Nov. 8, 1966 G. A. SAMUELS ETAL 3,283,935

CROWN CAP

Filed Dec. 21, 1964

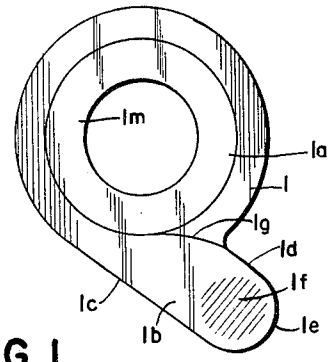


FIG. 1.

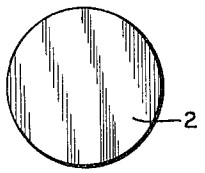


FIG. 4.

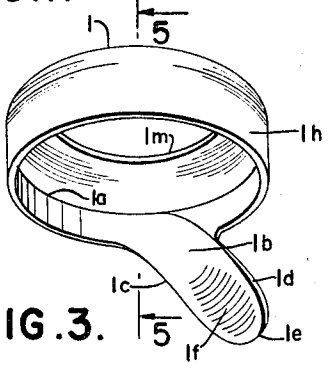


FIG. 3.

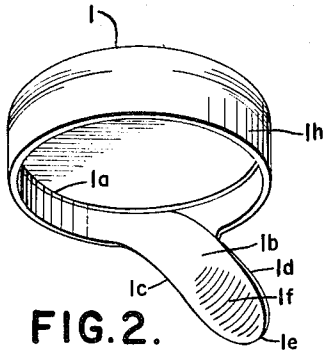


FIG. 2.

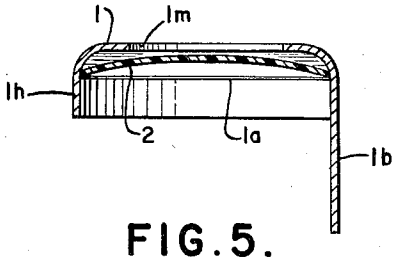


FIG. 5.

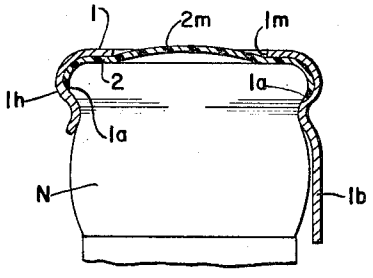


FIG. 6.

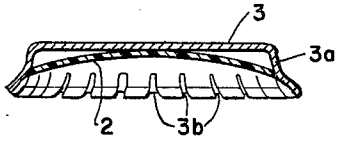


FIG. 7.

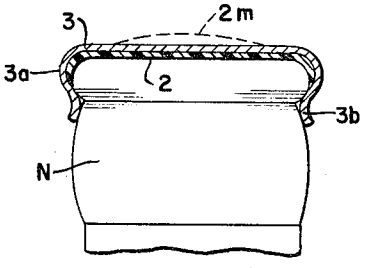


FIG. 8.

INVENTORS
Glenn A. Samuels &
Theodore Peterson

BY

ATTORNEYS

United States Patent Office

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CROWN CAP

Glenn A. Samuels, 1370 Pennsylvania Ave., Pine City, N.Y., and Theodore Peterson, 951 W. Church St., Elmira, N.Y.

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Our invention relates to closures for bottles, jars and like containers, and more particularly to sealing caps of the kind having a locking flange commonly clamped upon an annular shoulder at the mouth of a container, and commonly known as crown caps.

Our present invention is an improvement on the closure disclosed in our prior application Serial No. 321,167, filed November 4, 1963, in which we disclosed a sealing cap which could be readily applied to a bottle utilizing a dimpling chuck, btu which cap would be destroyed by the act of removing it therefrom, the cap being readily removable from the bottle or like container without the use of a bottle opener or other instrument. In said prior application we disclosed a crown cap for bottles which could be sold to the bottler in the form of a flat blank, the same being made of fully annealed aluminum, the blank being of general circular shape having a tearing tab projecting laterally from its periphery, the same having a circular line of scoring disposed axially of the main body of the circular blank, the tab having its outer edge disposed substantially tangential to the outer periphery of the blank and having its inner edge disposed parallel therewith, and and a second line of scoring extending from the inner end of the inner edge of the blank and disposed tangent to the scored circle so as to subtend an angle of approximately 33° with the outer edge of the tab.

