March 8, 1938. E. M. ENKUR 2,110,329

CONTAINER CAP AND METHOD OF MAKING THE SAME

Filed June 22, 1935 3 Sheets-Sheet 1

Fig. 1.

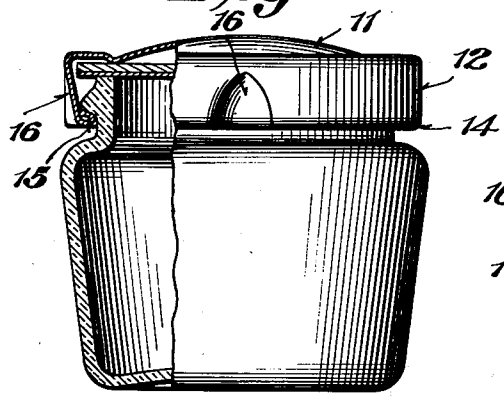


Fig. 2.

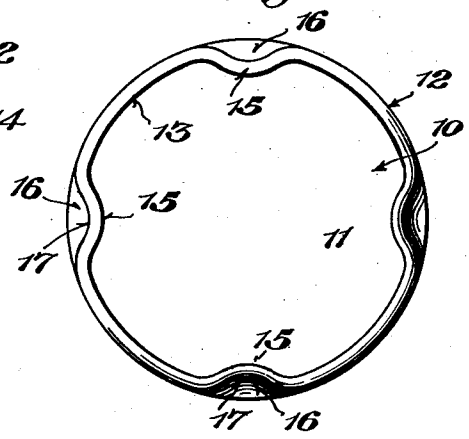


Fig. 9.

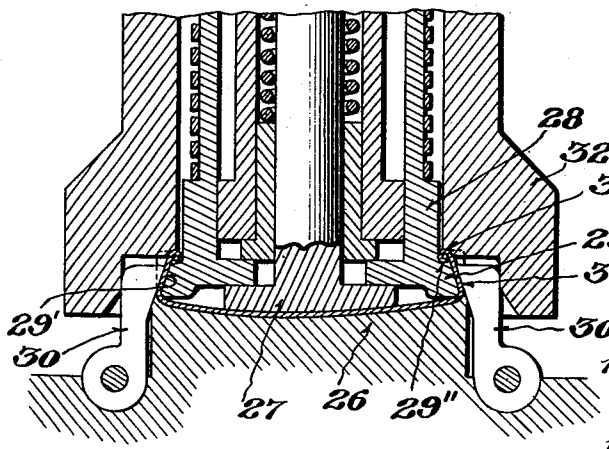


Fig. 3.

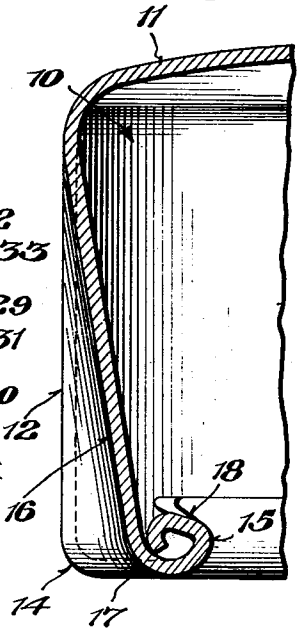
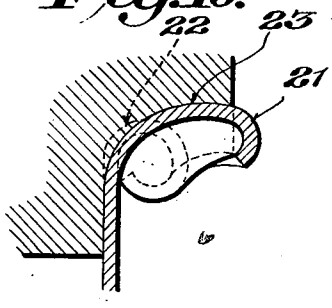


Fig. 10.



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CONTAINER CAP AND METHOD OF MAKING THE SAME

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Fig. 4.

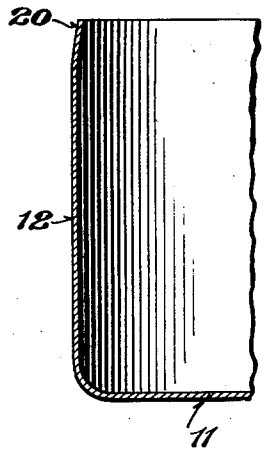


Fig. 5.

