

April 24, 1934.

G. W. BOOTH

1,956,210

METHOD OF CAPPING CONTAINERS AND PRODUCT THEREOF

Original Filed June 7, 1932 3 Sheets-Sheet 1

Fig. 1.

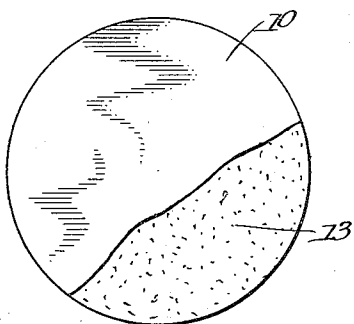


Fig. 4.

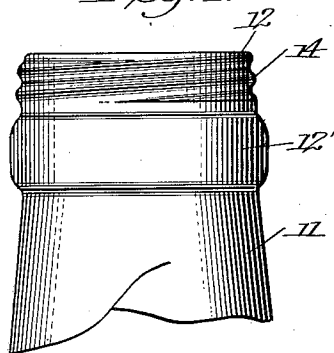


Fig. 2.

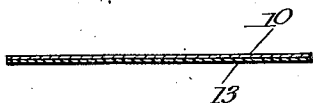


Fig. 5.

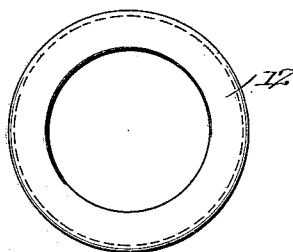
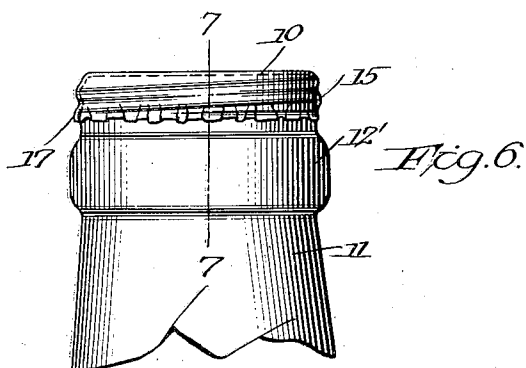
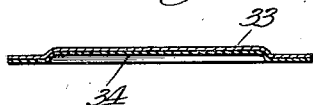


Fig. 3.



Inventor

George W. Booth.

By *Cushman, Bryant, Duffy & Lockman*
Attorneys

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G. W. BOOTH

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METHOD OF CAPPING CONTAINERS AND PRODUCT THEREOF

Original Filed June 7, 1932 3 Sheets-Sheet 2

Fig. 7.

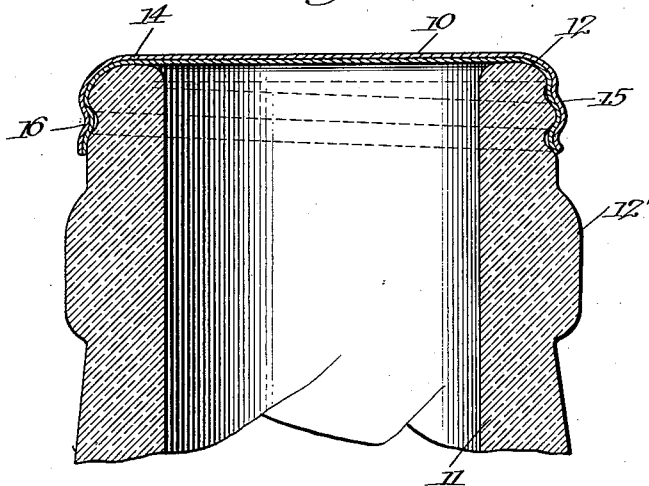


Fig. 8.

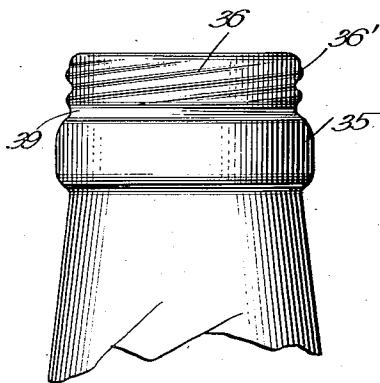


Fig. 9.

