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DELIVERY CLOSURE FOR COLLAPSIBLE CONTAINERS

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Fig. 1.

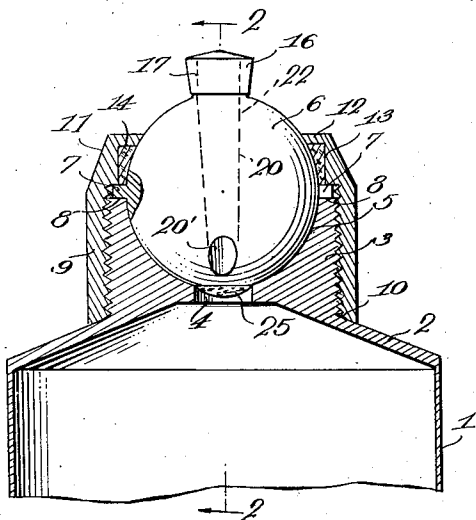


Fig. 2.

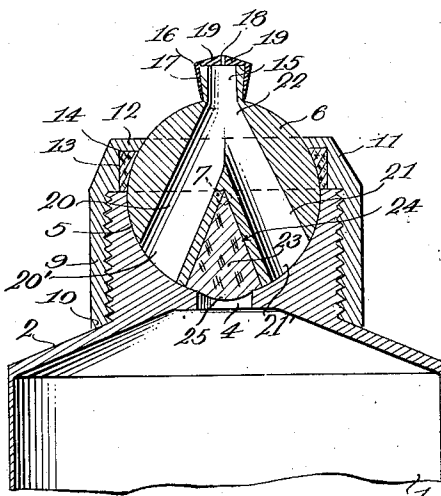


Fig. 3.

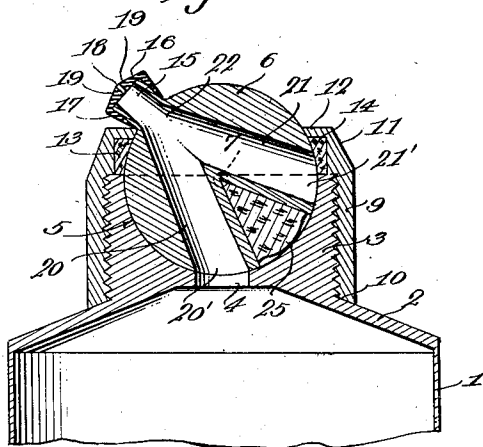
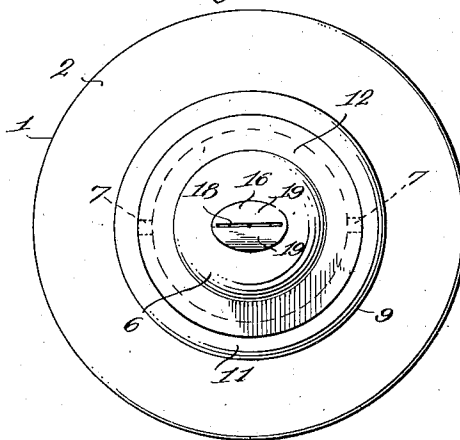


Fig. 4.



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DELIVERY CLOSURE FOR COLLAPSIBLE
CONTAINERS

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4 Claims. (Cl. 221-60)

This invention relates to collapsible dispensing container tubes and closures therefor. It has more particularly to do with collapsible dispensing tubes for pastes or semi-liquid preparations such as toothpaste, shaving cream and the like, but without limitation thereto.

Dispensing tubes of this character are usually provided with closure caps which are internally screw-threaded to fit on correspondingly externally threaded nipples at the dispensing ends of the tubes, said caps when properly applied effecting a substantially airtight closure. However, there is a disadvantage in the use of such closures in that the caps, of necessity, have to be unscrewed and detached and thereby easily mislaid when the contents are dispensed from the tube. So, too, the threads of both the nipple and the cap become filled with the material dispensed from the tube and the hardening or setting of the material in the threads obviously prevents proper replacement of the cap and resulting in the drying up and deterioration of the contents of the tube.

In an effort to overcome the disadvantages of the ordinary screw cap various forms of valved closures have been produced and usually applied in connection with the regular screw-threaded nipple portion of the tube, but without any appreciable degree of success, mainly because of the mechanical difficulty and prohibitive expense in manufacture and also due to the fact that the closures have failed to maintain the desired airtight effect owing to the wear of the movable parts in use.

The present invention has for its principal object to provide a simple, practical, efficient and economically manufactured dispensing closure of a valved type which may be applied to the regular screw threaded nipple portion of the dispensing tube and used without removal therefrom.

A particular object is to provide an improved ball-like dispensing valve element having delivery passageways therein and being readily movable to opened and closed positions and having cooperative provision for maintaining an effective seal for the tube throughout the time of unlimited actuations of the valve.

