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IMPROVED DISPENSER DELIVERING CHAMBER

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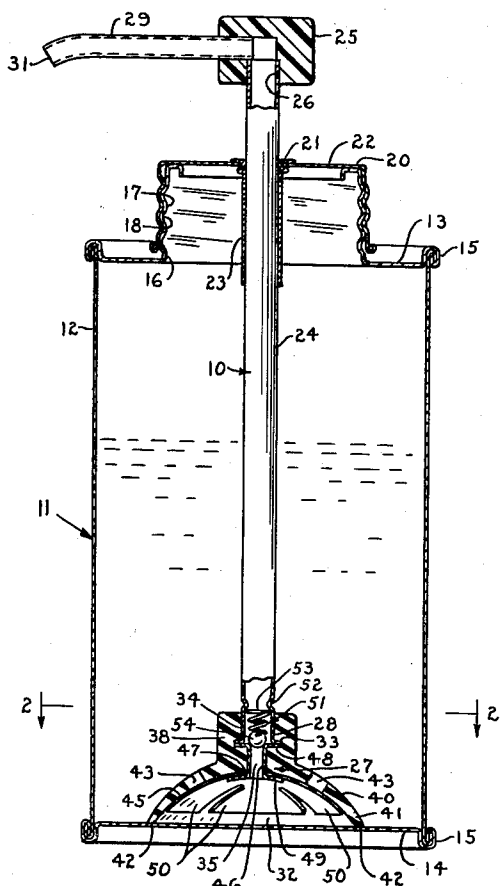


Fig. 1

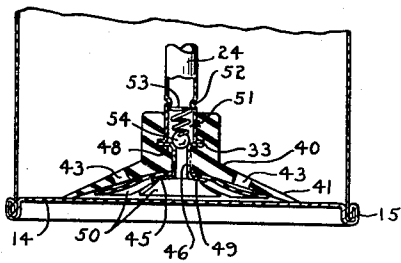


Fig. 4

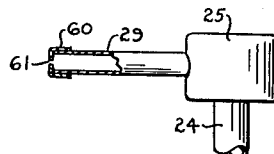


Fig. 5

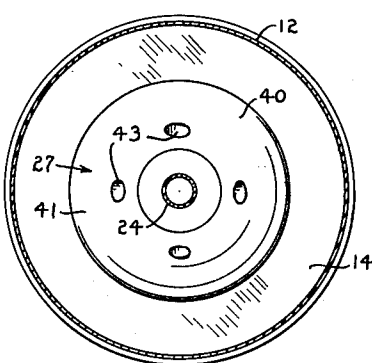


Fig. 2

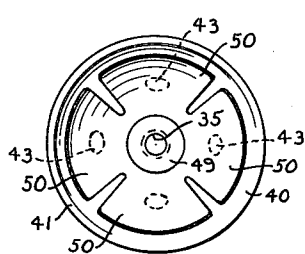


Fig. 3

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IMPROVED DISPENSER DELIVERING CHAMBER

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10 Claims. (Cl. 222—320)

This invention relates to dispensing devices and has more particular reference to dispensers for spraying or dispensing fluid-type materials.

Present-day dispensers for the above purposes generally are classified as either one of two different types. The first type comprises a container of material which is maintained under pressure whereby the contained material is ejected upon actuation of an outlet valve. The other type comprises a container of material which is provided with a pump on the discharge element whereby depressing the discharge element will operate the pump and eject the material. Both of these common types of present-day dispensers have some serious limitations.

For instance, the pressurized dispensing of material is relatively expensive. The cost of the pressure-proof containers, together with the expense involved in providing sufficient pressurizing material so as to be reasonably certain that all the usable material is dispensed before the pressure in the container is lost, is high. In addition, certain materials to be dispensed are not susceptible of use with a pressure-type container.

Additional precautions must be effectuated to safeguard the ultimate user against any explosive rupturing of the container caused by defective containers, by accidentally puncturing the container, or by exposure to extreme temperature conditions.

The other type of present-day dispensers referred to above, namely those employing movable outlet elements for actuating a metal pump within the container, likewise have many serious disadvantages and limitations. In the first place the pumps, in order to be usable for the anticipated life of the container, are comparatively expensive and are subject to deterioration by the reaction with the active ingredients in the various materials sought to be dispensed. The passages in the pump become fouled or otherwise obstructed whereupon further dispensing from the container is impossible. The various metal parts in the pump become worn and start to corrode in such a way as to contaminate the material stored in the container.