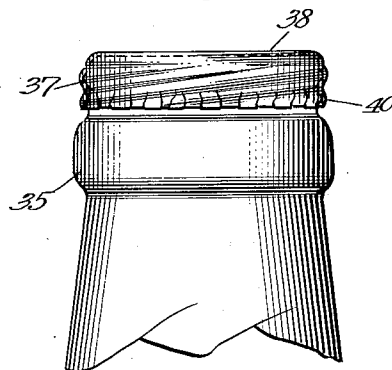
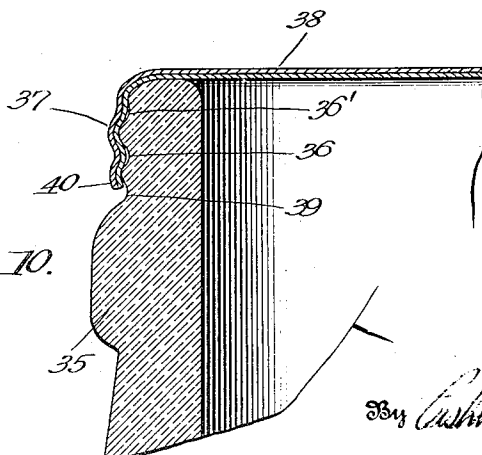


Fig. 10.



Inventor

George W. Booth.

By *Cushman, Dyer & Dyer*
Attorneys

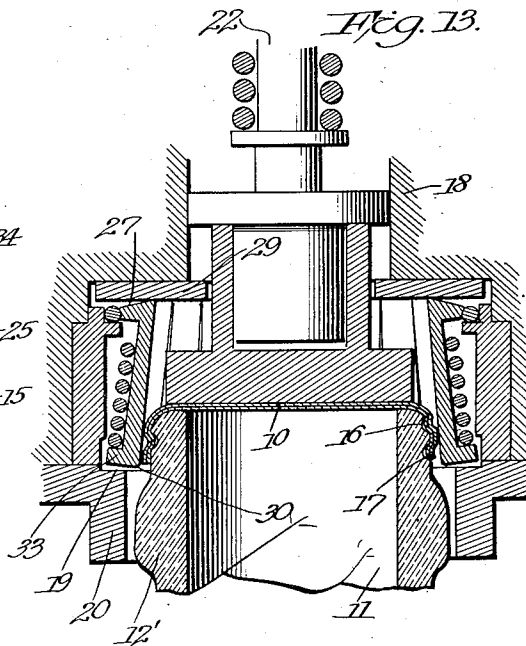
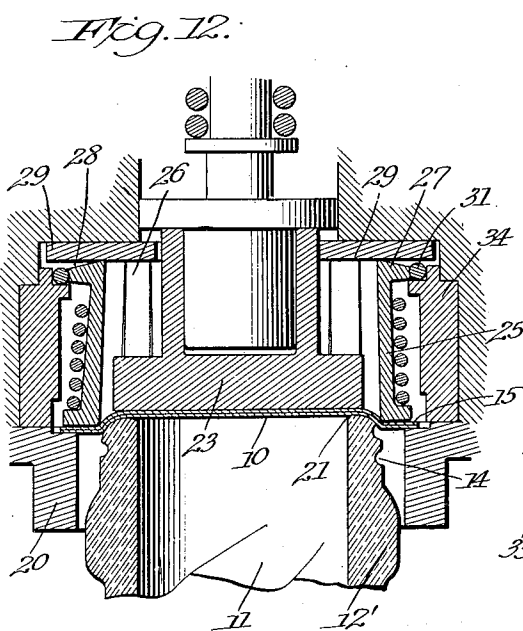
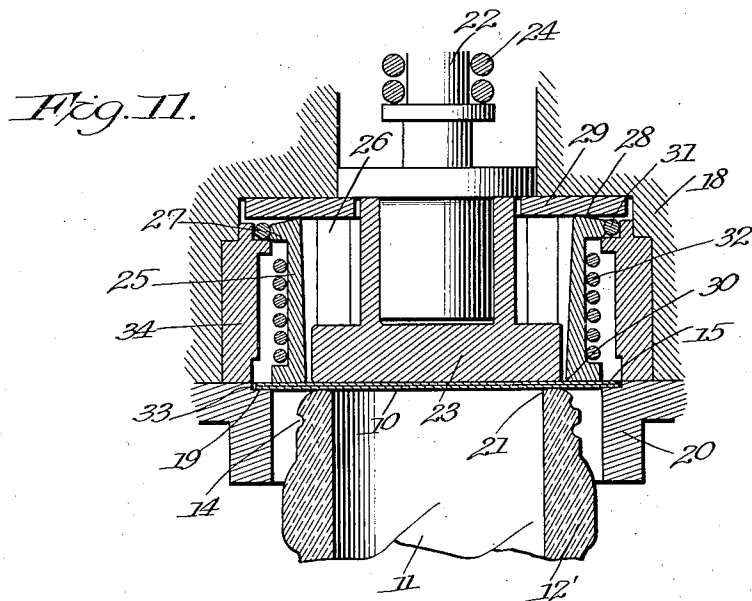
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G. W. BOOTH

