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METERING SPRING CLOSURE FOR DISPENSING
TUBULAR CONTAINERS
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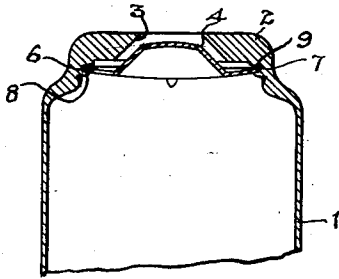


Fig. 2.

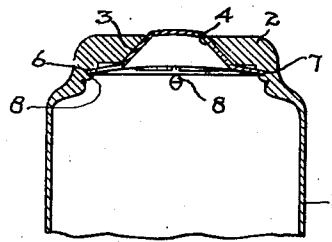


Fig. 1.

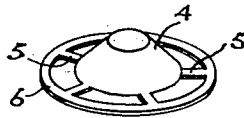


Fig. 3.

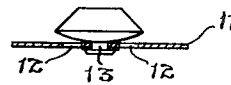


Fig. 5.

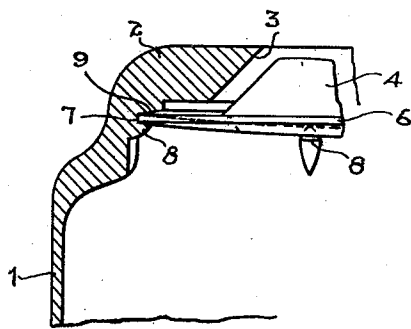


Fig. 6.

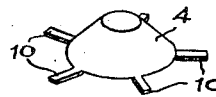


Fig. 4.

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METERING SPRING CLOSURE FOR DISPENSING TUBULAR CONTAINERS

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4 Claims. (Cl. 222-92)

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This invention relates to the collapsible type of tubular containers such as used in merchandising tooth paste, creams and ointments and the principal object of the invention is to provide a closure for such tubes which remains an integral part of the tube and cannot become lost or misplaced.

A further object is to provide a closure which will be easily and quickly opened and will automatically close and seal the tube after a regulated quantity of the contents has been dispensed.

A still further object is to provide means for automatically measuring the quantity of material dispensed from the tube following the manual operation of opening the closure member.

The principal feature of the invention consists in the novel construction of the collapsible tube with a tapered opening in the dispensing end and the arrangement within the tube end adjacent to the opening of an arched spring member supporting a tapered valve, the arch of the spring being reversed through applied pressure of the contents of the tube against the valve to move the valve into sealing engagement with the tapered opening.

In the accompanying drawings Fig. 1 is an enlarged longitudinal mid-sectional view of the dispensing end of a collapsible tube constructed in accordance with this invention showing the closure in the sealed position.

Fig. 2 is a view similar to Fig. 1 showing the closure member in the open position.

Fig. 3 is a perspective view of the preferred form of the closure member.

Fig. 4 is a perspective view of a slightly modified form of closure member.

Fig. 5 is a part sectional elevational view of a further modified form of closure member.

Fig. 6 is a part sectional much enlarged broken view of the dispensing end of a container and closure illustrating the means of securing the closure member in position.

Collapsible tubular containers have been in extensive use for a long period and though many attempts have been made to produce a closure as an integral part of the tube, such tubes are still practically universally closed with a removable cap threaded on the externally threaded hollow stem extending from the head or dispensing end of the tube.

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The externally threaded stem of dispensing tubes with the detachable cap is not only extremely inconvenient but it is messy and highly unsanitary as the contents of the tube invariably foul the thread and the cap and gather dust and dirt.

The present invention eliminates all of the objections and provides a smoother, clean tube which may be kept clean and entirely free of accumulations of the contents around the dispensing orifice.

As shown in the accompanying drawings the tube 1 is formed with a smoothly rounded dispensing head end 2 in which is formed an outwardly tapering dispensing opening 3 of suitable dimensions.

A valve member 4 is formed in frusto-conical shape to fit the tapered dispensing opening and the top of said valve preferably projects slightly above the top surface of the head so that it may be easily pressed inwardly by the tip of a finger or the end of a brush or other convenient instrument.

The valve 4 is preferably formed of stamped thin spring metal and is provided with a plurality of narrow radial fingers 5 extending outwardly from its base. These fingers as shown in Fig. 3 are connected at the outer ends by a thin ring 6.

The inner wall of the head end of the tube is formed with an annular groove 7 which forms a seat for the ring 6 of the valve and this seat is of slightly lesser diameter than the ring 6 and when the ring is pressed into said groove the radial spring fingers 5 are placed in compression thereby creating an outward warp or arching of the fingers so that the tapered surface of the valve engages in sealing contact with the tapered opening 3.

When pressure is applied against the outer end of the valve projecting through the opening the spring fingers are caused to assume an opposite curvature or warp and the valve moves inwardly to a position as illustrated in Figure 2 thus presenting an annular opening around the valve.

