United States Patent

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[15] **3,656,660**

[45] **Apr. 18, 1972**

[54] CLOSURE MEMBER AND DISPENSING DEVICE

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[22] Filed: **Nov. 17, 1969**

[21] Appl. No.: **877,138**

[52] **U.S. Cl.** **222/94**, 222/212

[51] **Int. Cl.** **B65d 35/22**

[58] **Field of Search** 222/92, 94, 95, 212

[56] **References Cited**

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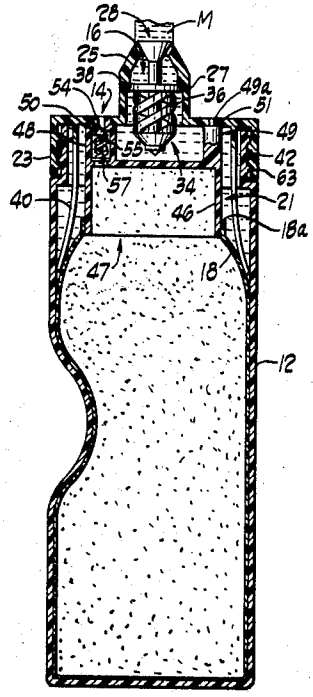
[57] **ABSTRACT**

A closure member, for use with a flexible, resilient, container. The closure member provides an inlet orifice and an outlet orifice to the container and an expansible chamber for containing displacement fluid. The outlet orifice is constructed to communicate directly with the interior of the container, to permit outflow of material when the container is squeezed, and to prevent inflow of displacement fluid. The inlet orifice is constructed to communicate with the expansible chamber, to permit inflow of displacement fluid to the expansible chamber when the container wall returns to original shape after being squeezed, and to prevent outflow of displacement fluid. A flexible bladder, initially collapsed, forms the expansible chamber. The closure member includes structure to which the bladder is attached and which contains the initially collapsed bladder, and structure that inhibits the bladder from sealing off the outlet orifice from the contents of the container. The structure that contains the initially collapsed bladder can be elongated to limit the extent to which the container can be flexed.

