

[54] **DISPENSER WITH FLAP VALVE**

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[58] **Field of Search**.....**222/490, 212, 213, 222/494, 556, 557, 96, 476, 481, 482, 491, 540, 531, 532, 544, 545, 107, 149, 150, 517, 527, 528, 529, 342**

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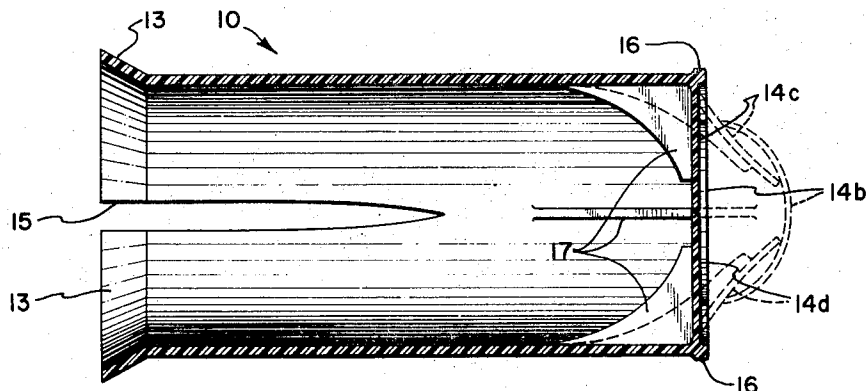
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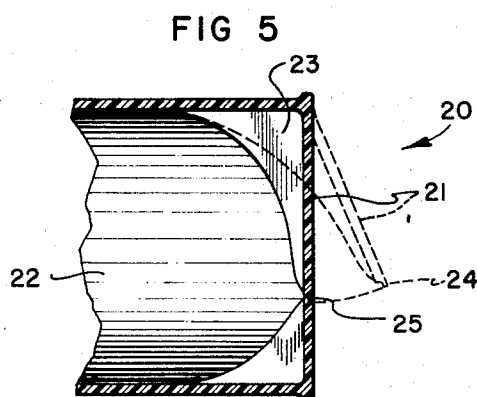
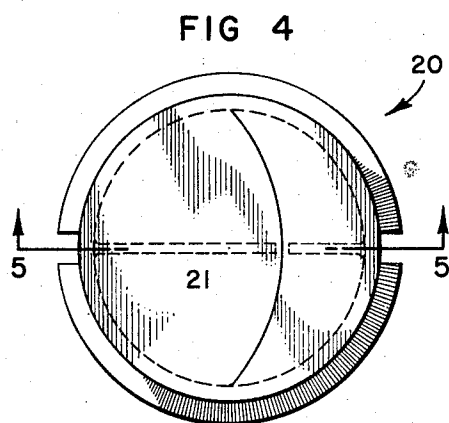
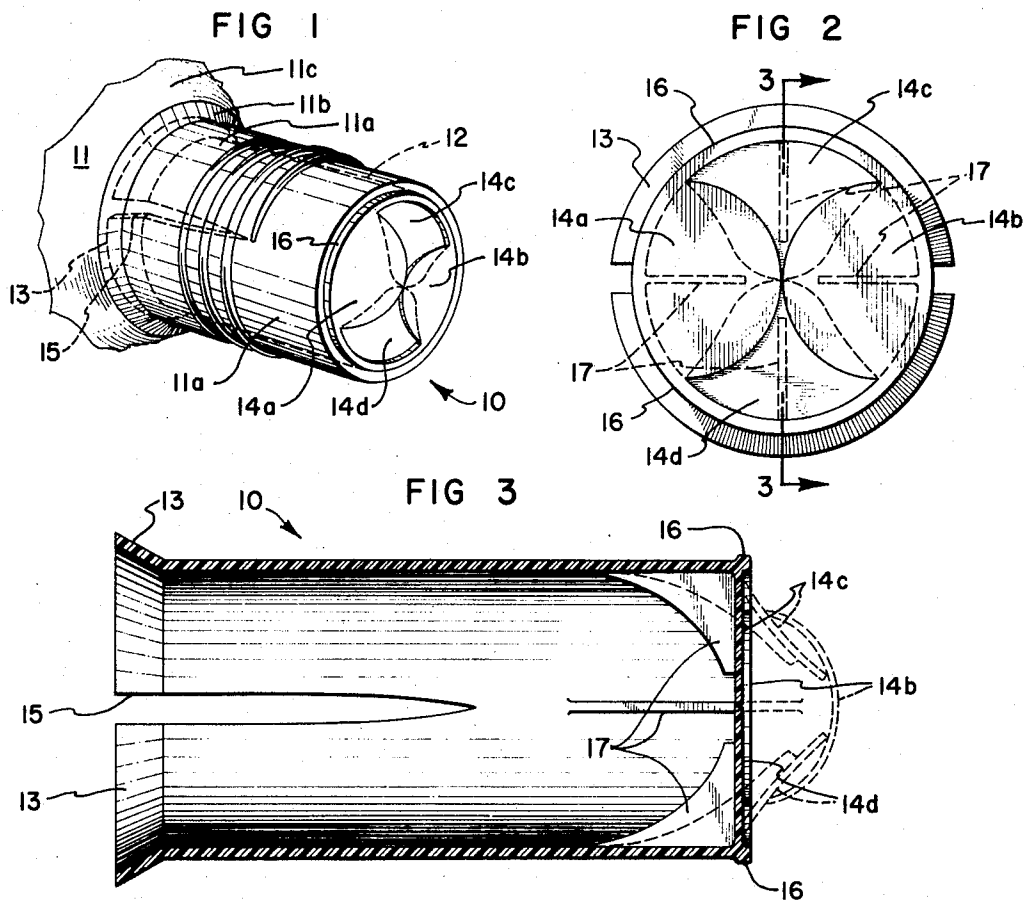
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[57] **ABSTRACT**

