July 23, 1968 J. K. BRUCE ET AL 3,393,842

PRESSURIZED CONTAINER WITH ELASTIC INNER CONTAINER AND METHOD OF ASSEMBLING SAME

Filed May 10, 1966

4 Sheets-Sheet 1

FIG. 1

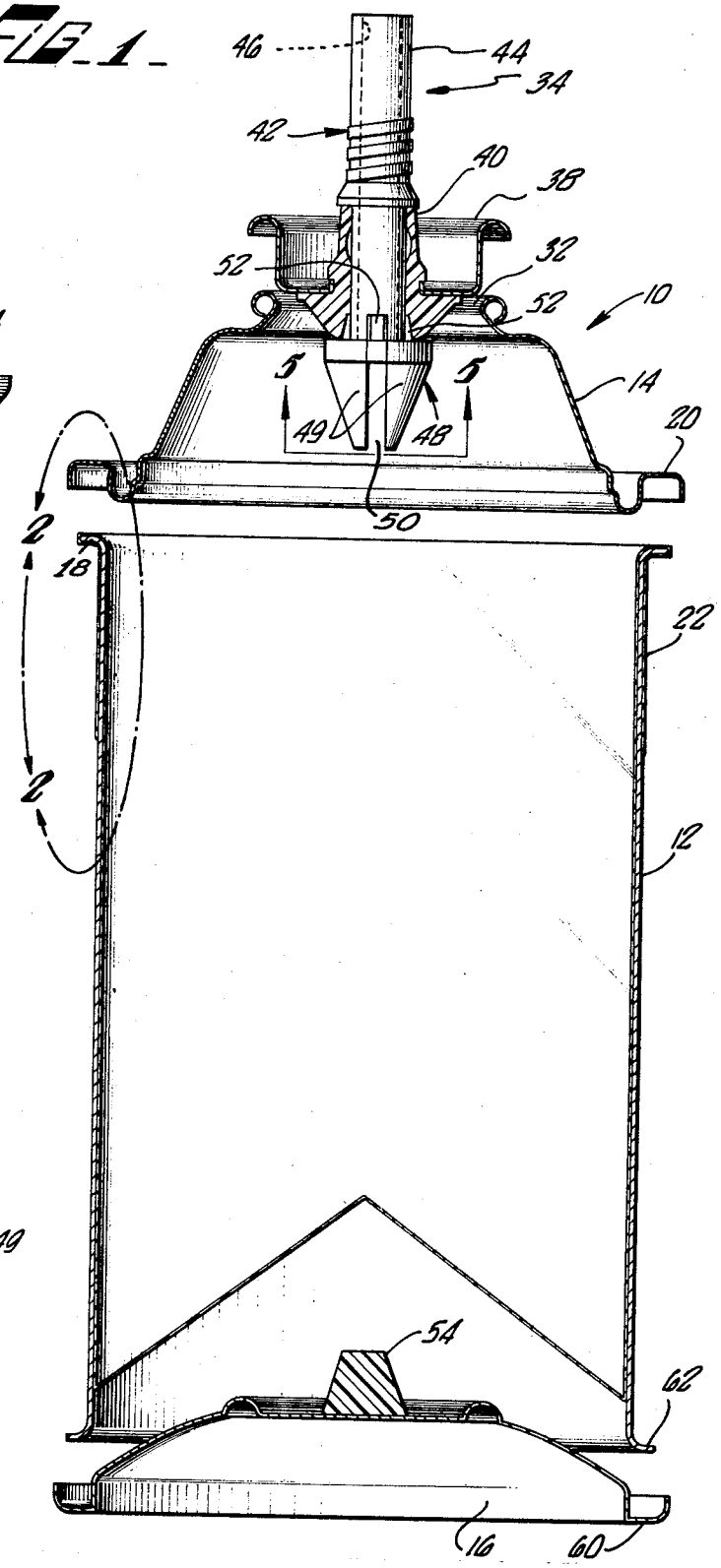
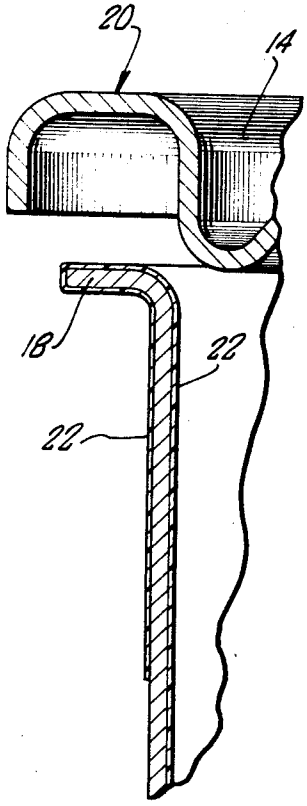



FIG. 2



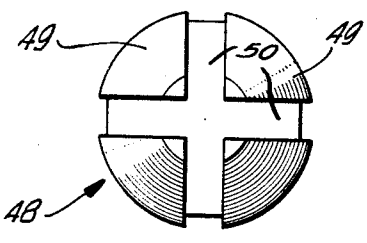




FIG. 5

July 23, 1968 J. K. BRUCE ET AL 3,393,842

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Filed May 10, 1966 4 Sheets-Sheet 2

FIG. 3.

