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## COLLAPSIBLE TUBE OR CONTAINER

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6 Claims. (Cl. 221-60)

This invention relates to improvements in collapsible tubes or containers and it consists of the matters hereinafter described and more particularly pointed out in the appended claims.

The tubes or containers with which the present invention is more particularly concerned are of the kind used for paste-like materials such as tooth paste, shaving creams and the like and which material is extruded from the tube by collapsing the body of the same, usually from one end.

One of the objects of the invention is to provide a tube of this kind which is self sealing.

Another object of the invention is to provide a tube of this kind which embodies but a minimum number of parts, so formed and correlated as to be positive and efficient in operation and at the same time be practical to make at an exceedingly low cost.

A further object of the invention is to provide a tube of this kind, which includes a resilient closure member secured in place in a novel manner, eliminating the use of threaded retaining rings or like means.

Again, it is an object of the present invention to provide a tube of this kind which when used retains no part of the extruded material at the discharge orifice to harden and clog up said orifice or to foul the contents of the tube.

The above mentioned objects of the invention, as well as others, together with the advantages thereof, will more fully appear as the specification proceeds.

In the drawing:

Fig. 1 is a perspective view of a collapsible tube embodying the preferred form of the invention.

Fig. 2 is a transverse vertical sectional view through the discharge orifice end of the tube on an enlarged scale, as when the contained material is being extruded through said discharge orifice.

Fig. 3 is a top plan view of the parts shown in Fig. 2 with certain of said parts shown as broken away better to illustrate the structure involved.

Fig. 4 is a view similar to Fig. 2 illustrating the manner of applying the closure member or disk and the position thereof when closing and sealing the tube.

Fig. 5 is a perspective view of the closure member or disk forming a part of the improved tube structure.

Fig. 6 is a view similar to Fig. 3 and illustrates a modified form of discharge or extrusion orifice.

Referring now in detail to that embodiment of the invention illustrated in the drawing: 10 indicates the collapsible body of the tube which is

closed at one end as at 11 in the usual manner and is provided at the other end with an end wall 12. The central portion of said end wall is formed as an outwardly extending, hollow tapering truncated valve member 13 and in said wall radially outward from said valve member is a plurality of openings 14 for the passage of the material from the tube body. Preferably in the manufacture of said body, it is provided with an upstanding marginal flange 15 and just within said flange is an annular shoulder 16 as best shown in Fig. 4 and the purpose of which will later appear.

Associated with the end wall 12 of the tube is a closure member 17 shown in perspective in Fig. 5. Said closure member includes a tapering truncated nozzle 18 conforming to the exterior surface of the valve member 13, and a substantially radial flange 19 that is axially resilient. Said flange is dished or bowed downwardly and inwardly from its peripheral margin which is normally disposed in a plane between the planes of the ends of the nozzle 18.

In the assembly of the closure member upon the body, the nozzle 18 is engaged upon the valve member 13 and this brings the peripheral margin of the flange 19 into engagement upon the shoulder 16 on the head end of the body. In this position of the parts, which is shown in Fig. 4, the flange 19 covers the openings 14 in the head of the body and the body flange 15 extends a suitable axial distance beyond the said margin of said flange 19. The body flange 15 is then upset inwardly and downwardly into overlapping engagement upon the peripheral margin of the closure member flange as best appears at 15<sup>a</sup> in Fig. 2. This secures the closure member 17 in a tightly sealed, non-detachable engagement upon the head of the body, and this without the aid of extraneous parts that require threading operations.

Assume that the tube structure thus far described, has been filled from its end 11 and then sealed in the conventional manner. Upon collapsing of the tube, a pressure is applied to the material with which the tube is filled so that it tends to pass out through the discharge openings 14 in the head 12. The pressure of the material passing out through the openings 14 is imposed upon the inner or bottom surface of the flange 19 to flex the same axially outward, the flange approximately straightening out and approaching the plane of its margin, as appears in Fig. 2. In this flexing, the nozzle 18 moves away from the valve member 13 to provide an annular

opening therebetween through which the material is expressed or extruded. In this extrusion of the material, the inner surface of the nozzle causes the material to converge into a solid column as it leaves the nozzle.

