Sept. 26, 1961 W. R. GAMBLE 3,001,657

CLOSURES FOR BOTTLES AND LIKE CONTAINERS

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Fig. 1.

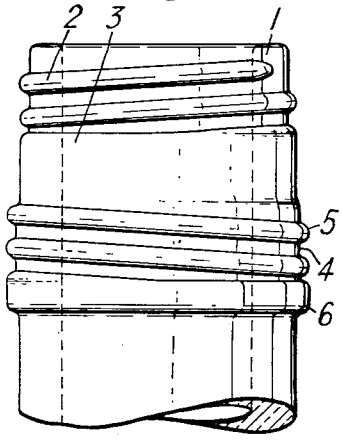


Fig. 2.

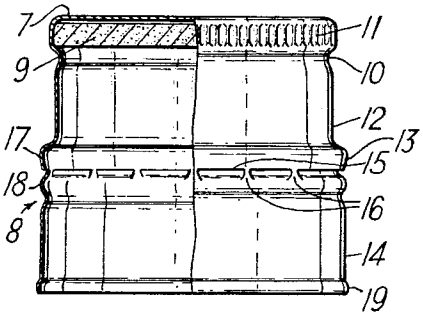


Fig. 3.

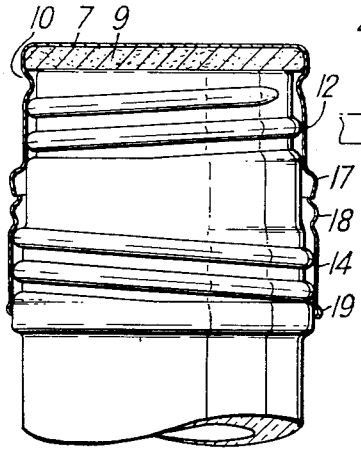
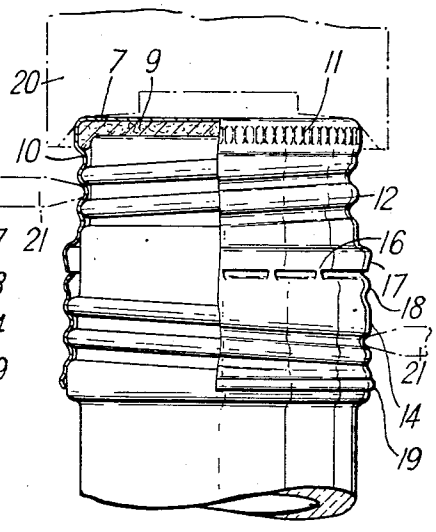


Fig. 4.



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Fig. 5.

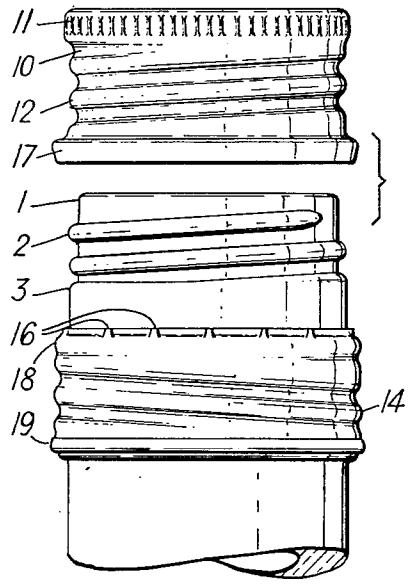
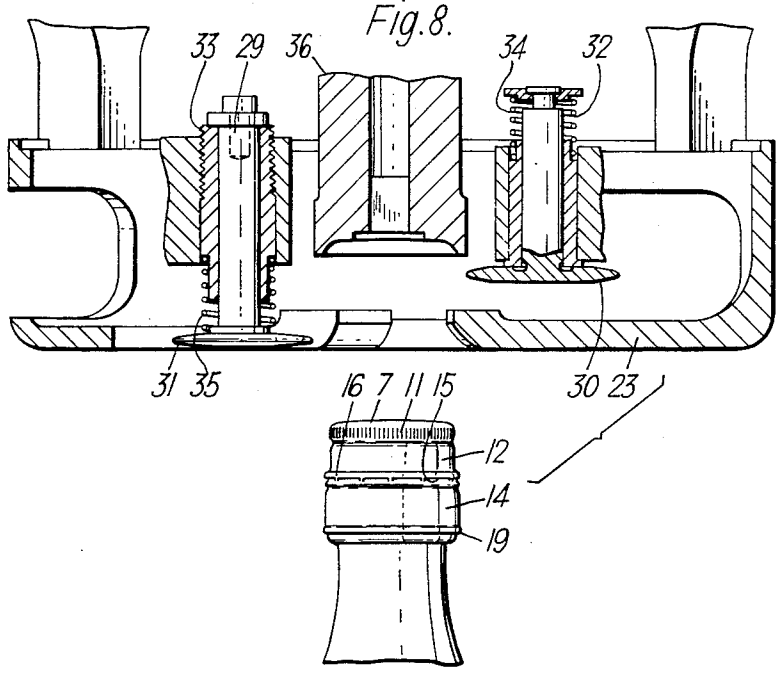