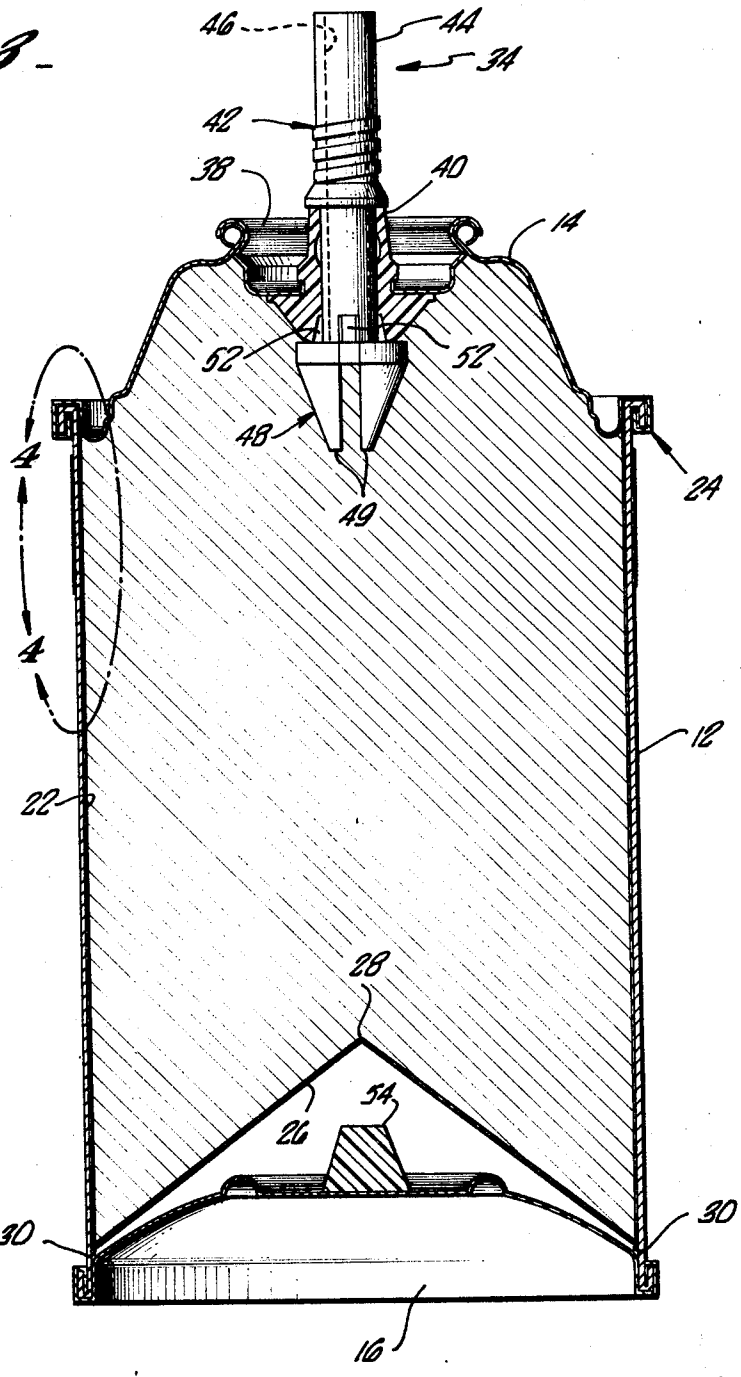
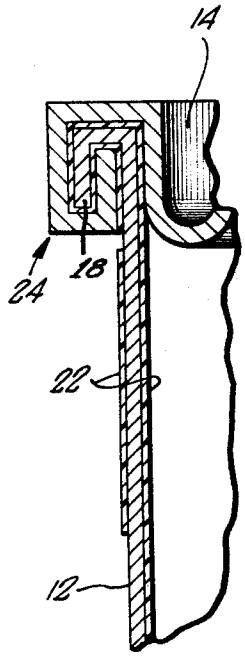



FIG. 4.




