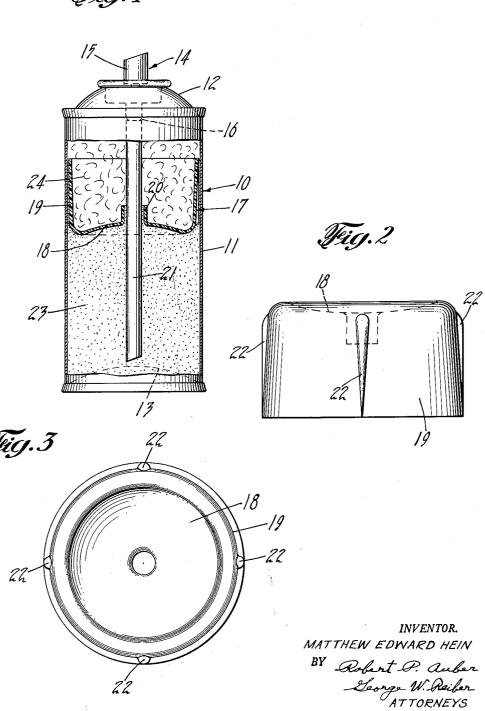
DISPENSING CONTAINER FOR VISCOUS PRODUCTS Filed Dec. 24, 1958





1

## 3,099,370 DISPENSING CONTAINER FOR VISCOUS PRODUCTS

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The present invention pertains to a can specially con- 10 structed to contain a viscous product and dispense this product by means of gas pressure within the can. More particularly, it pertains to a so-called pressure can having a novel construction whereby a viscous product and a pressure producing gas are contained and maintained in 15 separate chambers within the can.

By the term "pressure can" as used herein is meant a hermetically sealed metal container having inside a product maintained under superatmospheric pressure by means of a gaseous propellant, and having a dispensing valve 20 attached thereto whereby, upon opening of the valve, the product is ejected from the container by virtue of the pressure exerted thereon.

In general, the product-propellant system in pressure cans falls into either one of two categories. Either the 25 product and propellant are mixed forming a homogeneous mass or solution; or the product and propellant are maintained separate. In the first category, the product, upon being dispensed, emerges as a spray, mist or foam depending upon, among other things, the characteristics of the 30 product and propellant such as viscosity, surface tension, etc. In the class of spray or mist products are the wellknown insecticide sprays and hair sprays. Examples of foam products are pressure dispensed whipped cream and instant lather shaving soap.

The present invention deals with the product-propellant systems belonging to the second category, i.e. wherein the product and propellant are maintained separate. This separation of product and propellant may be accomplished either by placing a gas-tight, but movable barrier between 40 the product and propellant, in which case the relative solubility characteristics of the product and propellant are immaterial; or a mutually insoluble product and propellant may be used in full or partial contact with each other.

It is obvious that for viscous products which must be 45 dispensed in their natural form or state, i.e. not as a foam, the product and propellant must be maintained separate. Products falling into this class are tooth paste, mayonnaise, mustard, ketchup, hand lotion, petroleum jelly, marily for use in the home by persons of all ages, and the container thereafter discarded, it is equally obvious that the container in which they are sold and from which they are dispensed must be safe, easy to use, and relatively simple and inexpensive to manufacture.

Pressure cans having a gas-tight barrier between the product and propellant are disclosed in the prior art. This barrier either takes the form of a closed, flexible chamber, e.g. a plastic or rubber bag, within the can; or a movable piston in gas-tight engagement with the side 60 wall of the can. Pressure cans of this type are difficult and expensive to manufacture. Further, the friction resulting from the gas-tight seal between the piston and container wall necessitates relatively high pressures to move the piston and/or causes slow operation thereof. Also, the safety of such high pressure containers for general home use is questionable.

Before the instant invention, the prior art has utilized the principle of mutual insolubility by dispensing the product from the bottom of the container with the insoluble propellant gas situated above, and in complete or partial contact with, the product; or by situating the insolu2

ble propellant gas above, and in complete contact with, the product and forcing the product up through a dredge tube extending from the bottom of the container to a dispensing valve located at the top of the container. Aside from the inconvenience of dispensing from the bottom of the container, each of these prior art practices suffers from the same deficiency, i.e. loss of propellant gas by inverting or merely tipping the container beyond a certain angle during product discharge. This tendency to lose propellant is aggravated by the fact that, where there is complete contact between product and propellant, the product must have a relatively low viscosity so as to present a level surface to the propellant at all times.

