotter pin **152**. The four corners **154** of the leaf member are turned downwardly so as to make claw-like engagement with the bottom of the reservoir **112**.

The pump assembly **114** incorporates a movable lift assembly **156** comprising the aforementioned lift rod **148** and a lift disc **158** articulatively fastened to the lower end of the rod **148** by means of an attachment **160**. The lift disc **158** and its attachment **160** are similar in construction and configuration to the corresponding members **76** and **78** of the dispenser **20**.

The lift rod **148** comprises a lower hook portion **162** for engaging the fastener **160** and a straight vertical portion **164** immediately thereabove which extends upwardly within the lower tube section **124** to emerge through a hole **166** at the offset in the lift tube **122**. Above the portion **164**, the rod **48** is conveniently formed as clearly illustrated in FIGURE 13 to provide an upper finger loop **168**, along with parallel guide portions **170** and **172** which slidably engage the previously described guide tabs **140** and **142** of the upper retainer **132**. Preferably, the length of the guide portions **170** and **172** is sufficient to enable the lift disk **158** to be moved over substantially the full length of the lower tube section **124**. A bent end **174** is provided, however, at the lower end of the portion **170** to limit the upward movement of the assembly **156** so that the disk **158** will not bind at the offset.

The device **110** operates in a manner generally similar to that of the previously described device **20**. The upper retainer **132** is adjusted to a position wherein, with the finger portions **138** engaged beneath a flange such as **120**, the lock spring **150** is resiliently engaged with the bottom of the associated reservoir **112**. The downturned corners **154** of the member **150** are thus pressed into place so to retain the pump assembly **114** in secure position within the reservoir. The discharge tube **130** may then be withdrawn from its telescoped position within the upper tube section **126** and directed as desired for discharge of a liquid therefrom. The pumping assembly **114** is operated by engaging the finger loop **168** with the fingers and operating the lift assembly **156** up and down. The restricted opening at the lower end of the inlet tube section **124** of the lift tube **122** serves a checking function with relatively thick liquids, enabling the liquid to be sucked into the lower end of the tube **122** upon upward movement of the disk **158** and retaining the liquid against rapid flow back out of the tube while the disk **158** is returned downwardly.

Clearly, there have been provided dispensing devices for handling relatively thick liquids which fulfill the objects and advantages sought therefor.

It is to be understood that the foregoing description and the accompanying drawings have been given only by way of illustration and example. It is also to be understood that rearrangement of elements, substitution of parts, and changes in form of the elements, all of which will be obvious to those skilled in the art, are contemplated as being within the scope of the present invention, which is limited only by the claims which follow.

What is claimed is:

1. In a device for dispensing relatively thick liquids, a vertically elongated pump comprising, in combination, a vertical lift tube including an upper portion and a lower portion in laterally offset relation, the bottom of said upper portion being connected to the top of said lower portion by a passage defining said offset relation, lift means including automatic valve means disposed for reciprocation in said lower portion, rod means connected to said lift means and extending upwardly within said lower portion to the top thereof and beyond said lower portion externally of the upper portion, discharge tube means connected to the uppermost end of the lift tube, and means restricting the lowermost end of the lift tube, the lift means comprising a lift disc in the general form of a plate formed to oval shape, the peripheral edge of the disc being in part beveled for flush engagement with the interior of the lower portion of the lift tube when the disc is disposed at an angle within the tube, the automatic valve means comprising an articulated eccentric connection between the lift disc and the rod means.

2. The combination of claim 1 plus spring means disposed within the lower portion of the lift tube for biasing the rod means downwardly, said spring means engaging the rod means above and free of the eccentrically connected lift disc.

3. The combination of claim 1 wherein the means restricting the lowermost end of the lift tube comprises check valve means including a plate-like disc of flexible material.

4. In a device for dispensing relatively thick liquids, a vertically elongated pump comprising, in combination, a vertical lift tube including an upper portion and a lower portion in laterally offset relation, the upper end of the lower portion being connected to the lower end of the upper portion by a passage including an upper wall, said upper wall having a hole therethrough, lift means including automatic valve, means disposed for reciprocation in said lower portion, rod means connected to said lift means and extending upwardly within said lower portion to the top thereof and beyond said lower portion through the hole in said wall externally of the upper portion, discharge tube means connected to the uppermost end of the lift tube, and check valve means restricting the lowermost end of the lift tube, the check valve means comprising a plate-like disc of flexible material having crossed slits centrally thereof to define a plurality of deflectable tabs, and retaining means for securing said disc to the end of the lift tube, said retaining means including a plate-like portion having a central perforation underlying the disc, said perforation having a diameter less than the length of said slits.

5. The combination of claim 4 including a split grommet lining said hole, said grommet being provided with a passage adapted to make snug sliding contact with the rod means, the parts of said split grommet being separable during the sliding action of said rod means.

6. The combination of claim 4 wherein the top end of the lift tube is secured to a cap-like housing provided with a passage for discharge of liquid and provided with a hole for accommodation of the rod means, and wiping means associated with said hole for removing liquid which may adhere to the rod means.

7. The combination of claim 6 including means for reciprocating the rod means and wherein the length of reciprocation of the rod means is less than the distance between the split grommet and the wiping means.

8. The combination of claim 7 wherein the discharge tube means is flexible and has a sliding connection with the lift tube so as to permit its being selectively telescoped therewithin.

9. The combination of claim 8 wherein the pump terminates at its upper end in a retainer element adapted to cooperate with a flanged opening in a standard container, and wherein the rod means terminates in an upper finger ring which can be disposed below the retainer element so that the container may be closed with the pump remaining therein.

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