

[54] **PRESSURIZED DISPENSER HAVING
DIAPHRAGM ENCLOSED SKIRTED PISTON**

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[58] Field of Search..... 222/389, 94, 386.5,
222/209, 386, 387, 240; 239/323

[56] **References Cited**

UNITED STATES PATENTS

3,189,231 6/1965 Kibbel, Jr. et al. 222/386.5 X

3,415,425 12/1968 Knight et al. 222/386.5
3,494,513 2/1970 Bauer..... 222/386.5
3,613,963 10/1971 Berkmuller 222/389

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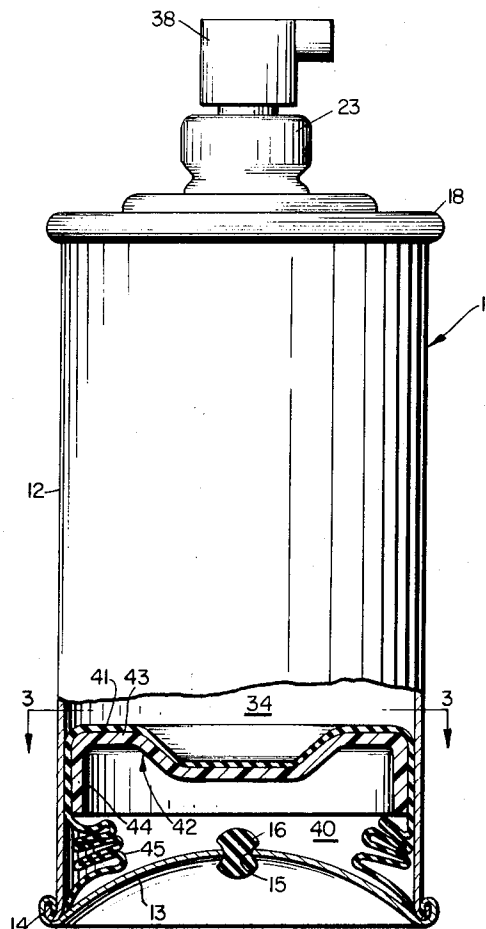
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[57]

ABSTRACT

An aerosol-type dispenser wherein the interior of the container is separated into isolated relatively fluid tight product and propellant compartments by a flexible wall below which is a separate relatively stiff shape retaining piston. The flexible wall has its periphery anchored fluid tight within the lower interior of the container. Propellant is introduced to act on the underside of the piston which acts through the flexible wall as a positive follower for displacing the product.

