

[54] **SAFETY CLOSURE ASSEMBLY**

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Related U.S. Application Data

- [63] Continuation-in-part of Ser. No. 95,300, Dec. 4, 1970, Pat. No. 3,675,804.
- [52] U.S. Cl. 215/9
- [51] Int. Cl. A61j 1/00, B65d 55/02
- [58] Field of Search..... 215/9, 44

References Cited

UNITED STATES PATENTS

- 3,682,343 8/1972 Landen..... 215/9
- 3,675,804 7/1972 Micallef..... 215/9

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 Attorney—David S. Kane et al.

[57]

ABSTRACT

A safety closure assembly of a container includes a cap having a radially shiftable liner with internal interrupted threads which are adapted to cooperate with a container neck having external specially arranged guide surfaces. Only informed and deliberate manipulation of the cap permits its removal from the container neck. Inter-engagement of the liner with its accommodating cap causes the liner to shift radially inwardly to increase resistance of projecting surfaces of the liner against a stop on the container neck should an attempt be made to remove the cap in an improper manner. The liner is also permitted to shift radially outwardly within the cap in order that optimum inter-engagement may be obtained between the liner threads and those present on the container neck in order that a relatively wide range of tolerances may be accommodated on the exterior of the neck finish.

11 Claims, 9 Drawing Figures

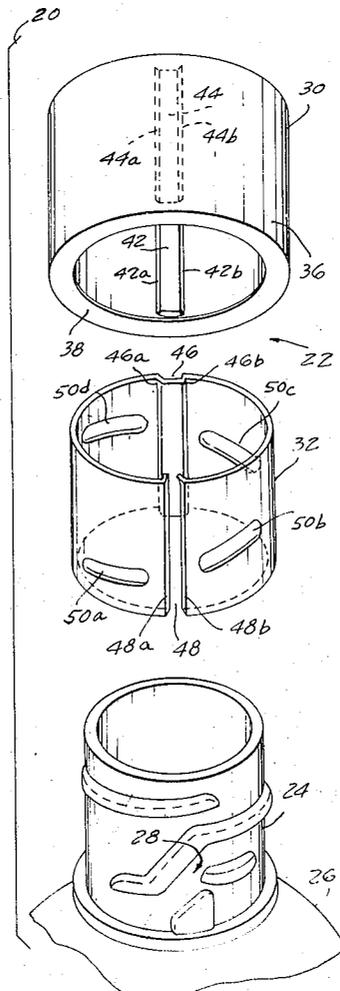


FIG. 1

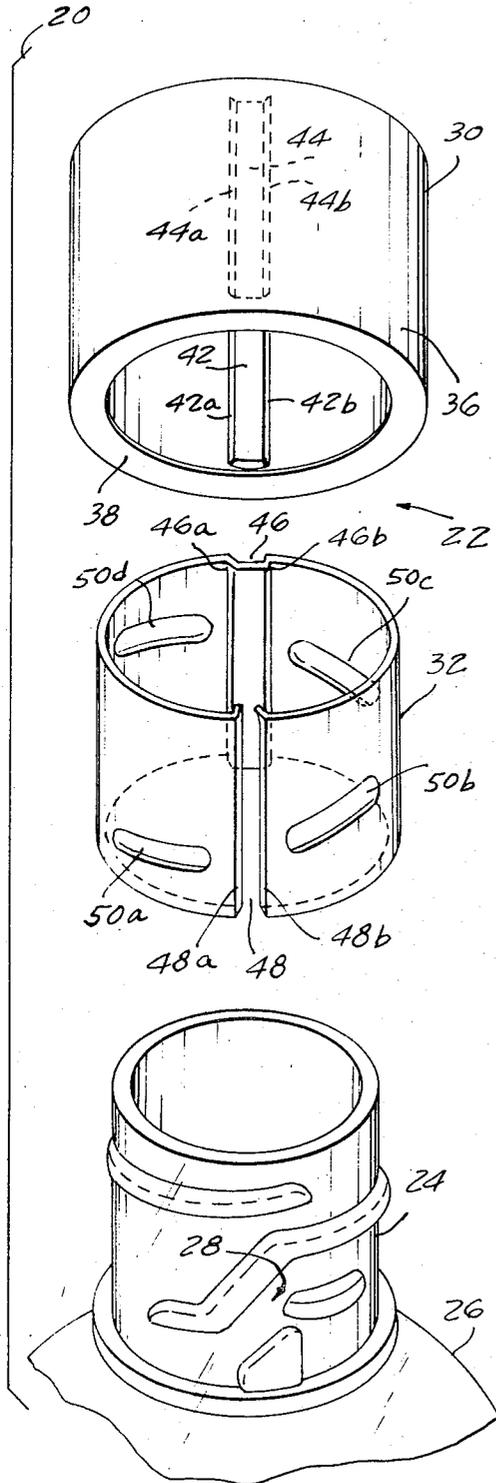


FIG. 2

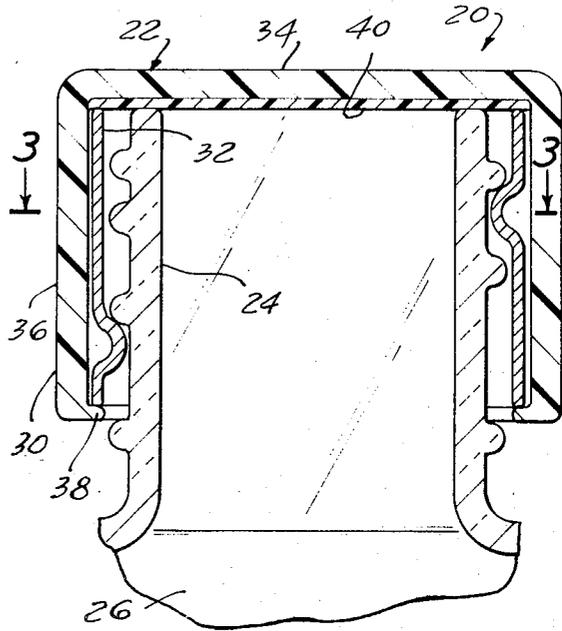


