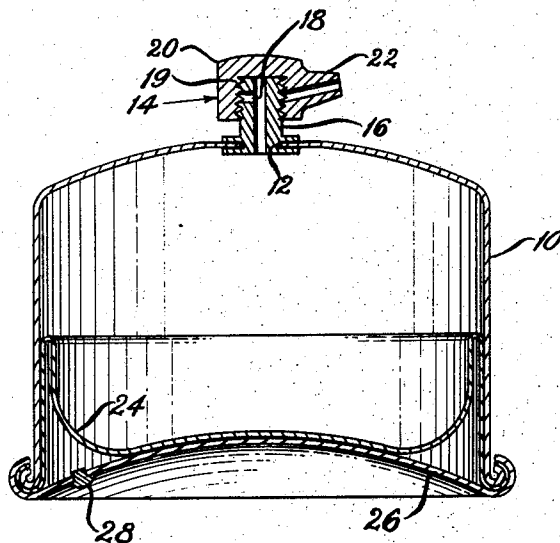


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B. SELLINGER
DISPENSING CONTAINER
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DISPENSING CONTAINER

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This invention relates to dispensing containers for pressure propelled products wherein a liquefied normally gaseous material is employed as the propellant. More particularly it is concerned with such devices wherein the propellant is physically isolated from the product to be dispensed, although both said product and said propellant are sealed within a single container.

It has previously been proposed to pressure propel various products from valved containers. Generally the propellant, e.g. halogenated lower molecular weight hydrocarbons such as the Freons, is in contact or admixed with the product. In the case of certain products which are intended for internal application, such as toothpastes, foods, edible products and the like, it is considered desirable to package the product without having it contact the propellant.

The apparatus of the present invention physically separates the product to be dispensed from the propellant by means of a flexible, non-resilient, non-permeable membrane which divides a single casing into two separate chambers, one for the product and one for the propellant, but transmits the propellant force from the propellant chamber to the product chamber. In addition to preventing contamination of the product, another benefit that is realized from the instant invention is that the product may issue in the same physical form that it had when placed in the container, rather than as a spray or foam such as is commonly experienced when the product and propellant issue as a mixture.

In accordance with the present invention, a dispensing container for pressure-propelled products comprises an outer casing having a discharge outlet at the top thereof and a bottom member joined thereto, a valve closing said discharge outlet, and a non-permeable, non-resilient, pressure-deformable diaphragm sealed to said casing at the joint thereof with said bottom member and forming with said casing and valve a valved chamber for retaining product to be dispensed therefrom and forming with said bottom member a closed chamber for retaining pressure generating means therein, said non-resilient diaphragm being adapted to assume a collapsed state when said product chamber is fully loaded and to displace product therefrom and ultimately assume substantially completely the shape of the interior of said casing when said valve is opened while said diaphragm is subjected to pressure.

While it has previously been proposed to construct pressurized dispensers employing diaphragms to separate product from propellant, such containers have employed either resilient diaphragms or have enclosed the product in a bag or sac-like member which is suspended from the top of the container and is collapsed by the action of the propellant as the product is dispensed. However, diaphragms of resilient materials are easily punctured by any sharp irregularities on the interior of the container or valve and also suffer from the disadvantage of generally being permeable to low molecular weight propellants, and thus fail to actually isolate the propellant from the prod-

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uct. Dangling product-filled bags or sacs which are compressed by the propellant against the product to be dispensed are subject to severe mechanical stresses where joined at their top to the container and valve assembly.

- 5 The container, valve and bag must be tightly sealed so as to prevent leakage of propellant gas, and yet the bag must not be weakened by crimping or other operations as it must support, in tension, the entire weight of its contents and itself. Even with careful fabrication, there is
- 10 considerable tendency for failure at the top of the bag, particularly from mechanical shock when the container is shaken or dropped while the sac is full. Consideration of the structure of the present invention will show, however, that it exhibits the advantages of non-permeability
- 15 and improved mechanical strength and reliability.

In order to more fully illustrate the present invention, reference is made to the accompanying drawing which illustrates a toothpaste dispenser constructed according to the present invention.

- 20 The dispenser comprises a rigid vertical cylindrical casing or can 10 having a discharge opening 12 at the top thereof. The opening is closed by a valve 14 comprising a hollow valve body 16 perforated laterally by an opening 18 and carrying a helical male thread 19. A cap 20,
- 25 having a mating female thread, is rotatably mounted on said body. A hollow spout 22 forms part of said cap, and in usage the valve is opened by rotating the cap 20 until the hollow spout 22 thereon is in registry with the perforation 18 in the valve body.