A dispenser including a valve unit which is housed within the neck of a flexible type container from which fluid and semi-fluid matter such as tooth paste, shaving cream, catsup, mustard and the like are dispensed. The valve assembly allows flow through when squeezing pressure is applied to the container and the material contained therein, and automatically closes to prevent further flow, when the pressure is removed. The valve assembly includes a valve having a plurality of overlapping flaps which are hinged to open back from one another and to form a central passageway between them when pressure is exerted from within the container. Each flap may have one or more elastic stiffener members to increase the flaps ability to return to its original location when pressure from within the container is removed. As the flaps close they compress and shear through any material trapped in the central passage, with the lower flaps wiping trapped matter from the undersides of the upper flaps so that no material is trapped between them.

8 Claims, 5 Drawing Figures





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DISPENSER WITH FLAP VALVE**BRIEF DESCRIPTION OF THE INVENTION****1. Field of the Invention**

This invention relates to dispensers and particularly to those of the collapsible container type.

2. Prior Art

There has long been a need for a normally closed control valve assembly for use with capped deformable containers which can be housed within the container neck, and that will open to form a central passage when pressure is applied to the container and its contents. In the past, efforts have been made to provide a dispensing type deformable container having a control valve assembly. For example, U.S. Pat. Nos. 2,314,052 and 3,179,301 disclose valves that are opened by squeezing of the valve assembly used. U.S. Pat. No. 1,977,227 shows a valve assembly of this type having adjacent valve segments and U.S. Pat. No. 2,937,795 shows a tube tip closing member in which a plurality of intersecting slits are provided to divide the tip into a plurality of individual flexible quadrants.

Some of the valve assemblies heretofore known have been formed integral within the container or have been independently constructed and then secured exteriorly of the tube with which they are used. The prior art patents known to applicant disclose dispensing means which may be satisfactory to control discharge of liquids and semi-liquids from a container, but they have proven unsatisfactory to adequately close off flow from the container when desired, and have often been expensive, bulky and unsightly. There has not heretofore been available, to my knowledge, a self closing valve assembly that provides a compact closure which prevents expulsion of further material from the container when exterior pressure is relieved and that prevents entrance of air or foreign matter into the container after dispensing has been completed.