10 Claims, 8 Drawing Figures



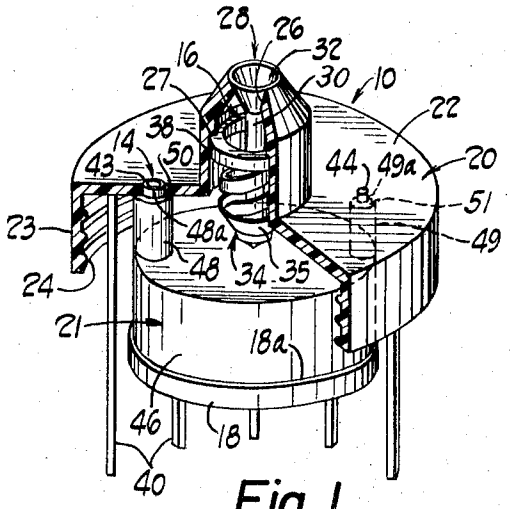


Fig. 1

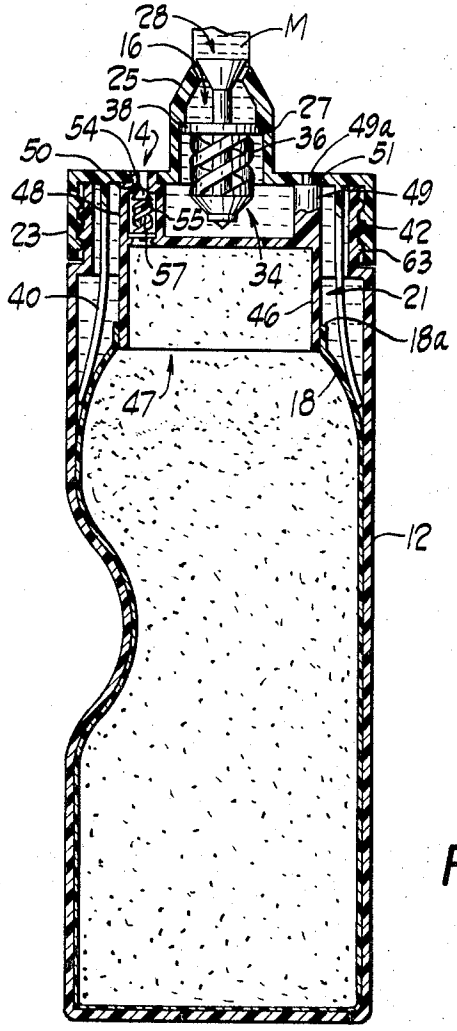


Fig. 3

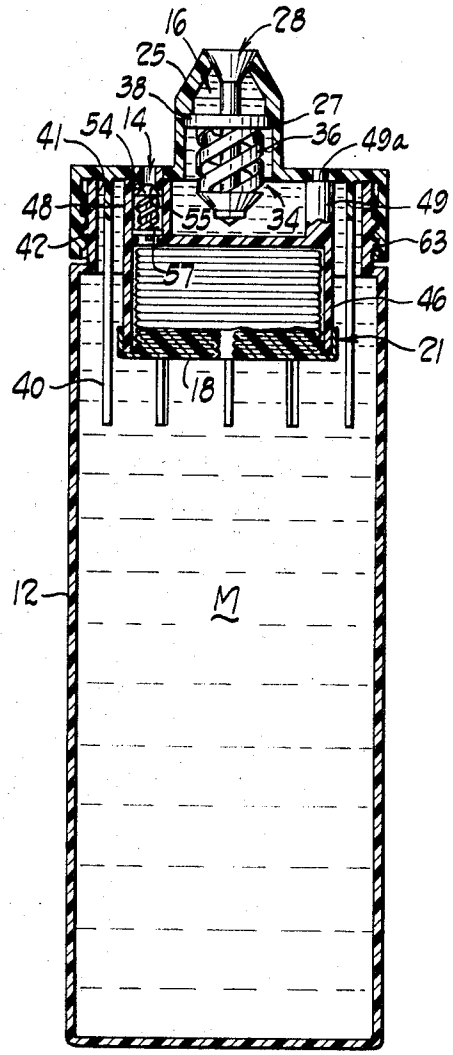


Fig. 2

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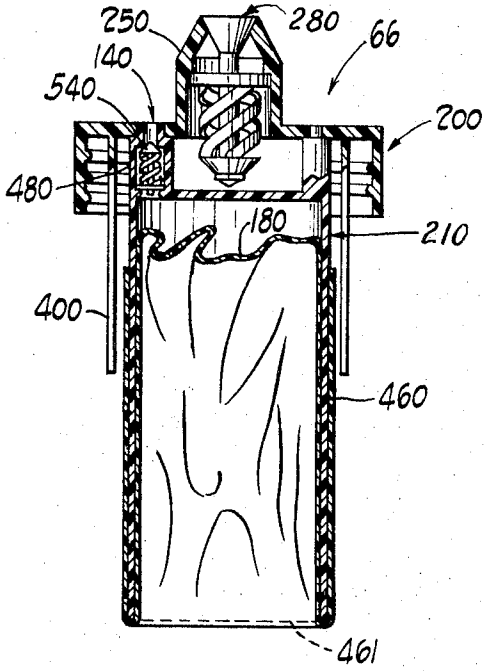

Fig. 4

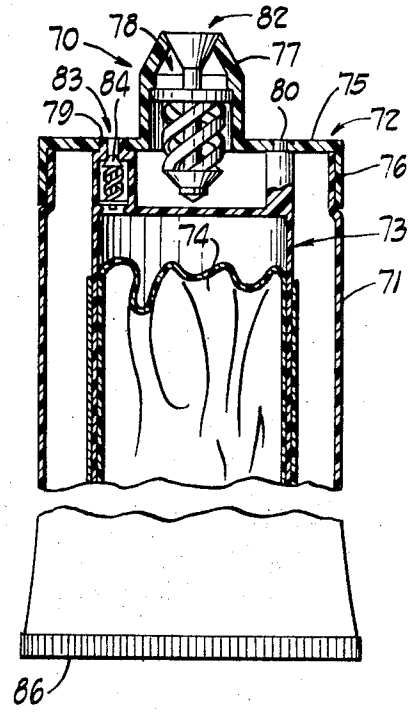

Fig. 5

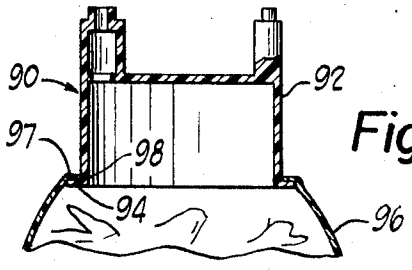

Fig. 6

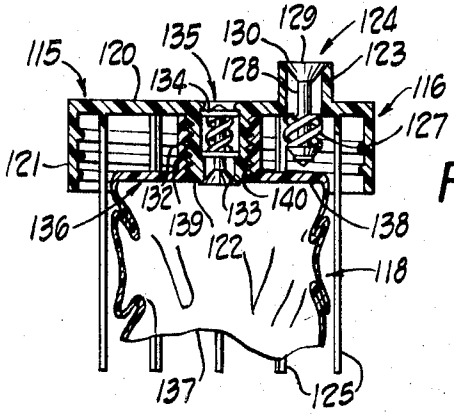

Fig. 8

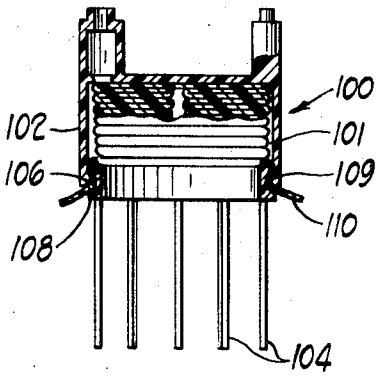

Fig. 7

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CLOSURE MEMBER AND DISPENSING DEVICE

This invention relates to a closure member that converts a flexible, resilient, container into a squeeze-type dispenser, and to a combination of the closure member and container.