- 30 A non-permeable, non-resilient flexible diaphragm 24, made of a single thin sheet of aluminum (or similar flexible metallic foil such as lead or tin), is crimped at its periphery into the joint between the base of the outer casing and a concave bottom 26. The concave bottom is
- 35 provided with an opening providing access to the propellant chamber. After filling, the opening is sealed by a plug 28.

- The diaphragm 24 is of such proportions that it extends across the full cross section of the casing and has, when
- 40 fully upwardly expanded or unfolded, substantially the same shape or contour and size as the interior of the outer casing 10. This condition may be achieved by simultaneously drawing the outer casing (on which the valve body has previously been mounted) and the diaphragm, or by other suitable means.

- On filling with toothpaste through the hollow valve body, the diaphragm is forced away from the top of the casing and collapsed to approximately the condition
- 50 shown in the aforesaid drawing. The valve may then be capped and closed, after which propellant is introduced, through the opening provided in the bottom of the container, to the propellant chamber or reservoir. The filling opening is then sealed and the package is complete.

- Although the present invention has been described with reference to a particular embodiment thereof, it will be apparent to those skilled in the art that variations and
- 55 modifications of this invention can be made and that equivalents can be substituted therefor without departing from the principles and true spirit of the invention.

- 60 I claim:

1. A multi-discharge valved dispensing container for a pressure propelled product comprising an upright cylindrical outer casing having a discharge outlet at the top
- 65 of said casing; a product discharge valve closing said discharge outlet; a recessed bottom closure member crimped to the base of said cylindrical outer casing and having a substantially smooth central inner surface; and a collapsed non-permeable, non-resilient flexible metallic diaphragm sealed at its periphery in said crimp and having
- 70 when fully distended, substantially the shape of the interior of said cylindrical casing; said diaphragm being centrally collapsed by a product which is to be dispensed

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from said container, said product being sealed within a valved chamber formed by said cylindrical outer casing, said product valve, and said diaphragm; said smooth central inner surface of said recessed bottom closure supporting said centrally collapsed diaphragm and said product bearing thereon without puncture of said diaphragm and forming with said diaphragm a sealed chamber containing gaseous propellant; said gaseous propellant serving to subject said diaphragm to distensive pressure causing said diaphragm to displace and dispense said product and assume substantially completely the shape of the interior of said casing when said valve is opened.

2. A multi-discharge valved dispensing container for pressure propelled products comprising an outer casing having a discharge outlet at the top thereof, a recessed bottom closure member joined to said outer casing at the bottom of said casing, the central portion of said recessed bottom closure presenting a substantially smooth contour on its interior surface, a product discharge valve closing said discharge outlet, and a non-permeable, non-resilient, pressure-deformable metallic foil diaphragm sealed to said casing between the bottom thereof and said bottom closure member, said metallic foil diaphragm forming with said casing and product discharge valve a valved chamber for retaining product to be dispensed therefrom and forming with said bottom closure member a closed chamber for retaining gaseous propellant therein, said non-resilient metallic foil diaphragm being collapsed towards said smooth contoured interior surface of said bottom closure to permit said product chamber to be loaded with product to be dispensed without causing puncture of said diaphragm, and said non-resilient metallic foil diaphragm also being distensible to displace product from said chamber when said valve is opened while said diaphragm is subjected to pressure from said gaseous

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propellant, said diaphragm having, when fully distended, substantially the shape of the interior of said casing.

3. A multi-discharge dispensing container for pressure propelled products comprising a rigid upright cylindrical outer casing having a discharge outlet at the top thereof and a recessed bottom closure member crimped to the base of said cylindrical casing, the central portion of the inner surface of said recessed bottom closure member presenting a substantially smooth contour, a product discharge valve closing said discharge outlet, and a pressure-deformable metallic foil diaphragm extending across the entire cross section of said casing and sealed to said casing at the base of said cylinder, the periphery of said diaphragm being inserted between said casing and said bottom member at said crimp, said diaphragm being centrally depressed, without puncture, against said smooth contoured portion of said bottom closure to form with said casing and product discharge valve a valved chamber for retaining product to be dispensed therefrom, and to form with said bottom closure member a closed chamber for retaining propellant gas therein.

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