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Continuation of application Ser. No.
697,857, Jan. 15, 1968, now abandoned,
which is a continuation-in-part of
application Ser. No. 548,963, May 10,
1966, now Patent No. 3,393,842.

[56]

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[54] **PRESSURIZED CONTAINER**
4 Claims, 7 Drawing Figs.

[52] U.S. Cl. 222/95,
 222/402.22
 [51] Int. Cl. B67d 5/38
 [50] Field of Search 222/95,
 105, 386, 381, 386.5, 402.22; 220/63, 67

ABSTRACT: The pressurized container has a cylindrical rigid body closed at its top and bottom. A flexible, elastic bag is disposed within the container with its top clamped by a seam formed between the body and a covering cap. The flexible bag has a sealed end proximate the bottom of the body which is arched, with the apex of the arch being at the centerline of the body and with the arch's sides extending down towards the bottom of the body. The space between the bottom of the container and the arch provides a volume for charging the container with a propellant. A dispensing valve is attached to the cap in communication with the interior of the bag on the other side of the propellant chamber.

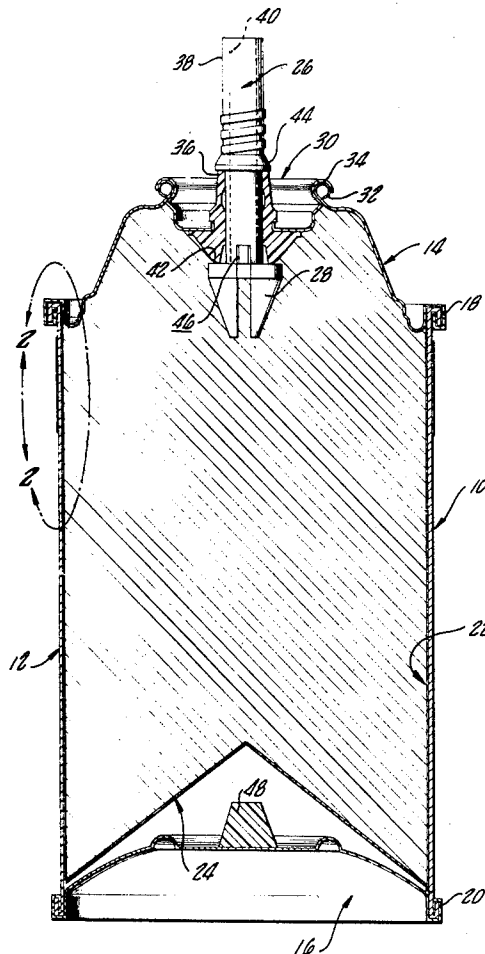


FIG. 1

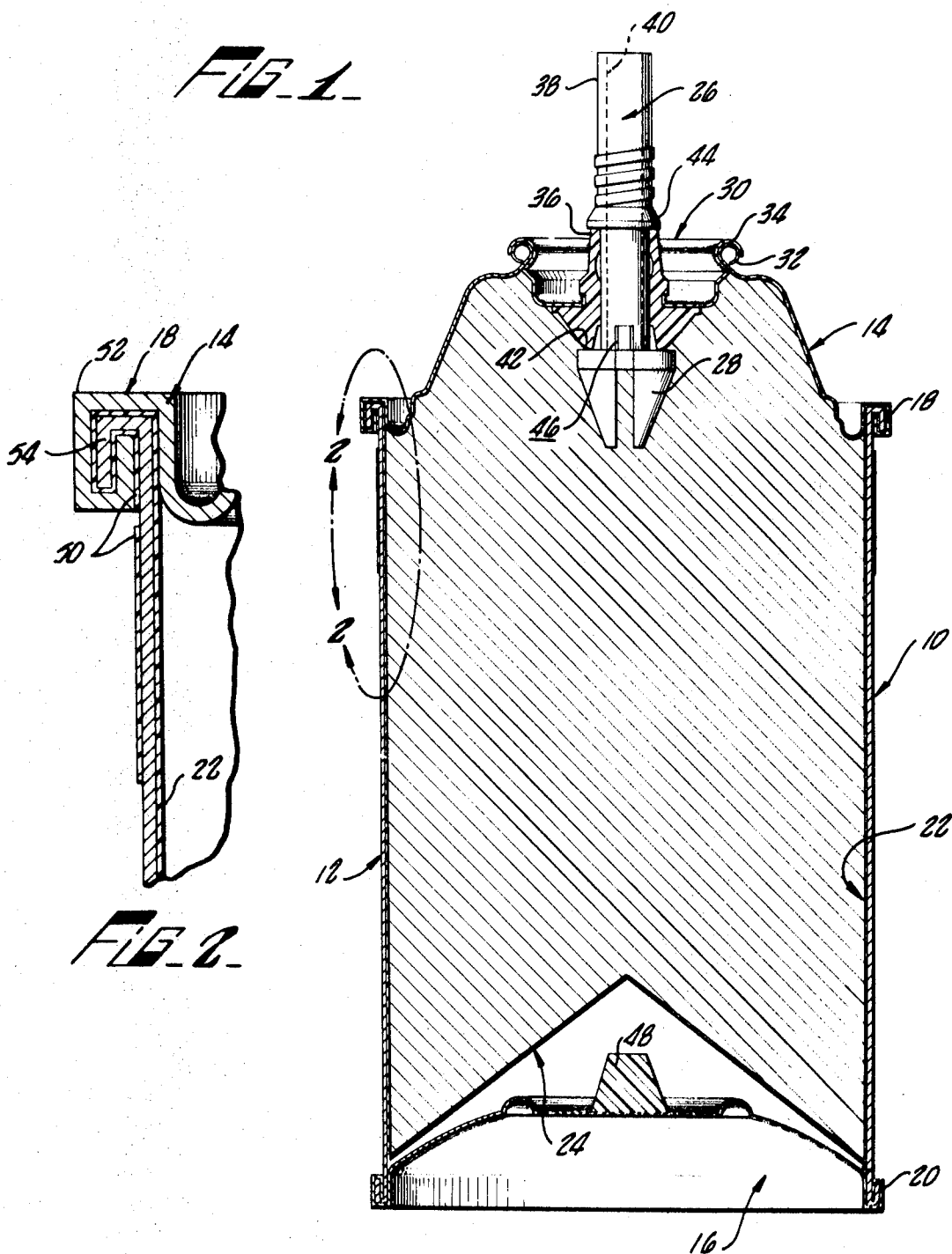


FIG. 2

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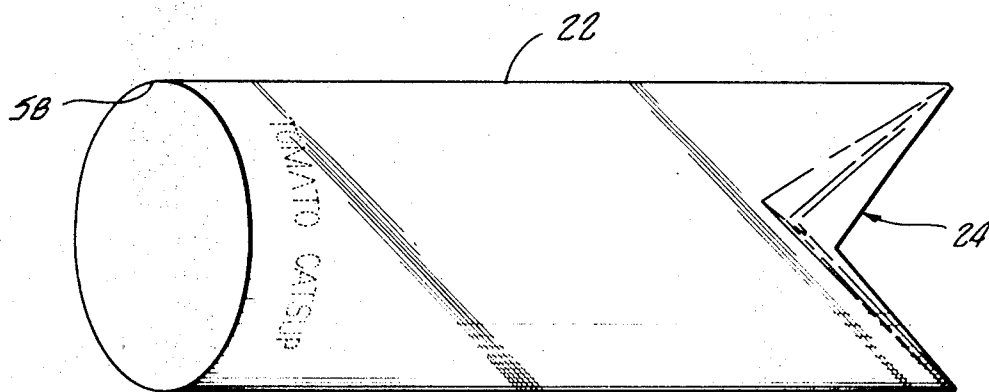