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July 23, 1968 J. K. BRUCE ET AL 3,393,842

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Filed May 10, 1966 4 Sheets-Sheet 3

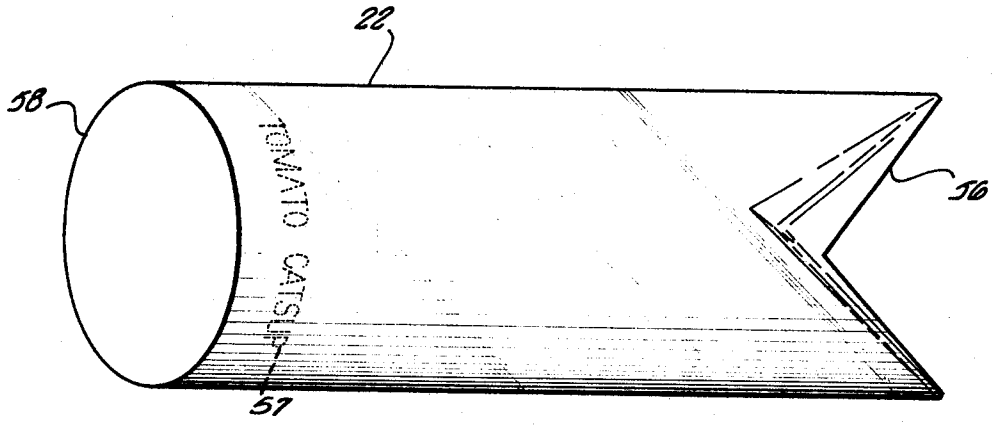



FIG. 7

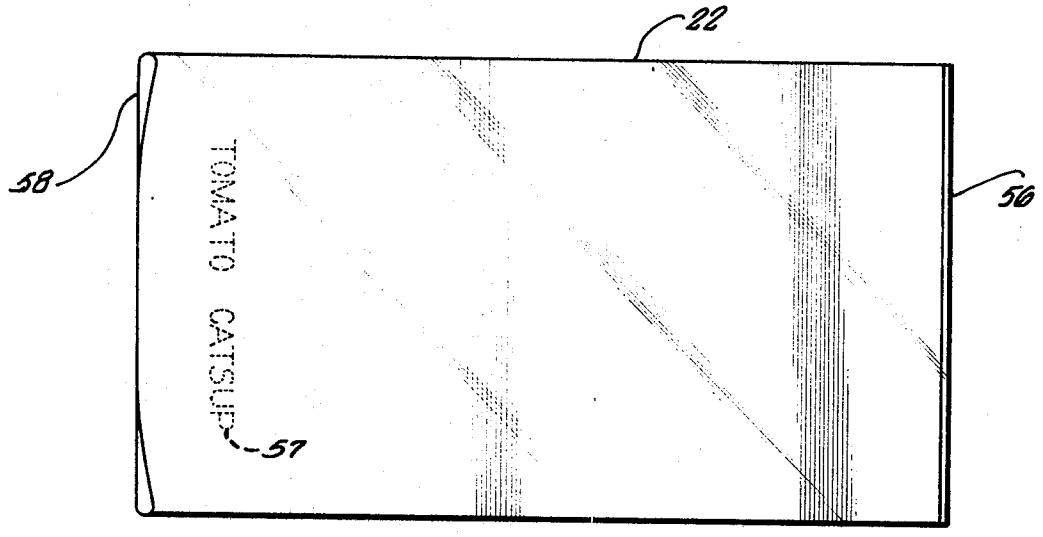



FIG. 6

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July 23, 1968 J. K. BRUCE ET AL 3,393,842

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Filed May 10, 1966 4 Sheets-Sheet 4

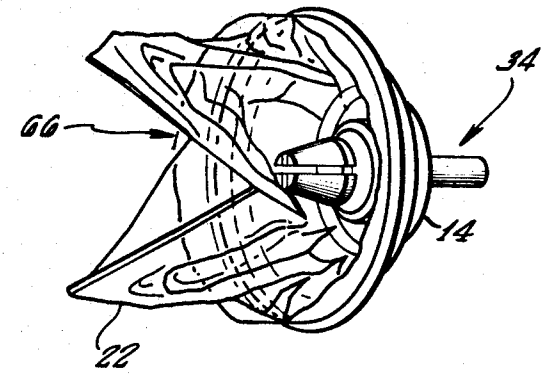



FIG. 9.

