Dec. 5, 1950 J. V. ZIMMERMAN 2,532,690

APERTURED CAP FOR COLLAPSIBLE TUBE, HAVING FRICTION-BIASED, RECIPROCABLE CLOSURE FOR THE APERTURE

Filed June 17, 1946

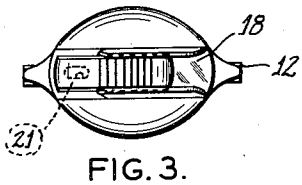


FIG. 3.

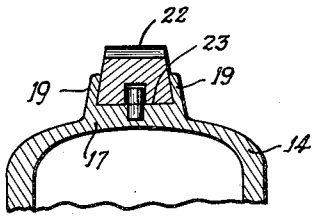


FIG. 5.

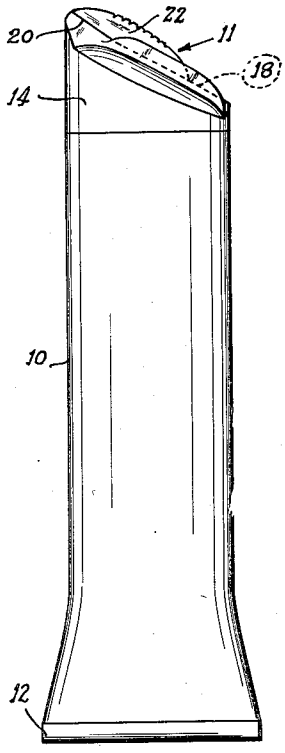


FIG. 1.

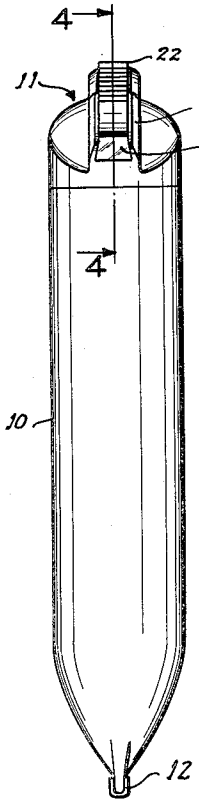


FIG. 2.

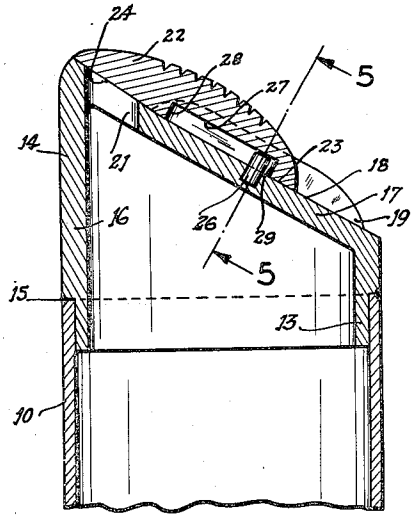


FIG. 4.

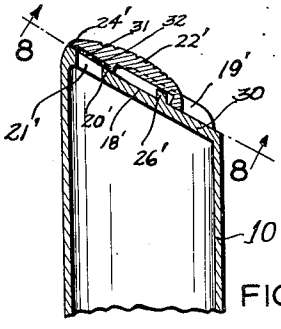


FIG. 7.

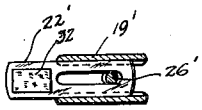


FIG. 8.

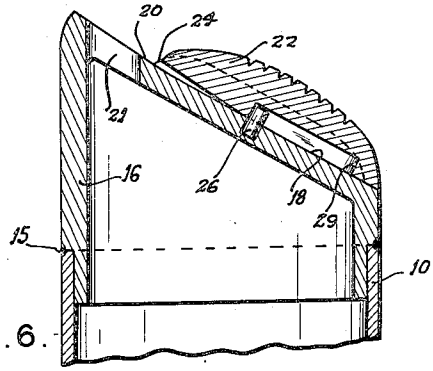


FIG. 6.