FIG. 3

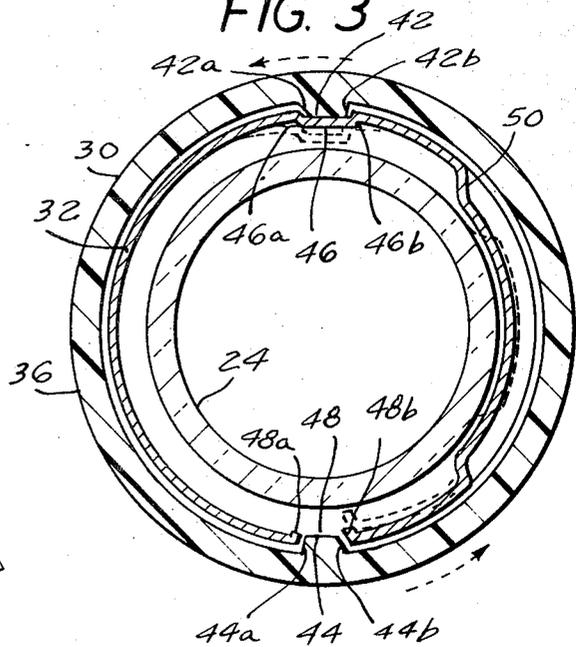


FIG. 4

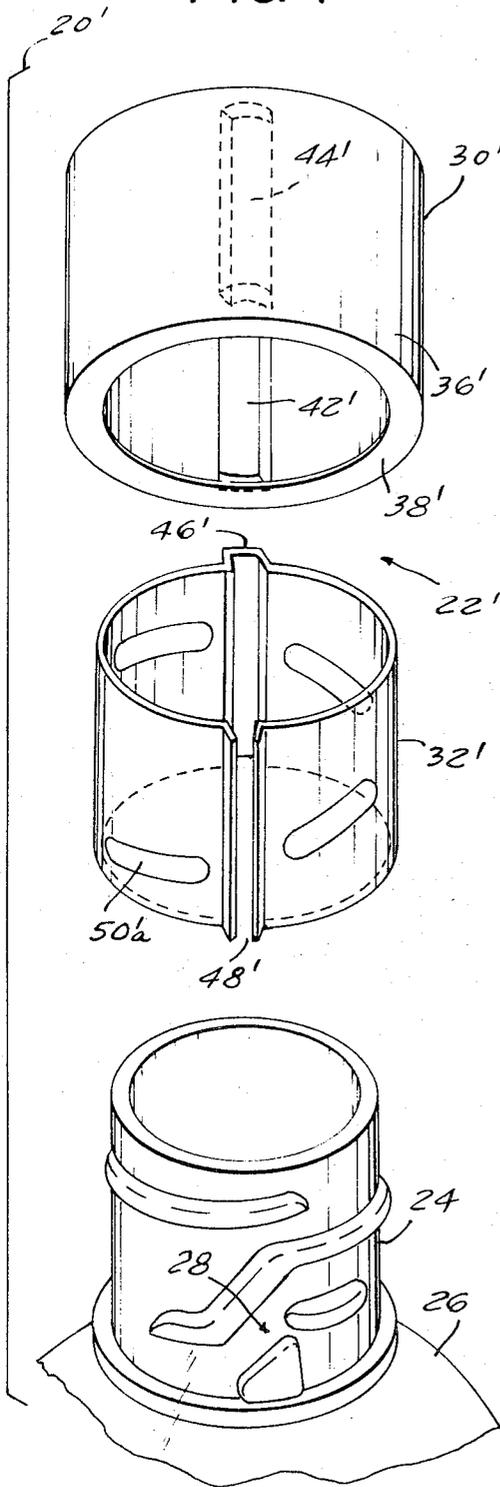


FIG. 5

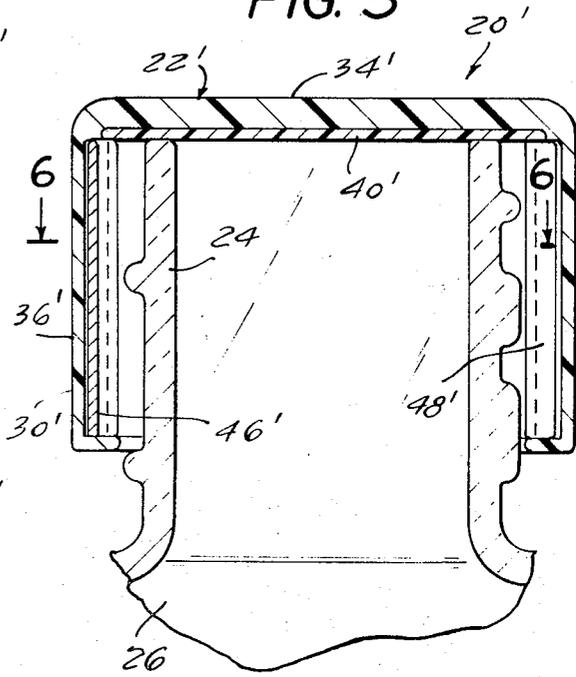
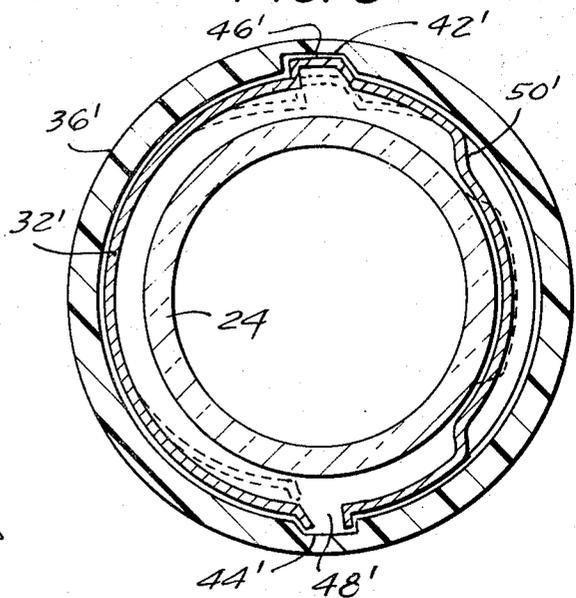
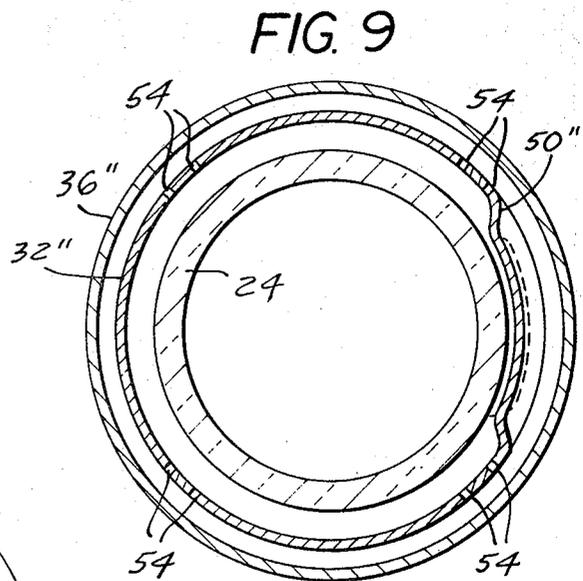
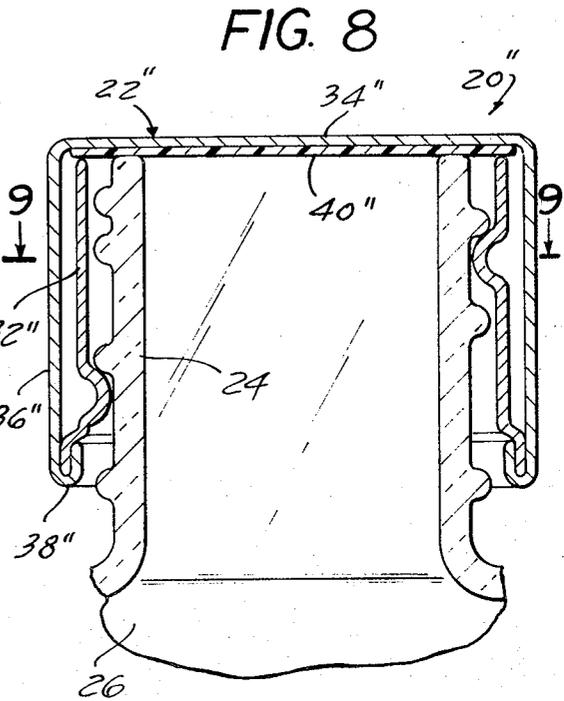
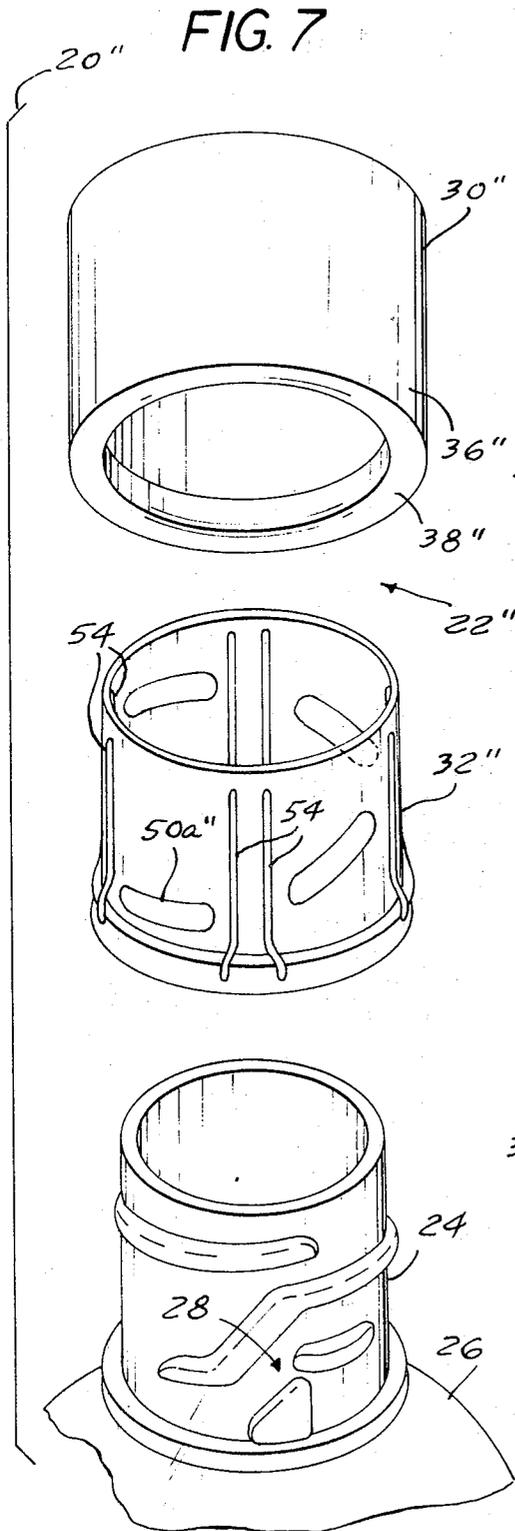


FIG. 6





SAFETY CLOSURE ASSEMBLY

REFERENCE TO RELATED APPLICATION

This application is a continuation-in-part of application Ser. No. 95,300 filed Dec. 4, 1970, now U.S. Pat. No. 3,675,804.