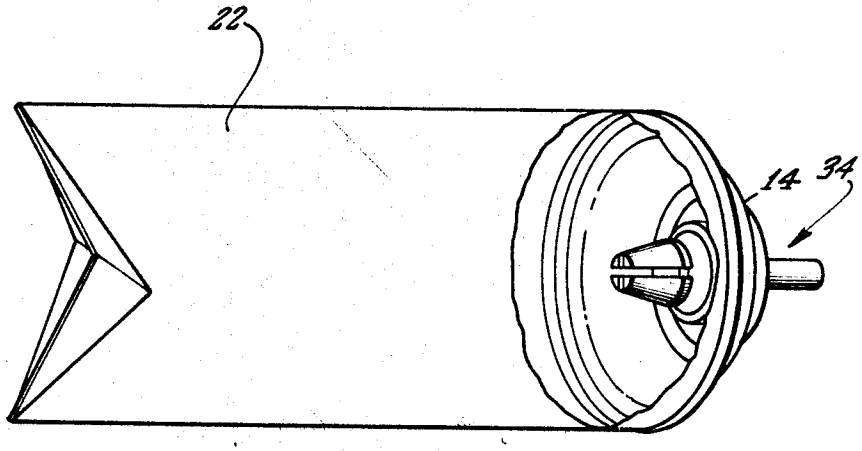



FIG. 8.

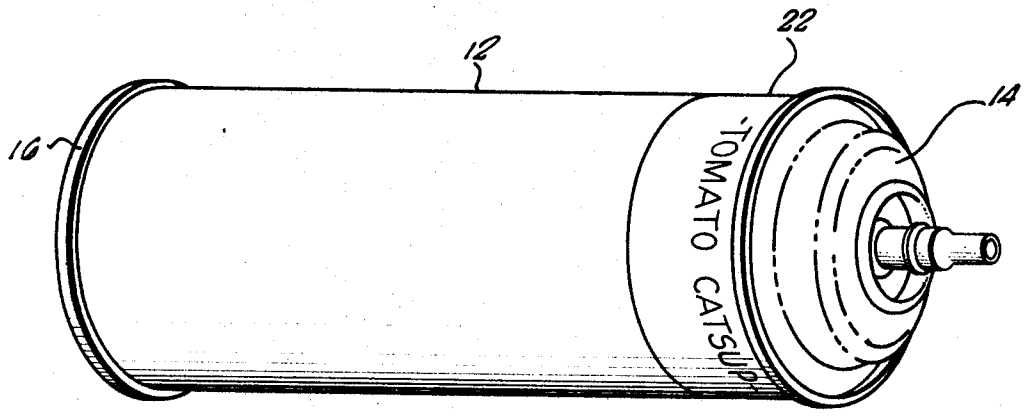



FIG. 10.

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3,393,842

# PRESSURIZED CONTAINER WITH ELASTIC INNER CONTAINER AND METHOD OF ASSEMBLING SAME

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Filed May 10, 1966, Ser. No. 548,963
6 Claims. (Cl. 222—386.5)

## ABSTRACT OF THE DISCLOSURE

A pressurized container for dispensing fluid products having a range of viscosities. The dispenser utilizes a tube of a flexible, elastic material closed at one end located within a length of rigid outer tubing. The open end of the tubing is stretched over the top end of the rigid outer tubing to form a product chamber. A container dome is seamed to the top end of the rigid tubing with the elastic tubing sandwiched in the seam. The bottom of the rigid tubing is sealed such that the space between the product chamber and the bottom of the container defines a propellant chamber. A dispensing valve is attached to the dome and propellant is charged into the propellant chamber by a gassing needle passed through a gassing valve located on the bottom of the dispenser.

This invention relates to a new self-dispensing container and in particular to a can type, valve operated, internally pressurized dispenser for fluid products, especially highly viscous materials that are difficult to vend from conventional containers.

A recent trend in the marketing of various types of products, such as shaving creams, paints and insecticides, has been to place these products in self-dispensing containers commonly referred to as "aerosol" containers or bombs. Typically these containers are rigid, cylindrical cans filled with a mixture of the product to be dispensed and a low boiling propellant such as Freon (a trademark of E. I. du Pont de Nemours & Co.). The container is provided with a finger operated valve and when operated the product, together with the propellant, is dispensed through a valve orifice. The pressure exerted by the low vapor pressure propellant as it evaporates within the container provides the force and medium for accomplishing the expulsion of the product through the orifice.

Such dispensers have been found to be useful primarily where the propellant is miscible with the product to be dispensed. In such instances the two ingredients are normally combined in the course of filling the dispenser. Regardless of the product to be dispensed, however, when the propellant and product are to be combined and contained in a single chamber, a reformulation of the product to be dispensed is necessary in order that the dispensate retains the same properties as it has prior to mixing with a propellant.

