June 13, 1939. C. E. LUNDGREN 2,162,092

CLOSURE

Filed March 13, 1937

FIG. 1.

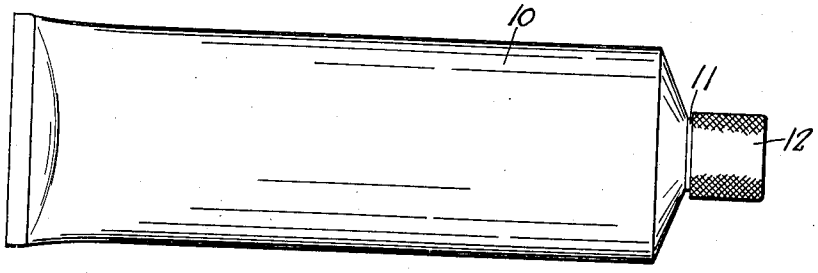


FIG. 2.

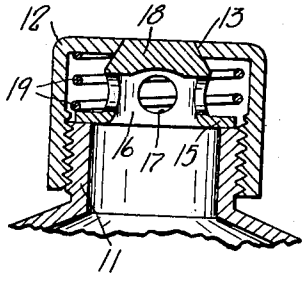


FIG. 3.

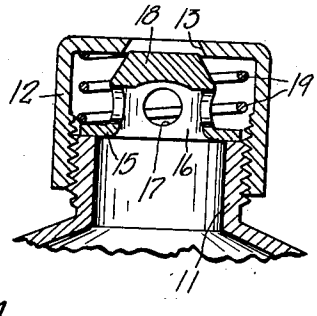


FIG. 4.

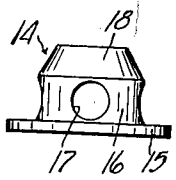


FIG. 5.

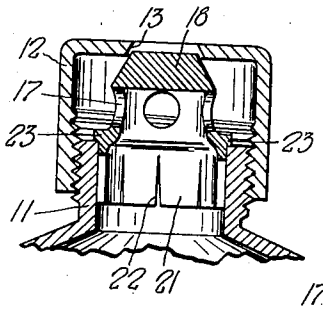


FIG. 6.

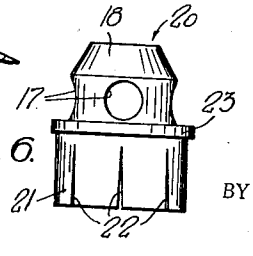
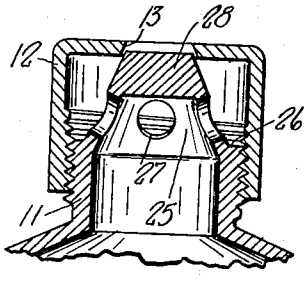


FIG. 7.



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CLOSURE

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5 Claims. (Cl. 221—60)

This invention relates to improvements in closures, and particularly to collapsible tube closures.

The closures for collapsible tubes and other containers of liquid or plastic materials heretofore developed and employed have generally been of one of two common types. One of these types is embodied in the conventional screw threaded cap which must be entirely removed from the container to permit exhaust of any of the contents of the container. The other of these types employs a normally closed valve which is automatically opened by the manipulation of the container to discharge the contents thereof. The first mentioned removable closure type is objectionable from the standpoint of the necessity of handling the cap independently of the container with the possibility of misplacing, dropping and losing the cap incident to such separate handling while removed. The valve type is objectionable because of the possibility of loss or discharge of the container contents through accidental valve opening, as when the container is dropped or a collapsible tube is subjected to pressure while packed in a traveling bag or the like.

It is therefore the primary object of this invention to provide a closure which can be positively locked in sealing relation when not in use and which can be conditioned for use by a simple adjustment and without removal of parts.

A further object is to provide a device of this character which can be readily applied to any container having a conventional screw threaded outlet.

A further object is to provide a device of this character having an apertured closure shiftable on a container outlet, and a spring pressed valve member in stationary relation to said container outlet, whereby shifting of said closure permits discharge of the container contents.

A further object is to provide a device of this character with a novel valve construction.

Other objects will be apparent from the description and the appended claims.

In the drawing:

Fig. 1 is a side view of a collapsible tube having my improved closure applied thereto.

Fig. 2 is a longitudinal sectional view illustrating the closure in sealing position.

Fig. 3 is a longitudinal sectional view illustrating the closure in open position.

Fig. 4 is a side view of the valve.

Fig. 5 is a longitudinal sectional view of a modified construction of my device.

Fig. 6 is a side view of the valve used in the embodiment illustrated in Fig. 5.

Fig. 7 is a longitudinal sectional view of another embodiment of the invention.

Referring to the drawing, and particularly to Figs. 1 to 4, which illustrate the preferred embodiment of my invention, the numeral 10 designates a conventional collapsible tube having a reduced outlet neck 11 which is exteriorly threaded. A cap 12 is provided with interior screw threads fitting on neck 11. The end wall of cap 12 is provided with a central tapered aperture 13.

A valve member 14 is positioned within cap 12 and is adapted to seal aperture 13 thereof. This valve 14 comprises an annular flat base flange 15 projecting outwardly from the end of a hollow cylindrical body portion 16 having a plurality of equi-spaced apertures 17 in its walls intermediate its ends. Body portion 16 terminates in an integral solid end portion 18 of frusto-conical shape adapted to seat in full face engagement with the periphery of tapered aperture 13 of cap 12.

Flange 15 of valve 14 seats on the outer edge of neck 11 in centered relation thereto with body portion 16 of the valve projecting outwardly from said neck. The cap 12 is threaded on neck 11, and valve portion 18 seats in aperture 13 thereof. A coil spring 19 is inserted in the cap between the end wall thereof and flange 15 of valve 14. The spring 19 is preferably of a diameter to closely fit within the cap, and the diameter of cylindrical body portion 16 of the valve is preferably less than that of the neck 11 and the inner diameter of the cap, so that spring 19 is positioned in substantially outwardly spaced relation to said body portion.

In operation, the cap 12 may be threaded on neck 11 to effect a tight sealing engagement between valve portion 18 and the cap aperture 13 which are equally tapered. The taper of said part and aperture permit self-centering of the loosely mounted valve with respect to the cap aperture. When the parts are so arranged, the tube is effectively sealed against discharge of its contents upon application of pressure to the tube.

To discharge the container contents, the cap 12 is first loosened slightly on neck 11, without, however, entirely removing the same. When the cap is so loosened, the spring 19 expands to continue to force the valve member 14 in seated relation on the end of the neck. The opening of the closure so produced is of annular shape between part 18 and aperture 13. Upon application of pressure to discharge the tube con-

tents, the same pass from the tube outwardly through the neck, into the hollow body portion 16, radially outwardly through apertures 17 into cap 12, and longitudinally outwardly in the cap to and through the annular passage between valve 18 and aperture 13. When a desired amount of the material has been discharged, the tube can again be sealed by slight rotation of the cap to bring the wall of aperture 13 into tight face engagement with the periphery of valve part 18. The tapered form of valve part 18 which forms somewhat of a guide for the material discharged by reason of the passage of said material thereover in its movement to and through the aperture 13, serves somewhat to resist the tendency of the pressure expelled material passing from the tube neck to unseat valve member 14 from said neck. Therefore the spring 19 is not required to sustain the full measure of the pressure applied to the tube to discharge its contents. It will therefore be seen that this continued spring pressed seating of the valve on the outlet neck of the container permits the contained material to be discharged under pressure after the cap has been only slightly loosened; and that the closure can be sealed by tightly thredaing the cap on the neck to seat on valve 18 to prevent discharge of the material upon accidental pressure application to the tube.

One of the important advantages of this construction is that the seal is effected positively, rather than by spring action. This permits the contained material which remains in the cap after partial discharge of the contents to be sealed against access of air thereto and prevents drying and caking of the material. Inasmuch as the material contained is generally of liquid or plastic character, and will not properly flow if dried or caked, such a positive seal overcomes one of the greatest disadvantages of the spring pressed valve type of closure wherein the stress applied by the spring to the valve is often inadequate to effect the necessary air-excluding seal. Another advantage of the instant construction is its simplicity and the adaptability thereof for application to any conventional screw threaded container outlet.

In the embodiment of the device illustrated in Figs. 5 and 6, the valve 20 is so constructed that the same has an integral spring portion acting to retain the same in stationary relation to neck 11 during operation of the device. In this embodiment, the valve 20 is generally of hollow cylindrical form with a portion 21 thereof comprising a skirt which is provided with a plurality of spaced longitudinal slits 22 therein. The skirt 21 fits within the neck 11, with the portions thereof between slits 22 pressing outwardly in frictional engagement with the interior of the tube neck. An exterior shoulder 23 defines the upper end of the skirt and forms a stop for the purpose of properly positioning the valve member within the tube neck. The remainder of the valve member 20 is constructed substantially the same as that heretofore described, having the apertures 17 in its head and a tapered valve head 18. The cap 12 and tapered aperture 13 of this embodiment are the same as heretofore described.

In the embodiment illustrated in Fig. 7, the valve is formed integrally with the tube neck. Thus, from the threaded neck portion 11 of the tube projects a tapered hollow portion 25 integral with said neck and preferably inset therefrom at 26. Apertures 27 are formed in portion 25, and the portion 25 terminates in a closed end portion 28. The cap 12 has the same type of aperture 13 tapered complementary to end portion 28 seating therein. The operation of this device is obviously the same as heretofore described.

While the device has here been illustrated and described as applied to a collapsible tube, it is obvious that it may be employed with equal advantage to other containers, and especially to containers which have screw threaded necks.

I claim:

1. A closure for the outlet of a container, comprising a cap adjustably mounted on said outlet and having an opening in its end, a hollow apertured member bearing on said outlet and including a tapered valve portion normally seating in said opening, and a coil spring in said cap bearing on said member to position said member seated on said outlet when said cap is shifted on said neck to unseat said valve portion relative to said cap opening.

2. In combination, a closure adjustable on a container outlet and having an aperture in its end, an apertured valve member having a tapered end portion seating in said cap aperture, a flange projecting from the end of said valve opposite said valve end, and a spring interposed between said closure and flange to press said flange against said outlet, adjustment of said closure at least partially opening said closure aperture.

3. A closure for the outlet of a container comprising a cover adjustable on said outlet and having a tapered aperture in its end, an apertured cylindrical member seating on said outlet and including a tapered end fitting in said cover aperture, and a spring interposed between said cover and member.

4. A valve adapted for a container outlet, comprising an apertured closure, a cylindrical body having a passage therethrough communicating with said outlet and discharging at the side of said body, the outer end of said body being tapered and normally sealing the closure aperture, said closure being shiftable relative to said body to permit discharge through said aperture.

5. A valve for a container outlet, comprising an apertured closure, a hollow cylindrical body open at one end and having apertures opening at its sides, a flange projecting laterally from the open end of said body adapted to seat on said container outlet, and a tapered head on the opposite end of said body adapted to seat in said closure aperture, said closure being shiftable relative to said body to permit discharge through said aperture.

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