SUMMARY OF THE INVENTION

The principal objects of the present invention are to provide a dispenser which is positioned within the neck of a deformable container, to dispense fluid and semi-fluid material when pressure is exerted on the materials within the container through pressure application to the exterior of the container. The dispenser has a valve assembly that is normally closed, thereby restricting passage of material therethrough. When the pressure extruding materials from the container is discontinued the dispenser valve closes thereby automatically preventing entrance of air or contaminating materials into the container and further discharge of the contents of the container.

Another object is to provide a valve unit which can be easily fitted within the neck of a deformable container thereby allowing a container cap to be screwed onto exterior threads formed on the container neck.

Still another object is to provide a dispensing valve having an arrangement of overlapping flaps to control flow. The flaps are preferably constructed of relatively rigid but resilient materials and may have stiffening means to make the flaps even more rigid while still allowing them to open with respect to one another. When pressure is applied to the inner surfaces of the flaps from within the container a central passage is opened between the flaps but the flaps return to their original passage closing position when the pressure is removed.

Yet another object is to construct the overlapping flaps such that the bottom flaps, as they close, tend to wipe the undersurfaces of the flaps above, thereby keeping material being discharged from clogging the valve and holding it open.

Another object is to provide flaps arranged such that their leading edges interact to compress and shear through, from all sides, any material remaining in the central passage after squeezing pressure has been removed from the container.

Still other objects are to provide a valve unit that is simple and economical to construct, that is easily fitted into or constructed within the neck of a deformable container, and will extrude a column of material having a novel and interesting design. The design of the column of material extruded is governed by the shape of the leading edges of the flaps through which the material passes.

Principal features of the present invention include a valve unit which is positioned in the neck of a deformable container. The valve unit consists of an arrangement of overlapping flaps which are made of a resilient material that is deformable and that tends to return to its original shape. The flaps are shaped and arranged so that lower flaps, as they return to their normal positions, scrape and clean the undersurfaces of upper flaps. The wiping keeps materials from accumulating between the upper and lower flaps where it will clog the valve opening.

Another feature is that the upper flaps of the overlapping flaps have their lines of separations of the individual upper flaps rotated 90° with respect to the lines of separation of the lower flaps at the common line of intersection of the lines of separation. This arrangement produces a four sided central opening when pressure is exerted on the container and the materials therein, the configuration of which opening causes column of materials to be extruded having a corresponding cross section. The appearance of the extruded material can be altered by changing the shape of the top or leading edges of the individual flaps but with the four semi-circular flaps disclosed a four pointed star-like configuration is obtained.

An additional feature is the locking ring that forms a portion of the bottom of the valve unit, with slots in the ring to allow the bottom of the valve unit to be compressed as it is inserted into the neck of a deformable container and to allow the slotted ring to expand beneath the shoulders of the container. A lip surrounds the top of the dispenser to limit the extent to which the valve assembly can be inserted into the container. The valve unit is then retained within the neck of the container and the container contents, when pressurized, are forced through the dispenser body against the flaps covering the dispenser top. Constructed in this fashion the valve unit can be readily used with conventional collapsible tubes and the usual tube cap can still be used. When the cap is left off, however, the valve unit will prevent rapid drying out and loss of tube contents.

Stiffeners may be provided within the valve unit to aid in returning the flaps to their original locations. The stiffeners connect the flaps to the valve unit side walls, and are of particular importance when the viscosity of the materials that are to be extruded is such that the flaps alone are not strong enough to properly close over and compress the mouth of the container.

Additional objects and features of the invention will become apparent from the following detailed description and drawings, disclosing what is presently contemplated as being the best modes of the invention.

THE DRAWINGS

FIG. 1 is a front view of the neck of a deformable container with a valve unit, shown partially in dotted lines positioned therein;

FIG. 2, a top view of a four flap embodiment of the dispenser with the lower flaps shown in dotted lines;

FIG. 3, a sectional view taken along line 3—3 of FIG. 2, with open positions of the flaps being shown in phantom;

FIG. 4, a top view of a single flap embodiment of the valve unit showing a flap stiffener in phantom lines; and

FIG. 5, a sectional view, taken along line 5—5 of FIG. 4, and with the open position of the flap being shown in phantom.