FIG. 3

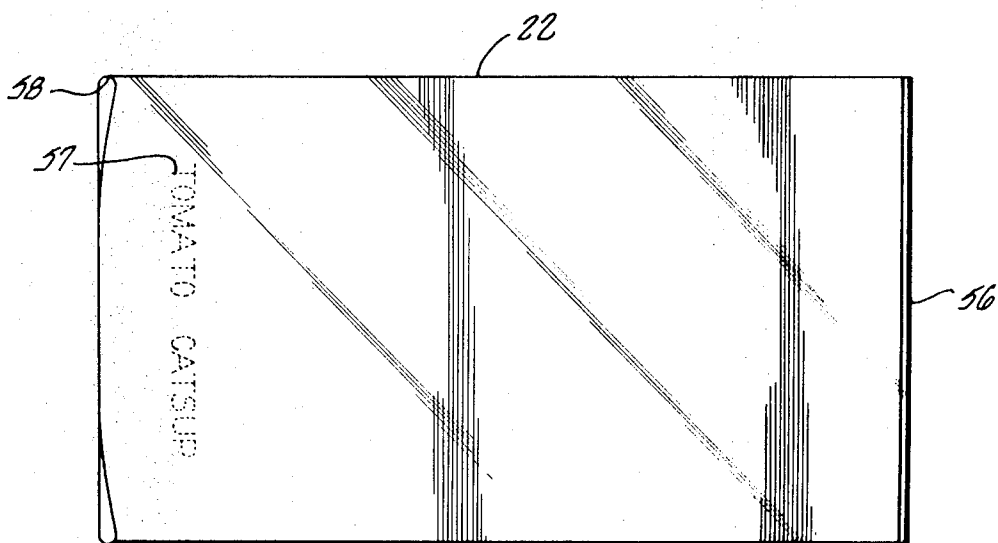


FIG. 4

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FIG. 6

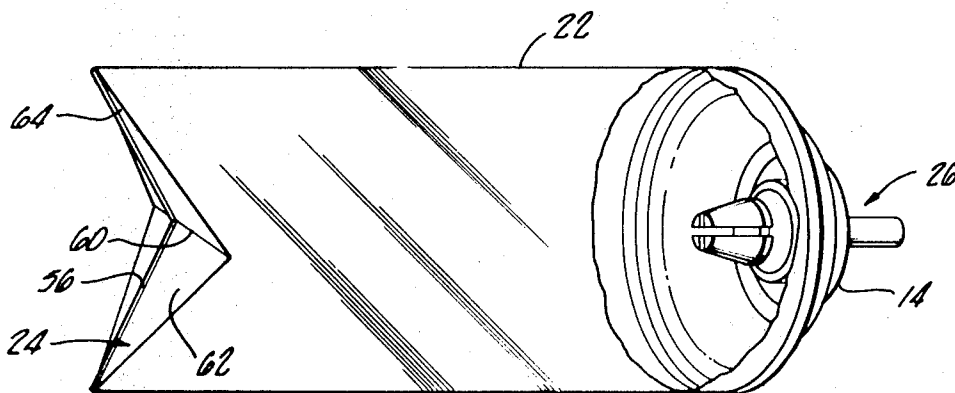
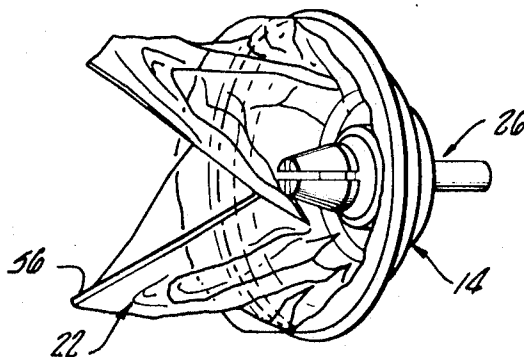