It is therefore an object of the present invention to provide a pressure can having a viscous product in its lower portion and a gaseous propellant in the upper portion, each insoluble in, and in partial contact with, the other, which pressure can may be positioned at any angle during product dispensing from the top of the can without danger of losing the gaseous propellant.

Still another object is to provide a pressure can of the character described for containing and dispensing from the top of the can a viscous product to be taken by mouth by humans and having no undesirable off-flavors, adulterants or consistency.

Another object is to provide a pressure can of the type described from which substantially all of the product may be dispensed from the valve at the top of the can with no propellant loss during the dispensing.

An additional object is to provide a pressure can of the type described from which products of relatively high viscosity may be dispensed.

A further object is to provide a disposable pressure can which is safe, easy to use and highly suitable for use in 35 the home by persons of all ages.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

The pressure can of the instant invention by which the above objects are achieved comprises a tubular body of suitable material having attached thereto an upper end closure and a lower end closure; a dispensing valve attached to the upper end closure; a dredge tube attached to the valve and extending longitudinally of and within the body to the lower end closure; and an apertured piston loosely mounted within the body, the dredge tube extending through the aperture in the piston. The piston shoe polish, etc. Further, since these products are pri- 50 is adapted to move downwardly within the can under the action of a propellant gas disposed thereabove and thereby force a viscous product disposed below the piston through the dredge tube and out of the dispensing valve upon actuation of the valve.

Referring to the drawing:

FIG. 1 is a side elevational view partly in section showing the subject pressure can.

FIG. 2 is an enlarged, inverted side elevational view of the piston used in the pressure can.

FIG. 3 is a plan view of the piston shown in FIG. 2. As a preferred or exemplary embodiment of the instant invention the drawing shows a pressure can generally designated 10 having a sheet metal tubular body 11 to which are attached an upper and lower end closure 12 and 13 respectively, joined to the body 11 in a conventional double seam. Mounted in the center of the top end closure 12 is a dispensing valve assembly generally designated 14. Valve assembly 14 comprises an actuator portion 15 extending exteriorly of the end 12 and a portion 16 extending into and enclosed within the can 10. The actuator portion 15 is adapted to be engaged by a finger of the consumer to dispense a product packed

within the can. This dispensing valve forms no part of the insatnt invention being any conventional type.

Enclosed within the can 10 is a piston generally designated 17 composed of a relatively flexible material essentially inert to the action of chemical substances, polyethylene being preferred. Piston 17 is substantially cupshaped, having a face 18 and an upstanding side wall or skirt 19 integral with face 18. Centrally located in the piston face 18 is an aperture surrounded by an upstanding wall defining a sleeve 20. The function of sleeve 20 will be defined more fully hereinafter.

The side wall or skirt 19 extends longitudinally of the can body 11 contiguous with the inside surface of the can body 11. The cross sectional configuration of piston 17 is the same as that of can body 11, e.g. if the can body 11 is cylindrical the cross sectional configuration of the piston 17 is circular. Also, the cross sectional dimension of piston 17 is slightly less than the cross sectional dimension of can body 11 so that the skirt 19 is spaced slightly away from the inner surface of can body 11.

Connected to the inwardly extending portion 16 of the valve assembly 14 is one end of a dredge or syphon tube 21. The dredge tube 21 extends longitudinally of the can body 11 through the sleeve 20 of piston 17 to the bottom end closure 13. Dredge tube 21 can be made of any suitable material, but is preferably made of a substantially inert plastic such as polyethylene. The cross sectional interior dimension, e.g. the diameter, of sleeve 20 is slightly greater than the outside cross sectional dimension of tube 21, thereby providing a slight spacing between the outside surface of the tube 21 and the inside surface of the sleeve 20.

As shown in the drawing the skirt 19 of the piston 17 has formed in its outer surface a plurality, i.e. at least 3, of ribs 22 extending longitudinally of the skirt 19. 35 The ribs 22 are raised above the outer surface of the skirt 19 which brings the ribs into closer proximity to the side wall of the can body 11 than the remainder of the surface of the piston skirt 19. However, the ribs 22 are dimensioned so as to be very close but not to con- 40 tact the side wall of the can body 11 when the piston is centered within the can body, i.e. when the piston 17 and the can body 11 have a common longitudinal axis. The ribs 22 tend to center the piston 17 within the can body 11 and yet permit the existence of a thin film of 45 product on the can body side wall on which the piston may ride, which film also provides a seal around the piston.