However, in the dispensing of certain items, particularly food products, it is frequently difficult to combine the product and propellant because of a number of problems. A first problem is difficulty of reformulation, a second is that many materials do not lend themselves to use in the form of an aerosol foam. In addition, with food products which can be reformulated, the choice of propellant is frequently limited to a few inconvenient ones. In still other instances, it has been found that the food product, i.e., tomato catsup, is not suitable for this type of packaging because of the adverse chemical reaction between the product, the propellant and the packaging material, frequently metal cans.



To overcome these problems, containers have been devised wherein the product is located in one chamber and the propellant in the other and the two are separated by a piston. In this arrangement the chamber containing the product to be dispensed communicates with a dispensing orifice. Suitable pressure exerting means are provided for moving the piston and forcing the product out of the orifice.

With respect to this type of dispenser, approximately 33% or more of the total container volume is occupied by the piston, limiting its useful volume substantially. In addition to the cost of providing a piston, the container must be of an extruded type to permit close contact between the piston and the container wall. Normally dents in the container wall render it useless and product seepage around the piston is a frequent problem. To provide sufficient pressure to operate this dispenser a high pressure propellant is necessary and the container cannot be used with certain products such as catsup unless protective layers are applied to the interior wall of the container to prevent metal-product contact.

Pressurized dispensers other than the piston type container include those types generally referred to as diaphragm and sack-type dispensers. Typical examples of these types of prior art dispensers are illustrated in U.S. Patents 3,140,802 and 3,145,884. Such dispensers have not been accepted in the trade for several reasons. These reasons include substantial problems in manufacture, difficulties in operation and excessive cost.

The present invention is a practical container that can be produced on equipment presently in use and utilizes standard, readily available components. By virtue of these two aspects, the package of the invention is assured of an extremely low manufacturing cost, thereby making it practical to package many products that heretofore have not been available in pressurized dispensers.

The invention provides a dispensing container which includes a length of rigid, hollow tubing. Located within the rigid tubing is a length of flexible, hollow, elastic tubing having an open and a closed end with the outer perimeter of hte elastic tubing having approximately the same dimensions as the inner perimeter of the rigid tubing. The open end of the elastic tubing has a predetermined length thereof along its longitudinal axis stretched over one end of the rigid tubing such that the elastic tubing extends from the interior of the rigid tubing over the end and down along the exterior for a predetermined distance with the elastic tubing forming a tensioned contact with the end and exterior side of the rigid tubing. A top portion having a dispensing orifice is attached at one end of the rigid tubing and a bottom portion at the other end with the top and bottom portions being attached in a manner such that the elastic tubing passes between one of said portions and the rigid tubing in a sealed laminar relationship. In this manner the space between the top end of the rigid tubing and the elastic tubing defines a product chamber and the space between the bottom end of the rigid tubing and the elastic tubing defines a propellant chamber.

An important feature of the invention is the formation of the seam between the top portion with the dispensing orifice and the rigid tubing. In particular, the open end of the elastic tubing is interlocked between a reverse bend of the one end of the rigid tubing and a double reverse bend of the edge of the top portion, the end of the elastic tubing being sandwiched between the edge of the top portion and the one end of the rigid tubing for the full extent of the seam so that the open end of the elastic tubing lies in direct tensioned contact with an unbent longitudinally straight portion of the outside surface of the rigid tubing.

One of the advantages of the present invention is its

suitability for use with standard, readily available components. The various parts of the container, including the body and top portions, and the flexible tubing, are all standard commercial items which need not be specially manufactured or tailored to be adapted to the present application. In addition, the use of tubing, which is preferably fabricated from polyethylene or other flexible organic plastic materials, provides a means for obtaining accurate measures upon filling and minimum wastage upon dispensing. As will be described in more detail below, the use of tubing drawn over the mouth of the body portion of the container at one end and sealed at the other to form a product containing bag results in a unique configuration to the bottom of the tubing which lends itself readily to easy charging or introduction of the propellant into the interior of the container after the dispenser is completely assembled. Since flexible tubing of minimum thickness is used, dispensing of the product can be accomplished at very low pressures.

In the preferred embodiment, the dispensing valve is provided with a unique configuration of that portion resident within the container which further aids in dispensing the final product to substantially eliminate waste.