The closure member is constructed to be secured to and close an opening of a flexible container, and includes an outlet orifice through which material from the container is dispensed and an inlet orifice through which displacement fluid is admitted to the container. The closure member further includes structure insertable into the container when the closure member is secured thereto, which defines an expansible chamber for receiving and containing displacement fluid that enters the container after material is dispensed. The container itself, with which the closure member is used, directly contains the material to be dispensed. The outlet orifice of the closure member is constructed and arranged to communicate directly with the interior of the container, to permit outflow of material when the container is squeezed, and to prevent inflow of displacement fluid. The inlet orifice is constructed to communicate with the expansible chamber, to permit inflow of displacement fluid to the chamber when the flexible, resilient, wall of the container returns to shape after being squeezed, and to prevent outflow of displacement fluid during squeezing of the container. As a result, the container and closure member form a dispenser of the constant volume type, which is divided into two separate zones, one for the material being dispensed and one for air or other fluid to displace the dispensed material. The respective volumes of the two zones vary inversely as the outer container, originally full of material to be dispensed, is emptied through use. This device operates in the same manner as the devices disclosed and claimed in my U.S. Pat. No. 3,319,837 issued May 16, 1967 and titled "-Dispensing Device," and is an improvement which facilitates the filling and assembly of containers and most importantly provides a closure member that can convert a standard flexible, resilient, container into a dispenser of the type described. Accordingly, a combined container and improved cover member embodying this invention has, in addition to its own specific advantageous features, the functionally advantageous features of the devices disclosed in the aforementioned patent, including the ability to dispense flowable material ranging from liquids to heavy creams or pastes and powders, the characteristic of isolating the contents from the displacing fluid, the lack of any need for propellants and hence avoidance of internal pressure until the wall is flexed, the efficient utilization of the volume of the container for material to be dispensed, and the characteristic of being, in effect, always full until empty.

A preferred embodiment of this invention utilizes an inner inverted cup or cuplike member beneath a cover part or cap portion of the closure member that is adapted to attach to a flexible container at the opening thereof. The cap portion is suitably threaded or otherwise constructed to attach to the container across the opening. The cup is secured to the cap and has a conduit that extends upward through the cap and opens externally of the container. A flexible bladder forms a displacement chamber of variable volume. The bladder is attached to the cup and is initially collapsed and contained in a compact condition within the cup. As displacement fluid is introduced into the bladder, it expands and extends from the cup into the flexible container. A one-way valve is located in the conduit to the cup and bladder to permit flow into the bladder but to prevent outflow. In the preferred embodiment, which is adapted for use with all flowable materials, a discharge orifice through the cap includes a one-way valve to permit outflow of material being dispensed but to prevent inflow of displacement fluid. Where the material to be dispensed is limited to highly viscous substances, the orifice alone, in cooperation with the material within the orifice, will serve to prevent inflow of displacement fluid and in such instances it is possible to omit specific valve elements otherwise required for more fluid substances.

The preferred closure member includes a plurality of flexible fingers extending from the member and adapted to be

received within the container to which the closure member is attached. These fingers constrain the upper part of the expansible bladder against expansion to an extent that, or against movement to a location where, the bladder obstructs passage of material about the bladder to the discharge orifice. For example, the fingers will restrict the bladder to a position slightly below the outlet orifice of the closure member and, in containers with a mouth of smaller diameter than the container, to a position somewhat below a neck portion thereof, and thereby assure that a passageway is maintained about the bladder to the outlet orifice.

An advantageous feature of the present invention is that the dispenser may be constructed to consistently dispense a substantially uniform and predetermined amount of the contents with each flexing, by limiting the maximum flexure of the container at a predetermined location. This is conveniently accomplished in accordance with the present invention by providing an elongated tubular member within the container, with an open end that receives the collapsed bladder and that limits inward flexure of the container. Advantageously, the cuplike member that extends from the cap of the closure member can be lengthened to provide this structure. This elongated cup, which typically will be cylindrical, forms a rigid structure centrally within the flexible container opposite the portion of the container to be squeezed. By providing a cup oval in cross section, two different predetermined volumes can be dispensed, depending upon the location at which the flexible container is squeezed. If squeezed opposite the major cross sectional axis of the oval cup, a smaller volume will be dispensed than when it is squeezed opposite the minor cross sectional axis of the cup. The similar usefulness of other shapes will be apparent.

Other embodiments of closure structures and bladders are contemplated to provide particular features and structural variants of the basic elements. For example, for convenience in manufacture, a one-way valve in the discharge orifice of the closure member can be formed integrally with the cap member. Various ways of attaching the bladder to the closure member are contemplated to facilitate manufacture and assembly and particular bladder structures are contemplated that inherently inhibit the bladder from blocking flow to the discharge orifice in particular embodiments.