DETAILED DESCRIPTION

Referring now to the drawings:

In the illustrated embodiment of FIG. 1, a valve unit 10 is positioned within the neck of a deformable container 11. The valve unit consists of a tubular body 12 having a flared locking ring 13 on a lower end. Flaps 14a, 14b, 14c and 14d project inwardly at the other end of body 12. At least one slot 15 is provided through locking ring 13, and into the body 12, which is somewhat resilient. The slot allows the locking ring 13 to be compressed, thereby temporarily reducing its diameter, so that it can be inserted into the neck 11a of the deformable container 11. The dispenser body 12 is then pushed into the neck until the locking ring 13 reaches a shoulder 11b formed between the container body 11c and the container neck 11a. The locking ring 13 expands, thereby enlarging its diameter to be greater than the diameter of the neck 11a, when it moves beneath the shoulder 11b. The expanded locking ring 13 then prevents withdrawal of the valve unit through the container neck.

A lip 16, having a greater diameter than the inner diameter of neck 11a, but less than the outer diameter of the neck engages the top of the dispenser 10 and keeps the valve unit 10 from moving entirely into the container 11. The valve unit 10 can be permanently positioned within the container neck 11a and will be held in place by ring 13 and lip 16. Since the entire valve unit, except the ring 13 which does not extend beyond the outer circumference of the neck of the container, is within neck 11a, a lid (not shown) may be installed on the container neck without interference from the dispenser.

In operation, material from within the container is forced past locking ring 13, through the body 12 and against flaps 14a, 14b, 14c and 14d. The flaps are made of a flexible material which can be deformed but that will return to its original shape, and preferably are formed integrally with the body 12, locking ring 13 and lip 16. The flaps are deformed outwardly of the neck by the material being forced from the container 11 and are returned to a normal position closing the opening through the neck by their own resiliency when the force is removed. Stiffeners 17 which comprise elastic webs joining the individual flaps and the wall of body

12 may provide additional force tending to return the flaps to their normal position. As the material from within the container forces flaps 14a, 14b, 14c and 14d open, it is extruded through the opening formed between the flaps. In this embodiment, upper flaps 14a and 14b, are each semi-circular and the lower flaps 14c and 14d each have a semi-circular central portion reversely curved outward to the ends so the central passage formed by the opening back of the flaps is that of a four pointed star. By modifying the edge configurations of the flaps the shape of the passage through which materials from the container are extruded can be varied. Stiffeners 17 may also leave impressions in the extruded material in the form of continuous notches between the points of the star.

Flaps 14a and 14b are positioned opposite one another and overlie flaps 14c and 14d which are also positioned opposite to one another. The line of separation between flaps 14a and 14b extends perpendicular to the line of separation of between flaps 14c and 14d. So arranged, the pressurized container material forces flaps 14c and 14d open and as they open they push flaps 14a and 14b open. When the pressure on the container and the material therein is discontinued, the natural resiliency of the flaps and stiffeners 17 tends to close the flaps. As the flaps close, the edges of the lower flaps 14c and 14d which because of the configuration of the flaps remain in full engagement with the upper flaps, scrape any accumulated material from the bottoms of the upper flaps 14a and 14b. This keeps dispensed material from being trapped between the upper and lower flaps. The closing action of the flaps compresses material trapped in the central passage back into the tube and the leading edges of the flaps shear through any residual materials left in the passage.

Another embodiment of the invention is shown in FIGS. 4 and 5. As shown, a valve unit 20 having a single, large, movable flap 21 is adapted to be positioned in a collapsible container of the type shown at 11 in FIG. 1. The body and locking ring are the same as described in connection with FIGS. 1-3 and will not again be described in detail. The single flap 21 has a single stiffener 23, corresponding to the stiffeners 17 previously described, and a lip 24 along its outer circumference which fits within a groove 25 in the open edge of the moon shaped, resilient end 26 of the dispenser body.

In operation, materials within the container 22 are forced against flap 21 to force the flap open. The opening thereby created is generally semi-circular. When there is no pressure forcing the material from the container the natural resiliency of flap 21 and stiffener 23 closes the flap to compress any remaining material at the outlet of the neck of the container back into the container and to force residue material away from the opening. The flap then comes to rest with lip 24 positioned in groove 25.