It is, therefore, a principal object of this invention to provide an improved dispenser that will overcome all of the above-noted disadvantages of the prior art.

Another object of this invention is to provide an improved dispenser having relatively few movable metal parts.

Still another object of this invention is to provide an improved dispenser having parts that will not corrode and contaminate the material being dispensed.

It is another object of this invention to provide an improved dispenser that can be easily inserted into a container for immediate use without requiring special tools and special adjustments.

And still another object of this invention is to provide an improved dispenser which can be used for dispensing fluid materials in a heavy flow or in an atomized state.

A further object of this invention is to provide an improved dispenser having simple one-way valves that are positive in operation and yet relatively inexpensive to construct and install in the pump structure.

And a still further object of this invention is to provide an improved dispenser having a substantial part thereof formed of a simple molded piece which can be readily assembled with the remaining simple parts of the dispenser for use.

Still another object of this invention is to provide an

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improved dispenser that is simple in construction, efficient in operation, dependable in use, of substantially long-life duration, and adapted to be assembled by semiskilled or unskilled workers.

Specifically, it is an object of this invention to provide a dispensing device of the character described having an elongate discharge passage extending into the container body and connected to a novel pump arrangement, which when depressed will positively eject a substantially uniform quantity of material for immediate point-of-application use.

Prevalent forms of fluid dispensers in the general class are so costly to produce that they make the individual package too costly to be readily marketable. One purpose of this invention is to provide a dispenser which performs satisfactorily and which has such low cost of production that it can reasonably be thrown away with the container when the container has become empty. Where dispensers are intended and adapted to be transferred from one container to another, additional cost of producing the dispenser must be incurred to give the dispenser sufficient life to make repeated transfer from one container to another practicable. It has been determined that users commonly prefer the convenience of disposing of both the dispenser and container at the time the container becomes empty—thus saving the time and avoiding the trouble involved in transferring a used dispenser to a new container.

Other objects and advantages of the invention will become apparent after the description hereinafter set forth is considered in conjunction with the drawing annexed hereto.

In the drawing:

FIGURE 1 is a side elevational view of a dispenser embodying the principles of this invention and having portions broken away and shown in section;

FIGURE 2 is a cross-sectional view taken along the line 2—2 of FIGURE 1;

FIGURE 3 is a bottom view of the inner portion of the pump element of FIGURE 1;

FIGURE 4 is a partial elevational view similar to FIGURE 1 showing the pump element in partially collapsed condition; and

FIGURE 5 is an elevational view of a modified nozzle arrangement showing an orifice attachment on the end thereof.

Referring more particularly to the accompanying drawing in which like numerals indicate like parts, the numeral 10 generally designates the dispenser of this invention. In the present case, the dispenser is shown connected to a container which comprises an elongate cylindrically shaped hollow body 12, formed of metal or other suitable material, having a top wall 13 and a bottom wall 14 attached to the opposite ends thereof by means of sealing beads 15. The top 13 has a centrally formed outlet opening 16 surrounded by a transversely disposed sleeve 17 which has threads 18 formed in the outer surface thereof. During shipment of the container filled with material, the opening is sealed by a screw-on cap (not shown) which is removed and discarded when the dispenser of the present invention is ready to be inserted into the container. The container may contain fluid materials ranging in viscosity from very volatile types, such as ether or the like, to somewhat viscid or heavy fluids, such as grease, heavy oils, creams or the like.

Screwed onto the threads 18 of the top 13 is a closure cap 20 which has an opening 21 formed through its flat end 22 into which one end of a guide sleeve 23 is crimped or otherwise fastened. Slidably passing through the guide sleeve 23 is an actuator or dispensing tube 24 which has an actuator button 25 attached at one end portion 26

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outside of the container and has a resilient collapsible pump 27 attached at the other end portion 28 within the container. A discharge nozzle 29 is fastened in an opening in the side of the button 25 so that a common passageway is formed which extends from the discharge end 31 of the nozzle 29 back into a trap chamber 32 in the pump 27.

The dispensing tube 24 is flared or flanged outwardly at its lower end portion 28 so as to extend into a groove 33 formed in the wall 34 of the opening 35 extending through a head portion 38 of a resilient collapsible pump element or bulb 40. The pump element 40 comprises the head 38 and a spherically shaped depending side wall or rim 41 which has an outer edge 42 lying substantially in a single plane. The edge 42 is adapted to engage with the bottom wall 14 in such a way as to substantially seal the trap chamber 32 from the contents of the container about the edge 42. The pump element 40 is adapted to be made of any suitable material such as rubber, neoprene, or the like.

Openings 43 extend through the spherically shaped walls 41 of the pump element 40 at various locations about the surface of the sphere. The number of openings 43 may vary from one on up, depending upon the calculated flow required of the pump 27. A one-way valve or flapper 45 is comprised of a sheet of material having resilient characteristics. The valve 45 is molded or otherwise shaped so as to substantially conform to the inner surface of the spherically shaped part of the pump element 40. The leaf valve 45 is attached to the inner portion of the pump element 40 by means of a metal eyelet 46 passing through an aperture 47 in the central area of the valve. The eyelet 46 is seated in the opening 35 in the head 38 of the pump element 40 with one flange 48 extending into the groove 33 in juxtaposed relationship with respect to the flange on the dispensing tube 24. Another flange 49 on the other end of the eyelet 46 bears against the inner surface of the valve 45 to seal the valve to the pump element 40. The leaf valve 45 is divided into a plurality of sealing tongues or portions 50 which lie in overlapping relation with respect to the openings 43 in the bulb 40, so as to selectively seal the contents of the container from the trap chamber 32 on the inside of the pump 27. The portions 50 of the leaf valve 45 permit flow of material from the container through the openings 43 into the trap chamber 32 within the confines of the bulb 40, but will prevent flow of material from the trap chamber 32 back through the openings 43 into the container.

A one-way ball valve 51 is positioned in the dispensing tube 24 in the general vicinity of the head 38 of the bulb 40. The valve 51 is comprised of a compression spring 53 which has one end urged against a crimped portion 52 in the dispensing tube 24 and has the other end urged against a ball 54 for seating the ball 54 in the opening in the eyelet 46 in the base 38 of the bulb 40. The ball 54 and the cooperating portion of the eyelet 46 form a one-way valve such that material can flow from the trap chamber 32 into the dispensing tube 24. A reverse flow of material, namely that from the dispensing tube 24 into the trap chamber 32, is prevented by the ball 54.

The planar face or edge 42 of the spherically shaped wall 41 of the bulb 40 is adapted to be seated against the bottom 14 of the container 11, whereupon downward pressure on the button 25 will flatten the resiliently collapsible bulb 40 and force any material in the confined portion or trap chamber 32 of the bulb 40 to flow past the valve 51 into the dispensing tube 24. Release of the button 25 will permit the resiliency of the collapsed bulb 40 to return the bulb 40 to the distended condition illustrated in FIGURE 1 by drawing material from the container through the openings 43 past the unseated leaf valve 45, such as illustrated in FIGURE 4, so as to substantially fill the trap chamber 32 with material from the container. Subsequent pressing on the button 25 will seat

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the leaf valve 45 over the openings 43 and, when sufficient pressure is developed in the trap chamber 32 of the bulb 40, the material in the trap chamber will unseat the valve 51 and permit the flow of the material into the dispensing tube 24 and out the discharge nozzle 29. Repeated strokes of the dispensing tube 24 will continue the flow of material until the desired quantity has been dispensed.

The fit between the threads 18 on the cap 20 and container 11 and between the sleeve 23 and the tube 24 of the dispenser can be made such that sufficient venting of the inside of the container will be produced. However, if additional venting is desired, a vent port (not shown) can be provided in the container or cap. The vent port may be covered by a one-way valve which permits air to flow into the container only when a reduced pressure is created within the container, all within standard venting practices.

When it is desired to dispense a fluid in a very fine spray or thin stream, the modification illustrated in FIGURE 5 can be effected; that is, a cap 60 can be secured on the outer end portion 31 of the discharge nozzle 29 such that the material being dispensed will be forced to flow through one or more restrictive orifices 61 formed in the cap 60. The smaller the orifice 61 the finer will be the stream or spray of material being dispensed. The remaining portion of the dispenser, as used with the cap 60 of FIGURE 5, is the same as that illustrated in FIGURES 1 through 4 whereupon repeated strokes of the dispensing tube 24 will supply material to the nozzle for dispensing.

Having thus described my invention, it is obvious that various modifications may be made in the same without departing from the spirit of the invention; and, therefore, I do not wish to be understood as limiting myself to the exact form, construction, arrangement and combination of parts herein shown and described.

I claim:

1. A dispensing device for replacing the cap of a liquid container comprising a substitute cap having an opening in the end wall thereof, a hollow stem slidably fitted in said opening and being of a length generally corresponding to the height of said container, a cup-shaped diaphragm of resilient elastomeric material, the crown of said diaphragm being connected to the lower end of said stem and having a passageway communicating with the interior of said stem and the peripheral edge of said diaphragm being in laterally unrestrained direct contact with a wall of said container, and valving means associated with said diaphragm, said means comprising a plurality of radially disposed holes through the diaphragm wall intermediate the crown and peripheral edge thereof, and an annular member attached to the crown of the diaphragm cavity and having radially extending resilient sealing tongues adjacent the openings permitting directional flow of material into the cavity of the diaphragm.

2. A dispensing attachment for a fluid container comprising a guide device for attachment to the walls of an opening in said container, a tubular member slidably fitted in said guide device, the inner end of said tubular member being formed with an outwardly extending rim, a resilient member defining a collapsible chamber, said member having a tubular connector portion extending outwardly from its center area, the interior of said connector portion being formed intermediate the ends thereof with a circumferential cavity receiving therein said rim of said tubular member, and an eyelet element arranged in the lower end of said connector portion and having one end flange received in said cavity and the other end flange engaging the inner wall of said resilient member, the wall of the collapsible chamber having a plurality of radially disposed openings thereto and valve means of annular form received between the end flange and the chamber wall having radially disposed tongues each lying adja-

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cent a chamber opening thereby defining a check valve permitting flow into the cavity.

3. A dispensing attachment for a container comprising a guide device for attachment to the walls of an opening in said container, a tubular member slidably fitted in said guide device, the inner end of said tubular member being formed with an outwardly extending rim, a resilient member defining a collapsible chamber, said member having a tubular connector portion extending outwardly from its center area, the interior of said connector portion being formed intermediate the ends thereof with a circumferential slit receiving therein said rim of said tubular member, an eyelet element arranged in the lower end of said connector portion and having one end flange thereof received in said slit and the other end flange thereof engaging the inner wall of said resilient member, the inner diameter of said eyelet being less than that of said tubular member and providing a valve seat at said one end, a valve element, and spring means biasing said valve element against said seat, the wall of the collapsible chamber having a plurality of radially disposed openings thereto and valve means of annular form received between the end flange and the chamber wall having radially disposed tongues each lying adjacent a chamber opening thereby defining a check valve permitting flow into the cavity.

4. A dispensing attachment for a fluid container comprising a guide device for attachment to the walls of an opening in said container, a tubular member slidably fitted in said guide device, the inner end of said tubular member being formed with an outturned rim, a resilient dome member defining a collapsible chamber, said member having a tubular connector portion extending upwardly from its crown, the interior of said connector portion being formed intermediate the ends thereof with a circumferential slit receiving the rim of said tubular member therein, said dome member being formed with one or more inlet openings, resilient tongue means underlying said openings, said tongue means including an apertured fastening portion, and an eyelet element arranged in the lower end of said connector portion and having one flange end received in said slit, said eyelet passing through the aperture of said tongue means with its lower end flange clamping said tongue means against the inner wall of said dome member.

5. A dispenser for a container having a top detachably secured thereon comprising a nozzle, a tube communicating with said nozzle at one end and extending into said container, resiliently collapsible inverted cup means carried by said tube at the other end and defining a substantially hemispherical shaped cavity in communicating relation with the tube, said inverted cup means being disposed within said container with its rim in substantially sealed laterally unrestrained direct contact with one wall thereof, inlet means including at least one inlet opening formed in a wall of the cup means, valve means for the wall inlet comprising an annular member substantially conforming to the hemispherical cavity of the cup means and having radially extending resilient sealing tongues adjacent the wall inlet means to admit unidirectional flow of material from the container into said collapsible inverted cup means, and valve means in said tube to admit unidirectional flow of material from said collapsible inverted cup means into said tube whereby a downward axial force on said tube forces the rim of said inverted cup means radially outwardly along said container wall and tends to flatten out the collapsible inverted cup means to force material in the collapsible inverted cup means to pass the last-named valve means.

6. In a dispenser; a container, a top detachably secured on said container and having an outlet opening, a sleeve engaging with the walls of said opening and extending into said container, a tube slidably engaging with the inside of said sleeve for movement in an axial direction relative thereto, resiliently collapsible inverted cup means carried by said tube in communicating relation

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with the tube, said inverted cup means being disposed within said container with its rim in laterally unrestrained direct contact with one wall thereof and having openings therethrough between the rim thereof and the place of communication with said tube therewith, valve means of generally annular form disposed about the inside of the cup means and having radially extending resilient sealing tongues lying adjacent the openings to admit unidirectional flow of material from the container into said collapsible inverted cup means, and valve means in said tube to admit unidirectional flow of material from said collapsible inverted cup means into said tube whereby a downward axial force on said tube forces the rim of said inverted cup means radially outwardly along said container wall and tends to flatten out said collapsible inverted cup means to thereby dispense material into said tube.

7. In a dispenser for a container, a top detachably secured to the container and having an outlet opening, a sleeve engaging with the walls of the opening and extending into the container, a tube slidably received within the sleeve for movement in an axial direction relative thereto, resiliently collapsible inverted cup means having a crown and a rim carried by the tube at its crown and having an opening therethrough communicating with the tube, said inverted cup means being disposed within the container with its rim laterally unrestrained for resilient radial movement upon contact with an end wall of a container, said inverted cup means having a plurality of peripherally spaced inlet openings through its wall, annular valve means having an opening in alignment with the opening through the crown and secured to the inside of the cup adjacent the opening thereto, said valve means having radial slits therein defining radially extending resilient tongues lying underneath the peripherally spaced holes to thereby define a one-way passage into the cup.

8. A dispensing device for replacing the cap of a liquid container comprising a substitute cap having an opening in the end wall thereof, a hollow stem slidably seated in said opening and being of a length generally corresponding to the height of said container, a cup-shaped diaphragm of resilient elastomeric material, the crown of said diaphragm being connected to the lower end of said stem and having a passageway communicating with the interior of said stem, said diaphragm having a plurality of radially directed holes through the wall thereof, and valve means of elastomeric material within the diaphragm being resilient throughout its body and generally conformable to the surface of the diaphragm to underlie the radially directed holes in the wall to permit a one-way flow of liquid from the container into the diaphragm, said valve means being annular and having an opening communicating with the interior of the stem to thereby permit discharge of the liquid from the diaphragm through the stem upon deformation of the diaphragm.

9. A dispenser for a liquid carrying container comprising: a discharge tube reciprocable through an opening in the container, a resiliently flexible inverted cup-shaped pump member received on the lower end of the discharge tube and having an opening at the base thereof communicating with the discharge tube, said pump having an annular rim in operative contact with a wall of said container, said cup having openings through the wall thereof, and valve means underlying the openings in the cup wall, said valve means being cup-shaped and annularly disposed about said base opening to the discharge tube and having radial slits therein defining resilient tongues in overlying relation with respect to the openings to establish one-way flow of liquid from the container into the pump whereby reciprocation of the discharge tube deforms the cup-shaped flexible pump and discharge liquid therefrom.

10. A dispenser for a container comprising: a deformable resiliently flexible inverted cup-shaped pump member having its base portion received on one end of

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a reciprocable discharge tube and having an opening through the base thereof in communication with the discharge tube, said pump member having additional openings in the side wall thereof, and valve means generally conforming to the inside surface of the pump adjacent the second-mentioned openings to define a one-way valve for the flow of liquid from the container into said pump means, said valve means being annularly disposed about the opening of the pump to the discharge tube and further provided with radial slits defining resilient sealing lips underlying the second-mentioned openings whereby reciprocation of the discharge tube and deformation of the pump discharges liquid from the pump to the tube.

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