These and other features and advantages of this invention and various embodiments therefore will be better understood by reference to the following detailed description, when considered in connection with the accompanying drawings, in which:

FIG. 1 is a perspective view, partially broken away, of a closure member embodying the present invention;

FIG. 2 is a sectional view of a dispenser formed of a flexible, resilient, container and the closure member of FIG. 1, with the container filled with material to be dispensed;

FIG. 3 is a sectional view of the dispenser of FIG. 1 in which the material has been substantially dispensed and the space filled with an expansible bladder;

FIG. 4 is a sectional view of another embodiment of a closure member similar to that shown in FIG. 1 but constructed to limit the extent to which a container with which it is used can be squeezed;

FIG. 5 is a sectional view of another embodiment of a closure member for use with a flexible resilient tube-type container;

FIG. 6 is a sectional view of a modified construction of portion of the closure member of FIG. 1;

FIG. 7 is a sectional view of another modified construction of a similar portion of a closure member to that shown in FIG. 6; and

FIG. 8 is a sectional view of a modified closure member embodying the present invention.

With reference now to the drawings, a closure member 10 embodying the present invention is shown in FIG. 1, suitable for attachment to a flexible and resilient container, such as a plastic bottle 12, as shown in FIGS. 2 and 3, and provides an

inlet orifice 14, an outlet orifice 16 and structure 18 forming an expansible chamber for the container. The closure member 10 includes a cap portion 20, an inverted cup 21 secured beneath the cap, and a flexible bladder secured to the cup and comprising the structure 18 forming the expansible chamber. The cap 20 includes a top surface 22 and a peripheral depending flange 23 having internal threads 24. A spout 25 extends from a central portion of the top surface 22 and forms the outlet or discharge orifice 16. A valve seat 26 is formed at the outer end of the spout and an internal shoulder 27 is formed within the spout for cooperating with a one-way valve 28 within the spout. The outer surface of the spout is constructed to receive an optional outer cover (not shown).

The one-way valve 28 is a relatively small valve and in the preferred embodiment is preferably molded of plastic so that it will not deteriorate in use or contaminate the material contained in the dispenser. The construction of the particular valve 28 disclosed provides rotary as well as axial movement to assure a good seal. The valve 28 includes a stem portion 30, a tapered valve head 32 integral with the stem, and a spring portion 34. The spring portion 34 includes an end cup 35, three helical spring strips 36 and a flat ring 38. The end cup, spring strips, and ring are integral, with the spring strips extending between the end cup and ring, about the stem portion 30. The ring encircles the stem and abuts against the internal shoulder 27 in the spout 25. In the embodiment shown in FIGS. 1 to 3, the stem is a separate piece from the spring portion 34 and is pressed into a central opening in the end cup 35 during assembly and after being inserted into the central orifice 16 and is held in place by a retaining groove in the stem that provides a snap fit with the cup. Alternatively, the stem and spring portion can be molded of one piece, without the tapered head 32. The top of the stem is then extended through the opening or orifice 16 and flared to form the head. The parts of the one-way valve 28 are of a size and the shoulder 27 is located so that the spring portion 34 biases the valve head 32 into a seated condition against the valve seat 26 under sufficient pressure to provide a seal and to seat the valve in the absence of a flow of material through the orifice. With the valve 28 of molded plastic, the spring strips are inherently flexible and resilient.

A plurality of flexible fingers 40 (eight such fingers being provided in the preferred embodiment) extend from the inside of the top surface 22 of the cap 20, just inwardly of the flange 23 a sufficient distance to clear the mouth, such as the mouth 41, of the container adapted to be closed by the closure member 10. The fingers extend a sufficient distance from the top surface of the cap to project into the container adapted to be used with the cap, e.g., beyond a neck portion 42 of the container 12 and sufficiently far to extend beyond the cup 21 so as to engage and constrain the upper portion of the flexible bladder 18 as it expands. In this manner, the flexible fingers 40 prevent the bladder 18 from expanding upward and from forming a seal between the cup and container, especially about the neck portion of the container or across the orifice 16 of the closure member.

Two circular apertures 43, 44 are formed in the top surface 22 of the cap 20, on diametrically opposite sides of the spout 25. These apertures provide means for securing the cup to the cap and provide a passageway through the cap to the cup for a flow of displacement fluid to the bladder.

The cup 21 is comprised of a cylindrical cup body 46 having an opening 47, and two posts 48, 49 at diametrically opposite portions of the cup body, extending in a direction opposite from that of the opening 47. Additional posts can be provided for greater stability and strength, but normally are not required. Each post 48, 49 has a shoulder portion 50, 51, respectively, and an upper end 48*a*, 49*a* of reduced diameter and equal in diameter to the diameter of the apertures 43, 44. The posts 48, 49 are of a length sufficient to locate the cup body 46 spaced below the valve 28 to provide a passageway around the cup body, between the cup body and cap, to the orifice 16. The lower position of the cup also locates the bladder sufficiently below the discharge orifice, tending to inhibit the bladder from reaching a position where it might seal off the orifice. The post 48 is tubular and includes a valve 54 and valve seat 55. The valve and valve seat are constructed to seal the passageway or orifice 14 against outflow of fluid, but to permit inflow. The valve 54 is biased against the valve seat 55 by a spring 57 and the seat and valve are constructed so that fluid acting in an outward direction, i.e., tending to escape through the cup body and orifice 14 tends to further seat the valve. Thus, the valve 54 acts as a check valve, allowing inward flow but not outward flow.