Fig. 8.



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CLOSURES FOR BOTTLES AND LIKE CONTAINERS

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Fig. 6.

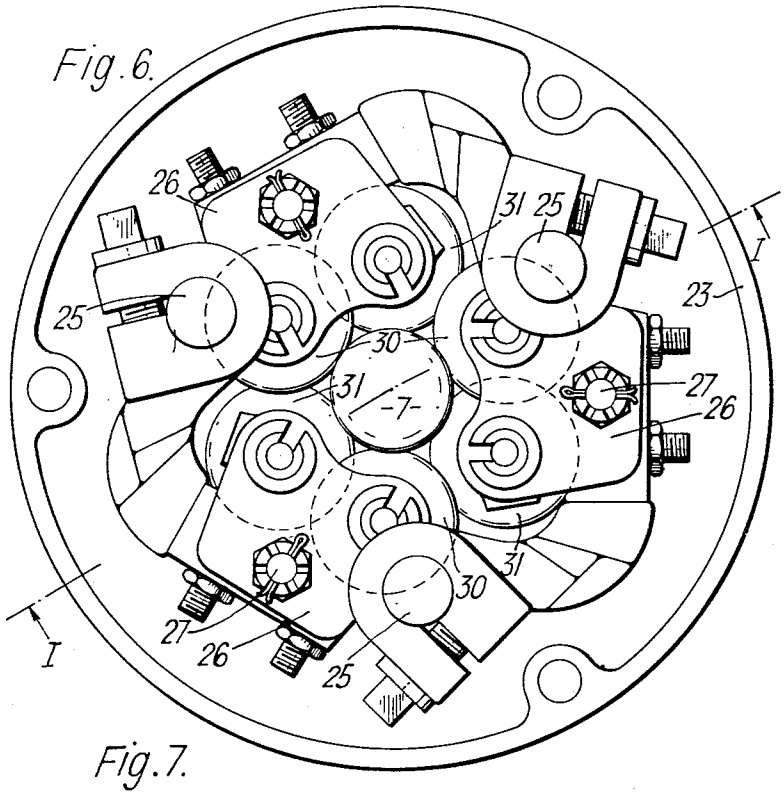
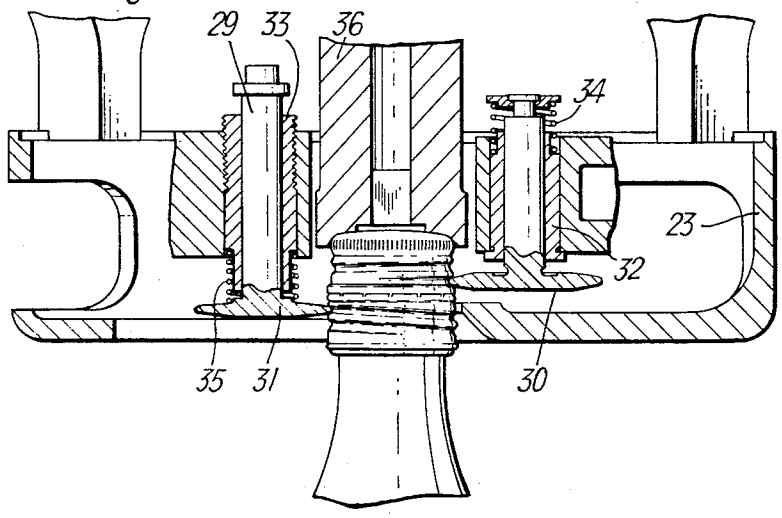


Fig. 7.



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CLOSURES FOR BOTTLES AND LIKE CONTAINERS

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Fig. 9.