The ring 6 of the valve may be secured simply by frictional contact with the wall of the groove in the head or it may be fastened by deforming the metal of the inner wall to form fastening lugs 8.

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It will be noted that the upper surface 9 of the groove 7 is bevelled upwardly so that the ring 6 may be free to flex upwardly in the closing movement of the valve.

The tube when the valve is sealed is filled with the soft flowable contents which presses against the large area of the underside of the valve and upon the valve being pressed inwardly to open the dispensing opening the flowable contents flows around the spring fingers and enters the annular space between the valve and the seat.

Pressure on the tube causes the contents to flow out between the valve and the seat but the pressure exerted against the inner side of the valve pushes it outwardly so that it pinches off the flowing material and again seals the opening but a quantity of the material sufficient for a normal or average application has been dispensed in the operation.

The extruded material may be removed with the brush or finger or a cloth or other object and a clean metal surface remains so that dust or dirt will not accumulate thereon.

As illustrated in Figure 4 the valve may be formed with the radial fingers 10 unconnected at their outer ends and when this form of valve is pressed into position in the inner groove 7 of the head the sharp ends will grip the soft tube metal without requiring the use of fastening lugs described.

A slightly different form of valve member is shown in Figure 5 in which a thin spring washer 11 is formed with perforations 12 around the center and a frusto conical, button-like valve is secured in the center of said washer by the rivet 13.

This spring washer when pressed into the annular groove 7 in the head will also flex into arched or dished form and it will operate in a manner similar to the form of valve previously described.

Other forms of flexible arching supports may be devised and used with the same result so long as the spring action of an arched member will cause the valve to move definitely in either an opening or a closing direction. It will also be understood that the dispensing opening and valve need not be tapered.

What we claim as our invention is:

1. In a collapsible tubular container having a dispensing opening, means operable to permit dispensing of a measured quantity of material from said container and to thereafter automatically close and seal said dispensing opening, said means comprising a valve arranged within said container, arched spring means supporting said valve and anchored at the periphery within said tube and capable of reversing flexure upon application of an external force between a position holding said valve in a closed position in sealing engagement with said dispensing opening and a position holding said valve in an open position away from and inwardly of said dispensing opening, said valve upon being displaced by external pressure applied thereto through said dispensing opening to the open position providing a flow path to said dispensing opening displaced from the axis of said dispensing opening and blocking the path of material moving axially toward said dispensing opening upon the application of dispensing pressure to said container, said valve being actuated upon application of such dispensing pressure under the flow of material thereagainst to close against said dispensing opening following the dispensing of a measured quan-

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tity of material through said flow path and dispensing opening.

2. In a collapsible tubular container having an outwardly convergent dispensing opening defining a bevelled annular seat within said container, a valve adapted to co-operate with said seat arranged wholly within said container, arched spring means secured in the inner wall of said container and supporting said valve and capable of reversing flexure upon application of an external pressure between a spring stable position urging said valve into sealing engagement with said seat and a spring stable position holding said valve in an open position away from and inwardly of said dispensing opening and said seat, said valve upon actuation under external pressure directed inwardly through said dispensing opening to an open position lying centrally within said container clear of said dispensing opening and in the path of material moving directly toward said dispensing opening under application of dispensing pressure and defining with said container flow path means for such material to said dispensing opening displaced from the center of said valve, said valve being actuated to reverse flexure of said spring means under pressure of material moving against said valve under dispensing pressure to close said dispensing opening following the dispensing of a measured quantity of material through said flow path means and dispensing opening.

3. A collapsible dispensing tubular container having an outwardly convergent dispensing opening in one end defining a bevelled annular seat within said container, a valve arranged within said container to close against said seat and thin flexible spring fingers secured against displacement at their outer ends to the wall of said tube and supporting said valve and held in compression in an arched form within said tube to form an overcentre type snap acting spring support, said fingers being movable under pressure between a stable position holding said valve closed against said seat and an oppositely arched stable position holding said valve open and inwardly of and away from said dispensing opening and said seat upon being moved to the open position under application of an external pressure inwardly through said dispensing opening, said fingers permitting said valve to move from said open position inwardly of said dispensing opening under pressure of material being dispensed upon application of dispensing pressure to close said dispensing opening following dispensing of a measured quantity of said material.

4. A dispensing tubular container of the collapsible type having a head end formed with a central dispensing opening and an inner circumferential groove in its inner wall, over centre type snap acting spring means within said container comprising a ring fitting said groove under compression and having arched inwardly extending radial fingers, a valve supported by said radial fingers within said tube and movable under reversal of flexure of said fingers upon application of external pressure to effect displacement of said fingers over centre between a stable position closing said dispensing opening and a stable position inwardly of and away from said dispensing opening, said valve being actuated to said position inwardly of and away from said dispensing opening upon application of pressure directed inwardly through said dispensing opening and being actuated from said position inwardly of said dispensing opening upon appli-

cation of dispensing pressure to said container to reverse the flexure of said fingers and move to a position closing said dispensing opening following the dispensing of a measured quantity of material therethrough.

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