In the preferred embodiment shown, the bladder 18 is a flexible envelope or pouch, suitably in the form of a plastic bag or the like. The bladder has one open end 18*a*, which is secured about the cup body 46 and sealed thereto in a fluid-tight relationship. The open end 18*a* of the bladder is narrower than the remainder of the bladder, which typically widens directly beneath the cup body to conform in shape and size to the container with which the closure member is adapted to be used. In this manner, the bladder, when expanded, will substantially fill the flexible container, as illustrated in FIG. 3. Initially, as illustrated in FIG. 2, the bladder 18 is in a collapsed condition and is tucked up into the cup body 46, either neatly accordioned as shown or randomly compressed into the space provided.

When the closure member 10 is attached to a flexible, resilient, container, such as the container 12 shown in FIGS. 2 and 3, which has external threads 63 about the neck portion 42 engageable with the threads 24, the cap seals the opening 41 and the cup and bladder extend into the container. Little space is occupied initially by the cup and bladder due to the compact collapsed condition of the bladder. The closure member is applied after the container is filled with material M to be dispensed. When the flexible, resilient, wall of the container 12 is squeezed to deflect the wall inwardly, as illustrated in FIG. 3, material M is forced through the discharge orifice 16, the increased pressure of the material easily opening the one-way valve 28. Upon release of pressure upon the container walls, the resiliency of the container returns the wall to the original condition. As the wall returns, expanding the volume of the container, displacement fluid, such as air, enters through the passageway 14 of the tubular post 48, readily opening the one-way valve 54. This expands the bladder 18 to an increased volume within the container 12 equal to the volume of the material dispensed. When the container is subsequently squeezed to discharge additional material, the displacement fluid within the bladder is retained by the one-way valve 54 so that pressure applied to the flexible wall of the container can only cause material M to be discharged. Conversely, removal of pressure from the wall and the expansion of the flexible wall to its original condition can only draw displacement fluid into the bladder 18 and not directly into the container 12 because of the one-way valve 28 in the discharge orifice 16. As additional material is dispensed, the bladder expands until finally the bladder reaches a condition of full expansion, as approximated in FIG. 3, in which substantially all of the material M has been dispensed. During expansion of the bladder 18, the fingers 40 will be deflected outward, but nevertheless will maintain the bladder beneath the neck portion 42 so that the bladder does not seal off the neck portion from the main body of the container 12. As a result, material beneath and/or around the bladder during expansion of the bladder can always flow between the bladder and container wall to the discharge orifice 16.

A modified construction of a closure member 66 embodying this invention is shown in FIG. 4 of the drawings. The closure member 66 includes a cap portion 200 with a spout 250, one-way valve 280, and fingers 400, all identical to corresponding portions of the closure member shown in FIGS. 1 to 3. This construction utilizes an inverted cup 210 with an inlet orifice 140 and one-way valve 540 in a post 480, of similar construction to the cup 21, except that a cylindrical cup body 460 of substantially greater length than the cup body

46 is provided, which is adapted to extend a substantial distance into the flexible and resilient container with which the closure member is to be used. A flexible bladder 180 similar to the bladder 18 is secured about the cup body 460, but substantially above a lower end 461 of the cup body. When the bladder is collapsed, in its initial state, it is extended along the length of the cup body and tucked up within the body to a position adjacent the upper end thereof, as shown in FIG. 4. Thus, the larger cup construction does not significantly reduce the capacity of the outer container. When the bladder 180 is expanded by the introduction of displacement fluid, the bladder expands within the container in the manner previously described. Assuming the outer container with which the closure member 66 is used is squeezed at a position laterally opposed to the cup 160, the cylindrical wall of the cup will limit the inward extent to which the container can be squeezed and thereby limit the volume that can be dispensed for each squeeze of the container. The cup body 460 may be of other shapes than cylindrical and if provided with a major and a minor transverse axis, it will facilitate the dispensing of two different predetermined volumes for any given squeeze, depending upon the location at which the container is squeezed.

It will be apparent from FIG. 4 that a quantity of air may be trapped in the space within the cup body 460 but outside of the bladder wall when the closure member 10 is inserted into the mouth of the container filled with material. This would result in a substantial loss of the effective volume of the container and is undesirable. The entrappment of such a volume of air can be avoided by initially introducing a quantity of diaplacement fluid, such as air, into the bladder, to a degree sufficient to inflate the bladder to a position adjacent the lower edge 461 of the cup body. The closure member is then introduced into the opening of the container, and as the lower edge 461 of the cup body contacts the flowable material within the container, the inlet valve 540 is mechanically opened, as by being depressed through the open end of the post 480. As the cup is lowered into the container, the hydrostatic pressure of the material within the container forces the displacement fluid within the bladder out through the valve 540. Once the cap member is secured to the container, the valve 540 is allowed to close and the device is in condition for use.