The above blank disclosed in our aforesaid application was adapted to be initially formed into cap shape, using a die of ordinary type, so that the cap would conform substantially with the neck of the bottle which is to be closed by the crown cap, and wherein the cap was provided with an annular skirt which was initially plain or undimpled, so that when the initially formed cap had been placed upon the bottle neck, with a cork or other liner inserted between the cap and bottle end, and the cap operated upon by the dimpling chuck, the sides of the skirt would be clamped or crimped to form a series of dimples therein extending around the neck of the bottle opposite the annular shoulder or bead of the bottle, the crimping being in the form of dimples spaced at 18° intervals around the neck of the bottle, twenty such dimples being formed therein around the 360° circumference of the bottle.

The principal object of our present invention is to provide a closure of the above type having a crown cap of metal having a scored wall, with an inner floating plastic liner inserted in the cap before the dimpling operation, which liner will snap into the scored wall and will be held in place prior to crimping by the score-line on the outer wall, said score-line thereby having a double function, namely, to hold the liner in place and at the same time providing a tear-line or guide path for easy removal of the closure by a pull on a tetar tab.

Another object of the invention is to provide a cap of the above type in which the plastic liner may be punched from a solid sheet of plastic material, such as low-density tenite polyethylene, and inserted in the crown in one operation, our method being a dry operation because of the physical properties of the plastic, and no glue or adhesive of any kind being required to hold the liner in place, the usual dimpling process itself creating a vacuum between the liner and top of the cap which holds the liner in the crown cap. Moreover, the heating process of pasteurization softens the material of which the liner is made and causing it to conform itself to the bottle neck, so that when the crown is removed the liner will come off with, and will stay in, the fractured portion of the crown cap.

A further object of the invention is to provide a closure of the above type formed of aluminum having a liner of low-density tenite polyethylene therein, the closure having at the top thereof a circular hole so that the contents of the bottle can be seen through the metal top of the closure, and thus forming a "see-through" closure, the pressure of the contents of the bottle exerting an upward force on the liner in way of the hole, thereby arching the center of the liner up into the hole.

A still further object of the invention is to provide a novel cap of the above type which need not be made of aluminum, but may be formed in the usual manner from tinplate, the cap having an annular skirt which is precrimped before being applied to the bottle, said tinplate crown, however, being provided with our novel low-density tenite polyethylene liner in the same manner as above stated, whereby when the cap is affixed to the bottle neck by the crimping chuck, the liner will be held in place under the top of the crown cap across the neck of the bottle by vacuum, the sides of the liner in effect forming an annular groove or biting into the side walls of the skirt, thereby firmly securing the liner in the cap, the cap remaining in place even after the cap has been removed from the neck of the bottle by a bottle opener; and said tinplate cap may also have a circular hole at the center of its top forming a "see-through" in the metal thereof as above stated in connection with the aluminum crown cap.

In either modification the plastic liner forms a floating type liner which may be inserted by commercially available equipment already in use, the liner being a component part of the finished closure, and the liner conforming to the bottle cap when pressure is applied by the crimping chuck, the liner requiring no adhesive to hold it in the crown, nor requiring use of heating steps at any stage; and when used for beer bottles the usual pasteurization step will not affect the physical properties of the liner.

The advantage of our cold process in punching and inserting the liner, and the fact that after crimping the liner conforms to the bottle cap, allows a much lower manufacturing cost, and further, at the time of crimping the closure crown and plastic liner becomes a single unit. Our invention therefore provides a bottle crown cap having a floating liner therein.

We will explain the invention with reference to the accompanying drawings which illustrate one practical embodiment thereof to enable others familiar with the art to adopt and use the same; and will summarize in the claims the novel features of construction, and novel combinations of parts, for which protection is desired.

In said drawings:

FIG. 1 is a plan view of a flat crown cap blank according to our invention.

FIG. 2 is a perspective view of one form of initially formed cap prior to dimpling.

FIG. 3 is a perspective view similar to FIG. 2 of the initially formed cap showing a modification.

FIG. 4 is a plan view of the low-density tenite polyethylene liner, detached.

FIG. 5 is a section on the line 5—5, FIG. 3, showing the liner of FIG. 3 inserted into the initially formed cap shown in FIG. 3.

FIG. 6 is a section showing the cap and liner of FIG. 5 after operation thereon by a dimpling chuck.

