United States Patent

[11] 3,592,359

[72] Inventor **Leonard L. Marraffino**
884 NE 42nd St. Oakland Park, Fort Lauderdale, Fla. 33308

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[54] **SPRING-VALVE MEMBER IN PRESSURIZED TWO FLUID DISPENSER**
5 Claims, 8 Drawing Figs.

[52] **U.S. Cl.** **222/94,** 222/145, 222/402.24
[51] **Int. Cl.** **B65d 83/14**
[50] **Field of Search** 222/94, 145, 399, 402.24

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Primary Examiner—Donald F. Norton
Attorney—Wynne and Finken

ABSTRACT: A nonresilient container for a pressurized primary fluid and an internal collapsible resilient holder for a secondary fluid, the fluids being placed in fluid mixing communication in a slidable valve stem by a resilient valve member which is of a compliance and construction such that a normal valve stem movement is available even though only a minor movement under certain tolerances may be required for opening minute pinhole sized ports and accomplishing the discharge of very low viscosity fluids. The lost action or over movement of a part of the valve member enables the storage of sufficient energy to insure return of the valve stem to full closed position by the valve member.

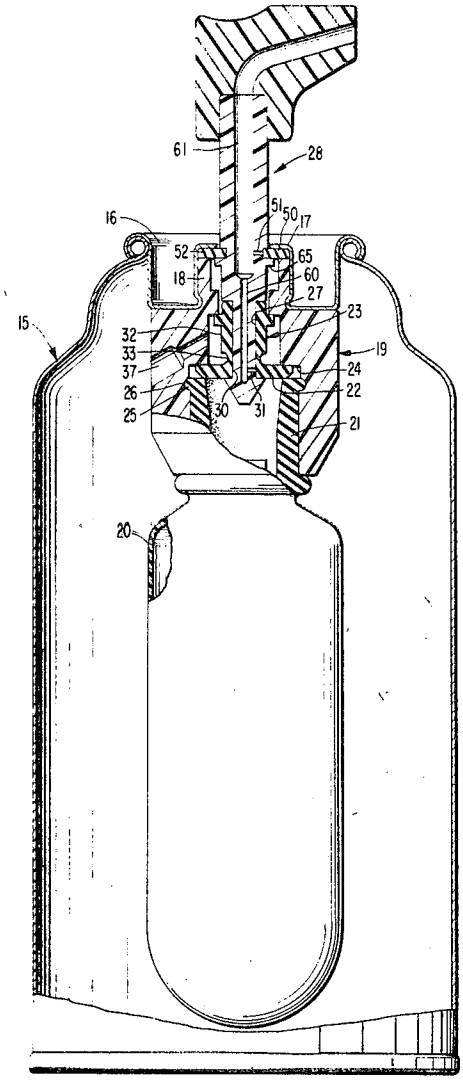


FIG. 1

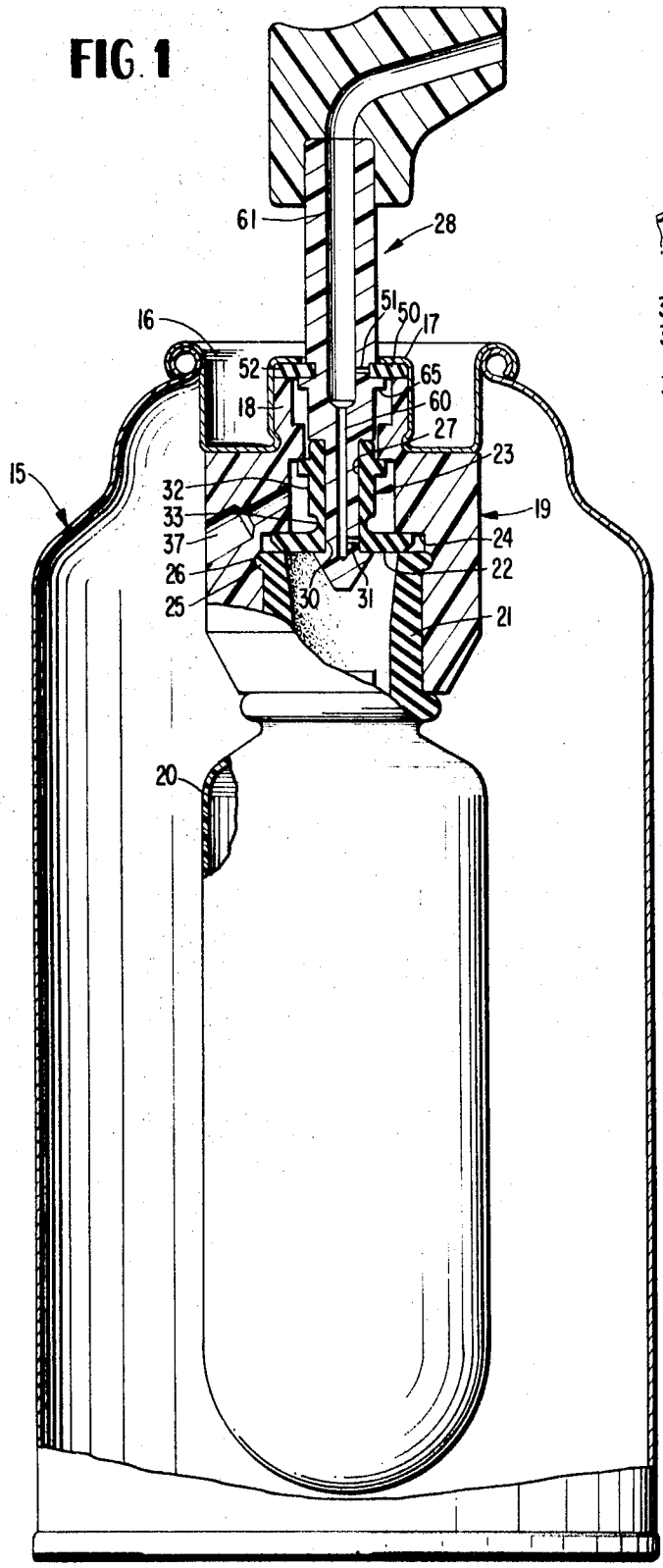
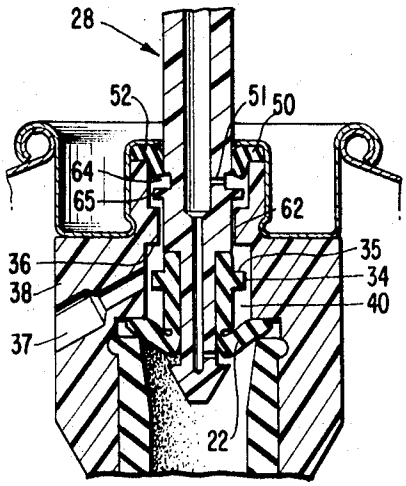