A further embodiment of this invention is shown in FIG. 5 and illustrates the manner in which a closure member 70, of generally similar construction to the closure member 66 of FIG. 4, can be used to form the upper part of a flexible and resilient tube 71. As shown, the closure member 70 includes a cap portion 72, an inverted cup 73, which as shown is elongated similar to the cup 210 of FIG. 4, but could alternatively be a shorter cup such as the cup 21 of FIGS. 1 to 3. A flexible bladder 74 is secured to the inverted cup 73 and tucked into the cup body. The cap portion 72 includes a top surface 75, a depending peripheral flange 76, typically cylindrical and without any threads, a spout 77 providing a central orifice 78, and two apertures 79, 80 on opposite sides of the spout. A one-way valve 82 is provided in the spout 77, an inlet orifice 83 with a one-way valve 84 opens into the cup 73 and communicates through the aperture 79 of the cap portion, similar to the embodiment shown in FIG. 4. The peripheral flange 76 is heat sealed to one end of the tube 71, which is flexible and resilient. Typically, the opposite end of the tube is left open until after filling. The device is filled through the open end, which is thereafter folded and/or crimped and sealed, as at 86. Because the inner surface of the tube 71 is substantially smooth and uniform in diameter adjacent the cap portion 72, there is little or no neck portion and thus little or no tendency of the bladder to form a seal with a part of the container. Accordingly, finger members such as the fingers 40 of the embodiment of FIGS. 1 to 3 or the fingers 400 in the embodiment of FIG. 4 can be omitted, as in the embodiment shown. Apart from preventing seal-off of the discharge orifice by the bladder, the fingers find use in providing channels between the wall and bladder for the flow of material and to that extent may be desired even in embodiments such as that of FIG. 5. For this purpose it is contemplated that fingers substantially longer than those shown in FIGS. 1 to 4 may be provided.

A modified construction 90 of a cup similar to the cup 21 is shown in FIG. 6. The cup 90 has a cup body 92 and is identical to the cup 21 and cup body 46 except that the cup body 92 terminates in an outwardly extending radial flange 94. The flange 94 is provided to facilitate heat sealing the open end of a bladder 96 to the cup body. To this end, the bladder 96 is formed with an inwardly directed flange portion 97 and a circular aperture 98 of approximately the same size as the cup body 92. The cup 90 can be inserted through the aperture by stretching the bladder if it is elastic or by inserting the cup through an open and subsequently sealed opposite end of the bladder, which may be a tubular member formed with the flange 97 at one end. After the cup is inserted, the bladder flange 97 is sealed to the radial flange 94, as by application of heat and pressure where the bladder is of a plastic material suitable for heat sealing. Alternatively, or in addition, an adhesive or other bonding agent can be applied. In an alternative construction, the end of the bladder to be sealed to the cup 90 is merely of the general tubular shape of the entire bladder and is folded inward over the cup flange 94, gathered to the extent necessary about the cup body 92, and heat sealed to the flange.

Another cup member 100 with a modified cup body 101 is shown in FIG. 7, which utilizes a snap ring type construction to attach a bladder 102 and at the same time provide flexible fingers 104 to restrain the upper portion of the bladder during expansion. The cup member 100 is substantially the same as the cup 90 of FIG. 6, except that a radial flange 106 at the lower end of the cup body 101 extends inwardly rather than outwardly. A ring 108 with an outside diameter substantially equal to the inside diameter of the cup body 101 is provided with a circumferential groove 109 adapted to receive the radial flange 106. An open end 110 of the bladder 102 is placed in an inverted position and surrounded by the radial flange 106, with the remainder of the bladder compressed into the cup body. The ring 108 is then inserted upward inside the radial flange 106 and open end of the bladder to clamp the open end between the ring and the flange. The bladder expands downward during use, through the ring and radially outward, within the container with which the device is used, in the same manner as previously described. The fingers 104 extend downward from the ring 108 at peripherally spaced locations to restrain the upper portion of the bladder during its expansion, for the purposes already described in connection with the other embodiments. In this instance, the fingers are more centrally located than in the previous embodiments and therefore must be sufficiently flexible so that the bladder can expand radially to substantially the full width of the container, even at a position very close to the ring itself, At the same time, the fingers limit upward movement of the bladder as it expands.

A different construction of a closure member 115 embodying the present invention is shown in FIG. 8, constructed to facilitate the convenient assembly of a cap member 116 and bladder 118 and to minimize the number of separate parts. To this end, the cap member 116 is formed of an integral top surface 120, an internally threaded flange 121, a central internally directed spout 122, an off-center outwardly directed discharge spout 123, one-way discharge valve structure 124 and depending, peripherally spaced, flexible fingers 125.