FIG. 5

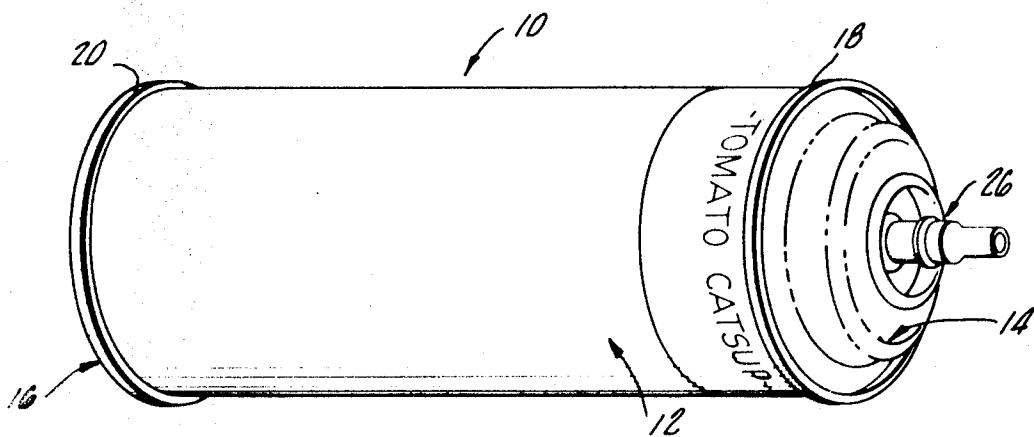


FIG. 1

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PRESSURIZED CONTAINER

CROSS REFERENCE TO RELATED APPLICATIONS

This is a continuation of Ser. No. 697,857 now abandoned, and which in turn is a continuation-in-part of Ser. No. 548,963 now U.S. Pat. No. 3,393,842.

BACKGROUND OF THE INVENTION

The present invention relates to self-dispensing containers of the pressurized type and, more in particular, to a pressurized container employing a bag between the source of pressure and the products to be dispensed.

Products are often marketed in self-dispensing containers commonly referred to as "aerosol" containers or bombs. These containers are rigid cylindrical cans filled with a mixture of the product to be dispensed and a propellant. The container is provided with a finger-actuated valve which, when operated, dispenses a mixture of the product and the propellant. The pressure of the propellant provides the dispensing force.

Such dispensers are only useful where propellant is readily miscible with the product. The propellant and product are always combined which results in a change of product characteristics and performance. In the dispensing of most items it is difficult to combine the product and propellant and retain required product characteristics. In food products the required texture and flavor cannot be produced. Catsup, for example, becomes a pink foam. Moreover, many products are not suitable for pressurized dispensing because of chemical interaction between the product and the propellant or the product and its metal container.

To overcome the problems inherent with a propellant and a product in the same chamber, several concepts have been proposed to separate the product and the propellant. One such concept envisions a piston between a product and propellant chamber. The chamber volume occupied by the piston is considerable, often reaching 50 percent of the total container volume. In addition to the cost of providing a piston and the waste space, the container must be of an expensive extruded type to present a smooth and continuous wall for the piston. This is necessary to provide relatively free piston movement and a sealing surface to reduce excessive product seepage into the propellant. Because of the required fit between the piston and wall, any dents in the container wall render the dispensing device inoperative. Moreover, a high pressure propellant is necessary with this type of container because of piston friction. High pressure propellants increase the hazard of explosion and the amount of propellant required. In addition, only highly viscous products may be used with this type dispenser because the product is required to seal the product chamber from the propellant chamber.

Pressurized dispenser concepts also include diaphragm and sack-type dispensers. These concepts have not been accepted because of substantial problems in manufacture, difficulties in operation and excessive cost.

A problem with pressurized dispensers having separate product and propellant chambers is in providing space for charging the propellant without compromising product volume. Propellant is charged through the bottom of the dispenser by inserting a gassing needle into the propellant chamber. This needle must have enough clearance space to avoid rupturing the chamber's separator. It has therefore been proposed to form the chamber's separator such that it lies normal to the dispenser's axis, considerably above the propellant entrance point. The separators have, then, generally taken the shape of a disc. This type of separation results in a considerable loss of product volume.

In summary, it is highly desirable to separate the propellant from the product. Separation should be accomplished with a minimum expenditure of space for the separating means. Moreover, it is highly desirable to provide a pressurized container having a large volume devoted to product space and a relatively small volume devoted to propellant while allowing

for propellant charging. These requirements should be met with a minimum of manufacturing costs.

SUMMARY OF THE INVENTION

The present invention provides a pressurized container with separate propellant and product chambers that maximize product chamber size while providing ample room for the propellant-charging needle.