FIG. 2



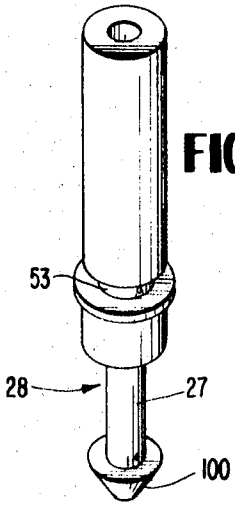


FIG. 3

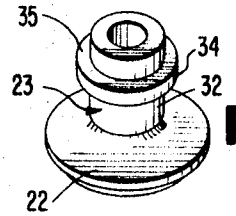


FIG. 4

INVENTOR
LEONARD L. MARRAFFINO

BY

Wynne & Finken

ATTORNEYS

FIG. 5

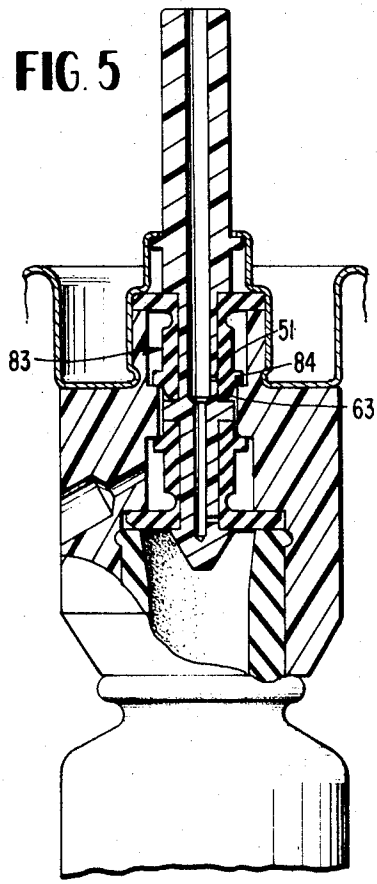


FIG. 6

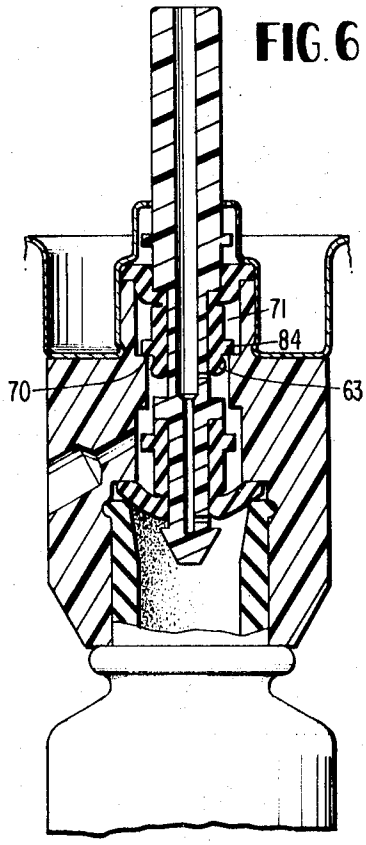


FIG. 7

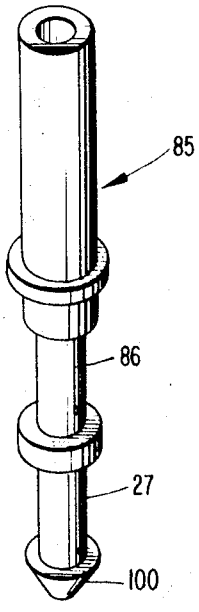
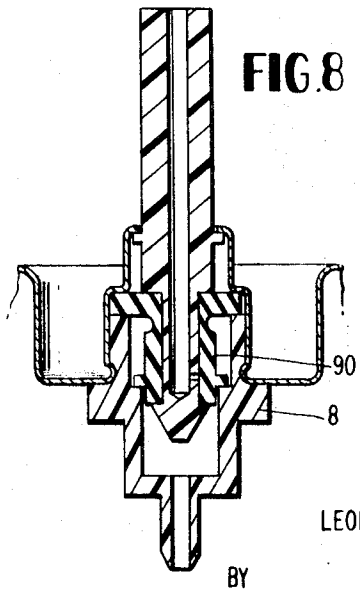


FIG. 8



INVENTOR
LEONARD L. MARRAFFINO

BY

Wynne & Finken

ATTORNEYS

SPRING-VALVE MEMBER IN PRESSURIZED TWO FLUID DISPENSER

The handling of very low viscosity fluids in pressurized containers presents unique valving problems. Further problems are presented by certain fluids since they destroy metal and therefore must be contained in and passed through nonmetallic parts.

This invention utilizes a rigid metal exterior container of the standard type with an interior nonmetallic plastic holder which is responsive in volume to the primary pressurized fluid in the container. The preferred holder is of the plastic bag type which becomes progressively further compressed as its contents are discharged. Other types such as piston followers and the like known in the art can be employed.

The valve stem is slidably mounted for movement from a top sealed position to a bottom open position, this movement being of the substantially normal distance of three thirty-seconds of an inch. The valve stem has an undercut portion for receiving and seating a valve member which has at its lower portion a flexing flange which accommodates the discernible stem movement and which seals a port in the valve stem. A valve head interconnects the holder with the container and has a hole in its sidewall providing open fluid communication of the container with a lower chamber sealed by the flexing flange and a rim at the upper part of the valve member which in turn seals in face-to-face engagement with the valve head. A second sealing means is provided above the rim for sealing a second port in the valve stem through which the primary fluid passes when the stem is opened.

This invention is particularly suitable for the dispensing of fluids of very low viscosity such as an antiperspirant contained in the holder and a propellant gas in the container. The dispensing of such low viscosity fluids is accomplished by the opening of very fine passages. Sufficient quantity is dispensed for the need and also effective control is provided over the quantity dispensed. Minute pinholes in the valve stem along with small clearances between bearing surfaces provide for the desired flow and mixing, the mixing taking place in the valve stem. Full opening might be accomplished with a movement of the valve stem less than the normal three thirty-seconds of an inch due to manufacturing tolerances. However, a discernible movement is desired so that the user can be certain the proper ratio of ingredients is insured and further so that sufficient energy is stored in the resilient valve member to overcome inertia and friction, wedging, and the like on starting the valve stem back to its closed position. Preferably the valve member is an injection molded cylindrical unit with flanges of polyurethane. Valve members so constructed have long shelf life and do not fatigue over many cycles of use. When packaging certain fluids, these considerations are of utmost importance because of their potentially dangerous nature.