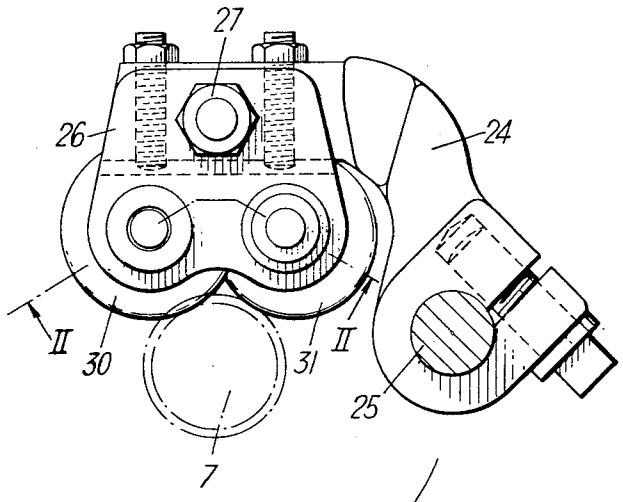
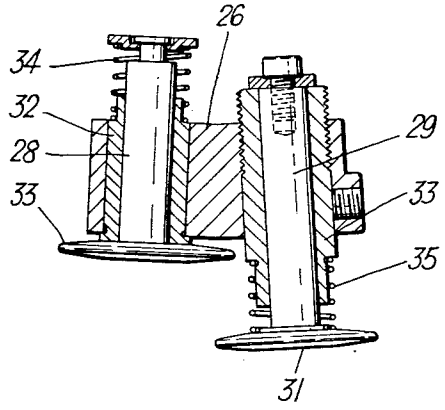


Fig. 10.



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3,001,657

CLOSURES FOR BOTTLES AND LIKE CONTAINERS

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Claims priority, application Great Britain Jan. 10, 1955
8 Claims. (Cl. 215—42)

The present invention relates to closures for bottles and like containers of the kind which when once applied to a container provide an immediate indication of any unauthorised attempt to tamper with the contents of the container involving removal or attempted removal and/or re-application of the closure, and which also provide for re-closure of the container by an authorised user of the whole or a part of the contents thereof.

The chief object of the present invention is to provide an improved closure of the kind referred to such that the security or assurance to the user of the contents of the container that said contents have not been tampered with is greatly enhanced.

Further objects of the present invention are to provide an improved closure of the kind referred to the whole of which is readily removable from the container without impairing the possibility of re-use of the container after the contents thereof have been used by an authorised user, which does not entail the manufacture of containers to fine tolerances and which can be readily applied to the container.

With the above objects in view the present invention consists in a closure for a bottle or like container of the kind referred to comprising a one-piece cup-like member the skirt of which includes an upper portion adapted with the base of said member to provide a re-closure for the container, a lower portion adapted to provide a security ring and an intermediate outwardly dished portion weakened to permit ready separation of the upper and lower portions, the upper and lower portions being adapted respectively to co-operate with screw thread formations of opposite hand on the container when the closure is in operative position on the container and the internal diameter of the upper portion being less than the internal diameter of the lower portion so that after separation of the upper and lower portions the lower portion can be removed from the container by movement lengthwise thereof.

More specifically stated the present invention consists in a closure for a bottle or like container of the kind referred to comprising a one-piece cup-like member, the skirt of which includes upper and lower flat ring-like portions, the internal diameter of the upper portion being less than the internal diameter of the lower portion, and an intermediate outwardly dished portion connecting said upper and lower portions weakened substantially centrally thereof along a line extending circumferentially of the skirt, the arrangement being such that after separation of the upper and lower portions the lower portion can be removed from the container readily by movement lengthwise thereof and the upper and lower portions being adapted respectively to co-operate with screw thread formations of opposite hand on the container when the closure is in operative position on the container.

The outwardly dished intermediate portion may be weakened in any convenient manner as by the provision of a continuous or interrupted score line or by the provision of a series of spaced slits or slots extending circumferentially of the skirt; when an interrupted score line or a series of spaced slits or slots is used the circumferential length of the scores, or of the slits or slots, should preferably be substantially greater than the circumferential length of the intervening portions of the flange. Since the outwardly dished portion is intermediate the upper and lower portions, the effect of providing a weakened portion centrally of the dished portion is, as it were, to form a bead at the lower edge of the upper portion and another bead at the upper edge of the lower portion.

In order that the present invention may be more clearly understood and readily carried into effect reference may now be had to the accompanying drawings illustrating the same by way of example and in which:

FIGURE 1 is an elevational view of a bottle neck finish for receiving a closure according to the present invention.