The present invention provides an elastic, flexible bag disposed within the body portion of a pressurized container. The bag is sealed at one of its ends and open at its other end. The sealed end is disposed proximate the bottom end of the body while the open end is attached to the container such that the interior of the bag is in product communication with a dispensing valve used to discharge product.

The sealed end of the bag has an arched configuration. The apex of the arch lies on the longitudinal axis of the container. The sides of the arch extend downwardly from the apex towards the bottom of the container to define a propellant chamber between the closed bottom and the exterior surfaces of the arch. The propellant chamber is thus somewhat wedge-shaped allowing a propellant injection needle to pass into the chamber without rupturing the bag. The interior of the bag proximate its sealed end is saddle-shaped because of the arch. Additional product volume between the interior surfaces of the arch's walls and the proximate lateral surfaces of the bag is therefore available.

In specific form, the arched configuration of the bag has the apex of the arch intersecting and crossing approximately normal to the end's seal. The sides of the arch are generally triangular in shape with the base for the triangular sides meeting at the apex. The seam defined by the sealed end then extends as a broad V across the apex and terminates at the tip or apex of the triangular side portions.

Preferably the pressurized container is closed at its top by a double-seamed connection between a dome-shaped cover or cap and the top of the body portion. The double seam is defined by a reverse bend of the top of the body and a double reverse bend of the edge of the cap. The bag is sandwiched between the edge of the cap and the top of the body, for the full circumferential extent of the seamed connection so that the open end of the bag lies in direct tensioned contact with the unbent exterior surface of the body.

The pressurized dispenser of the present invention provides a product dispenser which has separate product and propellant chambers. Therefore, the problems of product-propellant compatibility, product characteristics and product performance are avoided. The bulk of the product chamber is defined by the interior sidewalls of the bag and therefore container-product compatibility is not a problem. Because the product is contained in a bag, the concern with product-propellant sealing experienced with pistons is overcome. Moreover, standard container bodies having side seams may be used without affecting the operation and reliability of the dispenser. This means that standard, economical production facilities are readily adaptable to fabricate the dispenser of the present invention.

The arched configuration of the bottom of the bag provides a wedge-shaped propellant chamber that maximizes the amount of product which can be placed in a given size dispenser. The apex of the arch provides room for the passage of a propellant injection needle. The bag, however, extends downwardly from its apex to provide additional product volume. The arched configuration of the bag provides another salutary feature. This feature resides in the collapsing of the bag as product is withdrawn from the dispenser. It has been found that with the arched type configuration islanding of product is avoided. Islanding refers to the trapping of product by the collapsing bag into pockets which are out of communication with the dispensing valve. Another advantage attendant with the arched configuration of the present invention resides in its reliability. Typically, bags are formed of extruded plastic

tubing closed at one end by a heat seal. If the closed bottom of the bag were formed by a separate piece such as a disc, leakage becomes a problem because of difficulty in the seaming operation and the length of the seam.

In addition, it has been found that a much smaller amount of propellant is needed with this dispenser because none of the propellant is exhausted through the dispensing valve as the product is dispensed. Thus the container will hold more product and less propellant. It has also been found that only a small amount of propellant pressure is needed to obtain satisfactory discharge of the product. This pressure, which may be in the neighborhood of 5 to 10 p.s.i., means there can be a reduction in the strength requirements of the container which makes possible the use of less expensive containers. The danger of container explosion by inadvertent exposure to heat is also reduced because of the low pressure.

These and other features, aspects and advantages of the present invention will become more apparent from the following description, appended claims and drawings.