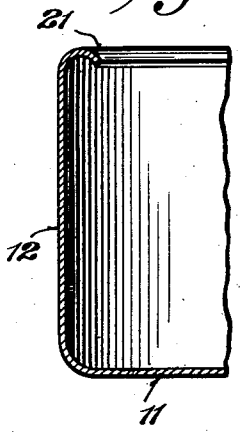


Fig. 6.a

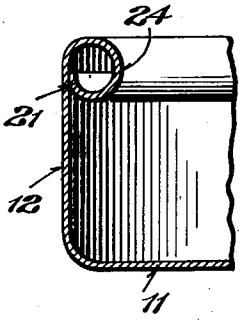


Fig. 6.b

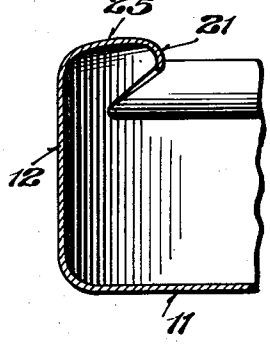


Fig. 7.a

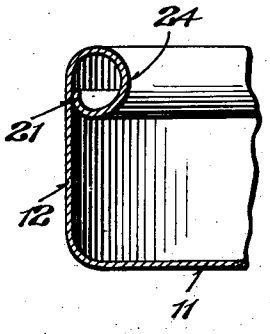


Fig. 7.b

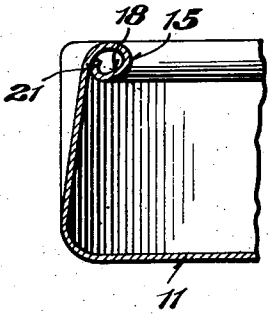
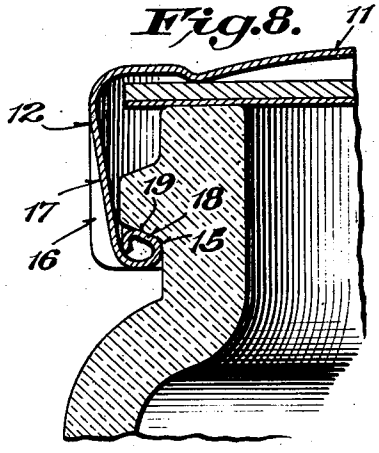


Fig. 8.



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CONTAINER CAP AND METHOD OF MAKING THE SAME

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Fig. 11.

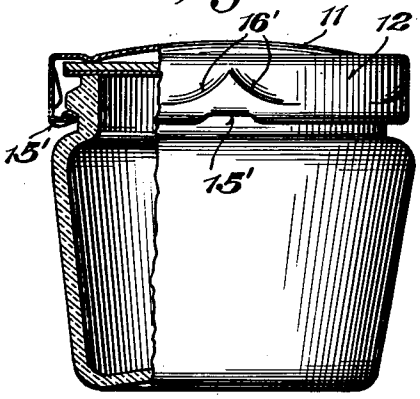


Fig. 13.

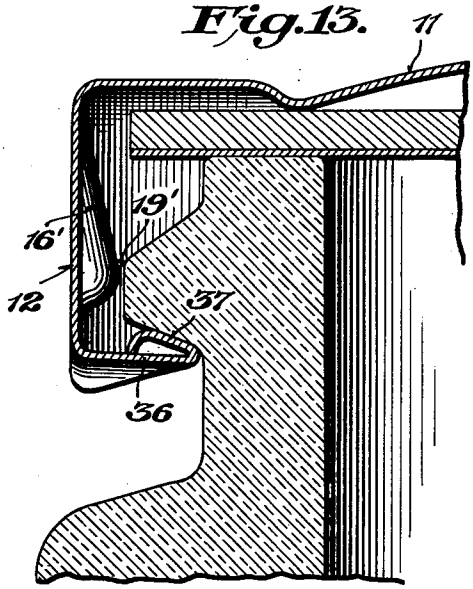


Fig. 12.

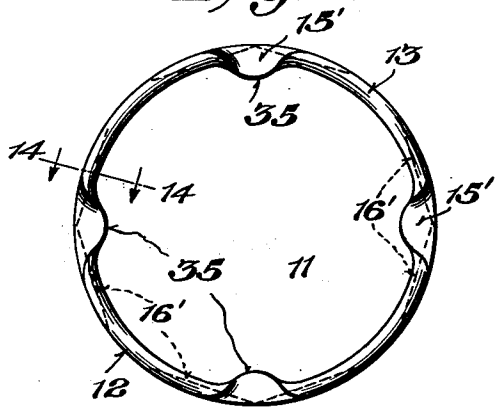


Fig. 14.

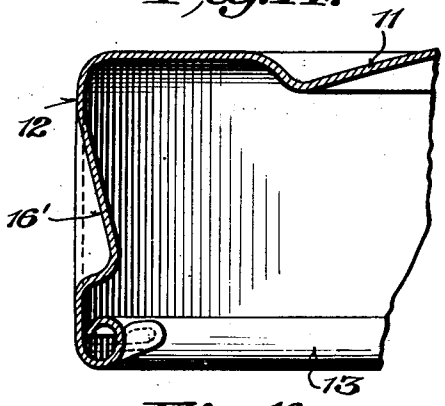


Fig. 15.

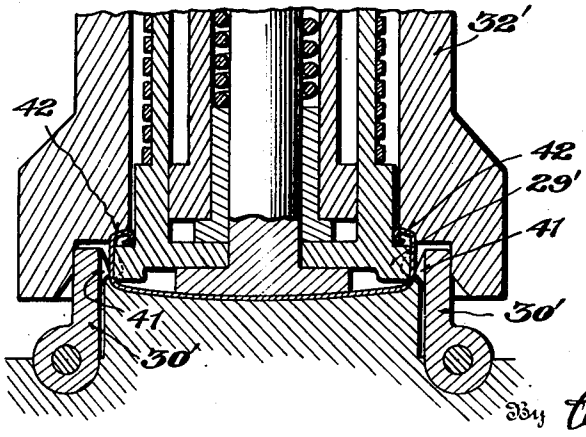
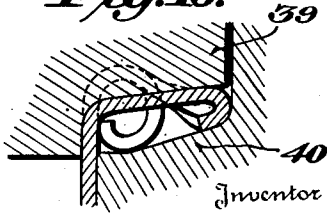


Fig. 16.



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Patented Mar. 8, 1938 2,110,329

UNITED STATES PATENT OFFICE

2,110,329

CONTAINER CAP AND METHOD OF MAKING THE SAME

Edward M. Enkur, Baltimore, Md., assignor to Crown Cork & Seal Company, Inc., Baltimore, Md., a corporation of New York

Application June 22, 1935, Serial No. 27,983

18 Claims. (Cl. 113—121)

This invention relates to container closures, or receptacle caps, and to new and improved methods of making the same.

The cap of the present invention is adapted for use with bottles, jars, or other receptacles having external threads or lugs on the necks thereof. More particularly, the closure is of the general class known in the art as lug caps, and relates to that type of lug cap in which the positions of the lugs are visible, or in other words, are not concealed by the skirt.

The cap of the present invention is characterized by certain novel combinations of parts and details which result in an improved appearance, and in certain functional advantages when in use.

It is an object of the present invention to provide a cap having a generally smooth, regular external appearance, which is not marred by the presence of the usual outwardly rolled external bead from which the lugs are conventionally struck. Further, it is an object to dispense with the unattractive row of knurls now conventionally formed on caps of this class, to provide a friction surface to facilitate removal of the same from a receptacle.

It is a further object of the invention to eliminate all sharp creases or flat folds on the cap, which might result in cracking or chipping the enamel coating conventionally applied to the cap making material before the caps are made. It is a further object to provide a cap characterized by the entire absence of raw edges, which in the past have always been objectionable because of their tendency to rust and disfigure the cap and contaminate the contents of the receptacle. Further, the cap of the present invention is characterized by the fact that the locking lugs are rounded, so that no sharp edges are presented, which might scratch or mar the glass of the receptacle, or injure hands of the user.

It is a further object of the invention to provide a cap having improved characteristics as to strength and rigidity.

It is a further object of the invention to provide, instead of the unattractive knurls formerly associated with lug caps, a few widely spaced, smoothly rounded, decorative finger grips formed at and resulting from the final inward pressing of the lugs and during their formation; these grips serve to facilitate removal of the cap from the receptacle.

In carrying out the objects of the invention, a cap is provided, having an inwardly rolled, rounded hollow internal bead from which the inwardly projecting lugs are formed. The bead is curled on a rounded curve of such a radius that the lacquer previously applied to the cap making material is not injured. The finger grips are produced by the inward pressure which plays a part in the formation of the lugs and are preferably of such a size that the fingers of a user fit nicely therein, as distinguished from the small sharp crimps or knurls provided in prior art lug caps. These finger grips consist of rounded depressions in the cap skirt.

In the novel method of making the cap of the present invention, the lugs and the finger grips may be independently made, by successive operations, or they may be simultaneously struck from the bead by appropriate forces. Preferably, however, the lugs are first partially formed from the internal bead, and then are stamped to final form at the time that the finger grips are formed; the formation of the finger grips resulting from the final positioning of the lugs.

In the accompanying drawings, two specific embodiments of the cap of the present invention are shown, and two methods of making the same are disclosed, but it must be understood that the invention is not limited to these forms or methods, but comprehends all equivalents coming within the scope of the appended claims.

In the drawings,

Figure 1 is an elevational view, partly in section of a jar having a cap embodying a preferred form of the present invention applied thereto;

Figure 2 is a bottom plan view of the cap of Figure 1;

Figure 3 is a greatly enlarged fragmentary sectional view of the cap of Figures 1 and 2 showing, in detail, the structure of the lug;

Figure 4 is an enlarged fragmentary view of a cup-shaped blank from which the cap of the present invention may be made;

Figure 5 is a similar view after the initial curling step has been performed;

Figures 6*a* and 6*b* are fragmentary sectional views taken through the bead and the lug respectively after the next step has been performed;

Figures 7*a* and 7*b* are fragmentary sectional views taken through the bead and the lug respectively of the finished cap;

Figure 8 shows a preferred form of the cap applied to a receptacle;

Figure 9 is a vertical sectional view of a punch adapted to perform one step in the method of making the cap of Figures 1 to 8;

Figure 10 is a fragmentary sectional view of a die adapted to perform a preceding step in the method;

Figure 11 is an elevational view, partly in section, showing a modified form of cap applied to a receptacle;

Figure 12 is a bottom plan view of the cap of Figure 11;

Figure 13 is an enlarged fragmentary sectional view of the cap of Figure 11 applied to a receptacle, showing the specific form of lug;

Figure 14 is a fragmentary sectional view taken on line 14—14 of Figure 12;

Figure 15 is a vertical sectional view of a punch adapted to perform one step of the method employed in making the form of cap shown in Figures 11 to 14; and

Figure 16 is a fragmentary sectional view of a die used in performing a preceding step in this method.

Referring to Figures 1, 2, and 3, showing a preferred form of the invention, the cap comprises a one-piece metallic shell indicated generally at 10, comprising a circular top 11 and a substantially cylindrical depending skirt 12. The lower edge of the skirt is rolled inwardly and upwardly to form a substantially circular hollow bead 13, merged with the cap skirt in a rounded lower edge 14. The curvature of the rounded edge 14 and of the bead 13 is such that the enamel coating conventionally applied to the cap making material will not be cracked or chipped in the curling operation. Thus, the bead 13 is not flattened to form a hem joining the skirt in a sharp fold or crease. At spaced points, around the periphery of the skirt, the inner edge of the bead 13 is projected inwardly as at 15 to form locking lugs, adapted to engage under the thread of a receptacle, as shown in Figure 8. Adjacent the points where the inner edge of the bead is thus displaced inwardly to form lugs, the cap skirt and the outer edge of the bead are also displaced inwardly to provide finger grips 16, in the form of smoothly rounded depressions extending from the lower edge of the skirt upwardly preferably substantially to the top, and of a size appropriate to receive the fingers of a user. The depressions 16 are preferably of gradually and uniformly decreasing depth from the lower edge adjacent the bead 13 upwardly toward the juncture with the top 11.

