

July 16, 1935.

E. B. KRAMER ET AL

2,008,586

LUG CAP AND METHOD OF MAKING SAME

Filed Sept. 16, 1932

2 Sheets-Sheet 1

Fig. 1.

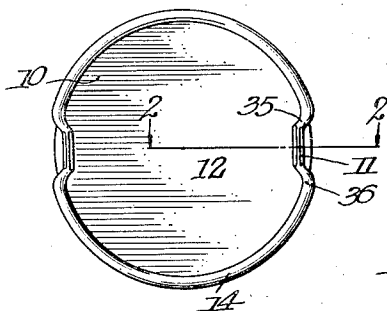


Fig. 2.

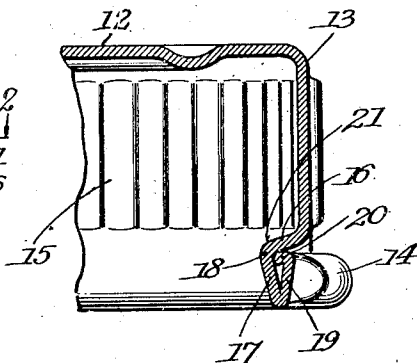


Fig. 3.

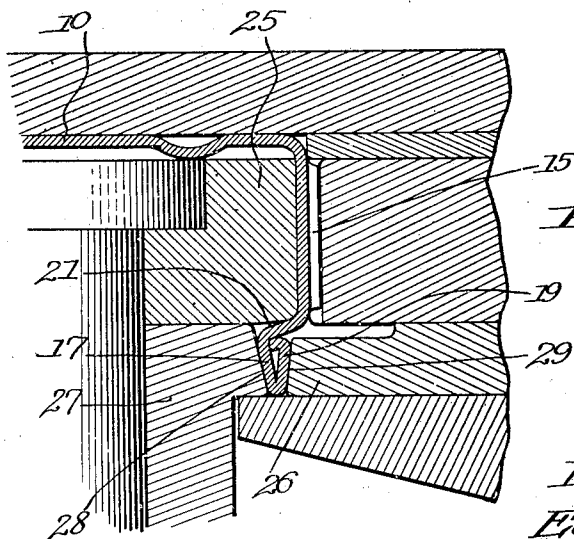
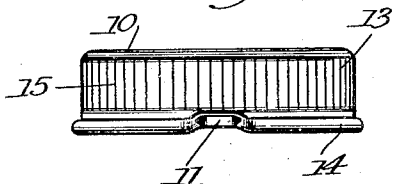


Fig. 4.

Inventor

Eric B. Kramer

Edward M. Erickson

By

Cushman, Bryant, Barby & Kuchman,

Attorneys

July 16, 1935.

E. B. KRAMER ET AL

2,008,586

LUG CAP AND METHOD OF MAKING SAME

Filed Sept. 16, 1932

2 Sheets-Sheet 2

Fig. 5.

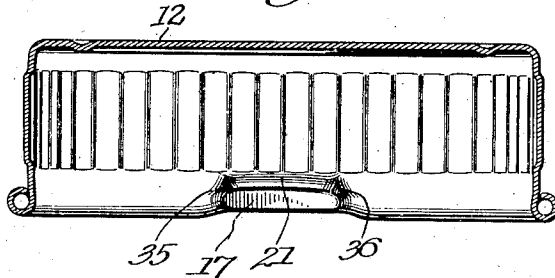


Fig. 6.

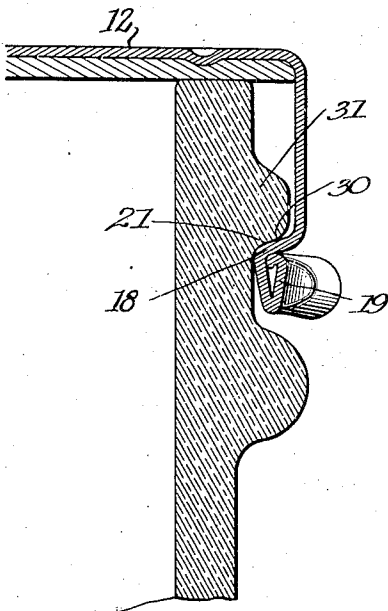


Fig. 7.

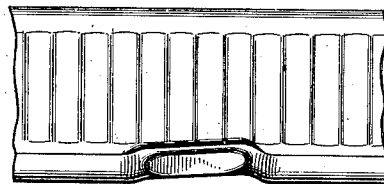
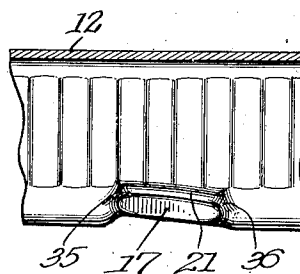


Fig. 8.



Inventor

Eric B. Kramer,
Edward M. Enck

By Cushman, Bryant, Harkins & Cushman
Attorneys

UNITED STATES PATENT OFFICE

2,008,586

LUG CAP AND METHOD OF MAKING SAME

Eric B. Kramer and Edward M. Enkur, Baltimore, Md., assignors to Crown Cork & Seal Company, Inc., Baltimore, Md., a corporation of New York

Application September 16, 1932, Serial No. 633,512

16 Claims. (Cl. 113—121)

The present invention relates to caps or closures and to a method of making the same, and more particularly to caps commonly known as "lug caps" for use on glass bottles and containers which have threads thereon, whereby, upon rotation of the cap, the lugs will engage the threads and securely lock the cap on the container.

An object of the invention is to provide a lug cap which has a stronger and more substantial locking lug than caps of this type which have been heretofore used, and which will, therefore, afford a greater sealing pressure against the mouth of a container.

Another object of the invention is to provide a lug having a cross section of a form characterized by its inherent stability. Preferably the metallic walls of the lug are formed and pressed into a general triangular shape, in cross section, which shape, according to well known engineering principles, is inherently stable, and cannot be collapsed or distorted without changing the relative position of one wall with respect to another. With the lug of the present invention, triangularly disposed walls are securely pressed into a definite, predetermined relation to each other, and cannot be displaced from that relation by the application of the cap to a jar, and consequently, the shape of the lug cannot be distorted. The use of a triangular lug is a radical departure from devices of the prior art, because in all such devices, the cross sectional form of the lug has been either a completely flattened circle, an oval, or an undeformed circle.

It is a further object of the invention to provide a lug having each of its walls so disposed that it constitutes a truss or brace for the others, and effectively prevents distortion of the lug in use.

It is a further object of the invention to produce a lug having an inwardly and downwardly inclined thread engaging surface, and a supporting and reinforcing portion disposed therebelow, which portion is in the form of a triangle or an upright V, and serves to support the thread engaging portion at two spaced points.

Preferably the inwardly and downwardly inclined thread engaging surface is flat, and is disposed at such an angle to the horizontal that it fits snugly under the thread or lug of a receptacle and contacts the same at the root or base of the thread, rather than at a point adjacent the outer edge thereof. The surface, being substantially flat, makes contact over a larger area than has been customary in the past.

Another object of the invention is to provide

a cap having lugs which will not tend to cut or scratch the threads upon the glass container with which the lugs engage to produce a sealing pressure between the top of the cap and the mouth of the container.

A still further object of the invention is to provide a novel locking lug which may be formed with a minimum distortion of the metal, thereby avoiding mutilation of the cap decoration and weakening of the cap.

The invention seeks to produce a lug which may be formed without substantial deformation of the cap skirt, and without substantially reducing the depth of the skirt at the lugs. In the manufacture of lug caps it has been customary to utilize a blank which is substantially hat-shaped. The blank has a top, a depending skirt, and the free edge of the latter is formed into a flat flange extending at a right angle from the skirt. This flange is ordinarily curled upwardly to form a bead of circular form in cross section. By various operations upon this bead it has been customary to form the same into lugs of various types and the present invention relates to an improved lug which overcomes the defects of lugs heretofore used.

The conventional type of lug has been formed by pressing the bead at intervals both inwardly and upwardly, so that the lugs formed are produced not only by an inward movement upon the bead, but by an upward pressure toward the top of the cap, the latter pressure collapsing the lug along axial lines, that is, lines extending toward the top of cap or parallel to the axis about which the cap is rotated when applying the same to the container.

As distinguishing from lug caps of the conventional type, the present invention contemplates a lug produced by pressure directed upon the bead in a generally radial direction by die surfaces disposed at a slight angle or inclination to the axis of the cap, and not at right angles to a radius of the cap. Thus, although the bead of the cap is partially collapsed by pressure applied in a radial direction, the faces of the dies which perform the collapsing function are disposed at such an angle to each other and to the axis of the cap that the bead walls are pressed into substantially V-shape, with the apex disposed downwardly and the divergent legs disposed upwardly. While forming the bead into triangular or upright V-shape, the inclined die faces force the metal of the same upwardly somewhat, because, it will be apparent that the metal will tend to ride upwardly to a certain degree on these inclined faces.

The inclined die faces result in the application to the bead of a force having two components, one a radial component and the other an axial or upward component. Thus, although no axial pressure is applied to the bead and the bead is not shortened at the lugs, some of the material thereof is forced upward, and all of the advantages which might be gained by applying pressure to the bead in an upward direction are gained, but none of the disadvantages, because the bead is not materially shortened.

This manner of forming the lug, i. e., applying pressure thereto along radial lines by means of die faces disposed at slight angles to the axis, results in a lug which is not reduced axially of the cap because no substantial pressure in an axial direction is applied to the bead. Consequently the same is not reduced in that direction. Furthermore, the skirt of the cap adjacent the lugs is not reduced in an axial direction and its appearance adjacent the lugs is not injured.

In order that the lug may not have a tendency to scratch or mar the finish of the receptacle to which it is applied, the inwardly projecting portion thereof is formed with a blunt surface, and the walls of the lug at this point join each other in an obtuse angle.

As stated above, an important feature of the invention is the retention of substantially the full length or depth of the skirt at the point where the lugs are formed, and the retention of the full height of the bead in the lugs. Heretofore, it has been customary to shorten the skirt by a compression of the bead upwardly or substantially parallel to the axis of the cap. This reduction in the depth of the skirt by vertical or axial compression, not only weakens the cap where the lugs are formed, but tends to destroy the ornamentation and produces an unsightly cap. It is preferable to exert the radial pressure which causes the inward radial movement of the bead and the formation of the same into substantially triangular shape in such a way that there is no substantial strain applied to the skirt above the lug. This will avoid stretching or thinning of the metal such as would result from an excessive inward movement of the skirt above the bead. The inward radial movement of the bead immediately prior to its being stamped into triangular or V-shape, tends to slightly uncoil the bead with the result that the upper surface of the lug is produced partially from the metal of the bead and partially from the metal adjacent the lower edge of the skirt.

In the accompanying drawings, a preferred embodiment of the invention is shown, in which

Figure 1 is a bottom plan view of a cap embodying the present invention,

Figure 2 is an enlarged sectional view taken on line 2—2 of Figure 1 and showing in detail a preferred specific form of lug,

Figure 3 is a side elevation of the cap of Figure 1,

Figure 4 is a vertical sectional view of the cap and lug showing a manner in which the same may be formed,

Figure 5 is an inside view of the cap, showing the lugs in elevation,

Figure 6 is a sectional view similar to Figure 2, showing the cap applied to a container and the lug in operative relation to a thread,

Figure 7 is a side view of a modification, and

Figure 8 is an inside elevation of the form of lug shown in Figure 7.

In the drawings, a cap 10 having diametri-

cally opposed lugs 11 is disclosed. It will be understood, of course, that the invention is not limited to the provision of two lugs, but one or more may be used. The cap comprises a top 12 having a downwardly depending skirt 13 provided, in accordance with conventional practice, with a hollow rolled edge or bead 14. The skirt 13 is preferably formed with a plurality of ridges or knurls 15 to facilitate turning of the cap on a receptacle.

The lug of the present invention is made by pressing the bead 14 radially inwardly at spaced points. As stated above, the lug preferably comprises a thread engaging surface and a supporting or reinforcing member disposed therebelow and arranged so as to prevent distortion of the thread engaging member when the cap is applied with considerable force to a threaded receptacle. In the embodiment illustrated, the skirt 13 of the cap terminates at its lower edge at spaced points in an inwardly and downwardly inclined portion 16. This portion may either be formed from the material of the skirt, or from an uncoiled portion of the material of the bead, or from some of the material of each of these portions.

The thread engaging portion 16 is inclined inwardly and downwardly from the skirt, and, adjacent its inner edge, is bent downwardly and slightly outwardly so as to constitute the inner section 17 of a reinforcing or supporting structure. The downwardly and outwardly inclined portion 17 is joined to the portion 16 by a bend 18 which, in cross section, is in the form of an obtuse angle so that the inwardly projecting corner of the lug as a whole, is blunt, and consequently, will not scratch or mar the glass finish of the receptacle. At the lower edge of the portion 17, the material of the bead is turned abruptly upwardly in an acute angle, and the upwardly extending portion 19 disposed above this acute angle underlies and contacts the lower or undersurface of the thread engaging portion 16, in supporting or bracing relation thereto.

Thus, the bead of the cap assumes the form of a triangle, or an upright V, and one leg thereof supports the inner edge of the thread engaging portion while the other or outer leg supports the thread engaging portion at a point spaced outwardly from the inner edge. The apex of the V or triangle is disposed downwardly, and the base of the triangle or the divergent portion of the V is disposed upwardly in supporting relation to the thread engaging surface of the lug.

A portion of the bead located adjacent the upper edge of the outer leg of the V is preferably turned inwardly toward the other leg as indicated at 20, and this portion functions to space the divergent legs a proper distance apart. The portion 20 underlies the thread engaging surface 16 and supports the same against distortion when in use.

It will be noted, that the section 19 of the bead, which has been flattened and straightened and is disposed between the lower edge of the lug and a central portion of the thread engaging surface constitutes a brace or truss and effectively prevents a flattening out of the lug when the cap is applied to a threaded receptacle with excessive turning force.

The lug of the present invention is provided with a relatively long, flat, and gradually inclined thread engaging surface 21. Normally the thread will contact this surface over a por-

tion of its area adjacent the corner 18. By making the thread engaging surface substantially planar and of considerable linear extent circumferentially of the cap, the sealing pressure is distributed over a large area, and the lug will not mar the undersurface of the thread. Furthermore, by providing the inwardly projecting portion of the lug as a whole with a blunt corner, as opposed to the sharp edges of the prior art lugs, the side wall of the neck of the receptacle below the threads will not be scratched or mutilated.

It will readily occur to one skilled in the art that many of the advantages of the present form of lug may be obtained without inclining the portion 19 outwardly from its point of juncture with the portion 17. The portion 19 could readily be formed to extend upwardly in a substantially vertical plane, and its supporting function would be performed in the same manner as in the present form; so long as it is forced into contact with the undersurface of the thread engaging portion 16.

The lugs of the present invention may conveniently be formed in accordance with the disclosure of Figure 4. A hat-shaped blank is placed on a suitable turret 25, and, in accordance with such a method as is disclosed in application of Bell, Serial No. 654,750, filed February 1, 1933, is provided with a rolled or beaded edge. During its progress through the machine, the cap goes through a stage where a plurality of radially disposed dies compress the bead to form lugs therein. In Figure 4, an outer die 26 is disposed so as to force a portion of the beaded edge radially inward, and a second die 27, disposed interiorly of the cap, serves as an anvil and limits the inward movement of the bead. The dies 26, 27, in the present instance, are provided with inclined faces 28, 29 respectively, and these faces impart to the bead the desired triangular form. In addition, the inclined faces perform the advantageous function of forcing the upper portion of the bead upwardly. This is accomplished by a sort of squeezing action between the inclined faces, and the material of the bead is caused to move upwardly as it assumes a triangular form, so that the upper surface 21 assumes a position to contact the under surface 30 of a thread 31 on the neck of a receptacle. By disposing the die faces in this novel relation a force having both a radial and an axial component is applied to the bead, and a lug is produced which fits the under-surface of the receptacle thread more snugly than has been possible heretofore.

This characteristic of the present lug is clearly disclosed in Figure 6. The blunt corner 18 of the lug contacts the juncture between the undersurface of the thread 31 and the neck of the bottle. The contacting surface 21 of the lug, which has been forced upwardly somewhat during the forming operation by the axial component of force imparted thereto by the die faces, is in engagement with the undersurface of the thread over a considerable area at the root or base thereof adjacent the receptacle. This type of contact, as opposed to a contact with the thread at a point on its outer edge is extremely desirable.

It will be noted that, in accordance with the method of manufacture disclosed in Figure 4, the metal of the cap is not stretched or weakened adjacent the lug. Whatever surplus material is needed for forming the inwardly struck lugs is supplied by a slight uncoiling of the bead itself.

The portion of the rolled edge below the thread engaging surface is firmly compressed by the dies 26, 27 and is forced into a form which enables it to effectively support the thread engaging portion.

The ends of the lug of the present invention merge with the beaded edge of the cap at points 35, 36, and it will be noted that the change from the triangular form to the circular form of the beaded edge is a gradual one, and the material is not thinned or weakened at these points. The upper thread engaging surface 21 of the portion 16 gradually merges from the flat, downwardly inclined relation at the lugs, to the vertically disposed cylindrical relation in the skirt proper. All of the changes from one relation to the other have been worked out in the present invention in such a manner that the entire cap contains no zones of thinned metal or other weak spots.

It will be noted that in the present invention no portions of the material of the lug can be considered as surplus. Each part performs a definite and useful function. The inwardly bent and downwardly inclined portion 16 constitutes a thread engaging means, and the V-shaped or triangularly formed bead portion of the lug constitutes a reinforcing or supporting means for the thread engaging means.

The modified form of lug disclosed in Figures 7 and 8 differs from the principal disclosures only in that the lugs as a whole are inclined to the horizontal. In some cases, it is found desirable to dispose the lugs in this manner so as to make them conform more exactly to the pitch of the thread and to increase the area of contact between the lug and thread.

A lug of the modified form may be made by changing the shape of the dies 26 and 27 so that one end is forced upwardly more than the other.

Although the invention has been described in detail, it will be understood that it is not limited to all features set forth in the drawings and in the foregoing description, and that many modifications may be made without departing from the invention.

We claim:

1. A cap having a top and a depending skirt provided at its lower edge with a rolled edge and having a plurality of integral inwardly projecting locking lugs, each of said lugs having a portion presenting a downwardly and inwardly inclined upper surface adapted to contact under a thread on a receptacle, a downwardly and outwardly inclined portion having a flattened substantially planiform inner face, said portion comprising a continuation of said first mentioned portion and disposed therebelow and terminating at its lower edge in a sharp fold, and a flattened portion extending upwardly from said sharply folded lower edge of said last mentioned portion and being disposed under said first mentioned portion and terminating at a point spaced from the inner edge thereof and constituting a supporting truss for said thread engaging surface of said lug.

2. A cap having a top and a depending skirt provided at its lower edge with a rolled bead and having a plurality of integral inwardly projecting locking lugs, each said lug having a portion presenting a downwardly and inwardly inclined upper surface adapted to contact under a thread on a receptacle, a downwardly and outwardly inclined portion having a flattened substantially planiform inner face, said portion comprising a

continuation of said first mentioned portion and disposed therebelow, and an upwardly and outwardly disposed portion extending from the lower edge of said last mentioned portion and joining the same in a sharp fold and projecting upwardly to a point intermediate the inner and outer edges of said first mentioned portion and constituting a supporting truss for said thread engaging surface of said lug.

3. A cap having a top and a depending skirt provided at its lower edge with a rolled bead and having a plurality of integral inwardly projecting locking lugs, each said lug having a portion presenting a downwardly and inwardly inclined substantially flat upper surface adapted to contact a receptacle thread, a downwardly and outwardly inclined portion having a flattened, substantially planiform inner face, said portion comprising a continuation of said first mentioned portion joining the same at an obtuse angle to form a blunt locking projection and being disposed below said first mentioned portion, and an upwardly and outwardly inclined portion extending from the lower edge of said last mentioned portion and joining the same in a sharp fold line and extending upwardly to a point intermediate the inner and outer edges of said first mentioned portion and constituting a supporting truss for said thread engaging surface of said lug.

4. A closure cap having a top and a depending skirt provided with a rolled lower edge and a plurality of integral inwardly projecting locking lugs, each said lug comprising an upper thread engaging portion joined at its outer edge to said skirt and inclined inwardly and downwardly therefrom, a second portion extending from the inner edge of said thread engaging portion and inclined outwardly and downwardly under said first named portion, and a third portion inclined upwardly and outwardly from the lower edge of said second portion to a point under said thread engaging portion, said three sections comprising a substantially triangular lug in cross section having characteristics of inherent stability.

5. A closure having a top, a depending skirt, a rolled lower edge, and integral locking projections, said projections each comprising an inwardly struck portion of said skirt and an inwardly struck portion of said rolled edge, said portion of said rolled edge being compressed into substantially V-shape and having its legs disposed at an acute angle, one of said legs at its upper edge joining said inwardly struck portion of said skirt in an obtuse angle to form a blunt locking projection, said other leg terminating under said inwardly bent skirt portion in supporting relation thereto to prevent distortion of said locking projection in use.

6. A closure cap having a top, a depending skirt, a rolled lower edge, and a plurality of integral locking projections, said projections each comprising an inwardly struck and downwardly inclined portion of said skirt, and an inwardly struck portion of said rolled edge, said portion of said rolled edge being compressed into substantially V-shape and having its legs disposed at an acute angle, the inner of said legs at its upper edge joining said inwardly and downwardly struck portion of said skirt in an obtuse angle to form a blunt locking projection, the outer of said legs terminating in a laterally bent edge underlying said inwardly bent skirt portion, said outer leg being spaced outwardly from said inner leg by said laterally bent edge and being disposed in

supporting relation to said skirt portion to prevent distortion of said locking projection in use.

7. A closure cap comprising a top and a depending skirt, said skirt having means adjacent the lower edge thereof adapted to engage a thread on a receptacle and means for reinforcing and bracing said thread engaging means, said thread engaging means comprising an inwardly bent and downwardly inclined portion of said skirt, said reinforcing and bracing means being adapted to prevent distortion of said thread engaging means when subjected to locking stress on a receptacle thread and comprising a continuation of said cap skirt disposed out of thread engaging position below said inclined portion and formed in a reverse bend to substantially upright V-shape and having a leg compressed under said inclined portion and contacting the same at a point intermediate the inner and outer edges thereof.

8. A closure cap comprising a top, a depending skirt terminating in a rolled head, a surface adapted to engage a receptacle thread, and a supporting means therefor, said thread engaging surface comprising an inwardly struck portion adjacent the upper edge of said bead, said supporting means comprising a portion of said rolled bead struck inwardly and squeezed upwardly to substantially the form, in cross section, of an isosceles triangle with its apex disposed downwardly and its base disposed upwardly under said thread engaging surface, the upward squeezing of said bead serving to force said thread engaging surface upwardly into predetermined position for engagement with the root of a receptacle thread.

9. A closure cap comprising a top, a depending skirt terminating in a rolled bead, a surface adapted to engage a receptacle thread, and a supporting means therefor, said thread engaging surface comprising an inwardly struck portion adjacent the upper edge of said bead, said supporting means comprising a portion of said bead struck inwardly and compressed to substantially triangular shape, one of the legs thereof being disposed to support the inner edge of said inwardly struck portion and the other leg thereof being disposed to support the same at a point intermediate the edges thereof, whereby said thread engaging surface is supported against distortion upon the application of sealing pressure thereto by engagement with a receptacle thread.

10. A closure cap comprising a top, a depending skirt terminating in a rolled bead, a surface adapted to engage a receptacle thread, and supporting means therefor, said thread engaging surface comprising an inwardly struck portion adjacent the upper edge of said bead, said supporting means comprising a portion of said bead struck inwardly and compressed to upright V-shape, one of the legs thereof being disposed to support the inner edge of said inwardly struck portion and the other leg thereof being disposed to support the same at a point spaced from the inner edge thereof, whereby said engaging surface is supported against distortion upon the application of sealing pressure thereto by engagement with a receptacle thread.

11. A closure cap comprising a top, a depending skirt terminating in a rolled bead, a surface adapted to engage a receptacle thread, and supporting means therefor, said thread engaging surface comprising an inwardly struck portion adjacent the upper edge of said bead, said supporting means comprising a portion of said bead struck inwardly and compressed to substantially triangular shape, one of the legs thereof being

disposed to support the inner edge of said inwardly struck portion and the other leg thereof being disposed to support the same at a point intermediate the inner and outer edges thereof, whereby said engaging surface is supported against distortion upon the application of sealing pressure thereto by engagement with a receptacle thread.

12. A closure cap comprising a top, a depending skirt terminating in a rolled edge, and a plurality of thread engaging lugs, each lug comprising an inwardly struck portion having a substantially flat surface adapted to engage a receptacle thread and being inclined inwardly and downwardly at an acute angle to the horizontal and an inwardly struck portion of said rolled edge directly therebelow, said inwardly struck rolled edge portion being compressed to substantially the form of an inverted triangle in cross-section and having its apex disposed downwardly and its base disposed upwardly and underlying said inwardly struck thread engaging portion in supporting and reinforcing relation thereto.

13. A closure cap comprising a top, a depending skirt terminating in a rolled edge, and a plurality of thread engaging lugs, each lug comprising an inwardly struck portion having a substantially flat surface adapted to engage a receptacle thread and being inclined inwardly and downwardly at an acute angle to the horizontal and an inwardly struck portion of said rolled edge directly therebelow, said inwardly struck rolled edge portion being compressed to substantially the form of an inverted acute isosceles triangle in cross-section and having its apex disposed downwardly and its base disposed upwardly and underlying said inwardly struck thread engaging portion in supporting and reinforcing relation thereto.

14. The method of making lugs in the beaded

edge of a closure cap skirt comprising applying an inwardly directed radial force to said bead at a point on the outside thereof and deflecting said bead inwardly, positioning an inwardly and upwardly inclined die surface inwardly of the bead and thereby limiting the extent of inward deflection of said bead and simultaneously applying to said bead by coaction of said inwardly directed force and said upwardly and inwardly inclined die surface, an axial component of force and thereby deforming the bead and deflecting a portion thereof upwardly without collapsing the same axially of the cap.

15. The method of making lugs in the beaded edge of a closure cap skirt comprising applying an inwardly directed radial force to the exterior of the bead, deflecting the bead inwardly against a die surface inclined upwardly and inwardly with respect to the axis of the cap, and continuing the application of said force to said bead causing a portion of said bead to be deformed and to ride upwardly on said upwardly and inwardly inclined surface to a predetermined upwardly deflected position.

16. The method of making lugs in a beaded edge of a closure cap skirt comprising applying a radial force to said bead at a point on the exterior thereof by a die surface inclined upwardly and outwardly with respect to the axis of the cap whereby an upward component of force is imparted to said bead, deflecting said bead inwardly against a relatively stationary upwardly and inwardly inclined surface, continuing the application of said force, and thereby causing a portion of said bead to be deformed and to ride upwardly on said inclined surface to a predetermined upwardly deflected position.

ERIC B. KRAMER.

EDWARD M. ENKUR.