

Nov. 3, 1970

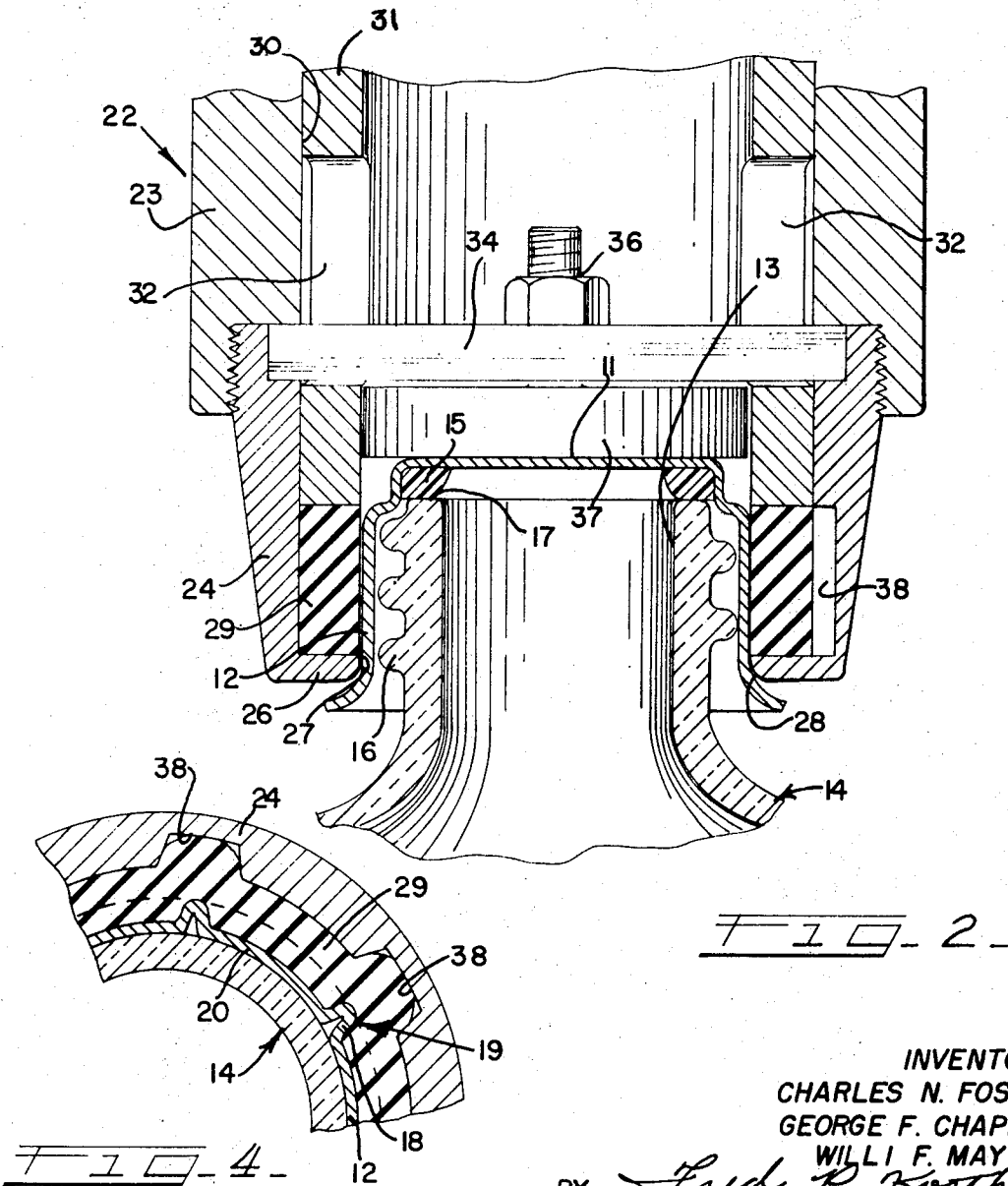
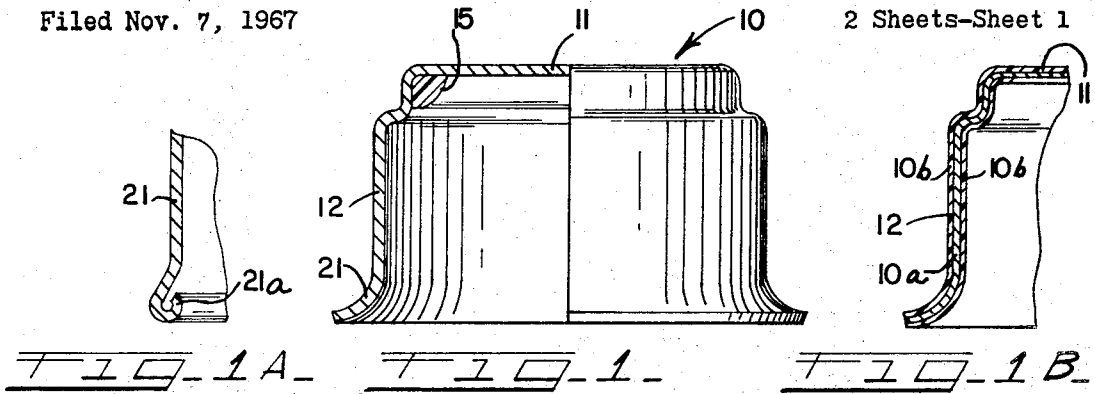
C. N. FOSTER ET AL