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METHOD OF CAPPING CONTAINERS AND PRODUCT THEREOF

Original Filed June 7, 1932 3 Sheets-Sheet 3



Inventor

George W. Booth.

By *Cushman, King and Dwyer*
Attorneys

UNITED STATES PATENT OFFICE

1,956,210

METHOD OF CAPPING CONTAINERS AND
PRODUCT THEREOFGeorge W. Booth, Baltimore, Md., assignor to
Crown Cork & Seal Company, Inc., Baltimore,
Md., a corporation of New YorkApplication June 7, 1932, Serial No. 615,915
Renewed January 17, 1934

16 Claims. (Cl. 226—83)

The present invention relates to an improved method of applying closures to containers and the product thereof, and more especially to an improvement upon the invention covered in my copending application, Serial No. 553,464, filed July 27, 1931.

An object of the invention is to provide an improved method for applying and securing a threaded closure to a container, so as to effectively seal and protect the contents thereof.

A further object is to provide a method for initially applying a closure in blank form to a container and shaping the same to screw threaded form to conform to the outer perimeter of the neck of the container so as to insure a maximum sealing engagement therewith and protect against dust and contamination of the surface over which the contents of the container is poured.

Another object of the invention is to provide means on the neck of the container arranged to coact with complementary means formed on the closure during its application to the container to permit the closure to be subsequently detached from and reapplied to the container and insure a positive sealing engagement of the parts when the closure is applied to the container.

A further object consists in affording a new and improved method of applying a closure of ductile material to a container provided with thread-like locking means. The method consists in initially positioning the closure or disc in blank form over the container mouth, and then subjecting the same to pressure outwardly and downwardly over the sealing lip, sufficiently to cause the ductile metal to assume the shape of the container and to flow into locking engagement with a locking means, such as a spiral rib or groove or the like in the neck of the container.

Other objects and advantages of the invention will become apparent from the following description when taken in conjunction with the accompanying claims and drawings.

Referring to the drawings in which is shown preferred embodiments of the invention:

Fig. 1 is a plan view of the closure shown in the form of a disc and with the upper layer partly cut away for the purpose of illustration.

Fig. 2 is a transverse sectional view of the closure shown in Fig. 1.

Fig. 3 is a view similar to Fig. 2 showing a modified form of closure.

Fig. 4 is a side view of the upper portion of a container made in accordance with the invention.

Fig. 5 is a plan view of the container shown in Fig. 4.

Fig. 6 is a side elevational view of the container shown in Fig. 4 with the cap applied.

Fig. 7 is a cross sectional view.

Fig. 8 is a side elevational view of a modified form of the invention.

