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H. J. SCHERINGER

2,209,665

TUBE CAP

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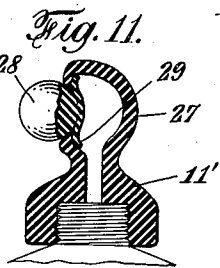
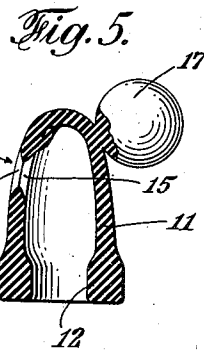
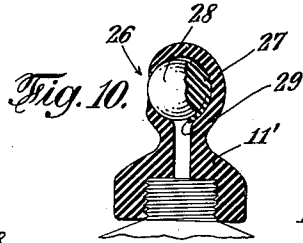
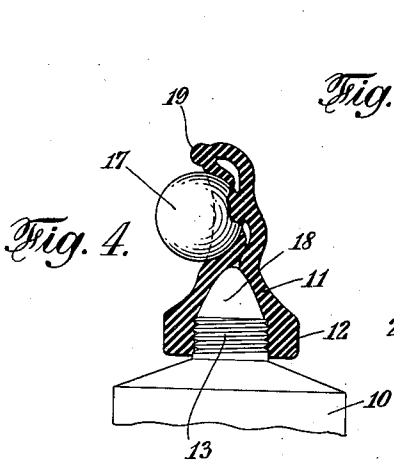
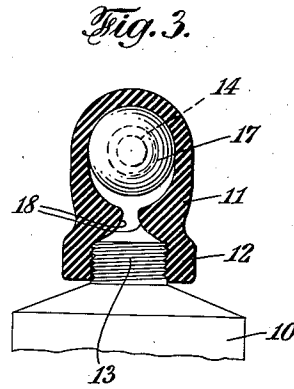
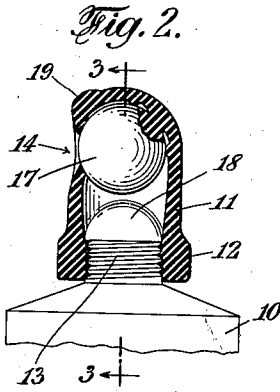
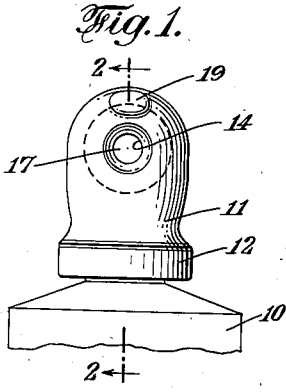
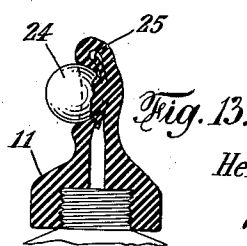
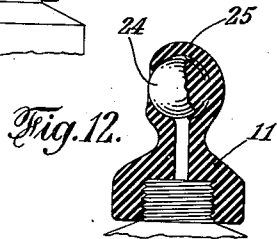
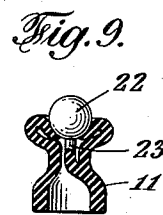
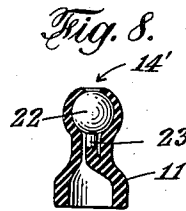
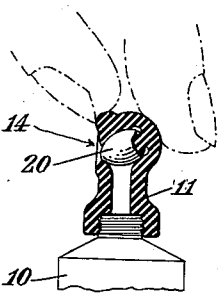


Fig. 6.



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TUBE CAP

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14 Claims. (Cl. 221-60)

This invention relates to caps or closures for collapsible tubes and has for its prime object to provide an efficient, inexpensive and simple device for either positively sealing the end of a collapsible tube, or for yieldably closing the tube so as to facilitate a temporary extrusion of the contents of the tube by exerting slight pressure against the tube.

Another object of this invention is to provide a tube closure of a substantially bag-like construction, provided with an outlet or port made of resilient material, and a valve body normally within the bag-like member, said outlet and said valve body being adapted to cooperate with one another in such a way, that the valve body may assume a position adjacent to either the interior or the exterior edge surfaces of the outlet, for permitting the extrusion of the tube contents, or for positively sealing the tube, respectively.

Another object of this invention is to construct the aforesaid tube closure, so as to facilitate the ready movement of the valve body relative to the bag-like structure without undue effort on the part of the operator.