With the foregoing and other important objects and advantages to be attained, as will hereinafter more fully appear, the invention consists in the novel general structure and in the particular parts and combinations and arrangements of parts thereof as hereinafter described and set forth in the appended claims, reference being

had to the accompanying drawing illustrating a practical adaptation of the invention, in which:

Figure 1 is a fragmentary sectional view of the dispensing end portion of a collapsible tube, showing a ball-valve element in elevation and partial section in its normal container closing position;

Figure 2 is a view similar to Figure 1 but on a line of section at right angles to that on which the view is taken in Figure 1, the ball-valve element being shown in section;

Figure 3 is a view similar to Figure 2, but with the ball-valve element operated to a dispensing position; and

Figure 4 is an end view of the tube with the ball-valve element in its normally closed position as shown in Figures 1 and 2.

Referring now to the drawing, the numeral 1 designates the dispensing end portion of an ordinary collapsible container tube, said end portion of the tube having a tapered head 2 provided with a central, externally screw-threaded, nipple extension 3. The nipple extension, as shown, is provided with a restricted axial outlet opening 4 at its base and an outwardly flared enlarged recess 5 of semi-spherical form, the latter providing a counterpart seat for a ball-like valve element 6 having diametrically opposite pivot stud extensions or trunnions 7 which are received in notches 8 provided therefor in the adjacent end face portions of the nipple 3, so that the rotative movement of said valve element is permitted only in the opposite directions about the axis of said stud extensions or trunnions 7. The spherical valve element 6 is retained in its seated relation in the nipple portion 3 of the container tube by a collar member 9 which is internally screw-threaded to match external threads of the nipple portion 3 on which it is received, the inner end portion 10 of the collar being preferably beveled as a counterpart of the tapered head 2 of the container tube against which it is tightened when the collar is applied. The outer end portion of the collar is preferably beveled annularly, as at 11, and said end portion is provided with an inward turned annular flange 12, the inner marginal portion of which is rounded out as a counterpart of the adjacent circumferential portion of the spherical valve element 6 which it engages, said flange 12 also affording an annular shoulder at the base of a cylindrically recessed portion 13 provided in the adjacent end portion of said collar 9 to receive a deformable packing 14, preferably cork, although the same may be of rubber or any other suitable resilient material. In this

connection, it is noted that the spherical valve element 6 and the counterpart seat 5 therefor in the nipple portion 3 are formed with reasonable accuracy for the interfitting thereof and the collar element 9 is also made so that its flange portion 12 engages the adjacent circumferential portion of the valve element and the inner end portion 10 engages the head portion 2 of the container with comparative accuracy, but the packing 14 is proportioned so that pressure is exerted thereon whereby to compress and deform it and effect a substantially airtight seal about the valve element 6 in the immediate region of the outer end of the nipple portion 3, the packing as thus applied also exerting a braking effect on the valve element 6 so as to hold the latter in its respective opened as well as closed positions to which it is moved as hereinafter described but without offering any undue resistance in the manipulation of the valve by the user.

The spherical or ball-like valve element 6 is provided with a nozzle extension 15 which projects from its circumference perpendicularly with respect to the axis of the stud extensions or trunnions 7, said nozzle extension being preferably elliptical in cross-section and its longitudinal axis being parallel with the axis of the stud extensions or trunnions 7, said nozzle extension also being undercut throughout its peripheral extent, or, in other words, its outer wall face flares from its base to its outer end. This particular external formation of the nozzle extension 15 is to provide for the effective retention of a rubber cap member 16, said cap member being of the same general elliptical form as the nozzle extension 15 and having its marginal skirt portion 17 tapered throughout the extent thereof and formed with an original set of lesser transverse dimensions than the corresponding portions of the nozzle extension so as to necessitate stretching the skirt portion of the cap when it is applied to the nozzle extension. In practice the inherent resiliency of the skirt portion 17 may be alone depended upon for holding the cap 16 in place on the nozzle extension 15, but, in some cases, the skirt portion 17 may be cemented to the nozzle extension or some obvious mechanical contrivance may be employed for fastening the cap in place.

The elastic cap 16 is slitted along its longitudinal axis from end to end thereof, as at 18, thereby providing a pair of yieldable lips 19 whose meeting edge portions are normally in contact with each other so as to close the opening of the nozzle extension 15 with substantially airtight effect, yet said lips are yieldable outwardly under pressure of the contents of the container 1 by the user squeezing the container between his fingers when it is desired to dispense some of the contents, the material being delivered in a tape-like string upon the opening of the slit 18 in the outward movement or expansion of the lips 19, said lips automatically retracting and biting off the discharged string of material and again effectively closing the slit 18 after the container tube is relieved of the squeezing pressure thereon.