Fig. 9 is a side elevational view of the container shown in Fig. 8 with the cap applied.

Fig. 10 is a fragmentary enlarged sectional view of the form shown in Fig. 9.

Fig. 11 is a sectional view showing the initial step in applying the closure to a container.

Fig. 12 illustrates an intermediate step in the application of the closure to a container, and

Fig. 13 shows the final position of the closure.

Referring to the drawings in which like numerals indicate like parts in the several views, the closure 10 (Fig. 1) is preferably made of thin ductile material, such as sheet metal or the like.

The closure or cap while shown of disc shape may be of any suitable configuration or size, so that when applied in blank form to the mouth of the container 11 and subjected to pressure, the margin thereof will be ironed or drawn over the lip of the container into circumferential continuous sealing engagement with the container lip 12.

The closure 10 may have connected thereto by any suitable binder, a facing 13 (Fig. 2) to provide a suitably impervious, resilient and non-corrosive surface for contacting with the lip 12. This facing 13 may be formed of any suitable material, such as parchment, "Cellophane," cellulosic material, rubber compounds, or cork composition, depending upon the chemical properties of the contents of the container.

For example, the neck 12' of the container may be provided externally with a spiral groove or thread 14 which extends from the mouth or lip 12 a limited distance downwardly. Obviously, this means may take other forms, such as, for example, the discontinuous or divided thread of my co-pending application, Serial No. 615,916, filed June 7, 1932.

The neck 12' of the container is provided with a means for effecting a locking engagement with the closure as in the invention of my copending application above referred to. But, in the present instance, I provide a locking means in the form of inclined or spiral threads 14 (Fig. 4), which, upon turning movement of the cap, will tend to lift the same, and also preferably effect locking engagement of the cap upon reverse turning movement when the cap is reapplied.

In Figs. 6 and 7, the cap 10 is shown applied

to the container mouth and it will be noted that the marginal portion or skirt 15 closely fits over the lip 12 of the container to provide a maximum sealing surface which is continuous circumferentially and extends a substantial distance outwardly and downwardly over the lip 12. The cap 10 is formed with the spiral rib 16 which extends into the complementary groove 14 for securing the closure to the container and permitting its subsequent removal or attachment thereto. Additionally, the edge of the skirt 15 is crimped or corrugated as at 17 (Fig. 6) to cause the skirt to yieldably engage the adjacent surface of the neck. The crimps 17 are formed from the blank when the latter is being applied to the container, as distinguished from the pre-formed corrugations or flutes heretofore formed in the skirts of a cap of the usual crown type. This distinction will be evident from the method of applying the cap to the container, as hereinafter described.

As shown in Fig. 11, the cap or closure 10 in blank form, is positioned over the mouth of the bottle 11 and is fed thereto by a suitable capping machine 18 which has a ledge 19 formed in a guide or annulus 20 that supports the marginal portion 15 of the cap. A spindle 22 reciprocally mounted in the capping machine has operatively connected thereto a presser tool 23 which is of slightly larger diameter than the inner diameter of the mouth 21 of the bottle 11 and is arranged to bear yieldably against the blank disc 10 through the instrumentality of the spring 24, to insure a proper centering of the closure or disc 10 upon the container and a close contact between the undersurface of the container and the top surface or perimeter of the bottle mouth.

While the intermediate portion of the disc, that is to say, the surface between the mouth 21 of the bottle, is maintained in firm engagement therewith by the presser tool 23, that portion of the disc between the margin 15 and the presser tool 23 is arranged to be uniformly drawn outwardly and downwardly to be ironed over the curved surface of the lip in the manner clearly illustrated in Fig. 12. During this ironing operation, the marginal portion or edge 15 of the closure remains supported by the ledge 19 so as to insure a gradual or progressive deflection of the closure along the surface of the container lip, as distinguished from a bodily bending of the same from the point of initial application of pressure outwardly to its edge.

This ironing and drawing of the metal to form the closure skirt is preferably accomplished by means of a bending throat 25 formed of a plurality of segmental strips 26 which surround the presser tool 23. I prefer a throat of the character disclosed and claimed in my copending application Serial No. 553,462, filed July 27, 1931, and which will here be briefly described.

Each of the segmental strips 26 has at its upper end an outwardly directed flange 27 formed with a beveled surface 28 which is arranged to bear against a follower plate 29. Relative movement of the plate 29 and container 11 toward each other acts to force the continuous and uncorrugated lower edge 30 of each segment against the adjacent surface of the closure 10 so as to draw the metal thereof outwardly and downwardly. The metal is smooth over the surface of the lip 12 and is caused to flow into the spiral groove 14 by the pressure imparted to the skirt 15 by the throat 25. This forms the complementary spiral rib 16 (Fig. 13) which permits

the subsequent removal or attachment of the closure to the container by relative turning movement of the cap and closure.

The segments 26 are collectively supported at their upper ends within a tubular housing 34 by means of a ring 31 against which the outer edge of the flanges 27 engage to constitute a fulcrum bearing, which permits the independent movement of the segments in order that they may conform to any irregularity or variation in diameters of the container mouths or necks. A coil spring 32 surrounds the segments 26 and is confined between the end flanges 27 and 33 to yieldably hold the segments in contacting engagement with each other while permitting relative movement between the segments when they encounter resistance during the operation of applying the closure to the container. The segments 26 have a slight longitudinal taper and the throat normally enlarges upwardly (Fig. 11), so that the diameter of the throat 25 is less at its lower end 30 than at its upper end. This variation in diameter reduces the contact between the inner surface of the segments and the cap 10 with the result that substantially the entire ironing action is produced by the lower edge 30.

When the presser tool 23 is yieldably maintained against the closure or cap 10 and the marginal portion 15 of the cap is supported by the ledge 19, relative movement between the container 11 and the bending throat 25 may be effected either by moving the container upwardly or moving the throat downwardly, such movement being permitted due to the yielding of the spring 24 which allows the presser tool to move upwardly within the throat 25.

The final position of the closure when applied by the capping machine to the container is shown in Fig. 14, and it will be understood that relative movement between the throat 25 and closure 10 results in the progressive ironing and drawing of the metal of the closure outwardly and downwardly toward the edge of the closure until the free marginal portion thereof is disengaged from the ledge 19 and distorted to form the skirt 15. Under this drawing and ironing action, the marginal portion of the skirt automatically buckles to form the corrugations 17 which yieldably press against the adjacent surface of the container.

It will be observed from Fig. 13 that the corrugations or crimps 17 formed by this buckling action are at all times free from engagement with the throat 25 which is spaced therefrom at its lower edge 30. In other words, the inner surface of the throat 25 contacts only with the upper and intermediate portions of the skirt 15. Consequently, the marginal portion of the cap will buckle against the adjacent surface of the finish of the container simply by reason of the bending and drawing pressure applied around the container mouth inwardly from the edge of the closure disc. This ironing and bending pressure automatically produces a buckling of the free edge of the marginal portion of the closure without engagement of the throat 25 therewith.

Obviously, the closure may vary as to size and shape so as to be applied to containers, such as milk bottles or the like of different sizes. As the skirt 15 is formed and applied to the container by uniform ironing and bending pressure, it will insure the provision of a sealing engagement of maximum area with the mouth and neck of the container and will readily conform itself to any irregularities in the shape of the container.

In order to provide a surface for permitting the convenient centering of the cap upon the container, the blank 33 (Fig. 3) may be provided with a central depressed portion 34 which, when the cap is applied to the container, forms a receiving seat for the container lip.

As shown in Fig. 8 the neck 35 of the container is preferably formed externally thereof with a double spiral thread or groove 36, 36' into which the skirt portion 37 of the cap 38 flows to form a complementary rib in substantially the same manner as the rib 16 previously described. It will be seen, however, that due to the double thread, that the cap, when once applied to the container, may be more quickly removed from the container since only a half turn (180°) is required. Moreover, the container may be provided beneath the grooves 36, 36' with an annular groove 39 adapted to receive the buckled free edge 40 of the skirt 37 (Fig. 10).