BRIEF DESCRIPTION OF THE FIGURES

FIG. 1 is an elevational view, partly in half section, of the preferred form of the dispenser of the present invention;

FIG. 2 is an enlarged fragmentary view of area 2-2 of FIG. 1;

FIG. 3 is a perspective view of the bag of the present invention in its open condition;

FIG. 4 is a view of the bag of the present invention in a flat condition;

FIG. 5 is a cutaway perspective view of the dispenser showing the top portion of the dispenser and the bag in its fully extended position;

FIG. 6 is a perspective view similar to FIG. 5 showing the product-containing bag in a collapsed position; and

FIG. 7 is a perspective view of the container in a fully assembled condition.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIGS. 1 and 7 illustrate the preferred form of a dispenser 10. The dispenser has three main portions: A cylindrical body portion of rigid tubing 12, a cover or cap portion 14 and a bottom portion 16. The cover and bottom portions are double seamed to body portion 12 at seams 18 and 20, respectively. A flexible bag of elastic material 22 is disposed within container 10 and is held in place in the container by seam 18. The bag has an arched bottom portion 24 disposed above bottom portion 16. A dispensing valve 26 of standard construction except for a valve extension 28 is in product communication with the interior of flexible bag 22. A valve cup 30 carries dispensing valve 26 on cover 14.

Cap or cover portion 14 has a bead rim 32 over which an annular flange 34 of valve cup 30 is crimped. Valve 26 is mounted in valve cup 30 through a rubber sealing and mounting member 36. Valve 26 includes a stem portion 38 which has a longitudinally disposed product passage 40. The product passage terminates at valve extension 28. Valve extension 28 has a conelike configuration and includes a generally flat sealing surface 42. Stem 38 has an annular flange 44 which bears against the upper edge of sealing member 36. Sealing member 36 is compressed slightly between flange 44 and sealing surface 42 to seal the contents of bag 22 from passage 40, the contents being shown by the crosshatching interiorly of bag 22 in FIG. 1. A plurality of circumferentially disposed ports 46 in stem 38 communicate passage 40 with the exterior of the stem. Horizontal finger pressure on stem 38 breaks the seal between mounting member 36 and sealing surface 42 to admit product through ports 46 into passage 40 for discharge.

Bottom portion 16 is a dishlike member having its convex side facing the interior of body portion 12. A self-sealing valve 48 of, for example, a catalyzed polyester compound, is mounted on the interior upper surface of bottom portion 16. Self-sealing valve 48 admits to the passage of propellant into

the interior of body portion 12 by a needle. The self-sealing valve may be conically shaped in order that the radical pressure exerted by the propellant on the deposit will give maximum sealing as a gassing or pressurizing needle is inserted through the valve to charge the container and is withdrawn through the valve after completion of propellant charging. Arched portion 24 admits to the insertion of a charging needle because its apex is disposed sufficiently above self-sealing valve 48 to prevent puncture of the bag during the propellant-charging process.

FIG. 2 illustrates the manner in which flexible bag 22 is affixed to container 10. Cover 14 is mounted on body portion 12 through double seam 18. This double seam is defined by a single reverse bend of body portion 12 and a double reverse bend of cap 14. Before the seaming, body portion 12 has a radially extending flange over which the top of the bag is stretched. A portion of the bag extends down the exterior wall of body portion 12. This portion is shown by reference numeral 50. During the seaming operation flange 52 of cover or top portion 14 is bent back upon itself with a portion of flange 54 of body portion 12 being bent downwardly at the same time. Flange 52 tucks inside the downward extension of flange 54 and up against external portion 50 of bag 22. The affixed end of bag 22 is disposed between the seamed flanges such that it doubles back on itself and then down the outside of body 12. The seal of the bag effected with this double seam is considerable because of the large clamped area. The stretching of the bag over the mouth of the body and tightly down its external side avoids gathering, doubling or twisting while forming seam 18. Any separation or tearing of bag material during seaming is normally localized because of the large clamped area, thereby avoiding the loss of the seal. Moreover, the tensioned contact of portion 50 over the top and down the external sidewall of the body portion 12 prevents the bag from being pushed back into the interior of body portion 12 during the seaming operation.

FIGS. 3, 4 and 5 depict the bag in detail. Flexible bag 22 is normally fabricated from commercially available rolled tubing which comes in a flattened configuration as depicted in FIG. 4. This tubing is inexpensive and is readily prepared for use in the dispensing container of the present invention. It has the further advantage that no side seam is required which might affect the seal in seam 18. The dimension of the perimeter of the flexible bag is selected such that it is approximately the same as the inner perimeter of body portion 12. When inserted and affixed in container 10, flexible bag 22 takes a generally cylindrical configuration down to arched portion 24 to conform to the interior configuration of body 12.