Other features and advantages of the invention will appear during the course of the following description.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a central vertical section through a pressurized dispenser;

FIG. 2 is a view showing the position of ports in open condition;

FIG. 3 is a perspective view of the two fluid valve stem of FIG. 1 showing the pinhole-type minute ports;

FIg. 4 is a perspective view of the resilient valve member;

FIG. 5 is a view similar to FIG. 1 with an upper valve member similar to the lower valve member but in inverted position;

FIG. 6 is a view showing the position of ports in open condition of FIG. 3;

FIG. 7 is a perspective view of the two fluid valve stems of FIG. 5; and

FIG. 8 is a central vertical section through a pressurized dispenser for a single fluid.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIGS. 1—4, the rigid metal container 15 has a metal cap 16 in the dome 17 of which is mounted the top portion 18 of a plastic valve head 19. A nonmetallic, preferably plastic holder 20 is connected to the lower end of the valve head 19 by its extension 21 which telescopes into the valve head and sandwiches or clamps the flexing flange 22 of the valve member 23 (FIG. 4) against the annular ledge 24 of the valve head 19. The plastic holder 20 at its upper end has an annular bead 25 which snaps into an annular recess 26 in the valve head.

The valve member 23 is preferably made of polyurethane and is sealingly seated and surrounds the lower annular undercut section 27 (FIG. 3) of the stem 28. The flexing flange 22 extends outwardly from the lower terminal end and, as mentioned, its outer periphery is clamped in sealing condition between the holder and 20 and the head 19. The inner surface 30 of the flexing flange seals the bottom minute port 31 of the valve stem 28. The valve member 23 has a tubular portion 32 which surrounds the valve stem 28, the lower portion of which has an annular outer groove 33 immediately above the flexing flange 22 to facilitate flexing action thereof. Close to the top of the valve member 23 there is an annular rim 34 which provides an upwardly facing sealing surface 35 for face-to-face sealing engagement with the inwardly extending annular ring 36 of the valve head 19.

Hole 37 extends through the sidewall 38 of the head 19 to provide free and constant fluid communication of the primary fluid in the container 15 with the lower chamber 40 formed in the head 19 by the flexing flange 22 and rim 34 seals.

Means 50 are provided for sealing the upper minute port 51 in the valve stem 28. In FIG. 1 it will be seen that this is accomplished by a resilient nonmetallic washer 52, while in the modification shown in FIG. 5, it is accomplished by the above-discussed valve member 23 mounted in inverted position. In FIG. 1 the washer 52 is seated in an upper annular groove 53 (FIG. 3) at the top part of the stem with its outer periphery sealingly clamped between the top portion 18 of the valve head 19 and the metal dome 17.

FIG. 2 shows the position of the elements when the valve stem 28 is moved downward to open position, a distance of three thirty-seconds of an inch. Secondary fluid from collapsible bag holder 20 passes by the flexing flange 22, the bottom port 31, up through central passage 60 of the stem 28 and into mixing conduit 61 of the stem. No metal is contacted during this flow of the possibly corrosive secondary fluid. At the same time the primary fluid present in lower chamber 40 flows around the rim 34, through the clearance space of bearing 62 into the upper chamber 64, around annular ledge 65, and transversally through port 51 to produce a swirling mixing action with the secondary fluid in the elongated passage 60 and in the enlarged mixing conduit 61 of the stem.

It will be noted in FIG. 2, that the rim 34 moves away from the head 19 ad that significant flexing action takes place in the flexing flange 22.

Referring to the modification of FIGS. 5—7, it will be seen that similar parts are present but that the top port 51 is sealed by the inner face of the rim 84. The outer periphery of the valve member extension or nose 63 is rounded to facilitate the distortion thereof on compression since the rim 34 seats on ledge 70 and does not allow significant movement of this portion of the valve member 83. Some distortion takes place, but a face-to-face seal is established and maintained by the rim 84 with the ledge 70 to prevent fluid from passing to the upper chamber 71. The flow of secondary fluid is the same as in FIG. 1. However the flow of primary fluid differs in that it passes beneath the downwardly facing valve member extension or nose 63 and into the top port 51 and does not pass into the upper chamber 71. The valve stem 85 differs in that it has an upper annular undercut section 86 for sealing reception of the substantially similar inverted or up-side-down valve member 83.