This yieldable engagement in the groove 39, of course, is immediately overcome upon the application of turning pressure applied to the cap when it is desired to remove the same from the container. As the lower edge of the skirt will extend into the recess 39, operation of the closure may be effected without the hands coming into contact therewith.

It will be seen that a closure made in accordance with the present invention is especially suited for use in capping bottles or the like, since it not only insures complete protection of the container mouth from dust and contamination, but also provides a sanitary seal which precludes the possibility of germs or dirt entering the bottle. Moreover, the hermetical seal formed when the closure is initially applied to the container insures the content retaining its pure and fresh condition. Since the cap may be conveniently removed or again applied to the container by a turning movement, no opening instrumentality is required while the danger of spilling and wasting the contents in attempting to remove the cap, is completely eliminated.

It is, of course, to be understood that the forms of the invention herewith shown and described are merely illustrative of preferred embodiments and that such changes may be made therein as fall within the purview of one skilled in the art and the scope of the appended claims.

I claim:

1. The improved method of capping a container having an inclined groove formed externally in the neck thereof, which consists in positioning over the mouth of the container a closure of ductile material and of larger area than the overall area of the container mouth and ironing the closure over the container lip by applying pressure beginning inwardly from the edge of the closure outwardly and downwardly sufficiently to cause the ductile material to flow into the groove and form a complementary rib, whereby the closure is detachably connected to the container mouth.

2. A new and improved method of capping a container having an external inclined groove around the mouth thereof which consists in positioning over the mouth a closure blank of ductile material and of larger diameter than the container mouth and ironing the closure over the container lip by applying pressure inwardly from the edge of the closure uniformly around the container mouth and progressively continuing the same outwardly and downwardly sufficiently to cause the ductile material to flow into said groove

and form a complementary rib, whereby the cap may be readily removed from the container.

3. The improved method of capping a container having an inclined groove formed externally in the neck thereof, which consists in positioning over the mouth of the container a closure of ductile material and of larger area than the overall area of the container mouth and ironing the closure over the container lip sufficiently to cause the ductile material to flow into the groove and form a complementary rib therewith, whereby the closure may be readily removed from or applied to the container.

4. A new and improved method of capping a container having an external spiral groove around the mouth thereof, which consists in positioning over the mouth a closure blank of ductile material and of larger diameter than the container mouth and applying pressure inwardly from the edge of the closure uniformly around the container mouth and progressively continuing the same outwardly and downwardly sufficiently to cause the ductile material adjacent the spiral groove to flow therein and form a complementary spiral rib.

5. The method of applying a removable closure to a container having an external spiral groove around the mouth thereof which consists in positioning over the mouth a closure blank of substantially flat ductile material and of larger diameter than the container mouth, applying pressure inwardly from the edge of the closure uniformly around the container mouth and progressively continuing the same outwardly and downwardly sufficiently to cause the ductile material adjacent the spiral groove to flow therein and form a spiral rib complementary to said groove.

6. The improved method of applying a detachable cap to a container having an inclined groove formed in the neck thereof, which consists in positioning over the container mouth a closure of ductile material having a depressed centering portion arranged to fit on the container lip, said closure being of larger area than the overall area of the container mouth and applying pressure outwardly and downwardly beginning inwardly from the edge of the closure to cause the ductile material adjacent the groove to flow therein and form a complementary rib.

7. The improved method of capping a container having an inclined groove formed externally around the mouth thereof, which consists in positioning over the mouth a closure of ductile material and of larger diameter than the container mouth, supporting the closure along its edge and while supporting its edge applying inwardly therefrom over the container lip an ironing pressure sufficient to distort the ductile material to conform to the lip, progressively continuing the ironing pressure outwardly toward the edge over the container lip sufficiently to cause the supported edge portion to be disengaged from its support and to flow into the groove to form a rib complementary therewith.