FIGURE 2 is a view of one form of closure according to the present invention ready for application to the bottle neck shown in FIGURE 1, the left-hand side of the figure showing the closure in section and the right-hand side showing the closure in elevation.

FIGURE 3 is a view partly in section and partly in elevation showing the closure of FIGURE 2 positioned on the bottle neck shown in FIGURE 1 prior to being deformed into sealing engagement therewith.

FIGURE 4 is a view partly in section and partly in elevation showing diagrammatically the manner of deforming the closure into sealing engagement with the bottle neck.

FIGURE 5 is a view in elevation of the bottle neck showing the upper reclosure portion of the closure removed and the lower security ring portion of the closure in position on the neck.

FIGURE 6 is a plan view of the headset used for applying the closure shown in FIGURE 2 to the bottle neck shown in FIGURE 1.

FIGURE 7 is a section on the line 1—1 of FIGURE 6.

FIGURE 8 is a view similar to FIGURE 7 showing the relative positions of the bottle with the closure positioned thereon and the headset at the commencement of the closure applying operation.

FIGURES 9 and 10 are plan and sectional views respectively of one spinning arm assembly as used in the headset shown in FIGURES 6–8, the sectional view of FIGURE 10 being taken on the line 2—2 of FIGURE 9.

The bottle neck shown in FIGURE 1 comprises an upper portion 1 having a formation 2 of continuous screw thread form formed therein, a plain intermediate portion 3, a lower portion 4 having a formation 5 of continuous screw thread form formed therein and a collar 6 below the lower portion 4. As shown the continuous screw thread formation 2 is right-handed and the continuous screw thread formation 5 is left-handed, the relation between the thread diameters being chosen so that the minimum root diameter of the thread formation 5 is not less than the maximum outside diameter of the right-hand thread formation 2 for a purpose wich will hereinafter appear. The lengths of the thread formations 2 and 5 are such that an equal amount of rolling is required to form the mating threads on the closure without collapse of the mating threads of the closure co-operating with the thread formations 5. The outside diameter of the intermediate portion 3 is equal to the outside diameter of the thread formation 2 and the outside diameter of the collar 6 is the same as the outside diameter of the thread formation 5. The collar 6 serves the normal purpose of a transfer ring for the mould maker and can be used to assist in the dressing of the lower end of the closure skirt.

FIGURE 2 illustrates a closure as made for application to a bottle neck of the form shown in FIGURE 1. This closure is of cup-like form and has a base 7 and a skirt indicated generally by the reference numeral 8. Within the closure and in contact with the base 7 is a liner 9, for example of cork or other suitable material, which is retained in position in the closure by a liner

retaining groove 10 formed in an appropriate position in the flange 8. The outer surface of the flange 8 between the groove 10 and the base 7 of the closure is preferably roughened, as for instance by knurling 11, to provide a grip. The upper portion 12, intermediate portion 13 and lower portion 14 of the closure are intended for co-operation respectively with the upper portion 1, intermediate portion 3 and lower portion 4 of the bottle neck shown in FIGURE 1. To this end the internal diameters of the upper and lower portions 12 and 14 are not less than the outside diameters of the thread formations 2 and 5 respectively of the bottle neck. The intermediate portion 13, connecting the portions 12 and 14, is outwardly dished as shown and is provided—preferably centrally thereof—with a circumferential row of spaced slits or slots 15, which are of substantially greater circumferential length than the intervening portions 16 of the flange. The spaced slits or slots 15 are preferably formed by a cutter which acts in a direction radially inwardly of the closure flange thereby producing a sunk type of slit or slot which divides the intermediate portion 13 into two parts except for the spaced narrow connecting portions 16 and forms upper and lower beads 17 and 18 which tend to insulate the narrow connecting portions 16 from the stresses arising during application of the lower portion of the skirt to the bottle neck. At its extreme lower end the skirt is provided with a return edge bead 19.