3,537,234

CONTAINER CAP CONSTRUCTION

Filed Nov. 7, 1967

2 Sheets-Sheet 1



INVENTORS
CHARLES N. FOSTER
GEORGE F. CHAPLIN
WILLI F. MAYER
BY *Fred P. Kostka*
ATT'Y.

1

3,537,234

CONTAINER CAP CONSTRUCTION
Charles N. Foster, Oak Park, George F. Chaplin, Elmwood Park, and Willi F. Mayer, Chicago, Ill., assignors to Continental Can Company, Inc., New York, N.Y., a corporation of New York

Filed Nov. 7, 1967, Ser. No. 681,261
Int. Cl. B67b 3/16; B65b 7/28; B31b 43/00
U.S. Cl. 53—357

2 Claims

ABSTRACT OF THE DISCLOSURE

A method and apparatus for attaching a cap shell including a top and a depending skirt on the open end of a container having cap retaining rib means projecting above the opening end thereof. A compression force is applied by a continuous member formed from a compressible material about the periphery of the skirt to conform and clinch the latter about the retaining rib means. The compressible member is mounted so that the compression force is ineffective at angularly spaced locations about the periphery of the skirt to permit the metal to be displaced in these spaces to form a plurality of narrow vertical ridges projecting from the conformed portions. The resulting cap is formed with continuous protuberances contoured substantially complementary to the container retaining rib means and a plurality of spaced vertical ridges which project from the non-conformed portions of the skirt.

BACKGROUND OF THE INVENTION

Field of invention

The present invention relates to a cap for sealing the opening of a container and to the method and apparatus for making the cap. More particularly, the invention relates to a method and apparatus for forming a sealing cap formed directly on the container structure and to the resulting sealing cap structure.

The prior art

Heretofore two general methods have been used to form sealing closures on containers.

One of these methods employs the well-known crown and crowner wherein a crown shell formed with side flutes is reduced in diameter by a gradually constricting throat in the crowner which serves to further reduce the diameter of the valleys of the flutes. The valleys of the flutes are thus forced under the cap retaining means of the container by the side walls thereof as the latter are pressed inwardly by the engagement of the constricting throat with the peaks of the flutes. The retention or retaining force of the flutes on the cap retaining means is accordingly dependent in part on the radical strength of the flute side walls. This fact may limit the material from which the crowns are formed to those which form a flute side wall having a retention force firmly sealing the crown about the retaining rib means.

The second method uses a spinning or rolling tool which is applied on the cap when the latter is disposed on the container. To conform the cap skirt in clinching relationship about the retaining rib means the tool and the container having the cap disposed thereon are rotated and reciprocated relative to each other. The apparatus to achieve these two motions is somewhat complex and results in an initial high cost of the apparatus and a corresponding high operating cost. Moreover, this method is limited for use with materials which may withstand the rolling or spinning without failure.

2

SUMMARY OF THE INVENTION

By the present invention there is provided a method for sealing and forming a cap on a container in which there is applied an inwardly directed compression force simultaneously along angularly spaced portions of the cap skirt so that the portions thereof at which the force is applied are displaced to conform and be clinched about the cap retaining means and concurrently therewith form a plurality of upstanding ribs in the spaces between which the force is not applied.

This is accomplished by an apparatus including a housing into which the open end of the container having the cap shell disposed thereon is inserted. Mounted in the housing is a continuous compressible means which when compressed is operative to simultaneously apply inwardly directed forces along selective angularly spaced portions of the skirt to conform the latter about the retaining ribs of the container and thereby to seal the cap thereon.