As shown in the drawing, the skirt 19 tapers inwardly toward the piston face 18, whereas the ribs 22 are 50 vertical and substantially perpendicular to the free edge of the piston skirt 19. By this illustrated construction, the ribs 22 extend outwardly from the outer surface of skirt 19 greatest adjacent the piston face 18 and merge with the skirt 19 adjacent the free edge of the piston 17. 55 The ribs 22 are also illustrated as being an elongated tear drop shape.

The presence of the ribs 22 and the inward taper of the piston skirt are not esssential to the operability of the piston 17. Pistons having a smooth exterior surface and 60 a skirt substantially parallel to the can body side wall have been tried and found operable in the pressure can construction of the instant invention. However, the ribbed piston construction has been found advantageous in that by preventing extensive surface contact between 65 the skirt 19 and the side wall of the can body 11, jamming and cocking of the piston are prevented.

Also as shown in the drawing the piston face 18 is shown to be concave. The purpose of this concave construction is to enable the piston face 18 to conform closely 70 to the contour of the bottom end closure 13, thereby insuring as complete as possible a removal of product. However, it is to be understood that other desired contours for the piston face 18 may be used.

The container of the instant invention, just prior to 75

filling and pressurizing, has the top 12 and the bottom 13 attached to the body 11 and the piston 17 mounted therewithin with its face 18 contiguous the bottom closure 13. The top closure 12 has in its center an aperture or opening adapted to receive the dispensing valve assembly 14.

A means of filling the container is as follows: an elongated filling tube, attached to a supply of product 23, is inserted through the opening in the top closure 12 and through the sleeve 20 of the piston 17 so that the open discharge end of the filling tube is contiguous the bottom closure 13. The product 23 is forced through the filling tube and between the bottom closure 13 and the piston face 18 causing the piston 17 to rise to its uppermost position adjacent the top closure 12. Thereafter, the filling tube is withdrawn and the dispensing valve assembly 14 is loosely mounted in the opening in the top closure 12 with the dredge tube 21 extending through the sleeve 20 and into the product 23. With the valve assembly 14 so loosely mounted, a propellant gas 24 is forced into the upper portion of the container through the opening in the top closure 12. When sufficient gas has been forced into the container, the valve assembly 14 is tightly crimped onto the top closure 12, sealing off the opening therein and trapping the propellant gas 24 within the container. Located within the cup of the cup-shaped piston, the propellant gas 24 exerts a force on the inner surface of both the skirt 19 and the piston face 18.

As mentioned previously, the cross sectional dimensions of the piston skirt 19 and of the dredge tube 21 are slightly less than the corresponding cross sectional dimension of the can body 11 and sleeve 20, respectively, thereby providing a space between skirt 19 and the wall of can body 11 and between the sleeve 20 and the dredge tube 21. After initial filling and pressurizing of the can a thin film of product fills at least the entrance into each of these spaces; and due to the pressure exerted by the propellant gas 24 in all directions within the cup of the cup-shaped piston, skirt 19 and sleeve 20 are both forced against this film of product. Due to the curvature of the junction between the piston face 18 both with the skirt portion 19 and the sleeve 20, the piston 17 in its downward travel during product dispensing does not scrape clean the side wall of can body 11, nor the outer surface of the dredge tube 21. Therefore, the film of product contiguous the skirt 19 and the sleeve 20 is maintained throughout the entire useful life of the can since a new film of product is continuously provided during piston movement.

As mentioned previously to be operable the propellant gas 24 must be insoluble in the product 23 and also it must be completely inert so as to produce no odor, taste or corrosion problems in the container. The gas most suitably meeting these requirements is nitrogen. However, other inert gases such as argon and helium could be used, although their expense makes them less desirable. Propellant gases conventionally used in pressure cans such as Freon, CO2, nitrous oxide and air are unsuitable in the container of the instant invention, since all of these gases are at least partially soluble in the products which the subject can is specifically designated to hold. The primary disadvantage of air is the 21% of oxygen therein which oxygen is relatively soluble in the products and also creates problems of corrosion and product deterioration.