So soon as collapsing pressure is released from the tube body, the flange 19 being resilient, returns to its original condition and this brings the nozzle into tight seating engagement on the valve member and cuts off the extruded material at the top of the nozzle. With the nozzle fitting snugly against the valve as described, the material between said valve and nozzle is forced backwardly into the head end of the tube. The nozzle, therefore, having a substantially large seating area on the valve, positively seals the content material from the effects of atmosphere.

In Figs. 1 to 5 inclusive, the structure thereof provides a circular extrusion orifice when the tube is being collapsed. In Fig. 6 the extrusion orifice is shown as of an elongated rectangular shape. This last mentioned shape may be had by making the tip end of the valve member and the nozzle of such elongated rectangular shape, the base end of both the valve member and the nozzle preferably remaining circular for an even flexing of the flange 19 of the closure member.

The improved structure requires only two parts, and no threading operations are necessary. The tube, even though of a simple construction for low production cost, is positive and efficient in its operation.

While in describing the invention, I have referred in detail to the form, arrangement and construction of the two parts thereof, the same is to be considered only in the illustrative sense so that I do not wish to be limited thereto except as may be specifically pointed out in the appended claims.

I claim as my invention:

1. In combination with the body of a collapsible tube, means providing a head at one end of said body and having at least one discharge opening therein, means providing an outwardly extending, tapering valve member on said head, means providing a closure member associated with said head and including a tapering nozzle portion normally engaged upon and substantially enclosing said valve member and also including a substantially radial, axially resilient flange portion covering said opening, and means for securing the peripheral margin of the flange portion to said head.

2. In combination with the body of a collapsible tube, means providing a head at one end of said body and having at least one discharge opening therein, means providing an outwardly extending, tapering valve member on said head, means providing a closure member associated with said head and including a tapering nozzle portion normally engaged upon and substantially enclosing said valve member and also including an axially resilient flange portion covering said opening, and means for securing the peripheral

margin of the flange portion to said head, said axially resilient flange portion being bowed inwardly toward said head between its margin and said nozzle.

3. In combination with the body of a collapsible tube, means providing a head at one end of said body, means providing an outwardly extending, tapering valve member centrally on said head and a plurality of discharge openings surrounding said valve member, means providing a closure member associated with said head and including a tapering nozzle portion normally engaged upon and substantially enclosing said valve member and also including a substantially radial, axially resilient flange portion surrounding the nozzle portion and covering said openings, and means for securing the peripheral margin of the flange portion to said head.

4. In combination with the body of a collapsible tube, means providing a head at one end of the body and having at least one discharge opening therein and an annular shoulder on its outer surface, means providing an outwardly extending tapering valve member on said outer surface of said head, means providing a thin sheet metal closure member associated with said head and including a tapering nozzle portion normally engaged upon and substantially enclosing said valve member and also including an inwardly dished, axially resilient flange portion surrounding the nozzle portion and covering said opening, the peripheral margin of said flange being engaged on said annular shoulder, and means for securing said flange margin in place upon said shoulder.

5. In combination with a means providing a tubular body portion, means arranged at one end of said body portion providing an outwardly tapering valve member and at least one discharge opening, a closure member associated with said end of said body portion and covering said opening and including a portion formed to close against said valve member and an outwardly extending substantially radial, axially resilient flange, and an integral flange on said end of the body portion turned inwardly to engage and hold the peripheral margin of said flange of said closure member in place upon said one end of said body portion.

6. In combination with the neckless tubular body of a collapsible tube, means providing a head for one end of said body, having at least one discharge opening therein, means providing an outwardly extending tapering valve member on said head, means providing a closure member associated with said head and including a tapering nozzle portion normally engaged upon and substantially enclosing said valve member and including a substantially radial, axially resilient flange portion covering said opening, and means for securing the peripheral margin of the flange portion to said head.

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