3 Claims, 3 Drawing Figures



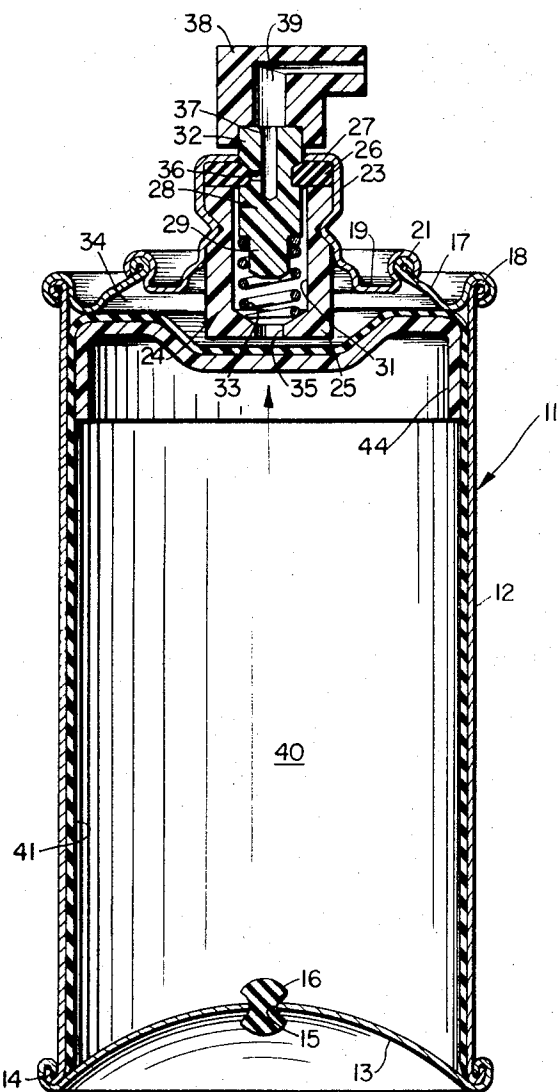


FIG. 2

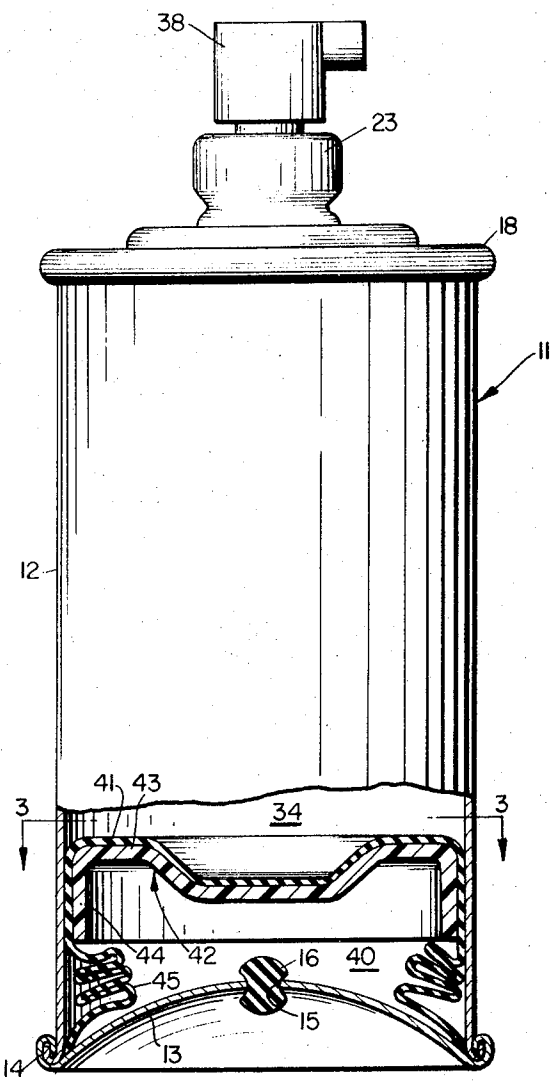


FIG. 1

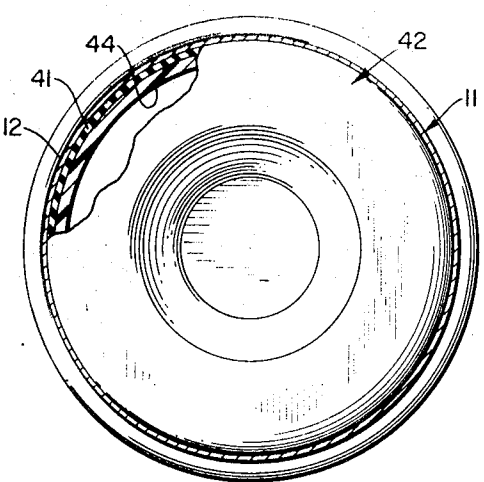


FIG. 3

PRESSURIZED DISPENSER HAVING DIAPHRAGM ENCLOSED SKIRTED PISTON

This invention relates to pressurized dispensing and particularly to pressurized dispensers of the type wherein a propellant acts through a piston or like follower to effect discharge of a foam product such as shaving cream.

The invention is particularly applicable to aerosol-type dispensers for producing a foam product such as shaving cream, wherein it is necessary or advisable to maintain the product separated from the propellant.

