

[54] **PRIMARY CLOSURE**

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[56] **References Cited**

UNITED STATES PATENTS

3,160,303	12/1964	Healy.....	215/DIG. 1
3,817,416	6/1974	Costa.....	215/9

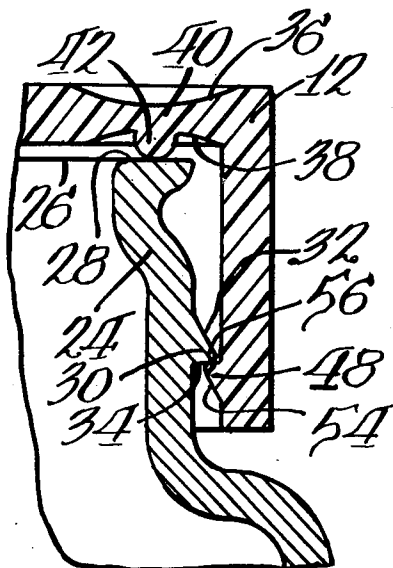
Primary Examiner—George T. Hall

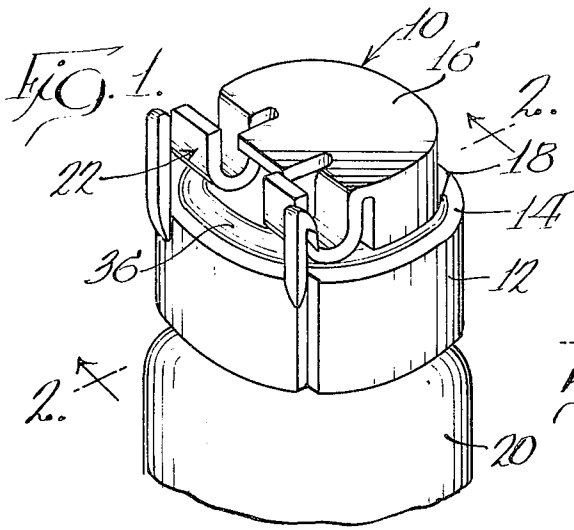
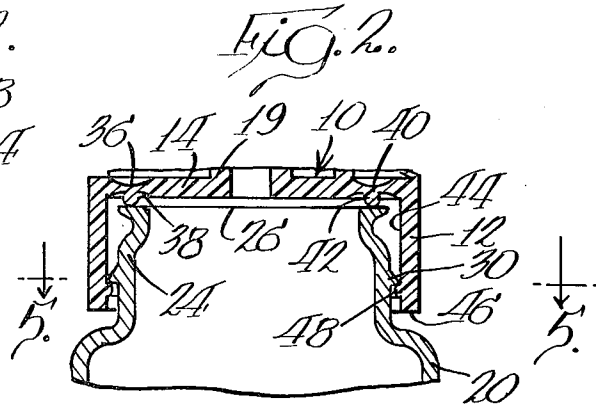
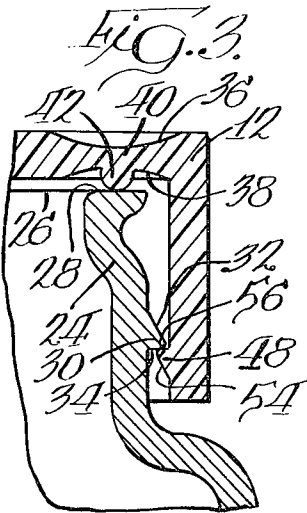
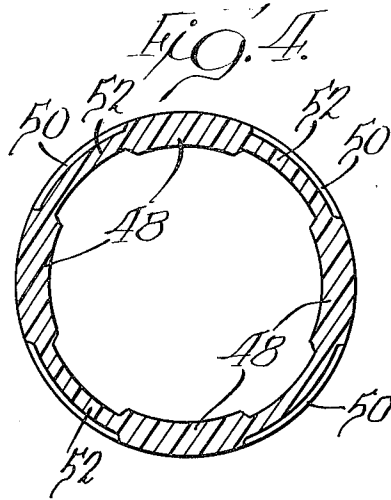
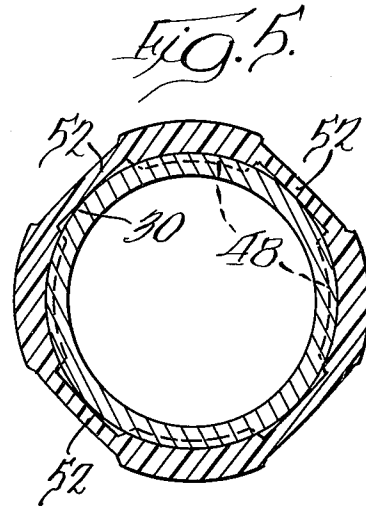
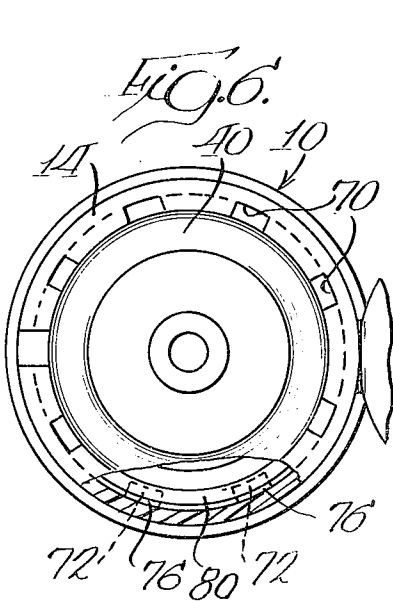
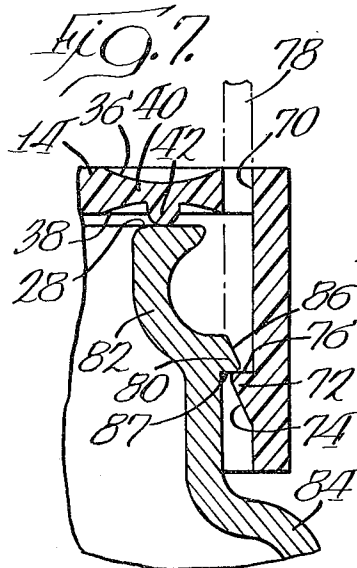
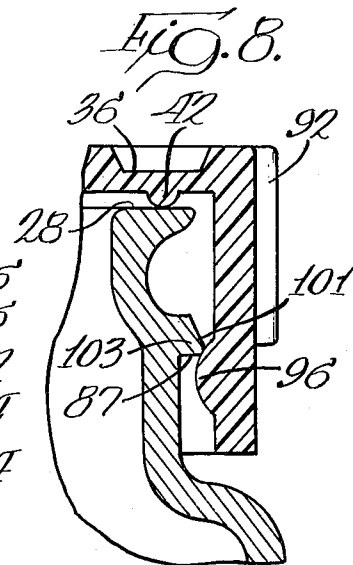
Attorney, Agent, or Firm—Hofgren, Wegner, Allen, Stellman & McCord