The tubing is heat sealed at one end either before or after it is cut from its roll. The heat-sealed end is indicated by reference numeral 56. If desired, printed indicia 57 can be placed on the tubing stock. The end opposite the seal end 56 is left open as indicated by reference numeral 58. The open end is expanded and slipped over the mouth at the top end of body portion 12 and then relaxed. This allows the tubing to contract against the exterior, upper portion of the body portion. The exterior portion 50 of the bag adheres to the exterior of the body in skinlike elastic contact. This exterior portion of the bag, if not removed in the manufacturing process, may be used to identify the dispenser. In addition, it may be useful as an advertising area for the product manufacturer while being removable by the user for decorative purposes. Thus, the exposed exterior portion of the bag may be preprinted and made to any suitable length.

Product-containing bag 22 may be fabricated from extruded polyethylene tubing having a relatively thin wall thickness, for example, 0.002 inch. A bag formed of polyethylene or similar plastic materials has the advantage that it undergoes very little expansion during its filling. This enhances the measure accuracy for the product placed in the dispenser.

The physical characteristics of the bag are important. The material should have good "memory" characteristics for its contraction into intimate contact with the outer wall of the

body portion and the encompassed flange. This avoids bunching which affects the seal in seam 18. The material must have a relatively high hardness to avoid squeezing or thinning during seaming and, therefore, separation. The bag material should accept a heat seal and have good barrier characteristics to avoid product-propellant communication. When filled with product, the bag should not expand, that is, the bag should have good filling resistance. The material should admit to extrusion to avoid a longitudinal heat seal. In addition, the material should be able to withstand relatively high product filling temperatures while not exhibiting brittleness from the low temperature effects of propellant charging.

As previously indicated, the open end of bag 22 is affixed in the container by its clamping in seam 18. The open end of the bag thus takes a circular configuration. The bag, however, is initially formed of flat stock. The heat-sealed bottom end 56 prevents this end from assuming a cylindrical configuration. By virtue of the fact that the perimeter of bag 22 is only slightly less than the interior perimeter of body 12, the bag is constrained against flaring outwardly of the interior diameter of the body. The constraining influence of the can together with seam 56 produces arched configuration 24.

The arched configuration is best seen in FIG. 5. Sealed end 56 describes a broad based "V." The apex of arch 24, indicated by reference numeral 60, extends laterally across seam 56 at approximately a right angle. A pair of generally triangular sides 62 and 64 are thus formed. The interior of tube 22 bounded by these triangular sections define two product chambers in open communication with the balance of the interior of bag 22. The bag in its installed condition is generally cylindrical at its top and remains so until the arched portion is reached. The extreme radial walls of the bag in the arched portion generally conform to the interior geometry of the can, that is, they take a generally cylindrical configuration.

The assembly operation of the present dispenser will now be described. After product-containing bag 22 has been formed and placed over body portion 12, the bag is drawn into the body by drawing a low vacuum at its bottom open end. Top portion 14 is now seamed to the top of body portion 12 to form seam 18 as depicted in FIG. 2. Bottom portion 16 is then seamed to the bottom of body portion 12 to effect seam 20 in a manner similar to that which formed seam 18. To complete the packaging operation, dispenser 10 is filled with product through the hole which receives valve cup 30. The dispenser is then ready for attachment of valve cup 30 and its carried dispensing valve 26. Valve cup 30 is crimped at a plurality of locations around the circumference bead rim 32. A propellant injection needle is then positioned beneath the dispenser and caused to pass through valve 48 to introduce any one of a number of commonly used propellants such as octafluorocyclobutane (commonly referred to as food grade C 318 Freon). The dispenser is now ready for shipment to the consumer.