It should be noted that the outer edge 17 of the bead 13 at the finger grip points is displaced inwardly an amount substantially equal to the inward displacement of the inner edge 15, which forms the lugs. Thus, as shown in Figure 2, the bead takes the form of a tubular ring having a plurality of short sections displaced inwardly from the line of the circle of the ring, and lying on short arcs of reverse curvature, projecting into the area of the ring circle.

As shown in Figure 3, the upper surface of the bead 13 at the lugs 15 is preferably flattened somewhat as shown at 18, to cooperate with the thread 19 of the receptacle neck (Figure 8). Moreover, the cap skirt 12 at the finger grip portions 16 is shown as being disposed on a downwardly and inwardly inclined curved surface.

A cap made in accordance with the construction of Figures 1 to 3 and 8 will be found to be particularly efficient because it is provided with a plurality of inwardly projecting rounded locking lugs formed from an inwardly rolled, substantially circular bead which acts as a reinforcement for the edge of the cap skirt, and because the cap is provided with finger grips to facilitate its removal from a receptacle. All sharp fold lines or creases and all raw edges are eliminated, as well as knurls or other unattractive projections, so that the cap presents a novel, improved appearance. Moreover, the finger grips 16, instead of being disfiguring features, as in the case of the prior art, add materially to the attractive appearance of the cap.

Although many alternative methods may be used in the manufacture of this cap, a preferred method is shown in Figures 4 to 7 and 9 and 10.

In my prior application, Serial No. 5,312, filed February 6, 1935, (a division of my prior joint application Serial No. 657,734, filed February 20, 1933), I have described a method of making a smooth finished, concealed lug cap, and, although the present cap is of a different class from the caps shown in that application, since the position of the lugs in the present case is not concealed, but is indicated by the finger grips, certain of the steps employed in the former method are useful in connection with one method of making the cap of the present invention.

Referring to Figures 4 to 7*b*, inclusive, the successive steps which may be employed in the present method are shown. Figure 4 shows a cup-shaped blank, in inverted position, having a top 11 and a cylindrical skirt 12 terminating in an inwardly crimped lower edge 20, which blank may be conveniently used in performing the new method. The crimped edge 20 (Figure 4) is struck with a conventional curling die to form the inwardly rolled partial bead 21, (Figure 5) around the entire perimeter of the skirt. In the next operation, the skirt may be curled further by a special lug forming and curling die, of a type described in my aforesaid application and shown diagrammatically in Figure 10. This die is circular in plan and is provided with a plurality of spaced arcuate curling grooves indicated diagrammatically at 22, Figure 10. Between the curling grooves, the die is either cut away entirely or is provided with a gradually rounded die surface 23 which causes spaced portions of the curled edge 21 to be projected or drawn inwardly beyond the adjacent curled portions, as is more fully described in my pending application identified above. Figures 6*a* and 6*b* show the form of the cap after the die of Figure 10 has completed its operation. The intermediate curled sections 24 are shown in Figure 6*a*, and it will be noted that the material of the cap skirt has been curled up to substantially tubular bead form. At the lug points 25, the bead has been projected inwardly beyond the adjacent portions and has not been curled up to the same degree. The initial curl 21 provided by the first step is still present, however, and serves to provide a rounded inner end to the lug.

The final step consists of bending the lug portions toward the cap top to their final position and bending the skirt inwardly at the lugs to project them radially inwardly an increased distance and simultaneously to form the finger grips 16. This step may conveniently be performed with a punch as shown in Figure 9. The blank is positioned upon a bed 26 and is held in place by a presser foot 27. A rotatable and reciprocable sleeve 28 then descends so that its lower end, provided with four anvil surfaces 29, is disposed within the cap. Adjacent the anvil surfaces, on the outside of the cap, are a plurality of levers 30 pivoted adjacent the bed 26 and having upwardly and inwardly inclined surfaces 31. A cylindrical outer sleeve 32 now descends and forces the levers 30 to swing inwardly so that the inclined surfaces 31 thereof engage the cap skirt at the lug points to project the lugs inwardly

an increased amount and to bend the skirt inwardly to form the finger grips 16. As the sleeve 32 continues to descend, rounded die surfaces 33 thereof force the lugs 25 (Figure 6b) toward the top of the cap to give the lugs their final "set". In addition to the die surface 33, the sleeve 32 is provided with a continuous die groove, to engage the intermediate portions 24 of the bead and align those portions with the lug portions, so that all portions of the bead lie in the same horizontal plane. The anvils 29 are provided with inclined outer surfaces 29', and with flattened upper surfaces 29'', adapted to form the flattened surfaces 18 on the finished lug.