INVENTOR
JAY V. ZIMMERMAN
By Alfred W. Petcharft
ATTORNEY

Patented Dec. 5, 1950 2,532,690

UNITED STATES PATENT OFFICE

2,532,690

APERTURED CAP FOR COLLAPSIBLE TUBE, HAVING FRICTION-BIASED RECIPROCABLE CLOSURE FOR THE APERTURE

Jay V. Zimmerman, St. Louis, Mo.

Application June 17, 1946, Serial No. 677,185

7 Claims. (Cl. 222—92)

1

This invention relates to containers of the collapsible tube character and, more particularly, to improvement in the construction thereof.

The prevailing types of collapsible containers or tubes utilized for paste materials, such as toothpaste, shaving creams, and many other materials having a similar paste consistency, are generally constructed to require a screw cap closure element for the delivery opening. After a short period of use, these containers become unsanitary due to the accumulation of the material at and around the tube opening. This condition is especially undesirable when the cap element becomes clogged with dried or partly dried material, the usual result being improper engagement of the cap. Moreover, the convenient tendency to leave the screw cap off the tube opening permits the formation of a dry plug within the discharge opening, resulting in tube ruptures and eventual discard of the tube with the material only partly used. There are other objectionable characteristics, such as leakage of material when the screw cap is improperly replaced, contaminating effect of material collecting around the opening, the inconvenience of handling the tube on which material has accumulated when the hand is wet or moist, and the repeated loss of screw-caps.

Accordingly, it is an object of the present invention to overcome the aforementioned objections by an improved and relatively simple collapsible tube construction which is inexpensive to manufacture, will facilitate the dispensing of the contents, and will eliminate the objectionable accumulation of such material on or around the opening provided for its discharge.

It is also an important object of the present invention to provide a collapsible type of paste material dispensing container or tube in which the tube body is provided with a non-deformable closure assembly having a discharge opening and a closure element operably arranged for movement into and out of a position of positive, but releasable, retention over the discharge opening and in sealing relation therewith.

Another object of the invention resides in the construction and improved arrangement of a closure assembly for use in connection with deformable or collapsible tubes comprising a tube cap having a discharge opening and a generally rectilinearly directed guide-way formed with an inclined surface portion in the zone of the opening, and a closure element adapted to move in the guide-way and cooperate with the inclined surface portion of the guide-way to effect a positive, but releasable, closure of the discharge opening when moved against such surface portion.

2

A further object of the present invention is the provision of a collapsible tube having a closure element which may be quickly and conveniently operated by one finger of the same hand in which the tube is held, and which cannot become detached, lost, or mislaid.

An additional object of the present invention is the provision of a collapsible tube of unique cross-sectional shape so as to be much more readily held in the hand and manipulated.

And with the above and other objects in view, my invention resides in the novel features of form, construction, arrangement, and combination of parts presently described and pointed out in the claims.

In the accompanying drawing—

Figure 1 is a side elevational view of the collapsible type container forming the subject of the present invention;

Figure 2 is an edge elevational view of the container showing additional features thereof;

Figure 3 is a top plan view thereof;

Figure 4 is an enlarged sectional view of the container and cap assembly as seen at line 4—4 in Figure 2 and in which the closure element is shown in port-closing position;

Figure 5 is a further sectional view taken in a direction transversely of and along the line 5—5 in the view of Figure 4;

Figure 6 is a view similar to that of Figure 4, but illustrating the port open position of the closure element;

Figure 7 is a fragmental vertical sectional view of a modified form of collapsible tube constructed in accordance with and embodying the present invention; and

Figure 8 is a fragmental sectional view taken along line 8—8 of Figure 7.

In the drawing, which illustrates the invention only in its preferred form, the container may be seen to comprise a body tube 10 having a generaly elliptical cross-sectional shape and constituted of deformable material, as tin or aluminum foil, to permit ready collapse thereof when desired, and a similarly elliptical shaped tube cap assembly 11 desirably formed of any suitable and relatively more rigid material to preclude its deformation. The tube 10 is conveniently closed at its head end by the cap assembly 11 and later closed at its base end 12 by the usual folding and crimping operations after filling the same with paste material, such as toothpaste or other generally and characteristically similar material.