8. The improved method of capping a container having a spiral groove formed externally around the mouth thereof, which consists in positioning over the mouth a closure of ductile material and of larger area than the container mouth, supporting the closure along its edge and while supporting its edge applying inwardly therefrom over the container lip an ironing pressure sufficient to distort the ductile material to conform to the lip, progressively continuing the ironing pressure outwardly toward the edge over the container lip

sufficiently to cause the supported edge portion to be disengaged from its support and the material of the closure to flow into the groove to form a rib complementary thereto, and the margin to buckle against the container whereby the closure may subsequently be detachably connected to the container.

9. The improved method of applying a removable cap to a container having an inclined groove formed externally around the mouth thereof which consists in positioning over the mouth a closure blank of ductile material having a diameter larger than the container mouth, applying pressure to the closure inwardly from its edge over the container lip inwardly from the edge of the closure and continuing the ironing pressure outwardly and downwardly toward the closure edge sufficiently to cause the ductile material to flow into the groove and form a complementary rib and the margin of the closure to buckle against the container neck, while maintaining the buckle portion free of ironing pressure, whereby the closure may be detachably connected to the container.

10. The improved method of applying a removable cap to a container having a spiral groove formed around the mouth thereof, which consists in positioning over the mouth a closure blank of ductile material and having an offset centering portion arranged to engage the lip of the container, said blank being of larger diameter than the container mouth, applying pressure to the closure inwardly from its edge to effect a sealing engagement with the container lip and simultaneously supporting the free edge of the closure and ironing the closure over the container lip by direct application of ironing pressure over the lip and continuing the ironing pressure outwardly and downwardly over the lip toward the edge of the closure sufficiently to cause the ductile material to flow into the spiral groove and form a rib complementary thereto and the edge to buckle against the container.

11. The improved method of capping a container having an inclined groove formed in the container mouth and an annular recess beneath said groove which consists in positioning over the mouth a closure blank of ductile material of larger diameter than the container mouth, applying pressure inwardly from the edge of the closure uniformly around the container mouth and progressively continuing the same outwardly and downwardly sufficiently to cause the ductile material to flow into the groove and form a complementary spiral rib and to buckle along its edge into yielding engagement in said recess.

12. The improved method of capping a con-

tainer having a continuous spiral groove formed externally in the neck thereof, which consists in positioning above the mouth of the container a closure blank of ductile material and of larger diameter than the container mouth, and ironing the closure over the container lip by applying pressure beginning inwardly from the edge of the closure and continuing outwardly uniformly around the container mouth to cause the ductile material to flow into the groove and form a complementary rib whereby the closure may subsequently be detachably connected to the container mouth.

13. The improved method of capping a container having a continuous spiral groove formed in the container mouth and an annular recess beneath said groove, which consists in positioning over the mouth of the container a closure of ductile material and of larger diameter than the container mouth and ironing the closure over the container lip by applying pressure beginning inwardly and continuing outwardly and downwardly sufficiently to cause the ductile material to flow into the spiral groove and form a complementary rib therewith and its lower edge to buckle and yieldably engage in said annular recess whereby the closure may be detachably connected to the container.

14. In combination with a container having an inclined groove around its mouth, a cap of ductile material having a top portion over said mouth and a depending skirt provided with a complementary rib formed in the capping operation and engaging said groove, the marginal portion of the skirt being buckled.

15. In combination with a container having around its mouth a continuous spiral groove extending from the upper surface to an intermediate portion thereof, a cap of ductile material having a top positioned over said mouth and a depending skirt, said skirt having a complementary spiral rib conformed to said groove by ironing therein during the capping operation, the marginal portion of the skirt being crimped to provide indentations.

16. In combination with a container having around its mouth an inclined groove and an annular recess beneath said groove, a cap of ductile material having a top positioned over said mouth and a depending skirt, said skirt having a complementary spiral rib conformed to said groove by ironing therein during the capping operation, the marginal portion of the skirt being crimped to provide indentations which yieldably engage in the recess.

GEORGE W. BOOTH.

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