SUMMARY OF THE INVENTION

This invention relates to an improved cap construction for use as part of the safety closure assembly disclosed in the above referenced patent application.

The present invention has as one of its principal objects an improved safety cap that is adapted to accommodate a relatively wide range of tolerances of container neck finishes.

Another object is to provide a safety cap of the foregoing type which may be made entirely of metal.

A further object is to provide an improved safety cap with the ability to increase the resistance to removal from the container neck incident to any improper or uninformed manipulation of the cap.

Other objects and advantages will become apparent from the following detailed description which is to be taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE FIGURES

In the drawings:

FIG. 1 is an exploded perspective view of a safety closure assembly of this invention showing the improved safety cap with liner spaced from the neck of the container, the latter shown fragmentarily;

FIG. 2 is a fragmentary longitudinal sectional view of the cap associated with the container neck;

FIG. 3 is a cross sectional view taken along the line 3-3 of FIG. 2 with the camming action being portrayed by dotted lines incident to uninformed turning of the cap and jamming of the interengaged surfaces;

FIG. 4 is an exploded perspective view of alternative embodiment of the invention;

FIG. 5 is a longitudinal sectional view of the cap in this embodiment shown associated with a container neck;

FIG. 6 is a cross sectional view taken along the line 6-6 of FIG. 5;

FIG. 7 is an exploded perspective view of a different form of safety cap and liner therefor shown spaced from a container neck;

FIG. 8 is a longitudinal section of this cap shown associated with the container neck and

FIG. 9 is a cross sectional view taken along the line 9-9 of FIG. 8.

DETAILED DESCRIPTION

Initially, reference is made to the embodiment of safety closure assembly 20 shown in FIGS. 1 to 3, in which an improved safety cap 22 is adapted to be coupled with the neck 24 of the container 26. The container 26 and particularly the finish on the neck 24 may assume the construction disclosed in the above referenced pending patent application and for this reason will not be described in detail herein. Suffice it to say that the exterior of the neck 24 is provided with cooperating surfaces for receiving interrupted threads or lugs of the cap 22 and securing the cap 22 to the neck 24 and permit its removal only after a child-deterrent position is encountered. For this purpose an interference zone 28 through which the lead lug or thread of

the cap 22 is adapted to pass may be provided. The interference zone is between the projecting surfaces of the neck finish; and adult strength is required to overcome the interference fit between the lead thread and the surfaces.

The improved safety cap 22 accommodates a relatively wide range of tolerances of the neck finish 24. In this connection, it will be appreciated by those skilled in the art that it is relatively difficult to maintain such tolerances when utilizing glass for a neck finish. The improved cap 22 alleviates this problem and also permits a relaxation of such tolerances. Towards this end, the cap 22 includes an outer shell 30 and an inner lining 32. The liner may be formed of a metallic material while the outer shell 30 may be of any suitable material including metal. The outer shell 30 includes an upper substantially circular disc 34 from which depends an integral skirt 36. The base of the skirt 36 includes an inwardly depending circumferentially extending flange 38 which cooperates in maintaining the liner 32 within the interior of the outer shell 30. Where needed or desired, a sealing liner 40 may be coupled to the interior face of the upper disc 34. A pair of diametrically opposed inwardly projecting ramps 42 and 44 having camming surfaces 42a and 44b respectively are present on the inner face of skirt 36. Surfaces 42b and 44a are radial serving as driving surfaces.

The liner 32 of the embodiment of FIG. 1 to 3 is in the form of a split band. The body of band 32 includes a recessed portion 46 corresponding in shape and size to the projection 42 on the inside of the shell apron 36. This recess 46 is diametrically opposed from the split in the band and includes the cam face 46a and driving face 46b. At the split the band includes a recess 48 defined by the driving surface 48a and camming surface 48b. The recesses 46 and 48 advantageously receive the projections 42 and 44 of the shell skirt 36. The band is also formed with a series of interrupted threads or lugs 50a,b,c, and d, projecting inwardly for eventual engagement with camming and guide surfaces of the neck 24.

The size and dimensioning of the liner 32 in relation to the outer shell 30 is such that the threads or lugs 50 may shift radially to accommodate the contemplated wide range of tolerances of the neck finish. However, in use, when the lead thread 50a encounters the interference zone 28 and there is experienced an obstacle as would be contemplated when an uninformed child attempts to remove the cap, further turning of the cap under these circumstances will cause the camming surfaces presented by ramps 42 and 44 and recesses 46 and 48 to shift the liner 32 inwardly to further increase the binding or jamming action. This inward movement of the liner 32 is shown in dotted lines in FIG. 3. Should the twisting of the cap be informed and deliberate so that proper traversing of this zone is accomplished, the jamming will not occur.