The cap may be removed from the apparatus of Figure 9 by relative rotation between the cap and the inner sleeve 28 provided with the anvil projections 29, so that the projections may pass between the lugs 15.

Several alternative methods of making this form of cap may be substituted for the one just described. For instance, it is entirely feasible to form the lugs by first providing the cap skirt with a continuous inwardly rolled bead around the entire inner periphery thereof, and then bending spaced portions of the bead and cap skirt inwardly by the application of substantially radial pressure applied to the exterior of the skirt. By using appropriately shaped tools or instrumentalities for applying the inward bending pressure, the internal lugs and external finger grips may be given substantially any desired configuration.

In accordance with still another method, spaced portions of the inwardly curled bead may be rolled up to a lesser degree than the intermediate bead portions to provide inwardly projecting lugs. The function of curling the bead to a lesser degree at the lug points may be performed in a number of ways, as by providing an internal abutment to positively prevent complete curling of the bead at the spaced points, or by first curling the bead up to the same degree as adjacent portions and then uncurling the bead at the lug points. Portions of the cap skirt may be depressed inwardly to form the finger grips simultaneously with the inward projection of portions of the bead to form the lugs, or as a distinct step, after the lug forming step. In any event, the finger grip formation cooperates with the lug formation to produce an improved lug structure.

The modification shown in Figures 11 to 16 differs from the form of the invention described above primarily in that the finger grips are formed in the skirt above the lower edge thereof and do not merge therewith, and in that the lugs are formed, in part, by displacing portions of the inwardly rolled bead upwardly, so that they lie in a plane above the plane of the intermediate bead portions.

Referring to Figures 11 to 14, the cap comprises a top 11 and a cylindrical skirt 12 terminating in an inwardly rolled bead 13. At spaced points 15', the bead is displaced upwardly and the inner edge thereof projected inwardly as at 35. Above the lugs and at opposite sides of a medial line thereof, the cap skirt is displaced inwardly as at 16' to provide finger grips. These inwardly projected portions perform the added function of acting as centering means, by contacting the outer surface 19' of the receptacle thread.

The specific form of the lug is clearly shown in Figure 13. It embodies a substantially horizontal, inwardly projecting, flattened portion 36, and a reversely curved portion 37, having an inclined surface adapted to underlie the receptacle thread.

In the method of making the second form of the invention, substantially the same preliminary steps are employed as in the first form. As shown in Figure 16, however, a predetermined shape is preferably given to the lug forming portions by cooperating die surfaces 39, 40.

Figure 15 shows a form of apparatus generally similar to that shown in Figure 9, but provided with differently shaped levers 30'. Each of these levers has a pair of projections 41, appropriately shaped to form the finger grips 16'—16', adjacent each lug. The anvil 29', of course, is provided with appropriate recesses to receive the inwardly projected metal at the finger grip portions. The outer die sleeve 32' is provided with die surfaces 42 adapted to form the flattened displaced portion 36 of the lugs and the reversely bent portion 37 thereof, by cooperation with appropriate surfaces on the anvil 29'.

I claim:—

1. A container cap comprising a top, a depending skirt terminating in a lower end portion rolled inwardly to provide an internal, radially non-flattened, hollow bead, said skirt being smooth and undeformed except at circumferentially spaced points, and a plurality of spaced locking lugs formed from said bead, portions of the cap skirt at said circumferentially spaced points adjacent the lugs being pressed inwardly from a lower point adjacent the lugs to a point in the skirt above the highest point in the inwardly rolled portion to form finger grips spaced apart circumferentially of the skirt and of a size and shape to receive the fingers of an operator.