To facilitate the forming of an integral valve structure 124 with the spout 123, the spout is of uniform diameter. Helical strips 127 extend downward from the inside of the top surface 120 about the lower end of the discharge spout 123 and are directly connected to the lower end of a valve stem 128 that extends upward through the spout 123. The upper part of the valve stem is hollow and, as initially formed, does not have a valve head. During manufacture the stem is biased upward above the upper end of the discharge spout 123 and is then

flared in an operation separate from the original molding operation, to form a valve head **129** that will seat on a valve seat **130** at the outer end of the discharge spout. Because the valve stem was biased upward and flared, the helical strips **127** urge the stem downward and maintain the formed valve head in seated relationship with the valve seat **130** in normal condition.

The central inwardly directed spout **122** is formed with external threads **132**, a downwardly directed valve seat **133** and an internal shoulder **134** facing upward or outward. A valve stem, head and helical spring assembly **135** of the type described in detail in connection with FIG. **1** is provided in the spout **122** and serves as a check valve to prevent the outflow of displacement fluid therethrough.

The bladder **118** includes a relatively stiff molded top portion **136** and a flexible body portion **137** that is initially collapsed and folded or compressed to a location adjacent the molded top portion of the bladder, for convenience in applying the closure member to a flexible and resilient container. The molded top portion **136** of the bladder includes a radial or disk-like portion **138**, with a central neck **139** that has internal threads **140** that receive and mate with the external threads **132** of the inwardly directed spout **122**.

This embodiment is readily assembled by merely inserting the valve **135** into the central spout and threading the bladder **118** to the spout. Depending upon the shape and construction of the flexible and resilient container with which the closure member **115** is adapted to be used, the flexible fingers **125** may be more or less advantageous. For example, if there is no neck portion or shoulder against which the flexible portion of the bladder might seat, the fingers can be omitted. Also, the molded disk-like portion **138** of the bladder is intended to restrain the bladder from distorting to an upper portion where it would cut off flow to the discharge spout **123**.

In the various embodiments disclosed, it is contemplated that the bladder can be constructed of a stretchable material, rather than being initially formed of full size, collapsed and tucked into a cup member. Various finger constructions or equivalents are contemplated, which will restrain the bladder to a position beneath the discharge orifice, yet which will flex to a position adjacent the side walls of the container, so that they do not prevent essentially full expansion of the bladder and displacement of the contents being dispensed. For example, a grill work or cross fingers could be provided to form a basket-like affair to restrain the upper portion of the bladder. Alternatively, the bladder itself can be somewhat preformed in the upper portion, for example, it can embody radial pleats that provide some rigidity and preshape to the upper portion of the bladder that will inhibit distortion of the bladder to a position that would cut off flow to the discharge orifice. It will be apparent that the cup that contains the collapsed bladder forms a part of the bladder or displacement chamber. One advantage of this is that the cup can be intricately formed of a size suitable for many sizes of containers and a bladder of appropriate size and shape can then be secured thereto. In addition, the top surface of the cup prevents the bladder from expanding upward. Nevertheless, other constructions are contemplated in which the bladder is connected directly to an inlet orifice and may be received within a tubular or cage-like affair that depends from the cap member and serves only to contain the bladder in its collapsed state to facilitate insertion of the bladder into a container.

From the foregoing specification it will be appreciated that a closure member has been provided that converts a conventional flexible and resilient container to a squeeze-type dispenser that is in a sense always full and in which the material to be dispensed is contained directly in the container. This latter feature not only results in superior operation but also permits the use of the improved closure member with containers that can be filled and processed in the conventional manner and which are then merely capped with the closure member of the present invention.

While in the foregoing disclosure certain preferred embodiments of the invention have been disclosed, numerous modifications or alterations may be made therein without departing from the spirit and scope of the invention, as set forth in the appended claims.

What is claimed is:

1. A closure member for use with a flexible, resilient container, said member comprising: a cover part adapted to close an opening of a flexible, resilient container, said cover part having a portion for connecting the part to a container; a flexible bladder, substantially empty initially, forming an expansible chamber carried by said cover part and adapted to fit through a container opening closable by said cover part, said bladder being connected at one end to said cover part and the remainder of the bladder being flexible and freely expansible; two orifices in said cover part, one adapted to communicate directly with the interior of a flexible, resilient container when the closure member is connected thereto and the other opening into said bladder, said one orifice constructed to permit outflow of material from a container when the closure member is connected thereto and to prevent inflow of displacement fluid; and a one-way valve in said other orifice that permits flow of displacement fluid into the expansible chamber and prevents outflow of fluid therefrom.

2. A closure member as defined in claim **1** wherein said bladder is initially in a compact, compressed condition and including means to retain the bladder in said compressed condition while empty to facilitate insertion of the bladder into a container.