Thus, an informed user removes the cap 22 by maintaining an upward pull in accordance with one of the disclosed embodiments of the above referenced patent application until the lead lug 50a snaps past the interference zone 28. In the absence of an upward pull, the lead lug 50a will ride up the bead at the interference zone 28 and the inclined surfaces of the ramp 42 and 44 will contact the adjacent surfaces of the band 32 causing it to contract. Under these circumstances, the

cap will jam and must be retightened in order to free it from this jammed condition.

Reference is now made to FIGS. 4 to 6 in which an alternative embodiment of the cap is illustrated. In this embodiment corresponding parts will be similarly numbered with an accompanying prime. Thus the cap 22' includes an outer shell 30' and an inner liner 32' in the form of a split band. In this embodiment the apron 36' of the shell 30' is provided with spaced recesses 42' and 44'. The band 32' is formed with opposed ramps 46' and 48' which are received in the respective recesses 42' and 44'. The operation of cap 22' is in all essential respects the same as that of cap 22. However, in this embodiment, the interrupted threads or lugs 50' can be more shallowly drawn. The inward shifting of the liner 32' and its contraction about the neck finish 24 when the lead thread 50a' is jammed in the interference zone 28, is shown in FIG. 6.

In FIGS. 7 to 9 another form of safety cap 22'' is shown as having an outer shell 30'' and liner 32''. Like parts will be similarly numbered with accompanying double primes. The cap 22'' is especially conducive to being fabricated entirely of metal. The liner 32'' includes a series of longitudinally extending slots 54 which impart a springing action to the threads or lugs 50''. In this manner, the threads are permitted to move slightly in a radial direction thus adapting to the wide tolerance range present in glass bottle neck finishes. It will be noted that the flange 38'' is crimped about the lower edge of the spring plate 32'' to secure the liner interiorly of the outer shell 30''.

Thus the several aforementioned objects and advantages are most effectively attained. Although several somewhat preferred embodiments of the invention have been disclosed and described in detail herein, it should be understood that this invention is in no sense limited thereby and its scope is to be determined by that of the appended claims.

What is claimed is:

- 1. A safety cap comprising an outer shell having a top disc and tubular apron extending laterally therefrom, a liner having spaced lugs thereon in said shell, said liner being radially shiftable to accommodate a wide range of tolerances of container neck finishes and means for permitting the liner to shift radially.
- 2. The invention in accordance with claim 1 wherein

the shell and liner include interengaging surfaces for maintaining the liner in the shell.

3. The invention in accordance with claim 1 wherein the shell and liner are metal.

4. The invention in accordance with claim 3 wherein the disc and apron of the shell are integral and the lower edge of the apron is crimped inwardly above the adjacent lower edge of the liner.

5. The invention in accordance with claim 1 wherein the liner is metal.

6. The invention in accordance with claim 1 wherein the liner is a split band and the band and apron of the shell cooperating in defining raised and recessed interengaging camming surfaces whereby any jamming of the lugs on surfaces of the container neck causes the camming surfaces to interengage and contract the band in a radially inward direction to tighten the band about the container neck to thereby increase said jamming.

7. The invention in accordance with claim 6 wherein interengaging camming surfaces are provided by a pair of radially inwardly projecting spaced ramps on the apron of the shell and by a corresponding pair of spaced recesses on the band that receive the ramps.

8. The invention in accordance with claim 6 wherein the interengaging camming surfaces are provided by a pair of radially outwardly projecting ramps on said band and by a corresponding pair of spaced recesses in the apron of said shell that receive the ramps.

9. The invention in accordance with claim 1 wherein the liner is a tubular spring plate having a number of longitudinally extending slots intermediate the ends of the plate to permit the lugs to shift outwardly.

10. The invention in accordance with claim 1 wherein the cap is on the container neck to provide a safety closure assembly, the exterior of the neck having guiding surfaces for cooperating in guiding the relative path of travel of the lugs, said guiding surfaces including an interference zone through which one of the lugs must pass and such passage is only permitted upon informed deliberate manipulation of the cap relative to the neck otherwise said jamming occurs.

11. The invention in accordance with claim 1 wherein the shell and liner have interengaging driving surfaces for facilitating the twisting-on of said cap on the neck finish.

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