The sealing cap which results from the process and apparatus comprises a closed top having a depending skirt including a plurality of angularly spaced portions which are conformed to the retaining rib means so that a longitudinal cross-section through the conformed portions is contoured approximately complementary to a corresponding underlying portion of said retaining rib means. In the spaces between which the skirt is not conformed to the retaining rib means, there is formed a plurality of vertically disposed ridges which serve to provide a gripping surface to facilitate the removal and replacement of the cap from and on the container.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is an enlarged elevational view partially in cross-section of a cap shell which may be used in forming the cap on the container;

FIGS. 1A and 1B are enlarged fragmentary cross-sectional views of a cap shell showing different forms which may be used to form a cap in accordance with the present invention;

FIG. 2 is a cross-sectional view of the cap shell of FIG. 1 applied on a container and disposed in the apparatus for forming the cap shell in sealing relationship about the container top with the components of the apparatus shown in the position prior to the application of the cap forming force;

FIG. 3 is a cross-sectional view similar to FIG. 2 but showing the components of the apparatus in the cap-forming position to conform the cap shell to the container;

FIG. 4 is a cross-sectional view taken generally along the lines 4—4 of FIG. 3 and showing the relief sections into which the force applying member is compressed so as to localize the inwardly directed forces along angularly spaced portions of the cap skirt; and

FIG. 5 is a fragmentary top view of the container partially in cross-section and showing the finished sealing cap disposed thereon.

PREFERRED EMBODIMENTS

Referring to the drawings there is shown a cap shell 10 formed by drawing and punching and having a top 11 with a downwardly depending flange or skirt 12. The cap shell 10 is adapted to be used for sealing and covering an opening 13 of a container 14 which may be of any suitable form such as a wide-mouth jar or a bottle as shown.

Formed around the outer periphery of the container opening 13 is a retaining rib means 16 about which the cap skirt 12 is adapted to be conformed and clinched into sealing relationship over the opening 13. In the embodiment illustrated the retaining rib means is formed as

a helix to define a thread for the easy removal and replacement of the cap on the container. It should be understood, however, that a cap embodying the principles of the present invention may be formed on various other forms of retaining rib means.

The cap shell is formed in sealing engagement about the container 14 when the top 11 is disposed on the rim 17 and the skirt 12 depending downwardly and overlying the retaining rib means 16. Radially inwardly directed forces are then simultaneously applied along angularly spaced portions of the skirt 12 so that the skirt is displaced in these spaced portions into engagement and conformity with the retaining ribs 16. The areas of the skirt contiguous to the portions of the skirt to which the force is not applied or ineffective are forced inwardly into vertical planes to form side walls 18 of the outwardly projecting ridges 19 as shown in FIG. 5.

In this connection it should be mentioned that the material from which the cap shell is made is characterized by being deformable under the radial forces exerted thereon to conform the skirt about the retaining ribs 16 while at the same time being sufficiently rigid so as to be capable of being removed and replaced on the container without distortion of the resulting cap structure under the manually applied twisting force used to manipulate the cap. The ridges 19 when formed of the above-characterized material form in the nature of a gripping surface about the periphery of the skirt 12 and thereby facilitate the removal and replacement of the cap on the container.

The shell material may be made from metal having a thickness of about .020 of an inch or a laminated sheet having a core 10a of sheet metal of about .002 to .010 inch with outer layers 10b formed of a suitable plastic adhered thereto as shown in FIG. 1B. Preferably, the outer plastic material is of the type which will readily form a seal about the rim 17 of the container when the cap 10 is applied thereon.

In the event that metal is used to form the shell 10, a sealing gasket 15 may be applied to the inner surface of the top 11. A typical gasket or seal may be a flowed on structure, as shown, a cut ring, a pad, or gasket.

The cap skirt 12 as shown may terminate with an outwardly turned flange 21 so as to facilitate the positioning of the cap over the container opening 13. If desired, the flange 21 may be formed with an inwardly turned curl 21a as shown in FIG. 1A. The major diameter of the skirt 12 is preferably such that the inner surface thereof engages the outer diameter of the retaining rib means 16.

The container 14 with the cap shell 10 disposed thereover is inserted into a capping apparatus 22 wherein the cap shell 10 is secured in sealing engagement over the opening 13 of the container 14. As shown the capping apparatus 22 comprises essentially a hollow casing 23 which is attached to a suitable frame support structure not shown. The casing 23 is provided at its lower end with a tubular hollow head 24 having in inwardly extending annular flange 26 of which the inner diameter is sized to provide a guiding action on the cap skirt 12 when the container 14 is inserted through the annular opening 27.

Disposed on the flange 26 is a circular ring 29 formed preferably as a continuous band. The ring 29 is formed of a rectangular section and made from a compressible material such as neoprene rubber or a composition sufficient to withstand the compression forces or loading imposed thereon as more fully to be described hereinafter.

Engaging the upper surface of the ring 29 is a ram 31 in the form of a tubular cylinder which is reciprocal within the bore 30 of the casing 23 and head 24. The ram 31 abuts at its lower end against the upper surface of the ring 29, so that during relative reciprocation between the head 24 and the ram, the ring 29 is compressed against the flange 26. The cylindrical member or ram 31 is provided with two diametrically opposed slots 32 through which there extends a guide strap 34 of which the ends

are affixed as by clamping between the casing 23 and the head 24.