2. A container cap comprising a top, a depending skirt terminating in a lower end portion rolled inwardly entirely around the skirt to provide an internal, radially non-flattened hollow bead, and a plurality of locking lugs formed by portions of said bead being displaced inwardly beyond adjacent bead portions, said skirt being smooth and undeformed throughout its circumference except at circumferentially spaced points adjacent said lugs, where it is displaced inwardly to provide grips of a size and shape adapted to receive the fingers of an operator, said grips extending upwardly to a point in the skirt above the top of the inwardly rolled portion and being relatively deep at their lower ends and shallow and merging with the skirt at their upper ends.

3. A container cap comprising a top, a depending skirt terminating in a lower end portion rolled inwardly to provide an internal, hollow bead, and a plurality of locking lugs formed by portions of said bead being displaced inwardly beyond adjacent bead portions, said skirt being smooth and undeformed throughout its circumference except at circumferentially spaced points adjacent the lugs, where it is pressed inwardly to form rounded depressions extending from a lower point in the skirt substantially to the top of the cap and of a size and shape adapted to serve as finger grips.

4. A container cap comprising a top, a depending skirt terminating in a lower end portion rolled inwardly to provide an internal, hollow bead, and a plurality of locking lugs formed by portions of said bead being displaced inwardly beyond adjacent bead portions, said skirt being smooth and undeformed throughout its circumference, except at circumferentially spaced points adjacent the lugs, where it is displaced inwardly

an amount substantially equal to the inward displacement of the bead, to form gently rounded recesses extending throughout a substantial portion of the height of the cap skirt and of a size and shape individually adapted to receive the fingers of an operator, whereby said recesses form finger grips.

5. A container cap comprising a top and a depending skirt terminating in an inwardly beaded reinforced lower edge of substantially uniform radial thickness circumferentially of the cap, short spaced sections of said edge being projected inwardly beyond the longer intermediate sections, on arcuate lines to provide internal locking lugs, spaced portions of said skirt extending from said edge at said lugs upwardly substantially to said top being projected inwardly to provide concave external finger grips, said skirt being smooth and undeformed throughout its length between said spaced portions.

6. A container cap comprising a top and a depending skirt terminating in an inwardly rolled, non-flattened hollow bead, the skirt presenting a smooth cylindrical surface throughout its circumference except at spaced points, said skirt at said spaced points being pressed inwardly from the lower edge thereof to a point above the top of the bead to form depressions adapted to serve as finger grips to facilitate removal of the cap from a receptacle, said inwardly rolled bead at points adjacent the inwardly pressed portions of the skirt having inwardly extending projections adapted to serve as locking lugs.

7. A container cap comprising a top and a substantially cylindrical, depending skirt terminating in an inwardly rolled bead, the skirt being smooth from its juncture with the top to said bead and throughout its entire circumference except at spaced points, where the lower portion of the skirt adjacent the bead is pressed inwardly to form rounded, concave depressions adapted to serve as finger grips to facilitate removal of the cap from a receptacle, said inwardly rolled bead having spaced, inwardly extending projections each having a rounded edge similar to the skirt depressions, adapted to serve as locking lugs.

8. A container cap comprising a top and a depending skirt terminating in an inwardly rolled bead, the skirt being provided at spaced points with inwardly pressed depressions of gradually decreasing depth extending from the lower edge thereof upwardly substantially to a point above the highest point in the bead and merging with the rest of the skirt, said inwardly rolled bead adjacent the skirt depressions being rounded and extended inwardly beyond the adjacent bead portions to form rounded locking lugs.

9. A container cap comprising a top and a substantially cylindrical depending skirt terminating in an inturned substantially circular, hollow bead, the inner edge of the inturned bead at spaced points being projected inwardly beyond adjacent portions of the bead to form spaced locking lugs, the outer edge of the bead and the lower portion of the skirt adjacent said spaced points being similarly projected inwardly to form depressions adapted to serve as finger grips, the skirt and the bead being smooth and undeformed throughout the entire circumference of the cap, except at said spaced points adjacent the locking lugs.