Although preferred forms of my invention have been herein disclosed, it is to be understood that the present disclosure is by way of example and that variations are possible without departing from the subject matter coming within the scope of the following claims, which subject matter I regard as my invention.

We claim:

1. A dispenser comprising

a collapsible container having a neck through which material contained within the container is dispensed;

a valve unit having a plurality of resilient flaps pivotally connected at a location inside the neck and biased to normally close the passage through the neck and arranged to open when sufficient pressure is exerted from the inside of the container against the flap, one of said flaps being arranged to scrape against the bottom of at least one other said flap; and

resilient stiffener means fixed to and extending essentially normal to each said flap and fixed with respect to the inner wall whereby said stiffener means assists the flap in returning to its normally closed position, whereby said flap closes the passage through the neck when the pressure exerted against the said inside of the container is removed.

2. A dispenser comprising

a collapsible container having a neck through which material in the container is dispensed; and

a valve unit having four hinged resilient flaps each pivotally connected at a location inside the neck, one pair of flaps overlying the other pair of said flaps and with the lines of separation of the overlying flaps being normal to the lines of separation of the flaps beneath, whereby the edges of said lower flaps scrape the bottom faces of the upper flaps during opening and closing of the flaps, said flaps being biased to normally close the passage through the neck and arranged to open when sufficient pressure is exerted from inside the container, thereby exposing a passage through which materials are extruded from the container, said flaps closing the passage when insufficient opening pressure is exerted thereon from inside the container.

3. A dispenser comprising

a collapsible container having a neck through which material in the container is dispensed;

a valve unit having four hinged resilient flaps each pivotally connected at a location inside the neck, one pair of flaps overlying the other pair of said flaps and with the lines of separation of the overlying flaps being normal to the lines of separation of the flaps beneath, whereby the edges of said lower flaps scrape the bottom faces of the upper flaps during opening and closing of the flaps, said flaps being biased to normally close the passage through the neck and arranged to open when sufficient pressure is exerted from inside the container, thereby exposing a passage through which materials are extruded from the container, said flaps closing the passage when insufficient opening pressure is exerted thereon from inside the container;

means for securing the valve unit within the container neck, said means comprising

a tubular body forming part of the valve unit, a resilient locking ring at one end of the body, said ring being deformable to have an outside diameter smaller than the inside diameter of the neck, having slots therein to facilitate such deformation and snapping of the body into the neck and being normally expandable into engagement with the container below the neck; and

a lip extending outwardly from the body around the other end thereof, said lip having an outside diameter greater than the inside diameter of the neck and less than the outside diameter of the neck, the distance between the ring and the lip being just slightly greater than the overall length of the neck.

4. A dispenser as in claim 2, wherein the upper flaps are each of semi-circular configuration, and the lower flaps have central semi-circular portion and reversely curved whereby material extruded through them has a generally four sided, star-like, cross-sectional configuration.

5. A dispenser as in claim 2, further including resilient stiffener means connected to each flap and fixed with respect to the inner wall of the neck, whereby said stiffeners assist the flaps in returning to their normally closed position.

6. A dispenser as in claim 3, wherein the flaps are each of semi-circular configuration, whereby material extruded through them has a generally four sided star-like cross-sectional configuration.

7. A dispenser as in claim 6, further including resilient stiffener means connected to each flap and fixed with respect to the inner wall of the neck, whereby said stiffeners assist the flaps in returning to their normally closed position.

8. A valve unit comprising

a generally tubular body formed of resilient material;

a lip radiating outwardly at a top end of body member;

a resilient locking ring radiating out from the body at a bottom end thereof, said locking ring being deformable to have an outer diameter not exceeding the outer diameter of the generally tubular body member, whereby said body member and said ring are adapted to be telescoped through the neck of a container;

a valve in a body member at the top end thereof, said valve comprising a plurality of resilient flaps, some of said flaps normally overlying some others of said flaps when said flaps close the passage through the valve member and all of said flaps being operable by pressure application through the body member from the bottom end thereof to open, and the bottom faces of the overlying flaps being scraped by the edges of the underlying flaps during opening and closing of the said flaps.

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