The cap assembly 11 is positioned over the open tube end with the undercut portion 13 of the cap member 14 telescoped into the tube 10 such that the exterior surface of the tube and cap are substantially flush. The tube and cap may then be permanently joined as by the application of solder or similar material to form a bead 15 which will also act as an effective seal means.

The cap assembly 11, shown in section elevation in Figure 4, includes the cap body 14 having the elliptically formed side 16, of which the portion 13 is an integral part, and an end wall 17 directed at an angle to the longitudinal axis of the container. As shown, the inclination of the end wall 17 extends in the direction of the major sectional axis of the elliptical tube. Proceeding further, it will be observed, Figures 2 and 4, that the exterior or upper surface of the cap end wall 17 is planar and generally rectilinear over a substantial inclined portion 18 and that at each side of this portion elongated and upstanding projections 19 are provided, for a purpose to appear presently. The general arrangement of surface 18 and projections 19 serves to define a guide-way, at least over the planar portion 18 of the cap end wall. This portion 18 extends across the major axis of the tube, as before noted, and in an upwardly inclined direction to merge with a second surface portion 20 which has a predetermined greater inclination so as to lie in a different plane from that of the planar portion 18. In so forming the cap 14 to provide the inclined and non-coplanar surface portions 18 and 20, it will be noted that the interior surface of this wall 17 also assumes an angular inclination such that a discharge port or opening 21 formed therein to open through the inclined surface 20 will be located advantageously for dispensing the paste material upon application of collapsing pressure or "squeeze" to the tube. In other words, the end wall 17 acts to direct and facilitate the flow of material toward the discharge port 21.

In association with the cap 14 just described, there is provided a closure element 22 formed and arranged for movement in the guide-way defined by the surface 18 and projections 19. Accordingly, the element 22 has a first planar surface 23 adapted for sliding engagement on cap surface 18 and a second planar surface 24 which is directed at a predetermined angle of inclination relative to the first surface 23 and in diverging relation with planar surface 18 such that the surface 20 on cap 14 and the second surface 24 closely approach a condition of parallelism to the end that, upon sliding displacement of the element 22 toward the discharge port 21, these planar surfaces attain a predetermined condition of contact to effect a complete closure of the port. The closure element 22 is suitably limited in its sliding movement to port open position through the provision of a stop pin 26 securely anchored in the end wall 17, as shown, and projecting upwardly for engagement in a recess 27 formed in the surface 23 thereof. In the preferred construction, the pin will abut the inner end wall 28 of recess 27 to limit port opening movement of the element and will be free of abutment at the outer end wall 29 of this recess in order to allow the planar surface 20 on the cap end wall and the surface 24 on the closure element a desired degree of contact, as will be noted presently. In Figure 5, the element 22 is shown as held in operative position in the guide-way by inwardly deforming the projections 19 whereby the projections lie adjacent the tapering side surfaces of the element and, in effect, constitute, with the planar surface 18 of the cap end wall 17, a dove-tail or under-cut type of guide-way. Thus the element 22 is positively prevented from accidental removal and yet retains a desired working fit in the guide-way.

Considering again the relative arrangements of planar surfaces 18 and 20 on the cap and the corresponding surfaces 23 and 24 on the closure element 22, it is preferable that the surface 20 have a small but predetermined angular inclination relative to the surface 18 and that surface 24 have an angular inclination relative to surface 23 of an order closely approaching that for the first mentioned surfaces whereby there is obtained a co-operative working relation of surfaces 20 and 24 to result in a slight wedging action therebetween upon movement of the element 22 toward port closing position. This wedging action is important as it will produce a desirable, though limited, elevation of the element 22, so that it may be brought into frictional engagement with the inturned projections 19 to assure its temporary or releasable retention therebetween. When this latter position has been attained, the planar surfaces 20 and 24 will also have attained a condition of surface engagement sufficient to close and tightly seal port 21.