Dispensers have been proposed wherein the interior of the container is separated into product and propellant compartments by a freely slidable piston. There have been drawbacks in these dispensers due either to leak of propellant past the piston into the product, or to leak of product past the piston into the propellant compartment. Either is objectionable in the dispensing of foam products. In the first instance propellant vapor usually collects around the product dispensing valve so that when the valve is actuated it discharges a non-homogeneous mixture of product and unblended propellant which, for example where the product is shaving cream, provides a product foam that is spluttery, dry and hard to spread on the face. Where product leaks into the propellant compartment it cannot be recovered and is wasted.

It has also been proposed to isolate the product in a sealed flexible bag-like enclosure defining the product compartment within the container, but these have been usually found to show poor product exhaustion. Similar difficulties in exhausting the product have been encountered where the propellant compartment is isolated within the container by a peripherally attached flexible diaphragm. In both of these instances the flexible bag or diaphragm provides a non-uniform follower action.

In the present invention the advantages of positive follower action and sealed isolation of the product and propellant compartments are provided, and this is a major object.

It is an important object of this invention to provide a novel dispensing container of the aerosol type wherein the product and propellant gas compartments are maintained in sealed isolation by a flexible barrier wall and a relatively stiff shape retaining piston is disposed in the propellant compartment.

Further objects will appear as the description proceeds in connection with the appended claims and the annexed drawings.

BRIEF DESCRIPTION OF THE DRAWINGS:

FIG. 1 is a side elevation in section showing an aerosol type container ready for dispensing and embodying a preferred form of the invention;

FIG. 2 is a side elevation in section similar to FIG. 1 but showing the pressurized container after the product has been substantially exhausted; and

FIG. 3 is a section on line 3—3 of FIG. 1.

PREFERRED EMBODIMENTS

An aerosol container of generally conventional size comprises a metal body 11 having a cylindrical side wall 12 upon the lower end of which a metal bottom cover 13 is permanently secured, as by conventional peripheral crimped joint 14. Cover 13 presents a con-

vex surface within the container, as is known, for resistance to internal pressure.

Centrally, cover 13 is formed with an aperture 15 adapted to receive a soft rubber or like resilient seal plug 16 as shown in FIG. 2.

At its upper end the container continues as an inwardly and upwardly inclined annular end wall 17 that is secured to the top of side wall 12 by a conventional crimped joint 18. A valve support 19 is centrally secured to the inner periphery of wall member 17 by a conventional crimped joint 21.

Centrally member 19 is formed with an upright hollow tubular portion 23 mounting a discharge valve assembly 24. Valve 24 comprises a body 25 fixed within tube 23, and a resilient valve seat annulus 26 is peripherally clenched between the upper end of body 25 and an intumed flange 27 on the top of tube 23.

A slidable valve stem 28 has a lower section 29 disposed in an internal body bore 31 and abutting valve seat 26, and a smaller diameter upper section 32 projecting up through the valve seat 26 to terminate above and outside tube 23. A spring 33 biases stem 29 upwardly in bore 31 into contact with seat 26.

Bore 31 is open to the space 34 in the upper end of the container through an opening 35, and the upper end of bore 31 is normally sealed pressure tight due to engagement of the stem and valve seat.

The upper section of stem 28 is formed with a radial passage 36 that intersects a longitudinal passage 37. A discharge control button 38 formed with an upwardly and laterally outwardly directed passage 39 open to stem passage 37 is fixed on stem 28 in spaced relation to flange 27.

The foregoing construction is more or less conventional. The metal container for example may be that disclosed in Moller et al. U.S. Pat. No. 3,471,059; and the valve may be for example the same as disclosed in Alpanalp U.S. Pat. No. 2,631,814. Alternatively the container walls and the end closures could be hard plastic units, suitably formed. The invention is mainly independent of the container construction or the type of discharge valve.

In general, when button 38 is displaced as by finger pressure toward the container body, stem 28 is displaced to uncover the outer end of radial passage 36 to place bore 31 in fluid communication with passages 37 and 39, and when the button is released spring 33 restores the stem to valve closed sealed position.