The foregoing and a number of still other objects and important advantages of the present invention will become more fully apparent from the ensuing description of the accompanying drawing, which latter, although showing specific forms of my disclosure, are by no means intended to limit me to the actual forms illustrated, and in which

Fig. 1 is a front elevation of one form of my tube cap.

Fig. 2 is a cross section taken on lines 2-2 of Fig. 1.

Fig. 3 is a cross section taken on lines 3-3 of Fig. 2.

Fig. 4 is a cross section similar to that shown in Fig. 2, wherein the valve body is in its exterior, sealing position.

Fig. 5 illustrates the device shown in Figs. 1, 2, 3, and 4, turned inside out.

Figs. 6, 7, 8 and 9 denote modified forms of my device.

Figs. 10 and 11 illustrate cross sections of another modified construction of my device with a floating, unattached valve body, and

Figs. 12 and 13 are cross sections through still another embodiment of my device, wherein the valve body is equipped with a sealing apron.

Referring now specifically to Figs. 1, 2, 3, 4 and 5, numeral 10 denotes a collapsible tube to which is secured a bag-like valve housing member 11, preferably made of resilient material, such as

rubber, and which is provided with a thickened annular portion 12, adapted to engage the outlet or neck 13 of the collapsible tube.

Member 11 is provided with a port or outlet 14, the surrounding material of which is specially resilient material. The circular edge of the outlet is preferably thinned down and forms outer and inner valve seats, as clearly shown in Figs. 2 and 4, as well as in Fig. 5, in which latter figure the outer valve seat is indicated at 15, and the inner valve seat at 16. In this figure the device is illustrated turned inside out, which is the original shape of the device while being fabricated in molds.

Attached to member 11 at an angle relative to outlet 14 is a valve body 17, preferably in the form of a sphere. This ball is normally adapted to yieldably engage inner seat 16 of aperture 14 in the manner indicated in Fig. 2. When the ball is forced through opening 14 to the position shown in Fig. 4, it will engage the exterior seat 15 and draw the material of member 11, surrounding opening 14, against that portion of the bag to which ball 17 is attached. By so doing, ball 17 will positively seal opening 14 and prevent the escape of the contents within tube 10.

In order to more positively insure the sealing of the material within the tube, there are provided within member 11 side enlargements 18, clearly seen in Figs. 2, 3, and 4, which side enlargements will have the tendency to fill the space of the lower portion of the bag when ball 17 squeezes member 11 in the manner stated, and as shown in Fig. 4.

The propulsion of valve body 17 to without the member is facilitated by an exterior enlargement 19, which forms a purchase point for the index finger, while the thumb presses against the valve body in an effort of passing it through opening 14. This operation is indicated in broken lines in Fig. 6.

Referring now to Figs. 6, 7, 8 and 9, here again are illustrated resilient members 11, which serve the general purpose and are substantially shaped similarly to the bag member shown in Figs. 1, 2 and 3. All of these modified forms are provided with discharge ports or apertures, with which latter cooperate valve bodies of different shapes.

In Fig. 6 I employ a substantially egg-shaped valve body 20, which is attached in angular relation to outlet 14. Valve body 20 operates in a similar manner as does valve body 17. It either yieldably engages the interior valve seat for permitting the extrusion of the contents of tube 10,

or it will positively seal opening 14 when body 20 is pushed to without and rests with its attached end against the exterior seat.

In Fig. 7 the valve body is in the form of a double cone, as indicated at 21. Its operation in respect to the opening provided in member 11 is similar to that explained above.

In Figs. 8 and 9 a somewhat different construction is illustrated, wherein the member 11 is so constructed that its opening 14' is placed at its apex and valve body 22, in the shape of a ball, is secured by means of an elongated stem 23 to the lower portion of member 11. In this construction the operation of the device is somewhat different, in that the upper portion of member 11 is so-to-speak slipped down under the lower, attached end of the ball 22, as clearly shown in Fig. 9, at which position the ball will effectively seal opening 14.

The modified form of my device shown in Figs. 12 and 13 may be readily compared with the embodiments illustrated in Figs. 1 and 2, with the exception that ball valve 24 is provided with an additional sealing element in the form of a semi-spherical apron or shield 25, which is adapted to engage the interior area surrounding the opening when ball 24 is pushed out, as shown clearly in Fig. 13. In other words, the valve seat area in this case is engaged at the outer surface by the attached portion of the ball, while the inner surface of the seat area is engaged by apron 25. In this manner a very positive sealing of the opening is accomplished.