In applying the improved closure shown in FIGURE 2 to a bottle neck as shown in FIGURE 1 the closure is first positioned on the bottle neck as shown in FIGURE 3, thereafter pressure is applied vertically to the closure by means of a tool as shown diagrammatically at 20 in FIGURE 4 and the upper and lower portions 12 and 14 of the skirt of the closure are deformed simultaneously into close engagement with the screw thread formations 2 and 5 respectively on the bottle neck by means of rollers 21 and 22. When this operation has been completed the closure is sealed firmly on the bottle neck and any attempt at unauthorized removal thereof will be clearly shown by fracture of some or all of the narrow connecting portions 16. However, an authorized person can readily gain access to the contents of the container of which the neck forms a part by merely gripping the upper portion of the closure and exerting a rotational force thereon in a clockwise direction. The effect of this will be to rupture all the narrow connecting portions 16 whereupon the upper portion 12 of the closure can be screwed off the neck and the lower portion 14 is left still firmly in position on the neck. Since during this operation the thread formations on the upper and lower portions 12 and 14 of the closure are not deformed in any way, the upper portion 12 may be used as a reclosure by merely screwing it back on to the bottle neck. Moreover, due to the fact that the thread formations on the lower portion 14 are of larger diameter than those on the upper portion the now detached lower portion 14 can be readily removed from the neck by merely rotating it anticlockwise after removal of the upper portion.

While the upper and lower portions 12 and 14 of the skirt of the closure may be deformed into close engagement with the screw threaded formations 2 and 5 respectively on the neck of the container by any appropriate form of apparatus, we have found that this operation can be performed very efficiently and also simultaneously by the use of a rotary headset carrying one or more pairs of rollers as shown in FIGS. 6 to 10 inclusive. The headset comprises a guide bell 23 in which are mounted for rotation three spinning arm assemblies one of which is shown in detail in FIGS. 9 and 10. Each assembly comprises an arm 24 adjustably and detachably secured at one end to a vertical shaft 25 and upon which an equalizing member 26 is pivotally supported at or near its other end at 27. Mounted upon each equalizing member 26 are two shafts 28, 29, each of which carries at one end a roller 30, 31 and is freely rotatable in a bush 32, 33. Further, one or both of each pair of shafts 28, 29 is/are inclined or raked to the vertical to suit the helix angle of the thread which the roller it carries is intended to form in the closure skirt 8 and is movable in the direction of its longitudinal axis against the bias of a light helical spring 34, 35 relatively to the equalizing member 26. As illustrated in FIGS. 9 and 10 the roller 30 is intended to assist in deforming the upper portion 12 of the skirt 8 of the closure shown in FIG. 2 into close engagement with the screw thread formation 2 on the bottle neck shown in FIG. 1 whilst the roller 31 is intended to assist in deforming the lower portion 14 of the skirt 8 into close engagement with the screw thread formation 5 on the bottle neck. The roller 30 is therefore biased to the position shown in FIG. 10 by the helical spring 34 and moves downward during formation of the thread in the upper portion of the closure skirt against the action of the spring 34 whilst the roller 31 assumes the position shown in FIG. 10 under the action of the helical spring 35 and moves upwardly during formation of the thread in the lower portion 14 of the closure skirt 8.

Means (not shown) are provided for causing each pair of rollers 30, 31 to bear with an appropriate degree of radial pressure on the closure skirt 8 during the application of a closure to a container and the headset also comprises a pressure block 36 for exerting the requisite degree of pressure vertically on the closure prior to and during deformation of the upper and lower portions 12 and 14 of the closure skirt 8 into close engagement with the screw thread formations 2 and 5 on the corresponding portions of the bottle neck.

In the use of the headset described a closure as shown in FIG. 2 is first assembled on a bottle neck as shown in FIG. 1 and the bottle is then placed in a sealing machine having such a headset. The relative positions of the bottle and headset at this stage are shown in FIG. 8. The bottle and the headset are next moved relatively to one another to bring the base 7 of the closure into contact with the pressure block 36 which compresses the liner 9 and holds the closure firmly in position on the bottle. Almost simultaneously the rollers 30, 31 are brought into engagement with the upper parts of the upper and lower portions 12 and 14 respectively of the closure skirt 8 and due to the fact that the spinning arms 24 are at this time being rotated in a clockwise direction and to the fact that the rollers carried thereby are pressed radially against the skirt the portions 12 and 14 of the skirt are deformed into close engagement with the respective screw threaded formations on the bottle neck, thereby causing the rollers to move respectively downwardly and upwardly against the action of their biasing springs 34, 35. Upon completion of the sealing operation the bottle and headset are moved relatively to one another to separate them and the rollers 30, 31 returning to their initial positions as shown in FIG. 8 under spring bias ready for a further sealing operation.