These and other advantages of the invention will be more readily understood by reference to the following figures in which:

FIG. 1 is an exploded sectional view of the dispenser of the present invention before the components are seamed and crimped together;

FIG. 2 is an enlarged fragmentary view of area 2—2;

FIG. 3 is an exploded sectional view of the dispenser after assembly;

FIG. 4 is an enlarged fragmentary view of area 4—4;

FIG. 5 is a view taken along lines 5—5 of FIG. 1;

FIG. 6 is a front elevation of the product containing tubing after being cut from a length of flat stock;

FIG. 7 is a front elevation of the bag of FIG. 6 in its opened condition;

FIG. 8 is a cutaway perspective view of the dispenser showing the top portion and dispensing valve and the tubing in its fully extended condition.

FIG. 9 is a perspective view similar to FIG. 8 showing the product containing bag or tubing in the collapsed position; and

FIG. 10 is a front elevation view of the container in a fully assembled condition, including printing on the exterior portion of the tubing.

Referring now to FIGS. 1, 2, 3 and 4, there is shown in FIG. 1 a sectional view of a dispenser **10** having three main portions, a body portion of rigid tubing **12**, a top portion **14**, and a bottom portion **16**. In the assembled condition (FIG. 3), the top and bottom portions, **14** and **16**, respectively, are double seamed to the body portion **12**. A seam is a word of art in the packaging industry denoting the way in which container parts are attached to one another.

Extending over the top lip or flange **18** of the body portion **12** and passing between the lip **18** and a flange **20** of top portion **14** is a portion of a flexible tube **22** the tubing being preferably fabricated from a plastic, elastic material. When properly positioned, the tube or tubing **22** extends from a point on the exterior of body portion **12** a predetermined distance below the top of the body portion, over the flange top or lip **18** and into the interior of the rigid body portion. When top and body portions, **14** and **12**, respectively, are joined a seam **24** is formed. This seam interlocks the open end of tubing **22** between the top lip of body portion **12** and the edge of top portion **14** for the full extent of the seam so that the open end of tubing **22** lies in direct tensioned contact with an unbent longitudinally straight portion of the outside surface of body portion **12**. When positioned and filled as shown in FIG. 3, the bottom **26** of the flexible tubing **22** assumes an arched configuration with the apex **28** of the arch being located at a position considerably higher than the bases of the arch **30**.

A valve assembly **34** is adapted to be disposed within an opening **32** in top portion **14** and crimped to the rim of opening **32**. The valve assembly **34** compriises a mounting member **38**, having a body portion **40** concentrically disposed therein through which a valve member **42** passes. The valve member **42** comprises an elongated portion **44** having an interior passage **46** passing therethrough and a unique valve extension **48** abutting body portion **40** at one end and extending from the elongated portion **44** into the interior of the dispenser **10**. Valve extension **48** is provided with a plurality of segments **49** which define longitudinal channels **50** communicating with apertures **52** which in turn communicate with passage **46** through valve member **42**. An end view of valve extension **48**, taken along lines 5—5 of FIG. 1, is shown in FIG. 5. In addition to the segmented construction of valve extension **48**, other configurations are also possible. For example, a solid core piece of predetermined length having plurality of longitudinal channels or grooves located in its surface or a hollow apertured core piece are also satisfactory. In the former, the grooves or channels are cut sufficiently deep so that they communicate with apertures **52**. The primary function of valve extension **48** is to provide some means about which tubing **22** may collapse. It is particularly useful in aiding in the explusion of the last few ounces in the dispenser. The valve extension **48** will be more fully discussed in conjunction with the discussion of the dispensing of a product from container **10**. In addition to a valve as shown, which is operated by horizontal finger pressure, other valves suited for use with pressurized dispensers may also be employed.

As indicated above, bottom portion **16** is joined to the bottom of body portion **12** by means of a seaming operation (FIG. 3). The bottom portion **16** in one embodiment is a dished member having its convex side facing interiorly of body portion **12**. In the presently preferred embodiment there is deposited on the convex side of the bottom portion **16**, a deposit **54** of a catalyzed polyester compound. The deposit is preferably frustoconically shaped and serves as a self-sealing valve through which propellant for pressurizing the product to be dispensed is introduced into the interior of container **10**. The conical shape of the deposit is preferred in order that the radial pressure exerted by the propellant on the deposit will give maximum sealing as a gassing or pressurizing needle or other plunger which has been inserted through the bottom of body portion **16** and deposit **54** is withdrawn from the container. In addition, the arched configuration of the bottom of the flexible tubing **22** cooperates with the preferred conical shape of the self-sealing valve to prevent puncture of the tubing when the bottom portion **16** and valve **54** are pierced by a pressurizing device. In addition to using a self-sealing compound, other self-sealing valves may also be used in this application.