FIG. 7 is a modification showing the liner of FIG. 4 applied to a standard pre-crimped tinplate crowncap.

FIG. 8 is a section showing the crown cap of FIG. 7 applied to the neck of the bottle by the dimpling chuck.

As shown in FIG. 1, our novel crown cap consists of a flat blank 1 formed of fully annealed aluminum, the blank being of substantially circular shape and having within the periphery a circular line of scoring 1*a*, to form a tear-line hereinafter described.

Extending from the periphery of the blank is a tearing tab 1*b*, the outer edge 1*c* of which is disposed tangent to the periphery of the blank, and its inner edge 1*d* being disposed parallel with the edge 1*c*, the outer edge 1*e* of the tab 1*b* being substantially semi-circular. If desired, a roughened portion 1*f* may be provided adjacent the outer end of the tab 1*b* to facilitate the tearing operation.

A second line of scoring 1*g* extends from the inner end of the edge 1*d* of the tab 1*b* tangent to the circular line of scoring 1*a*, the line 1*g* making an angle of substantially 33° with the line 1*c*. In this manner, when the tab 1*b* is pulled, the blank will tear first along the line of scoring 1*g* and then follow along the circular line of scoring 1*a*, as indicated in FIG. 7, to permit removal of the cap from the bottle neck.

Flat blanks such as shown in FIG. 1 may be furnished to the bottler in large quantities in relatively small packages, thus substantially eliminating storage space for the usual preformed bottle caps now in use, and since the blanks or caps are made of fully annealed aluminum the metal may be readily torn when the tab 1*b* is pulled out, thus eliminating use of a bottle opener or other instrument to uncap the bottles, this tearing being facilitated by the fact that the score-line 1*g* is disposed tangent to the circular score-line 1*a*.

Such blanks may be readily formed by the bottler or user into initial crown cap shape shown in FIGS. 2 and 3 by inserting the flat blank 1 into a commercial die having a mandrel and a depressible head so that, when the mandrel and head are brought together with the blank 1 therebetween, the blank will be initially given the crown cap shape shown in FIGS. 2 and 3, in which the sides of the blank and the tab portion 1*b* are flanged into a skirt portion 1*h*, which skirt portion 1*g* is plain or undimpled, as clearly shown in FIGS. 2 and 3. The provision of an initial blank such as shown in FIGS. 2 and 3 in which the skirt is plain or undimpled is of primary importance according to our invention, for the reason that if the skirt were pre-formed with dimples or crimps prior to operation thereon by the dimpling chuck, the cap when applied to the bottle would not effectively seal the bottle neck.

Instead of using a cork or similar liner disclosed in our aforesaid copending application, we use a liner formed of low-density tenite polyethylene which can be readily blanked from a sheet of polyethylene to form individual liner blanks 2, FIG. 4, of diameter slightly larger than the diameter of the skirt portion 1*h*, whereby the liners before being subjected to the crimping process may be inserted therein by customary machines before being applied to the bottles, FIG. 5 showing the liner thus inserted in the preformed blank with its edges substantially entering the groove 1*a* on the inner wall of the skirt, whereby when the cap has been crimped on the bottle neck N, as shown in FIG. 6, by the usual dimpling chuck, the liner 2 will be pressed into close engagement with the underside of the top of the crown and the sides of the skirt 1*g* and the liner 2 will closely conform with the shape of the outer end of the bottle neck N, the edge of the polyethylene liner 2 being retained in the line of scoring 1*a*, whereby the liner will be firmly held within the cap 1 by vacuum between the top of the cap 1 and the liner 2, and by the edge of the liner 2 being engaged in the scoring 1*a*, the liners remaining so positioned in the cap even after the cap has been removed from the bottle by the usual bottle opener or the like.

FIG. 6 shows that the liner 2 has entered the scored line 1*a* and will conform with the proper contour of the bottle neck upon operation of the dimpling chuck, thereby making a solid airtight and leak-proof closure.

Instead of the cap having a solid top, the blank and the top of the cap may be provided with an axially disposed hole 1*m* as shown in FIGS. 1, 3, 5 and 6, so that the contents of the bottle may be seen through the metal top of the cap, the polyethylene liner 2 being relatively transparent or translucent. When the cap is applied by the dimpling check the central portion of the liner 2 in way of the hole 1*m* will be arched slightly upwardly as at 2*m*, FIG. 6, by the pressure of the fluid within the bottle. However, the relation between the liner 2 and the cap 1 will remain the same as previously described, the liner being held fixedly within the cap by reason of the vacuum created between the top of the cap 1 and the liner 2, and by reason of the fact that the edge of the liner 2 will be retained in the line of scoring 1*a* in the skirt of the cap.

We have found that the polyethylene liner 2 may also be used with the customary tinplate bottle caps or crowns 3 shown in FIGS. 7 and 8, said crowns 3 having a preformed skirt 3*a* which is initially outwardly and downwardly flaring and is provided with crimps 3*b*, FIG. 7. We have also found that such tinplate caps need not have been provided with an actual line of scoring 1*a* in the initial form of the cap, but the liner 2 merely inserted therein as shown in FIG. 7 prior to being subjected to the capping operation. However, a score-line similar to line 1*a* of FIG. 5 may be provided in the tinplate cap 3, if desired. We have found that when such tinplate caps shown in FIG. 7 are applied to the bottle neck N, as shown in FIG. 8, the crimping pressure will create a vacuum between the top of the cap 3 and the liner 2 in the same manner as previously described, and that the sides of the liner 2 in the crimped condition will in effect form score-lines in the skirt of the cap 3, or will bite into the inner wall of the skirt 3*a*, thus firmly holding the cap and liner together so that the same forms substantially a unitary structure.

In this modification the top of the cap 3 may also be provided with a circular hole such as shown at 1*m* in FIGS. 3 and 5, in which case the liner will bulge upwardly as at 2*m*, as indicated in dotted lines in FIG. 8, in way of the circular hole in the cap. Thus the same score-line 1*a* in the exact location may be used to adapt our snap-in liners to standard tinplate crowns. In actual use the snap-in liner 2 will hold itself in place in the tinplate caps 3 by the vacuum created by the crimping die and by the physical action of the plastic.

In all forms, the plastic portion of our cap 2 forms a floating type liner which may be inserted by commercially available equipment already in use; and the liner being a component part of the finished closure will conform with the bottle neck or finish when pressure is applied by the crimping machine. The liner 2 being of floating type requires no adhesives to hold it in the caps 1 or 3, nor does it require any heating at any time. In the case of beer the pasteurization step does not affect the physical characteristics of the liner. The advantages of the cold process in punching and inserting the liner, and the fact that after crimping the liner conforms to the bottle finish, results in a much lower manufacturing cost.

Further, at the time of crimping the closure crown and the plastic liner become in effect a single unit, thus providing a bottle crown with a floating liner. We have thus provided a closure having an outer crown of metal with a scored wall in its skirt and an inner floating plastic liner which snaps into and is held in place prior to clamping by the score-line in the inner wall of the cap. Said score-line has a double function, namely, to hold the liner in place and at the same time providing a tear-line or guide path for removal of the closure by a pull on the tear tab. To remove the cap from the bottle neck it is merely necessary to apply an outward pull on the tab 1*b*, whereupon the metal will be torn first along the scoring

1*g* and then along the scoring 1*a*, as indicated in FIG. 1, due to weakness imparted by the lines of scoring 1*a*–1*g*, the tearing continuing to such extent that the ruptured cap 1 may be readily lifted off the bottle neck.

We do not limit our invention to the exact form shown in the drawings, for obviously changes may be made therein within the scope of the claims.

We claim:

1. A cap for the necks of bottles and like containers comprising an initial crown-shaped blank having a head and having a marginal skirt adapted to receive the bottle neck; said skirt having a line of scoring defining a circular line of weakness in its inner wall spaced from the lower end thereof; and a floating liner in said cap formed of low-density polyethylene disposed between the head and scoring, said liner being of slightly larger diameter than the inner diameter of the skirt and the peripheral edge of the liner being engaged in said line of weakness, whereby when the cap is crimped and pressed around the bottle neck the liner will be held by suction within the cap and the deformed edges of the liner will be engaged in the line of scoring to form an airtight and leakproof closure.

2. In a cap as set forth in claim 1, said cap being formed of fully annealed aluminum.

3. In a cap as set forth in claim 1, said cap head having a central hole therein forming a see-through portion at the top of the cap.

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JOSEPH R. LECLAIR, *Primary Examiner.*

D. F. NORTON, *Assistant Examiner.*