If desired, a modified form of collapsible container may be provided, as shown in Figures 7 and 8, comprising a unitary tube 10', formed of aluminum foil, tin, or other soft metal preferably by means of extrusion and molding, having an inclined top wall 30 having a port 21' and being integrally provided with an upstanding pin-like projection 26' and guide-way forming projections or ribs 19'. It will be noted that in the present modification, as in the modification previously described, the upper or exposed face of the top wall 30 is inclined upwardly at a sharp or more oblique angle, as at 20', than the remainder of the surface, as at 18'. Provided for slidable disposition between the ribs 19', is a closure element 22' similar in construction to the closure element 22, except that its inclined underface 24' is provided with a shallow rectangular recess 31 for receiving a cementitiously secured sealing member 32 formed of cork, rubber, tin foil, synthetic plastic, or other suitable material, the latter preferably projecting slightly downwardly beyond the recess 31 so as to wedge tightly over the port 21'.

In use, the container of the present invention can be conveniently held in the palm of the hand and the closure element can be easily opened and closed with the thumb of the same hand by a slight pressure applied thereon in the general direction of the inclined surface 18 to overcome the temporary frictional retention thereof between the guide-way projections 19. Accomplishing this, the tube body 10 may be collapsed manually until the desired quantity of the contained paste material has been delivered through port 21. After completing delivery, the closure element 2 may be moved again to its port closing position by a second slight finger pressure applied thereto oppositely to that for opening the port. Furthermore, the unique oval cross-sectional shape of the tube portion 10 facilitates holding and makes it possible to squeeze the tube for expelling the contents in a more convenient and efficient manner.

It should be understood that changes and modifications in the form, construction, arrangement, and combination of the several parts of

the collapsible tube may be made and substituted for those herein shown and described without departing from the nature and principle of my invention.

Having thus described my invention, what I claim and desire to secure by Letters Patent is,

1. In a container of collapsible type for dispensing materials of a paste or cream consistency, the combination comprising a hollow deformable body, a cap member secured at one end of the body and provided with a dispensing port, a port controlling element displaceably carried on said cap member for opening and closing the port, said cap member having a first inclined surface through which the port opens and a second inclined slide-forming surface, said port controlling element also having first and second inclined surfaces corresponding respectively to the first and second surfaces of the cap member, the first surface of the port controlling element being adapted for sliding movement over the first surface of the cap member and the second surface of the port controlling element being adapted for sliding engagement with the second surface of the cap member as the port controlling element is moved into port closing position to afford a limited degree of elevation of the element, and means on the cap member engageable by said element upon elevation thereof for effecting its releasable retention in port closing position.

2. In a container of collapsible type for dispensing materials of a paste or cream consistency, the combination comprising a hollow and readily deformable body member, a cap member secured at one end of said body member and formed to provide an end wall having a first upwardly presented inclined planar surface through which a material discharge port opens and a second upwardly presented planar surface disposed at an angle with respect to the first planar surface, means projecting from said end wall to define therewith a guide-way along said second planar surface, an element positioned in said guideway for shiftable movement toward and away from the discharge port, said element having first and second inclined planar surfaces respectively parallel with the first and second inclined planar surfaces of the cap, said first surfaces being adapted for wedging engagement with each other in effecting closure of the discharge port upon shifting movement of said element, the engagement between said planar surfaces affording a predetermined degree of elevation of said element to effect frictional engagement thereof with said projecting means and releasable retention of said element in port closing position, and means on said cap for limiting displacement of said element in a direction away from the discharge port.

3. A cap assembly for use in connection with material dispensing means of collapsible type, said cap assembly comprising a cap body having an inclined end wall provided with a material discharge port, said cap body also having an upwardly presented slide face inclined with respect to the end wall, means projecting from the end wall at each side of the slide face to define therewith a guide-way, an element having a first planar surface and a second planar surface angularly inclined relative to their surface thereon, said element being adapted for shifting movement in the guide-way with its first planar surface in sliding engagement on the slide face thereof and its second planar surface adapted for engagement with the inclined end wall of the

cap to effect closure of said port, said projecting means being formed to have a working fit at each side of said element to prevent removal thereof and further cooperating with said element upon movement thereof to bring its second planar surface into engagement with said inclined end wall so as to be engaged by the element to afford releasable retention thereof in port closing position, and means on said cap end wall to limit movement of said element in a direction for opening said port.