FIG. 8 shows another use of the valve member 23 in a single-fluid container where in the action of the valve member 90 is similar to that of FIG. 1, the valve head 8 being of different and closed design since no combination of fluids is required.

One of the significant advantages of the instant invention is the manufacturing economies which are designed into the parts. It will be noted that the lower end of the valve stem is a cone 100 which facilitates application and seating of the tubular valve member. The parts clamp together to integrate the unit as well as to form seals.

I claim:

1. A valve member for a pressurized fluid container having a valve stem slidably mounted therein, said valve stem having a port, comprising

a longitudinal tubular portion mounted on and sealingly surrounding the valve stem and said port;

an annular flexing flange extending transversely at one end of the tubular portion and adapted to be secured in fixed sealed position at its outer periphery with relation to said container, said tubular portion having an outer annular groove adjacent said flexing flange to facilitate flexing when said valve stem is moved; and

an annular sealing rim close to the other end of the tubular portion having a longitudinally facing sealing surface for producing a seal;

said valve member being integrally formed of resilient material of a compliance such that a discernible movement of the valve stem distorts the valve member sufficiently to insure full return of the valve stem and closure of the port.

2. A pressurized dispenser having a rigid external container for a pressurized primary fluid and an internal holder for a secondary fluid responsive in volume to the pressure of the primary fluid, comprising

a vertically slidable valve stem having a top port for primary fluid and a bottom port for secondary fluid;

means for sealing the top port when the valve stem is in up position; and

a valve member having a longitudinal tubular portion mounted on and sealingly surrounding the valve stem;

an annular flexing flange extending transversely at one end of the tubular portion and secured in fixed sealed position at its outer periphery with relation to said container, said tubular portion having an outer annular groove adjacent said flexing flange to facilitate flexing when sad valve stem is moved; and

an annular sealing rim close to the other end of the tubular portion having a longitudinally outwardly facing sealing surface for producing a seal;

said valve member being integrally formed of resilient material of a compliance such that a discernible movement of the valve stem distorts the valve member sufficiently to insure full return of the valve stem and closure of the ports.

3. A pressurized dispenser having rigid container for a pressurized fluid and an internal holder for a secondary fluid responsive in volume to the pressure of the primary fluid, comprising

a valve head attached at its upper end to the container and at its lower end to said holder, said valve head having an axial passage therethrough with an interior annular ledge intermediate its ends providing a downwardly facing sealing ring;

a valve stem slidably mounted in said valve head and having a minute top port for primary fluid and a minute bottom port for secondary fluid and having a lower annular undercut section extending upwardly from the bottom port and an upper annular groove at said top port;

a resilient sealing washer mounted in said groove sealing said top port with its outer annular periphery clamped between said valve head and the container; and

a resilient valve member having a tubular portion seated in said undercut section with a bottom terminal annular flexing flange having its outer annular periphery clamped between the top of the holder and the valve head, the tubular portion immediately above the flexing flange having an annular outer groove to facilitate flexing when said valve stem is moved, an annular rim close to the upper end of the tubular portion having an upwardly facing sealing surface for sealing engagement with the ring of said valve head to define a primary fluid lower chamber with the flexing flange and a primary fluid upper chamber with said sealing washer,

said valve head having a hole providing free fluid communication between said container and said lower chamber whereby upon a discernible downward movement of the valve stem the annular rim opens the lower chamber to the upper chamber and primary fluid flows past the distorted washer, through the top port, and into the valve stem and the secondary fluid flows past the distorted flexing flange, through the bottom port, and into the valve stem,

said valve member being integrally formed of resilient material of a compliance such that distortion to a degree to produce a discernible movement of the valve stem is possible and sufficient energy is stored to insure full return and closure of the ports.

4. A pressurized dispenser as defined in claim 3 and wherein said sealing washer is similar to said valve member but seated in its own upper undercut section of the valve stem in inverted position, with sad top port being closed by an annular rim of the sealing washer.

5. A pressurized dispenser as defined in claim 4 and wherein said valve member and said sealing washer each include a nose extending from the annular rim and loosely positioned in a bearing in the valve head.