10. A container cap comprising a top and a depending skirt terminating in an inturned, non-flattened bead, the inner edge of the inturned bead at spaced points being convexly rounded and projected inwardly beyond adjacent portions of the bead to form rounded, spaced locking lugs, the outer edge of the bead and the lower portion of the skirt adjacent said spaced points being pressed inwardly to form concave, rounded depressions each having a degree of curvature substantially equal to said rounded lugs, said depressions being adapted to serve as finger grips to facilitate removal of the cap from a receptacle, the skirt and the bead being smooth and undeformed throughout the entire circumference of the cap, except at said spaced points adjacent the locking lugs.

11. A container cap comprising a top and a depending skirt terminating in an inwardly and upwardly rolled bead disposed interiorly of the skirt and concealed from view thereby, the lower edge of the skirt and said bead being pressed upwardly at spaced points to lie bodily at a higher level than the intermediate portions and being projected inwardly at said spaced points to form locking lugs, said skirt being provided with spaced depressions of a size and shape adapted to receive the fingers of an operator to serve as finger grips to facilitate removal of the cap from the receptacle.

12. A container cap comprising a top and a depending skirt terminating in an inwardly and upwardly rolled bead disposed interiorly of the skirt and concealed from view thereby, the lower edge of the skirt and said bead being pressed upwardly at spaced points to lie bodily at a higher level than the intermediate portions and being projected inwardly at said spaced points to form locking lugs, said skirt being provided with depressions spaced between its lower edge and said top and disposed adjacent said locking lugs, said depressions being of a size and shape to receive the fingers of an operator to facilitate removal of the cap from the receptacle.

13. A container cap comprising a top and a depending skirt terminating in an inwardly and upwardly rolled bead disposed interiorly of the skirt and concealed from view thereby, the lower edge of the skirt and said bead being pressed upwardly at spaced points to lie in a plane above the intermediate portions and being projected inwardly at said spaced points to form locking lugs, said skirt being provided with a plurality of spaced pairs of depressions adapted to serve as finger grips and being smooth between the several pairs, each pair being associated with one of said locking lugs and being spaced between the lower edge of the skirt and said top.

14. The method of making a lug type container cap from a blank having a top and a substantially cylindrical skirt terminating in a free edge, which comprises turning the free edge of the skirt inwardly around the entire perimeter of the skirt to form at least a partial hollow bead, projecting spaced portions of the bead inwardly beyond intermediate portions to form locking lugs by displacing portions of the skirt inwardly beyond adjacent portions, forming external finger grips by said displacement of the skirt, and maintaining the inturned bead hollow and non-flattened throughout the circumference of the cap.

15. The method of making a lug type container cap from a blank having a top and a substantially cylindrical skirt terminating in a free edge, which comprises turning the free edge of the skirt inwardly around the entire perimeter of the skirt to form at least a partial hollow, non-flattened bead, projecting spaced portions of the

bead inwardly beyond intermediate portions to form locking lugs, pressing the lugs to final position by pressing portions of said skirt adjacent the lugs inwardly and thereby forming finger grips adjacent said locking lugs, and maintaining the inturned bead hollow and non-flattened throughout the circumference of the cap.

16. The method of making a lug type container cap from a blank having a top and a substantially cylindrical skirt which comprises rolling the free edge of the skirt inwardly to form an internal hollow, non-flattened bead, projecting the inner edge of the bead inwardly at spaced points to form internal locking lugs by projecting the outer edge of the bead and the lower edge of the skirt at those spaced points inwardly to form external finger grips, and maintaining the hollow, non-flattened condition of said bead throughout the entire circumference of the cap.

17. The method of making a lug type container cap from a blank having a top and a depending skirt which comprises curling spaced sections of the free edge of the skirt inwardly to form a bead and thereby drawing intermediate portions of the bead inwardly beyond the first mentioned sections, pressing the skirt at said spaced portions inwardly and simultaneously bending the edge toward the top to form internal locking lugs and external finger grips.

18. The method of making a lug type container closure from a blank having a top and a depending skirt comprising curling the free edge of the skirt upwardly and inwardly to form an internal bead, applying pressure along axial lines to the bead at spaced points to form inwardly projecting locking lugs, and applying pressure to the cap skirt at spaced points on substantially radial lines to provide depressions in the skirt adapted to serve as finger grips.

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