The film of product contiguous to the skirt 19 and the sleeve 20 acts as a resilient sealing gasket whereby any irregularities in the can body, such as dents, variations from the tubular, or the side seam of the can are nullified as potential leak passages from the propellant side of the piston to the product side of the piston. The film of product also acts as a lubricant permitting easy movement of the piston. It is readily apparent that if the propellant gas had any solubility effect on the product, this film, which is in contact with the gas, might be removed; or at least would permit diffusion of the gas into

5

body of product below the piston and the ultimate escape of the gas 24. Also, because of the combined effects of viscosity of the product tending to resist flow thereof and the mutual insolubility of product and propellant whereby the gas 24 presses against the film without diffusing 5 into or through the film, the product 23 exhibits no tendency to flow around the piston up into the propellant compartment.

It is thought that the invention and many of its attendant advantages will be understood from the fore- 10 going description, and it will be apparent that various changes may be made in the form, construction, materials thereof, and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore de- 15 scribed being merely a preferred embodiment thereof.

1. A package comprising a container, a viscous product in the lower portion of said container, and a gaseous propellant having superatmospheric pressure in the upper 20 portion of said container; said container comprising a tubular body having an upper and lower end attached thereto, a dispensing valve mounted on said upper end, a hollow dredge tube within said body having its upper end connected to said valve and its lower end immersed in said 25 viscous product, and a substantially cup-shaped piston within said body separating said product from said propellant; said piston having a centrally apertured face and an upstanding substantially straight imperforate skirt contiguous the side wall of said body and integral with said 30 face, said skirt adjacent said face having the same crosssectional shape as said body and an outside cross-sectional dimension less than the corresponding inside dimension of said body, said aperture in said piston face being in the tube extending through said sleeve; a thin film of said product separating said sleeve from said dredge tube and at least the major portion of said skirt from said can body side wall, said films of product adapted to lubricate said piston for easy downward movement thereof and to form 40 a seal between the product and propellant sides of said piston, said gaseous propellant being in contact with said films and being inert to both said container and said product and being insoluble in said product.

2. The package set forth in claim 1 wherein said propel- 45 lant is selected from the group consisting of nitrogen,

helium and argon.

3. The package set forth in claim 1 wherein said product is tooth paste and said propellant is nitrogen.

4. A pressure can for viscous products such as pastes, 50 creams and the like, comprising a tubular metal body having upper and lower end closures secured thereto, a dispensing valve mounted on said upper end closure, a hollow dredge tube connected to said valve and extending within said body to its lower end, and a cup-shaped piston 55 mounted in said body and having a centrally apertured face and an upstanding annular imperforate skirt contiguous the side wall of said body and integral with said face,

said piston dividing the interior of said body into an upper chamber adapted to contain a gaseous propellant at superatmospheric pressure to maintain a continuing downward force against said face and a lower chamber adapted to contain a viscous product to be dispensed from said valve, said apertured face having a sleeve concentric to but narrowly spaced from said tube and said skirt having a transverse cross-sectional shape and transverse exterior size along its entire length the same as and smaller than the transverse cross-sectional shape and transverse interior size of said body, respectively, to provide a loose fit between said sleeve and said tube and between said skirt and said body to permit the formation of thin films of said viscous product therebetween to provide both a sealant to prevent escape of said gaseous propellant around said piston into said product and a lubricant to facilitate downward movement of said piston upon actuation of said valve.

5. A pressure can for viscous products such as pastes, creams and the like comprising a tubular metal body having upper and lower end closures secured thereto, a dispensing valve mounted on said upper end closure, a hollow dredge tube connected to said valve and extending within said body to its lower end, and a cup-shaped piston mounted in said body and having a centrally apertured face sleeved around said tube and an upstanding annular imperforate skirt contiguous the side wall of said body and integral with said face, said piston dividing the interior of said body into an upper chamber adapted to contain a gaseous propellant at superatmospheric pressure to maintain a continuing downward force against said face and a lower chamber adapted to contain a viscous product to be dispensed from said valve, said sleeved face concentrically conforming to but narrowly spaced from said form of a sleeve integral with said piston face, said dredge 35 tube to provide a clearance space therebetween, the outer surface of said skirt having a plurality of longitudinally extending ribs thereon to provide a clearance space between said skirt and said body, said clearance spaces permitting the formation of thin films of said viscous product therein to provide both a sealant to prevent escape of said gaseous propellant around said piston into said product and a lubricant to facilitate downward movement of said piston upon actuation of said valve.

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