As previously pointed out the presence of the beads 17 and 18 on each side of the circumferential row of slits or slots in the closure skirt tends to insulate the narrow connecting portions 16 from the stresses arising during application of the closure to a bottle neck, and particularly during deformation of the lower portion of the skirt into close engagement with the formations on the bottle neck. It also assists in making it possible to apply a closure according to the present invention to substantially all glass finishes falling within the somewhat wide range of tolerances permissible in commerical practice.

Although in the foregoing description each spinning arm has been described as carrying two rollers adapted to act simultaneously on the closure skirt 8 this is not essential. Moreover, the present invention includes with-

in its scope a closure similar to the closure shown in FIG. 2 but in which screw thread formations are preformed on either the upper portion **12** or the lower portion **14**.

Furthermore instead of the closure being provided with a circumferential row of slits or slots **15** relatively long with respect to the intervening connecting portions **16**, a continuous or interrupted score line may be provided or the skirt of the closure may be weakened in any other way which would accomplish the same result as that provided by the spaced circumferential row of slits or slots described.

In the use of a closure according to the present invention any attempt to tamper with the contents of a container to which the closure has been applied will be apparent immediately since the lower portion of the skirt of the closure, or the security ring as it is termed, will be partially or wholly detached from the upper portion of the flange.

What I claim is:

1. A closure for a bottle or like container of the kind referred to comprising a one-piece cup-like member the skirt of which includes an upper portion adapted with the base of the said member to provide a re-closure for the container, a lower portion adapted to provide a security ring and an intermediate outwardly dished portion weakened to permit ready separation of the upper and lower portions, the upper and lower portions being adapted respectively to cooperate with screw thread formations of opposite hand on the container when the closure is in operative position on the container and the internal diameter of the upper portion of the skirt being less than the internal diameter of the lower portion of the skirt to such an extent that after separation of the upper and lower portions the lower portion can be removed from the container by movement lengthwise thereof.

2. A closure for a bottle or like container as claimed in claim 1, in which one of the portions of the skirt is provided with a screw thread formation adapted for engagement with a corresponding formation on the container before assembly of the closure on the container and the other portion of the skirt is adapted to be deformed into engagement with a screw thread formation on the container which is of opposite hand to the first mentioned formation after assembly of the closure on the container.

3. A closure for a bottle or like container as claimed in claim 1, in which the intermediate portion is weakened by radially inwardly extending indentations on said portion.

4. A closure for a bottle or like container as claimed in claim 1, in which the weakening comprises a plurality of spaced score lines or narrow slits or slots extending circumferentially of the intermediate outwardly dished portion, the circumferential length of said score lines or slits or slots being substantially greater than the width of the intervening portions of the skirt between said spaced score lines or slits or slots.

5. A closure for a bottle or like container as claimed in claim 1, in which the upper portion of the skirt is adapted to be deformed into close engagement with a formation of screw thread form on the container and the lower portion of the skirt is adapted to be deformed into close engagement with a formation of screw thread form on said container of opposite hand to said first mentioned formation.

6. The method of applying a one-piece cup-like closure, the skirt of which has upper and lower portions and an intermediate outwardly dished portion weakened to permit ready separation of the upper and lower portions, to a bottle or like container, which comprises first positioning the closure on the container, then applying vertical pressure to the closure and thereafter rolling the upper and lower portions of the skirt simultaneously into close engagement with adjacent formations on the container.

7. A closure for a bottle or like container of the kind referred to comprising a one-piece cup-like member, the skirt of which includes upper and lower flat ring-like portions, the internal diameter of the upper portion being less than the internal diameter of the lower portion, and an intermediate outwardly dished portion connecting said upper and lower portions weakened substantially centrally thereof along a line extending substantially circumferentially of the skirt, the difference in diameters of said portions being such that after separation of the upper and lower portions the lower portion can be removed from the container readily by movement lengthwise thereof and the upper and lower portions being adapted respectively to cooperate with screw thread formations of opposite hand on the container when the closure is in operative position on the container.

8. A method of applying a closure comprising a one-piece cup-like member having a skirt with an upper portion and a lower portion connected to said upper portion by an intermediate security ring consisting of an outwardly dished weakened section, the internal diameter of the upper portion being less than the internal diameter of the lower portion, to a container having a right and a left handed threaded portion thereon, comprising the steps of positioning the closure on the container with the upper skirt portion adjacent one threaded portion and the lower skirt portion adjacent the other threaded portion, applying vertical pressure to the closure, and thereafter simultaneously rolling said portions of the skirt into close engagement with the adjacent threaded portions on said container.

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