The valve element 6 is provided with a pair of branched passageways 20 and 21, respectively, the end ports 20' and 21' of which are located circumferentially of the valve element 6 so as to be alternately brought into registrable communication with the axial outlet opening 4 of the nipple portion 3 of the container tube when said valve element 6 is turned in either direction about the

axis of its stud extensions or trunnions 7. As shown more clearly in Figures 2 and 3 of the drawing, the passageways 20 and 21 are arranged in the form of a V or acute angular relation to each other, their merging end portions coinciding, as at 22, with the elliptical outlet opening of the nozzle extension 15. In this connection, it is here noted that the passageways 20 and 21 may be round, oval or oblong in transverse form, as desired, but, in any case, it is preferable that said passageways 20 and 21 each gradually increase in transverse areal dimension from their end ports 20' and 21', respectively, to where they merge with the outlet opening of the nozzle extension 15. This is to minimize frictional resistance to the flow of the material through said passageways from the container tube during the dispensing operation.

Obviously, inasmuch as the spherical or ball-like element 6 is provided to rotate only about the axis of the stud extensions or trunnions 7, as hereinbefore described, the passageways 20 and 21 are symmetrically arranged equidistant on opposite sides of said axis of rotation and with their respective ports 20' and 21' located at a sufficient distance apart whereby the intermediate circumferential portion of the valve element 6 completely covers the outlet opening 4 of the head portion 2 of the container tube. In order to assure an effective airtight seal for the outlet opening 4 a suitable packing element 23 is provided. This element 23, which is preferably made of cork although any other suitable resilient material may be used, is of general conical form and inserted in a counterpart tapered seating recess or socket 24 provided therefor in the adjacent body portion of the valve element, the annular marginal circumferential portion of said packing element 23 conforming to the circumferential contour of the valve element 6 and with which it is substantially flush, but a rounded, button-like protuberance 25 is formed on the circumference of said packing element 23 within the boundary of said conformed annular marginal portion and adapted to enter the outlet opening 4 of the nipple portion 3 of the container tube in the neutral closed position of the valve element 6 as shown in Figures 1 and 2, said packing element 23 being slightly compressed within the tapered socket portion 24 and the button-like protuberance riding on the opposed surface of the semi-spherical recess 5 when the valve element is moved in the direction to bring either of its passageways 20 or 21 into communication with the outlet opening 4 of the nipple portion 3 of the container tube.

In accordance with the present invention as herein set forth, a practical ball-valve type of closure is provided for collapsible dispensing tubes which is not only practical and efficient in use but is economically produced and may be applied to a nipple extension of a container as ordinarily screw-threaded externally for the reception of the usual closure cap, or, obviously, a modification of the collar element 9 may be substituted in the structure and provided with suitable means for securing it either detachably or permanently to the nipple extension 3 or its equivalent on a regular dispensing tube of the character herein set forth. It is here again pointed out that the packing element 14 and also the later described packing element 23, in addition to functioning as sealing means, function with ample braking effect to hold the valve element in either its opened or closed positions, yet

not interfering with the manipulation of the valve element at the will of the user.

By the novel provision of the branched passageways 20 and 21 and the particular provision in the mounting of the sperical or ball-like element 5 so that said element is rotatable only in two opposite directions and also by disposing the slotted portion of the rubber cap 16 to extend parallel with the axis of the stud extensions or trunnions 7 of the valve element, the direction in which the valve element is rotatable is thereby readily indicated so that there is no confusion in the manipulation of said element, it being only necessary for the user to turn the valve element 15 in either direction transversely of the slot 18. When the capped nozzle extension is positioned axially of the collar element 9 it is known that the packing element 23 is positioned in sealing relation to the outlet opening 4 of the container tube and when the valve element 6 is rotated in either direction until its capped nozzle extension is brought into engagement with the flanged portion 12 of the collar element 9 the user is also assured that one of the passageways 20 or 21 is in communicable registration with said outlet opening 4. This is a particular advantage in the manipulation of the valve element 6 and there is a further advantage in the use of the closure device of the present invention in that an effective seal is always obtained whether the valve element 6 is in its neutral closed position or turned to either of its dispensing positions, the seal being more full and complete in the neutral closed position of the valve element due to the relation of the packing element 23 to the outlet opening 4. In the dispensing position of the valve element the self-closing resilient lip portions 19 of the cap member 16 effect a closing of the nozzle extension 15 sufficient to prevent drying out of any material which may remain within the passageways 20 and 21 after the use of the device and until such time as it is again used.

While a practical adaptation of the invention is illustrated in the accompanying drawing, it is obvious that considerable modification and alteration of the device may be made without departing from the spirit and scope of the invention as defined in the appended claims. The invention, therefore, is not limited to specific construction and arrangement shown.