Product dispensing is normally accomplished in the following manner. The product within flexible bag 22 is in communication with valve 26. A propellant is disposed in the propellant chamber outside the bag between arch portion 24 and the upper surface of bottom portion 16. Stem 38 of valve 26 is displaced laterally of opening ports 46 to the interior of bag 22. Product will then flow through passage 40. When the valve is operated, pressure from the propellant is exerted on the exterior surfaces of bag 22. This pressure causes the bag to collapse toward the longitudinal axis of the container forcing the product through valve 26. Longitudinal collapsing continues for a time. Because bag 22 is attached to the container at seam 18, the portions of the bag closest to the top of the container will begin to collapse towards the interior surface of top portion 14. The bag will follow the outline of the interior of this portion, whether it be domed or flat. The pressure from the propellant causes the product to be squeezed towards valve extension 28 in the center of container 10. As further amounts of product are dispensed, the bag, still feeling the pressure of the propellant, eventually reaches the configuration depicted in FIG. 6. Very little product volume is left in this configuration.

ration depicted in FIG. 6. Very little product volume is left in this configuration.

Bag 22 being of filmlike consistency offers very little resistance to propellant pressure and therefore collapses substantially completely about valve extension 28. The arch configuration of bag 22 in conjunction with valve extension 28 prevents islanding or isolation of product in pockets out of communication with valve 26. If the bottom of bag 22 were a flat disc circumferentially sealed to the balance of the bag, islanding would be a severe problem because in this case the resistance offered by the seam forces preferential collapsing interiorly of the bottom against the longitudinal walls of the bag.

What I claim is:

1. An improvement in a container for dispensing pressurized fluid products comprising:
 - a. a rigid, right cylindrical, hollow body portion having a right cylindrical interior wall;
 - b. a bottom portion closing the bottom of the body portion;
 - c. a cover seamed to the top of the body portion, the cover being adapted to mount a selectively actuatable dispensing valve in fluid product communication with the interior of the body portion;
 - d. valve means on the bottom portion disposed on the longitudinal axis of the container for allowing a propellant injection needle to pass into the hollow interior of the body portion to inject a propellant therein and for sealing the hollow interior of the body portion after the injection needle is withdrawn; and
 - e. an elastic, flexible bag disposed within the body portion, the bag having a sealed end proximate the bottom portion and an open end proximate the cover, the sealed end defining a straight line before disposal in the body portion, the open end of the bag being clamped between the top of the body portion and the cover in the seam such that the interior of the bag faces the top portion and defines a product volume for a fluid product to be dispensed, the sealed end of the bag being arched, the apex of the arch crossing the longitudinal axis of the container and being spaced from the valve means on the bottom portion to provide a space between the bag and the bottom portion for a propellant injection needle, the sides of the arch extending from the apex towards the bottom portion to define a propellant chamber between the bottom portion and the exterior of the arch and product volumes bordered by the interior surface of the sides of the arch and the interior surface of the bag radially of the sides of the arch, the bag at least between about the apex of the arch and its open end being contiguous with the interior wall of the body portion, the bag, including the arch, being capable of collapsing towards the longitudinal axis of the dispenser as a fluid product in the product volume is discharged from the dispenser.
2. The improvement claimed in claim 1 wherein the apex of the arch extends as a line laterally across the seam, each side of the arch being generally triangular in shape with the apex at the base of the triangular sides and the seam extending generally normal to the apex to the tips of the triangular sides.
3. The improvement claimed in claim 2 wherein the seamed connection between the top of the body portion and the cover is formed by interlocking the two with a reverse bend of the top of the body and a double reverse bend of the edge of the cover, the open end of the bag being sandwiched between the edge of the cover and the top of the body for the full circumferential extent of the seamed connection so that the open end of the bag lies in direct tensioned contact with the unbent exterior surface of the body.
4. The improvement claimed in claim 2 wherein a portion of the bag extends from the seam joining the cover and the body portion down the exterior surface of the body portion is direct tensioned contact therewith.

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,581,941 Dated June 1, 1971

Inventor(s) John K. Bruce and Theodore R. Bruce

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the specification: Column 2, line 42, after "body" remove the period. Column 2, line 55, "MOreover" should be --Moreover--. Column 4, line 33, "MOreover" should be --Moreover--. Column 5, line 65, delete "Because." first occurrence.

In the claims: Claim 4, column 6, line 71, "is" should be --in--.

Signed and sealed this 23rd day of May 1972.

(SEAL)

Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents