Jan. 13, 1959 A. G. FELLER ET AL 2,868,422

CAPTIVE CLOSURE

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Fig. 1.

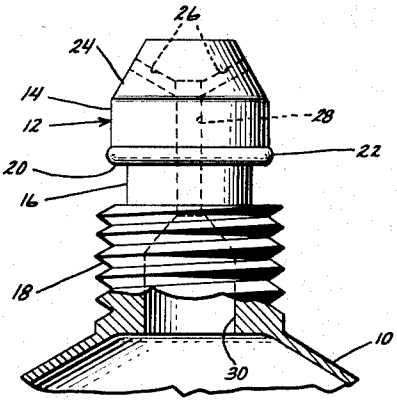


Fig. 2.

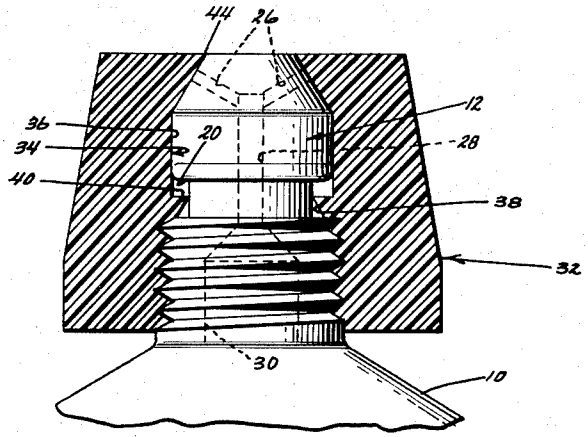
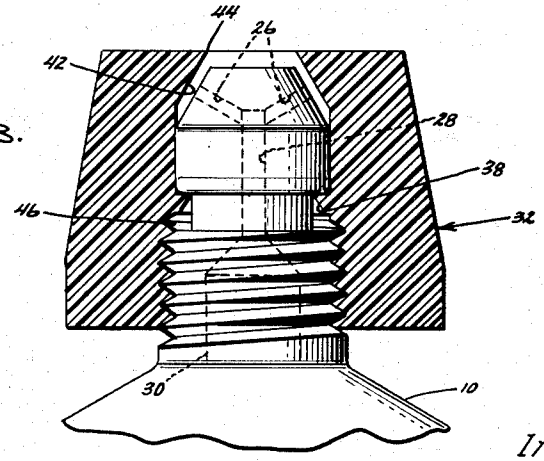


Fig. 3.



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CAPTIVE CLOSURE

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4 Claims. (Cl. 222—521)

The present invention relates to a captive closure and more particularly to a closure for collapsible receptacles such as toothpaste tubes, mucilage containers, or any similar vessel which applies a manually manipulable closure to a dispensing nozzle.

Toothpaste and shaving-cream tubes, as well as many other types of cream or liquid containers, conventionally utilize removable caps which are threadedly received onto nozzles from which the contained material is dispensed. The closure is manually completely removed from the nozzle for dispensing the material and in many instances the closure is either misplaced or lost, causing considerable inconvenience in either finding the lost closure or in trying to provide some suitable means for closing the nozzle.

It is an object of this invention to provide a captive closure for a dispensing nozzle which may be manually manipulated for opening and closing the nozzle.

It is another object of this invention to provide a non-removable closure for a dispensing nozzle which when open provides a good seal against back-flow of dispensed material.

It is yet another object of this invention to provide a non-removable closure for a dispensing nozzle which may be fabricated of conventional plastic material for providing a seal against back-flow of dispensed material.

Other objects will become apparent as the description proceeds.

To the accomplishment of the above and related objects, the invention may be embodied in the forms illustrated in the accompanying drawings, attention being called to the fact, however, that the drawings are illustrative only, and that specific change may be made in the specific constructions illustrated and described so long as the scope of the appended claims is not violated.

In the drawings:

Fig. 1 is an elevational view of the nozzle portion of one embodiment of this invention;

Fig. 2 is a partial sectional illustration of the same embodiment of this invention showing the cap in closed position; and

Fig. 3 is a similar sectional illustration showing the cap in open position.

Referring to the drawings, a conventional, collapsible tube 10 shown only in part-section is provided with a dispensing nozzle, generally indicated by the reference numeral 12. This nozzle is generally of cylindrical shape having an upper cylindrical portion 14 of uniform diameter, an undercut portion 16 of smaller diameter, and another larger diameter portion 18 which is externally threaded as shown. Preferably, the diameter of the threaded portion 18 is substantially the same as that for the portion 14, the reason for this being explained hereinafter.

The larger and smaller diameter portions 14 and 16 are joined by a radially outwardly projecting annular, right-angle shoulder 20 which extends or projects radially outwardly from the portion 14 to provide an annular rib 22, the outer diameter of this rib 22 being only slightly larger than that of the portion 14.

The upper end of the nozzle 24 is frusto-conical in shape and is provided with two or more branch passages 26 which open through the surface 24. These two branch passages 26 merge with a central dispensing passage 28 disposed in the central portion of the nozzle, which communicates with the discharge opening 30 of the tube 10.

The nozzle thus far described as well as the cap which will be described in the following are fabricated of suitable plastic material of the type which is resiliently yieldable whereby the rib 22 may be slightly deformed radially inwardly. The purpose of this resilient yieldability will be explained further in the following.

As shown in Figs. 2 and 3, a cap or non-removable closure 32 is adjustably mounted on the nozzle 12. This cap is provided with a bore, generally indicated by the reference numeral 34, having one portion 36 of uniform diameter which is substantially equal to the diameter of the nozzle portion 14. This bore portion 36 is of such size as to provide a snug-rotational fit with the nozzle portion 14 whereby back-flow of dispensed material will be inhibited.

Extending radially inwardly from the bore portion 36 is an annulus 38 integral with the cap which projects into the radial space provided by the smaller diameter nozzle portion 16. The upper portion 40 of this annulus is radially flat, hence complementary to the radial surface of the shoulder 20.

The cap bore is threaded below the annulus 38 for engagement with the nozzle threads 18.

The upper end of the bore 36 is tapered inwardly, as shown, complementary to the frusto-conical surface 24 of the nozzle, this tapered surface being indicated by the numeral 42. The end of the cap is provided with an opening 44 through which the material in the tube 10 may be dispensed.

In initially assembling the cap 32 to the nozzle 12, the cap is telescoped over the nozzle portion 14 until the cap threads 46 engage the nozzle threads 18. The cap is then merely turned downwardly until the annulus 38 drops into the annular space provided by the nozzle undercut 16. As mentioned earlier, the cap 32 is formed of a resilient plastic material so that as the cap is initially telescoped over the nozzle portion 14, the cap merely bulges outwardly to accommodate the passage of the annulus 38 over the portion 14. Also, the tapered surface on the underside of the annulus 38 assists in this passing. Once the annulus 38 snaps into the annular space of the undercut 16, removal of the cap from the nozzle becomes impossible, because the upper surface 40 of the annulus abuts against the nozzle shoulder 20. Hence, the provision of the shoulder 20 and annular surface 40 prevents the cap from being removed.

By screwing the cap 32 downwardly to its fullest extent, the tapered surface 42 seals against the frusto-conical surface 24 of the nozzle, as shown in Fig. 2. This serves to seal off the openings of the branch passages 26, thereby closing the nozzle. When it is desired to dispense material from the tube 10, the cap 32 is merely unscrewed to the point at which the surface 40 engages the shoulder 20, thereby opening the passages 26 whereby material may be dispensed therefrom and through the cap opening 44.

As mentioned earlier, the bore diameter 36 is made to substantially the same size as the diameter of the nozzle portion 14 for preventing back-flow of material; however, this feature alone is not adequate to provide a perfect seal against material from flowing backwardly and filling the space of the threads 18 and 46. In order

to provide an effective and absolute seal against this back-flow, the rib **22** on the nozzle is formed with a slightly larger diameter than the bore portion **36** so that the rib **22** always forcefully engages the bore surface providing a perfect seal against the flow of the dispensed material. By reason of the fact that the rib **22** is formed of a resilient, yieldable plastic material, it will deform radially inwardly but yet will resist this deformation and will bear against the bore surface **36**. Thus, by reason of the resilient yieldability of the material in both the nozzle and the cap, a perfect seal against back-flow of dispensed material from entering the threaded portions of the assembly is simply and effectively accomplished.

By reason of the fact that the diameter of the threaded portion **18** is substantially the same as that of the nozzle portion **14**, it is seen that the cap threads **46** will engage the rib **22** as the cap is initially telescoped over the nozzle. Thus, for assembly purposes only, the rib **22** provides a thread whereby the cap may be forcefully screwed onto the nozzle until the annulus **38** snaps into the annular space provided by the undercut portion **16**.

What is claimed is:

1. In combination, a cylindrically shaped nozzle having opposite ends, one end having a frusto-conical surface, a passage in said nozzle which opens through said surface, the other end being of reduced diameter and joining the larger diameter portion of the nozzle in an annular shoulder, a circumferential rib integral with and surrounding the larger diameter portion, said rib being of slightly larger diameter than said larger diameter portion and yieldable radially inwardly, said rib further being of resilient material which opposes deformation, a cap having opposite ends and a cylindrical bore therethrough, said bore having one portion of a diameter substantially equal to the diameter of said larger diameter nozzle portion, said one bore portion being rotatably engageable with said rib to provide a fluid seal, said bore having a radially inwardly extending annulus of smaller diameter than said nozzle shoulder and extending into the radial space of the smaller diameter nozzle portion, and a tapered portion in said bore shaped complementary to said frusto-conical surface, said cap being movable axially on said nozzle for abutting said annulus against said shoulder.

2. In combination, a cylindrically shaped nozzle having opposite ends, one end having a frusto-conical surface, a passage in said nozzle which opens through said surface, the other end being of reduced diameter and joining the larger diameter portion of the nozzle in an annular shoulder, an outwardly projecting annular rib on the larger diameter portion of said nozzle contiguous with said shoulder, said rib being of slightly larger diameter than said larger diameter portion and yieldably radially inwardly, said rib further being of resilient material which opposes deformation, a cap having opposite ends and a cylindrical bore therethrough, said bore having one portion of a diameter substantially equal to the diameter of said larger diameter nozzle portion, said one bore portion being rotatably engageable with said rib to provide a fluid seal, said bore having a radially inwardly extending annulus of smaller diameter than said nozzle shoulder and extending into the radial space of the smaller diameter nozzle portion, and a tapered portion in said bore shaped complementary to said frusto-conical surface, said cap being movable axially on said nozzle for abutting said annulus against said shoulder.

3. In combination, a cylindrically shaped nozzle having opposite ends, one end having a frusto-conical surface, a passage in said nozzle which opens through said surface, the other end being externally threaded, a reduced diameter portion intermediate said opposite ends and joining the larger diameter portion in an annular shoulder, an outwardly projecting annular rib on said larger diameter portion contiguous with said shoulder, said rib being of slightly larger diameter than said larger diameter portion and yieldable radially inwardly, said rib further being of resilient material which opposes deformation, a cap which is radially resilient and having opposite ends and a cylindrical bore opening therethrough, said bore having one portion of a diameter substantially equal to the diameter of said larger diameter nozzle portion, said one bore portion being rotatably engageable with said rib to provide a fluid seal, said bore having a radially inwardly extending annulus of smaller diameter than said nozzle shoulder and extending into the radial space of the smaller diameter nozzle portion, said bore having at one end a tapered surface shaped complementary to and engageable with said frusto-conical surface, said bore having threads at the other end which engageable with said nozzle threads for moving said cap axially on said nozzle.

4. In combinaion, a cylindrically shaped nozzle having opposite ends, one end having a frusto-conical surface, a passage in said nozzle which opens through said surface, the other end being of reduced diameter and joining the larger diameter portion of the nozzle in an annular shoulder, a circumferential rib integral with and surrounding the larger diameter portion, said rib being of slightly larger diameter than said larger diameter portion, a cap which is radially resilient and having opposite ends, and a cylindrical bore therethrough, said bore having one portion of a diameter substantially equal to the diameter of said larger diameter nozzle portion, said one bore portion being rotatably engageable with said rib to provide a fluid seal, said bore having a radially inwardly extending annulus of smaller diameter than said nozzle shoulder and extending into the radial space of the smaller diameter nozzle portion, and a tapered portion in said bore shaped complementary to said frusto-conical surface, said cap being movable axially on said nozzle for abutting said annulus against said shoulder.

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