What is claimed is:

1. A delivery closure for dispensing containers of the character described, comprising a spherical valve element mounted in cooperative relation to a restricted outlet opening of the container with provision for limiting rotative movement thereof only in two opposite directions about a single axis, said valve element having a radial nozzle extension substantially perpendicular with respect to said axis of rotation and a pair of angularly disposed passageways extending through the valve element and merging at their convergent end portions communicably with the opening of the nozzle extension, the opposite ends of said passageways terminating as port openings in the circumference of the valve element equidistant on opposite sides of the axis of rotation of the element whereby to be alternately brought into communicable registration with the outlet opening of the container, and an elastic closure for the nozzle extension of said valve element slitted to provide a normally closed outlet with opposed lip portions yieldable to open under pressure of the contents of the container and, by their inherent resiliency, being self-closable when

relieved of the pressure of the contents of the container.

2. A delivery closure for dispensing containers of the character described, comprising, in combination with a nipple extension of the container having a restricted outlet opening in the base portion thereof and an enlarged semispherical recess in its outer end portion in communication with said outlet opening, a spherical valve element seated in said recessed portion of the container nipple extension and having interfitting provision with the nipple extension to limit rotation of the nozzle element only to two opposite directions about a single axis, the protruding portion of the valve element having a radial nozzle extension substantially perpendicular with respect to said axis of rotation, said nozzle extension having a slitted closure composed of an elastic material yieldable to opening effect under pressure of the contents of the container and, by the inherent resiliency thereof, being self-closable when relieved of said pressure, the valve element having a pair of angularly disposed passageways therethrough, the convergent end portions of said passageways merging communicably with the opening of the nozzle extension and the opposite ends of the passageways terminating as port openings in the circumference of the valve element equidistant on opposite sides of the axis of rotation of the element whereby to be brought alternately into communicable registration with the outlet opening of the container nipple extension upon rotation of the valve element, the circumferential portion of the valve element in its neutral position covering said outlet opening and being provided with a packing and sealing medium, a retaining collar attachable to the container nipple extension for retaining the valve element in seated relation in said nipple extension, and an annular packing medium interposed between said valve element, nipple extension and retaining collar.

3. The herein described dispensing means, comprising, in combination with a collapsible container tube having an externally screw-threaded nipple extension provided with a restricted axial outlet opening in the base portion thereof and a semispherical recess in its outer end portion, a spherical valve element fitted rotatably in said recessed portion of the nipple extension and having diametrically opposite trunnions fitted in corresponding recesses in the end face of said nipple extension whereby to limit rotation of the valve element to two opposite directions about the axis of said trunnions, the protruding portion of said valve element having a radial nozzle extension substantially perpendicular with respect to the axis of said trunnions, said nozzle extension being substantially elliptical in cross section with the major axis thereof parallel to the axis of said trunnions and provided with an elastic closure slitted parallel to the major axis of the nozzle extension, said closure being yieldable to opening effect under pressure of the contents of the container and, by its inherent resiliency, being self-closable when relieved of such pressure, said valve element having a pair of angularly disposed passageways therethrough, merging at their convergent end portions communicably with the outlet opening of said nozzle extension and terminating at their opposite ends as port openings in the circumference of the valve element and equidistant on opposite sides of the axis of said trunnions, the circumferential portion of the valve element in-

- intermediate the port ends of the angularly disposed passageways, in the neutral position of the valve element, covering the outlet opening of the container nipple extension and being provided
- 5 with an inserted resilient packing medium having a protuberance entering and sealing said outlet opening, a retaining collar internally screw-threaded and fitted upon the container nipple extension and having an inward annularly
- 10 flanged outer end portion retentively engageable with the adjacent protruding portion of the valve element, and an annular packing medium interposed between said valve element, nipple extension and retaining collar.
- 15 4. Dispensing means of the character described, comprising, in combination with a collapsible container tube having a nipple extension provided with an axial outlet opening, and a round bodied valve element rotatably mounted
- 20 on said nipple extension in cooperative relation to the outlet opening thereof, said valve element being limited in its movement to two opposite directions about a single axis and having a radial

nozzle extension substantially perpendicular to its axis of rotation, said valve element having a pair of passageways therethrough merging at one end communicably with the outlet opening of said nozzle extension, the opposite ends of said passageways terminating as port openings in the inner circumferential portion of the valve element next adjacent the container tube nipple extension and equidistant on opposite sides of the axis of rotation of the element whereby to be alternately brought into communicable registration with the outlet opening of said nipple extension upon rotation of the valve element in either direction from neutral position, the circumferential portion of said valve element intermediate the port ends of the said passageways, in the neutral position of the element, closing the outlet opening of said nipple extension, and a resilient closure for the nozzle extension of said valve element yieldable to opening effect by pressure of the contents of the container tube and being self-closable when relieved of such pressure.

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