Another embodiment of my invention is found in Figs. 10 and 11, wherein again member 11' is illustrated, provided with a port or opening 26 in its upper portion 27. This upper portion is of a substantially spherical shape and so-to-speak completely surrounds the free or floating valve body 28. The latter is equipped with a detent shield or apron 29 which is adapted to engage the interior surface surrounding opening 26 when ball 28 is propelled to without member 11'. This position of ball valve 28 is clearly illustrated in Fig. 11.

In all of the modified forms described, it is essential that the edges of the port or opening of the bag-like member are sufficiently resilient to permit the passage of the relatively hard valve body from within to without the cap member. This movement of the valve body is facilitated by the lubricating effect of the contents of the tube, which fills the interior of the cap when the tube is squeezed.

Obviously a similar result may be obtained, by making the edges of the opening of relatively hard material, while the valve body is made sufficiently resilient to facilitate its passage through the opening.

The illustrations just described are intended to explain the principle upon which my tube closure operates. It is quite evident that in each of the constructions shown, the valve body, while within the bag-like member, will yieldably close the discharge opening of the member so as to permit the extrusion of the tube contents when slight pressure is exerted against the tube. The moment the valve body is propelled to without, it will effectively seal the discharge opening against the extrusion of the tube contents.

The principle of alternately seating a valve body against two adjacent valve seats may be employed for either closures similar to those illustrated or for vastly different purposes, for which reason I reserve for myself the right to make

changes and improvements in the construction of my invention, without departing from the broad principle thereof, as defined in the annexed claims.

I claim:

1. In a closure for collapsible tubes or the like, a resilient hollow member having an outlet, a valve body within the member and movable in respect to said outlet, said valve body being adapted to yieldably close the outlet while within said member, and to positively seal the outlet when disposed without said member.

2. A closure comprising a substantially bag-like resilient, hollow member having a discharge outlet, a resilient valve body operatively disposed within said member and adapted normally to yieldably close the outlet while within the member, and to positively seal the outlet when forced through the latter to without the member.

3. In a closure, the combination with a hollow member provided with a resilient outlet, of a valve body normally within the member and co-operating with said outlet, said valve body being constructed and arranged to pass through said outlet to without the member, thereby sealing said outlet.

4. In a closure, as set forth in claim 3, said member and said valve body being made of one piece of material.

5. In a closure, as set forth in claim 3, said member and said valve body being made of one piece of material, said valve body being disposed at an angle relative to said outlet.

6. In a closure, as set forth in claim 3, said member and said valve body being made of one piece of material, said valve body being disposed at an angle relative to said outlet, and means provided with said member for facilitating the movement of the valve body to without said member.

7. In a closure, as set forth in claim 3, said valve body having a flexible apron adapted to normally adhere to the body while the latter is within the member, and to deflect from the body and to engage the interior wall portion surrounding the outlet, when the valve body is forced to without the member for sealing the outlet.

8. In a closure, as set forth in claim 3, said member and said valve body forming independent structures.

9. In a closure, as set forth in claim 3, said member and said valve body forming independent structures, said valve body being provided with a shield or apron, normally adhering to and partially covering the body while the latter is within the member, said apron being constructed and arranged to deflect from the valve body and to form a stop for the latter and to engage the interior wall portion adjacent to the outlet, when the body is forced to without the member for sealing the outlet.

10. In a closure, a substantially bag-like resilient member having a resilient outlet, a valve body normally within the member and adapted to yieldably close said outlet so as to permit the extrusion of matter from within the member when pressure is applied, said outlet being normally of substantially smaller dimension than that of the valve body, but being adapted to permit the latter to pass to without the member, said valve body being so constructed and arranged as to facilitate its positioning without the body, thereby positively sealing the outlet.

11. In a closure having an outlet with interior and exterior adjacent valve seats, and a spherical

valve movable in respect to said outlet and adapted to engage either of the valve seats.

5 12. In a closure, an outlet, a one-piece, solid-bodied valve movable in respect thereto and adapted to engage either the exterior or the interior faces of the outlet.

10 13. In a device for either positively sealing or yieldably closing a passage, a member provided with an opening having adjacent valve seats, and a valve adapted to cooperate with either of the valve seats and capable of passing through the opening.

14. In a device for either positively sealing or yieldably closing a passage, a valve housing, a port therein, having adjacent valve seats disposed at both faces of the port, a valve cooperating with said port and its valve seats, said port and said valve being so constructed and arranged as to facilitate the passage of the valve through the port in order to seat the valve against either of the valve seats of the port at will.

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