In some applications it is contemplated that the propellant can be introduced into the container in a solid state. In such applications a gassing valve is unnecessary since the propellant can be deposited on bottom portion **16** before it is seamed to the rigid body tube **12**.

In FIGS. 6 and 7 are shown elevational views of a length of flexible tubing **22** such as is used in the dispenser of FIGS. 1 and 3. The tubing is normally obtained in roll form and is dispensed therefrom in a flattened configuration (FIG. 6). Use of such tubing makes the cost of the product-containing portion of the dispenser of this invention low by virtue of the ready availability of such tubing in rolls and the simplicity of its preparation for use in the container of this invention. The dimension of the perimeter of the flexible tubing is selected such that it is approximately the same as the inner perimeter of the rigid tubing into which it is inserted, i.e., body portion **12**. In the preferred embodi-

ment, flexible tubing **22** and rigid body portion **12** are cylindrical and the diameter of the flexible tubing is selected such that it is equal or less than the inner diameter of body portion **12**.

To prepare the tubing for insertion into the container, a predetermined length thereof is heat sealed to close one end **56** and it is cut from the roll. If desired, printed material **57** can be placed on the tubing stock before the cutting operation. When ready for attachment, the opposite end **58** of the tube is expanded and slipped over the top end of the body portion **12** and then released allowing the tubing to retract leaving the open end of the tube stretched over the mouth of the body portion **12** and extending down a predetermined length along the exterior of the body portion. By controlling the dimensions and grade of plastic tubing used, the tubing walls can be caused to adhere to the exterior of the can body and maintain a skin-like, tensioned elastic contact around the flange and exterior surface of the body portion as shown in FIGS. 1–4. This skin-like, pressure contact is important in producing a gripping, elastic attachment to the body portion **12** and flange **18** thereby holding the bag in place during the seaming and preventing the bag from being pushed back into the container by insertion of top portion **14** and from gathering, doubling or twisting while forming the double seam.

In the preferred embodiment, the product containing bag is fabricated from extruded polyethylene tubing having an appropriate wall thickness for example .002 inch. It is contemplated that other organic plastic materials such as polyvinyl, polypropylene, and the like can also be used. In contrast to the product-containing bags used in certain prior art dispensers, the tubing of this invention is preferably of uniform wall thickness throughout. Polyethylene has the further advantage that it undergoes very little expansion during the filling operation. This characteristic, coupled with its stretched attachment to the top lip **18** of body portion **12**, combines to provide a very accurate measure for the product to be placed in the dispenser.

The assembly operation of the present dispenser is best illustrated in conjunction with FIG. 3. After the product containing bag has been formed from tubing **22**, it is placed over body portion **12** and a predetermined length at the open end thereof is drawn down over the lip **18** of body portion **12**. Once positioned relative to body portion **12**, placement of the bag within the rigid body portion is accomplished by drawing a low vacuum at the bottom of rigid tubing **12** to cause the tubing to be drawn into the interior of the dispenser.

Top portion **14** is now clamped to the top of body portion **12** and flange **20** on the top portion **14** is bent around flange or lip **18** on the top of body portion **12** by means of a seaming operation to achieve the relationship shown in FIGS. 3 and 4. The seaming operation seals the flexible tubing **22** between the top and body portion around the perimeter thereof and also serves to sever that portion of the polyethylene tubing **22** extending down below the lower end of the flange **24** on top portion **14**. The top of body portion **12** has a reverse bend and the edge of top portion **14** has a double reverse bend. The end of tubing **22** is sandwiched between the reverse bend of the top of body portion **12** and the double reverse bend of the edge of top portion **14** for the full extent of the seam so that the open end of tubing **22** lies in direct tensioned contact with an unbent longitudinally straight portion of the outside surface of body portion **12**. Decorated and printed, that portion of the polyethylene tubing becomes a label which can be stripped off to make the can acceptable for table service (FIG. 10).

At a time previous to the filling operation, a deposit of a self-sealing rubber-like compound forming a self-sealing valve is placed on the convex side of bottom portion **16** approximately in the center thereof. As indicated above, the valve may be unnecessary in certain applications. This bottom portion is now clamped to the bottom of body portion **12** and flange **60** on the bottom portion **16** and is bent around flange **62** on the body portion by means of a seaming operation similar to that with which the top portion is attached to the body portion to complete the closure of the container.