3. A closure member for use with a flexible, resilient container, said member comprising: a cover part adapted to close an opening of a flexible, resilient container, said cover part having a portion for connecting the part to a container; a flexible bladder, substantially empty initially, forming an expansible chamber, carried by said cover part and adapted to fit through a container opening closable by said cover part; two orifices in said cover part, one adapted to communicate directly with the interior of a flexible, resilient, container when the closure member is connected thereto and the other opening into said bladder, said one orifice constructed to permit outflow of material from a container when the closure member is connected thereto and to prevent inflow of displacement fluid; a one-way valve in said other orifice that permits flow of displacement fluid into the expansible chamber and prevents outflow of fluid therefrom; and means carried by said cover part to constrain a portion of the bladder that is adjacent the cover part against expansion to an extent that, or movement to a location where, it obstructs passage of material about the bladder to the said one orifice during use.

4. A closure member as set forth in claim **3** wherein said means to constrain a portion of the bladder includes a plurality of flexible fingers fixed to said cover part, peripherally spaced about the bladder, and extending from the cover part at locations and in a direction to enter a container opening closable by said cover part.

5. A closure member as set forth in claim **3** wherein said means to constrain a portion of the bladder is a rigid top portion to the bladder, located beneath the said one orifice, to provide a definite passageway between the top portion of the bladder and said one orifice.

6. A closure member for use with a flexible, resilient container, said member comprising: a cover part adapted to close an opening of a flexible, resilient container, said cover part having a portion for connecting the part to such a container; first and second orifices in said cover part, said first orifice constructed to communicate directly with the interior of a flexible, resilient container when the closure member is connected thereto and to permit outflow of material from the container and to prevent inflow of displacement fluid; a cuplike member secured to said cover part, located with respect thereto to fit through a container opening closable by said cover part, said cuplike member opening in a direction away from said cover part; a passageway between said cuplike

member and cover part opening through said second orifice; a flexible bladder, substantially empty initially, forming an expansible chamber, secured to said cuplike member, the interior of the bladder communicating with the interior of the cuplike member, the bladder being sealed about and substantially contained within the cuplike member when said bladder is initially empty; and a one-way valve controlling flow through said passageway between said cuplike member and said cover part, said valve arranged to permit flow from outside of the bladder through said first orifice and passageway into the cuplike member and bladder and to prevent outflow therefrom.

7. A closure member as set forth in claim 6 wherein said cuplike member extends in a direction away from said cover part a distance sufficient to mechanically restrict inward flexing of a substantial portion of a container to which the closure member is adapted to be attached.

8. A closure member for use with a flexible, resilient container, said member comprising: a cover part adapted to close an opening of a flexible, resilient, container, said cover part having a portion for connecting the part to such a container; first and second orifices in said cover part, said first orifice constructed to communicate directly with the interior of a flexible, resilient container when the closure member is connected thereto; a one-way valve in said first orifice arranged to permit outflow of material from a container to which the closure member is connected and to prevent inflow of displacement fluid; a cuplike member secured to said cover part, located with respect thereto to fit through a container opening closable by said cover part, said cuplike member opening in a direction away from said cover part; a passageway between said cuplike member and cover part opening through said second orifice; a flexible bladder, substantially empty initially, forming an expansible chamber, secured to said cuplike member, the interior of the bladder communicating with the interior of the cuplike member, the bladder being sealed about and substantially contained within the cuplike member when said bladder is initially empty; a one-way valve controlling flow through said passageway between said cuplike member and said cover part, said valve arranged to permit flow from outside of the bladder through said first orifice and passageway into the cuplike member and bladder and to prevent outflow therefrom; and means forming a part of said closure member to constrain a portion of the bladder that is adjacent the cover part against expansion to an extent that, or movement to a location where, it obstructs passage of material about the bladder to the said one orifice during use.

9. In combination, a flexible, resilient container adapted to directly contain material to be dispensed, a flexible bladder within the container forming an expansible chamber, a first opening in the container providing a passage to the bladder, a one-way valve in said passage that permits flow of fluid into the bladder and that prevents outflow, a second opening in the container communicating with a zone within the container external to the bladder, constructed to permit outflow of material from the container when the container is squeezed and to prevent inflow of displacement material, and a relatively rigid tubular member extending from one end of the container and open at the extending end, adapted to receive a portion of the bladder when the bladder is collapsed and which limits the extent to which the flexible container can be flexed inwardly.

10. In combination, a flexible, resilient container with a single opening and adopted to directly contain material to be dispensed, a closure member secured to said container, said closure member having a cover part that receives and closes the container opening, said cover part including a threaded portion connecting the member to the container; a flexible bladder secured to the cover part, forming an expansible chamber, and adapted to fit through the container opening, said bladder being initially in an empty, compact or compressed condition and expansible to substantially fill the container; means to temporarily retain the bladder in said compressed condition, while empty, to facilitate insertion of the bladder into the container during assembly, said bladder in its compressed condition being located beyond said closure member cover part and entirely within said container; two orifices in said cover part, one communicating directly with the interior of the container and the other opening into said bladder, said one orifice constructed to permit outflow of material from the container when the container is squeezed and its volume reduced and to prevent inflow of displacement fluid when the container returns to its original volume; and a one-way valve in said other orifice that permits flow of displacement fluid into the expansible chamber when the container returns to its original volume after being squeezed and that prevents outflow of fluid therefrom when the container is squeezed to dispense material.

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