Supported intermediate the ends of the straps 34 by means of a vertically adjustable nut and bolt 36 may be a support block or top pad 37. The top pad 37 may be used to either control or limit the upward movement of the container 14, to reshape the cap top 11, or increase the force between the interface of the gasket 15 and the container rim 17 in order to achieve an effective seal therebetween during the formation of the cap. As shown in FIGS. 3 and 4, the underside of the flange 26 is formed with a chamfered surface 28 to assist in guiding the cap 10 disposed over the container into the hollow of the casing. In this manner the cap 10 is retained in proper relationship and suitably seated over the container opening 13.

Formed in the inner wall of the bore 30 adjacent the inwardly projecting flange 26, is a plurality of angularly spaced relief recesses or clearances 38. Upon a vertical relative movement between the head 24 and the ram 31, the ring 29 is compressed and radially expands in the direction of least resistance. Thus, the sections 39 of the ring 29 in the angularly spaced portions between the recesses 38 expands toward the skirt 12 to apply a radial force thereon which displaces the aligned sections 25 of the skirt 12 into conformity with the retaining rib means 16. In this connection it should be noted that the compressible material from which the ring 29 is formed is such that it readily conforms to the contour of the retaining rib means 16 and thereby forms the skirt into conforming and clinching relationship thereabout. At the same time the sections of the ring 29 in alignment with the relief recesses 38 expand outwardly therein so that the conforming force of the ring 29 is applied on the skirt 12 in a manner folding the portions contiguous to the conformed sections 20 inwardly to form radially extending wall sections 18 defining the upstanding or outstanding ridge 19.

From the foregoing it should be readily apparent that a sealing cap is formed directly on the container in a simple and expedient manner. The cap skirt 12 is conformed and clinched about the opening 13 and the retaining rib means so as to be securely fastened thereon. At the same time there is provided a gripping surface in the form of ridges 19 which facilitates the removal and replacement of the cap 10 on the container. The removal of the cap is accomplished by a simple twisting and lifting action and the replacement by reversing the procedure used for removal.

What is claimed is:

1. A cap forming apparatus for applying a cap shell having a top and a skirt depending therefrom in sealing engagement on the open end of a container having cap retaining rib means adjacent the opening end, said apparatus comprising a hollow casing adapted to receive the open end of said container with the cap shell disposed over said open end and with the depending skirt overlying said cap retaining rib means, compression force applying means supported by said casing and disposed about said container for applying inwardly directed forces upon being compressed on and continuously around said skirt so as to conform and clinch the latter on and about said retaining rib means, means mounted in said casing for vertical movement relative thereto for compressing said compressible force applying means, and means arranged so as to render said compressible force applying means ineffective at spaced locations about the periphery of said skirt thereby to form substantially vertical outwardly projecting ridges in the portions of the skirt which are not conformed and clinched about said retaining rib means, said means rendering said force applying means ineffective comprising spaced recesses formed in said casing into which said compressible force applying means is compressed so as to be ineffective to apply an inwardly directed force on said skirt.

5

2. The invention as defined in claim 1 wherein said compressible force applying means is in the form of a ring of continuous length and made from a compressible material, and said casing includes means causing compression of said compressible ring toward said container so that the force associated with such compression is applied on said skirt, thereby to conform the latter to said retaining rib means, and wherein said compressible ring is compressed into said recesses so that the forces associated with the compression of said ring are ineffective to conform the portion of the skirt in alignment with said recesses into conformity with said retaining rib means.

References Cited

UNITED STATES PATENTS

2,642,213	6/1953	Goldsmith	53—357	X
3,495,505	2/1970	Hansson	53—358	X
883,127	3/1908	Bond	53—347	
883,128	3/1908	Bond	53—358	X

2,082,167	6/1937	MacCordy	53—358
2,085,879	7/1937	Trump	53—347 X
3,383,836	5/1968	Salminen	53—358
743,636	11/1903	Goltstein	53—362
792,238	6/1905	Robinson	53—362
808,833	1/1906	Goltstein	53—362 X
2,086,552	7/1937	Hogg	53—362 X
2,364,380	12/1944	Marek	53—362
2,503,944	4/1950	Frascari	215—38
2,954,725	10/1960	Palmer	93—59
3,202,066	8/1965	Palmer	93—59

FOREIGN PATENTS

972,278	11/1959	Germany.
95,051	3/1939	Sweden.

WAYNE A. MORSE, JR., Primary Examiner
U.S. Cl. X.R.

53—290, 362; 93—55.1, 59