In the invention a flexible gas impermeable diaphragm 41 has its outer periphery secured fluid tight to the lower end of the container around joint 14. Diaphragm 41 provides a transverse wall within the container separating the interior of the container into upper product compartment 34 and a propellant compartment 40. Preferably wall 41 is a single uniform thickness sheet of polyethylene, polytetrafluoroethylene or like flexible plastic that is inert with respect to both the product and the propellant. Wall 41 is of sufficient size to permit substantially full length displacement of the piston within the container as will appear.

Disposed within the propellant compartment is a free piston 42 having an upper transverse wall 43 and a depending cylindrical skirt 44. Piston 42 is of such dimensions as to extend across the container with its cylindrical wall 44 spaced from the inner periphery of the container substantially only by the thickness of the diaphragm 41. Piston 42 is preferably an integral molded

element of polyethylene that is stiff enough to be shape retaining under the pressures involved.

In the assembly shown in FIG. 1, the upper surface of piston 42 engages the central portion of diaphragm 41 and the portion of the diaphragm between piston 42 and the bead 14 is collapsed into a folded annulus indicated at 45. The wall of piston 42 may be substantially thicker than diaphragm 41.

Propellant gas, or a gas forming liquid, is introduced into compartment 40 as by a needle in a conventional manner. Similarly the product, liquid, powdered or otherwise fluent, is incorporated in compartment 34 in a conventional manner. FIG. 1 shows a filled container, with the propellant compressed in compartment 40 and exerting pressure upon the underside of piston 42.

The pressurized product such as shaving cream foam is sealed in compartment 34 and may be discharged by depressing button 38. As the product discharges piston 42 rises to maintain pressure on the product, the diaphragm portion surrounding piston skirt 46 sliding upwardly in the container wall. As the piston moves upward in the container the diaphragm below it will be moved toward a position where it substantially lines the container. The pressure within cup-shaped piston 42 will tend to radially expand the piston skirt 44 which thereby acts through the surrounding annular portion of wall 41 sliding up the container inner surface to effect a wiping action insuring optimum product recovery. FIG. 2 shows the parts as positioned when the product is substantially fully dispensed.

During dispensing of the product, the propellant will be at all times acting upon the same transverse area of the piston in all positions of the piston. The piston maintains its shape and provides a positive constant area of pressure on the product, and diaphragm 41 freely permits piston displacement while maintaining sealed isolation of the product and propellant compartments.

While the piston 42 is usually free and unattached to said diaphragm 41 and normally held against the diaphragm by fluid pressure, in some forms the upper piston surface 44 may be attached to the central portion of the diaphragm 41 as by an adhesive bond.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the fore-

going description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A pressurized dispenser of the type wherein the interior of a cylindrical container is separated into an upper product containing compartment and a lower pressurized fluid propellant containing compartment, a flexible gas impermeable diaphragm having its outer periphery anchored fluid tight within the lower end of said container adapted for separating and isolating said compartments, a downwardly open cup-shaped piston that is stiff enough to be substantially shape retaining with respect to the pressures encountered in said container disposed within said propellant compartment, said piston having a transverse wall portion in full surface engagement with the central region of said diaphragm and a depending cylindrical side wall rigid with the outer periphery of said transverse portion in full surface engagement with a surrounding annular portion of said flexible diaphragm slidably disposed in lining relation against the internal cylindrical surface of said container whereby said piston side wall is spaced from the container internal surface substantially only by the thickness of the flexible diaphragm, the fluid pressure within said propellant compartment constantly urging said piston axially of said container in product discharge direction and acting radially outwardly on said side wall to insure optimum sliding and sealing engagement between the diaphragm and the container wall as the piston may move upwardly under propellant pressure during product dispensing, said diaphragm being of such size and characteristics as to be expansible from a collapsed condition when the product compartment is full to extend substantially the full length of the container for optimum product dispensing.

2. The pressurized dispenser defined in claim 1, wherein the valve has an inlet open to said product chamber and an internal abutment is provided in the upper end of the product chamber adapted to be engaged by the central portion of the diaphragm to prevent upward displacement of the piston and diaphragm sufficient to block said inlet.

3. The dispenser defined in claim 1, wherein said piston is an integral polyethylene element.

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