4. A cap assembly for use in connection with material dispensing containers of the collapsible type, said cap assembly comprising a cap body having and end wall having first and second upwardly presented planar surfaces, inclined to each other, a material discharge port formed therein to open through the first planar surface, means projecting from said end wall and in spaced relation to define therebetween a guideway over and along the second planar surface, an element positioned in said guide-way for movement therein and in a direction toward or away from said port, said element having first and second planar surfaces which are respectively parallel with said first and second planar surfaces of the cap body, the first planar surface on said element being provided with a resilient sealing member adapted for co-operative engagement with the first planar surface of the cap body to effect closure of said port upon movement of said element into closure-forming position over said port, and means on said end wall engageable by said element for limiting the movement thereof away from the first planar surface of the cap body.

5. A cap assembly for use in connection with material dispensing containers of the collapsible type, said cap assembly comprising a cap body having an end wall having first and second upwardly presented planar surfaces inclined to each other, a material discharge port formed therein to open through the first planar surface, means projecting from said end wall and in spaced relation to define therebetween a guideway over and along the second planar surface, an element positioned in said guide-way for movement therein and in a direction toward or away from said port, said element having first and second planar surfaces which are respectively parallel with said first and second planar surfaces of the cap body, the first planar surface on said element being provided with a flat cork sealing member adapted for co-operative engagement with the first planar surface of the cap body to effect closure of said port upon movement of said element into closure-forming position over said port, and means on said end wall engageable by said element for limiting the movement thereof away from the first mentioned planar surface of the cap body.

6. A cap assembly for use in connection with material dispensing containers of the collapsible type, said cap assembly comprising a cap body having an end wall having first and second upwardly presented planar surfaces inclined to each other, a material discharge port formed therein to open through the first planar surface, means projecting from said end wall and in spaced relation to define therebetween a guide-way over and along the second planar surface, an element positioned in said guideway for movement therein and in a direction toward or away from said port, said element having first and second planar surfaces which

are respectively parallel with said first and second planar surfaces of the cap body, the first planar surface on said element being provided with a shallow recess and a resilient sealing member secured within and projecting from said recess for co-operative engagement with the first planar surface of the cap body to effect closure of said port upon movement of said element into closure-forming position over said port, and means on said end wall engageable by said element for limiting the movement thereof away from the first planar surface of the cap body.

7. In a container of collapsible type for dispensing materials of a paste or cream character and consistency, the combination comprising a hollow deformable body member, a cap member secured at one end of the body and angularly disposed to the longitudinal axis of said body, said cap having first and second upwardly presented planar surfaces continuous with each other and inclined to each other, said first planar surface having a material discharge port formed therein, upstanding wall members projecting from said end wall at either side of said second planar surface and in spaced relation to define therebetween a guide-way over and along the second planar surface, and a port-controlling element movably positioned in the guide-way having side faces slidably co-operable with the inner faces of the upstanding walls, said element being provided on its under face with third and fourth planar surfaces respectively complemental to said first and second planar surfaces of the cap body, whereby with said element in port-closing position the said planar surfaces will be in surface abutting engagement and when said element is in port-open position only the first and third planar surfaces will be in engagement.

JAY V. ZIMMERMAN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
684,986	Higgins	Oct. 22, 1901
1,578,077	Courney	Mar. 23, 1926
1,690,654	Trotter	Nov. 6, 1928
1,738,728	Pringle	Dec. 10, 1929
1,800,936	Ganger	Apr. 14, 1931
1,835,448	Alland	Dec. 8, 1931
1,897,890	Cook	Feb. 14, 1933
1,972,793	Prendergast	Sept. 4, 1934
1,990,863	Geach	Feb. 12, 1935
2,050,309	Ruetz	Aug. 11, 1936
2,066,792	McLeod	Jan. 5, 1937
2,091,217	Ruetz	Aug. 24, 1937
2,111,482	Ruetz	Mar. 15, 1938
2,139,085	Lawson	Dec. 6, 1938
2,141,572	Tucker	Dec. 27, 1938
2,182,243	Baker	Dec. 5, 1939
2,370,997	Rudolph	Mar. 6, 1945