To complete the packaging operation the dispenser is then transported to a location such as a rotary filling machine where a product, e.g., toothpaste, catsup, peanut butter, syrup, or the like is charged into the polyethylene container. The dispenser then moves from the filling location and is ready for attachment of valve mechanism **34**. The valve mechanism **34** is placed in opening **32** and crimped at a plurality of locations around the circumference thereof to the top portion **14**. Where a gassing valve is used, the can is then transported to a location where a hypodermic needle or other plunger is positioned beneath the dispenser and caused to pass through valve **54** to introduce any one of a number of commonly used propellants. A preferred propellant is octafluorocyclobutane (commonly referred to food grade C 318 Freon). The dispenser is now ready for shipment to the consumer.

The relationship of the container body **12** to tube **22** and to container top portion **14** is important in accomplishing the efficient dispensation of products contained within tube **22**. In FIG. 8 is shown the relationship of top portion **14** to tube **22** with the tube in its fully filled condition. The use of flat tubing necessarily constrains the tube to form an arch in the bottom portion **26** of tube **22**. The arched configuration of the tube provides important advantages in the pressurization of the container and the complete discharge of the product therefrom.

Dispensing of the product contained within polyethylene container **22** is normally accomplished in the following manner: Finger pressure is brought to bear on the elongated member **44** of valve assembly **34** creating a space between valve body portion **40** and valve member **42** and providing a path of communication from the interior of flexible tubing **22** to the passage **46** in elongated member **44**. When the valve is operated, pressure from the propellant located within the container interior being exerted on tube **22** causes it to collapse toward the longitudinal axis of the container thereby forcing the product through apertures **52** and passage **46** and out of the valve. This action continues until approximately one-half or more of the product has been dispensed. Then because tubing **22** is attached to the container at the point where top portion **14** and body portion **12** are seamed, the portions of tubing **22** nearest the top of the container collapse first toward the top portion **14** (FIG. 9) and tend to follow the outline of the interior of this portion whether it be domed or flat. Pressure from the propellant exerted on this portion of the tube causes the product to be squeezed toward valve extension **48** in the center of the container. As further amounts of the product are dispensed from the container, the tube, under the influence of the propellant and because of its natural tendency, collapses toward valve extension **48** as shown at **66** in FIG. 9. Because the tube **22** is of film-like consistency little resistance is offered to the pressure exerted by the evaporating propellant and it collapses substantially completely leaving no space for any product to be retained within the container. The configuration of the tube **22** in conjunction with valve extension **48** prevents the tendency of the product-containing portion of the container to "island" at any point during the dispensation of the product from the container. This islanding tendency wherein the product containing tube tends to form pockets or islands of product which are prevented from communicating with the valve impedes the elimination of the product contained within these pockets and contributes to wastage.

In addition to the aforementioned advantages, it has been found that a much smaller amount of propellant is needed because none of the propellant is exhausted through the dispensing valve as the product is dispensed. Thus the can will hold more product and less propellant. It has also been found that only a small amount of pressure is needed to be exerted by the propellant introduced within the dispenser in order to obtain satisfactory discharge of the product. This pressure (on the order of 25 p.s.i.) means there can be a commensurate reduction in the strength requirements for the can making possible the use of less expensive containers further adding to the economy of a dispenser according to the present invention.

What is claimed is:

**1.** A pressurized container for dispensing fluids comprising:

a hollow, rigid body having first and second open ends;

an elastic, flexible tubing located within the body, the tubing being closed at its end near the first end of the body and being open at its end near the second end of the body and the diameter of the tubing being less than the diameter of the body;

a first cap covering the first end of the body;

a second cap covering the second end of the body;

a seam formed by interlocking the open end of the tubing between a reverse bend of the second end of the body and a double reverse bend of the edge of the second cap, the open end of the tubing being sandwiched between the edge of the second cap and the second end of the body for the full extent of the seam so that the open end of the tubing lies in direct tensioned contact with the unbent longitudinally straight portion of the outside surface of the body;

a charge of propellant located within the body on one side of the tubing;

a charge of material to be dispensed located within the body on the other side of the tubing; and

a dispensing valve located in one of the caps, the valve being in communication with the charge of material to be dispensed.



**2.** The container of claim **1**, in which the seam is formed by bending the open end of the tubing back on itself twice.

**3.** The container of claim **1**, in which the seam is formed by bending the open end of the tubing into an S-shaped portion bounded on one side by the edge of the second cap and on the other side by the second end of the body for the entire length of the S-shaped portion.

**4.** The container of claim **3**, in which the first cap has a self-sealing valve permitting access to the interior of the body.

**5.** The container of claim **1**, in which the first cap has a self-sealing valve permitting access to the interior of the body.

**6.** The container of claim **1**, in which the charge of propellant is located on the side of the tubing facing the first cap, the charge of material to be dispensed is located on the side of the tubing facing the second cap, and the dispensing valve is located in the second cap.


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