[57] **ABSTRACT**

A primary closure is permanently locked to the neck of a container in sealing relationship by means of the interlock between a continuous flange or bead on the neck of the container being engaged by ears on the collar or skirt of the primary closure. The primary closure body is sealed to the container by engagement between a resiliently mounted bead on the closure body engaging in axially loaded condition against the lip on the end of the neck of the container.

5 Claims, 8 Drawing Figures





PRIMARY CLOSURE

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to the closure field and more particularly to the safety closure field wherein there is provided a structure for substantially preventing removal of the primary closure from the container and at the same time resiliently sealing the primary closure to the container.

2. Description of the Prior Art

Many products are provided in both plastic or glass containers with primary closures that screw onto the neck surrounding the opening in the container. A secondary closure is provided on the primary closure for sealing a spout or similar restricted opening in the primary closure. Some of the containers are used to store materials that may be potentially dangerous to certain classifications of people, such as children, who might be injured upon contact with or exposure to materials, such as liquid detergents, medicaments, poisons, such as drain cleaners, and the like.

Although legislation has been passed requiring the use of safety closures on containers of potentially dangerous materials, the most stress has been placed on secondary closure arrangements for use on the usual dispensing spout to prevent ready access to the contents of the container, but little effort has been expended to produce a connection between the primary closure and the container that not only is considered safe, but also is capable of sealing the container against leaks.

SUMMARY OF THE INVENTION

In many industries using glass or plastic bottles or containers, it is necessary that the bottle or container have a fairly sizable opening through the neck into the bottle or container for efficient and rapid filling of the bottle. To reduce the size of the filling opening to a reasonably sized spout, a primary closure is provided which engages the neck around the sizable opening and includes a reduced size dispensing spout which is closed by a secondary closure. A flange is provided around the neck of the bottle to which appropriate ears on the inside of the depending collar of the primary closure engage for locking the primary closure to the neck of the bottle or container. A resiliently supported bead or seal ring formed on the top wall of the primary closure has a constant spring loading effect for urging the bead against the end wall or lip of the opening in the bottle or container when the ears on the primary closure engage with the flange on the neck of the bottle or container. Any attempt to twist the primary closure from the bottle or container will result in the primary closure rotating relative to the bottle or container but it will not separate therefrom and the contents cannot leak between the primary closure and the container.

BRIEF DESCRIPTION OF THE DRAWINGS

The details of construction and operation of the invention are more fully described with reference to the accompanying drawings which form a part hereof and in which like reference numerals refer to like parts throughout.

In the drawings:

FIG. 1 is a perspective view of a primary closure fastened to a container using my improved nonremovable attachment;

FIG. 2 is a cross-sectional view of a preferred form of my invention taken on the line 2—2 of FIG. 1;

FIG. 3 is an enlarged partial cross-sectional view, similar to FIG. 2, only showing a modified version of my non-removable primary closure;

FIG. 4 is a cross-sectional view of the primary closure looking in the direction of section lines 4—4 of FIG. 2 and illustrated prior to and after assembly with the bottle or container;

FIG. 5 is a cross-sectional view looking in the direction of section lines 5—5 of FIG. 2 with the primary closure skirt momentarily deformed at point of maximum interference of the bead overriding the flange;

FIG. 6 is a top view of a modified form of primary closure with a portion of the primary closure broken away;

FIG. 7 is an enlarged partial cross-sectional view of one form of my invention with a die pin shown in phantom; and

FIG. 8 is a modified form of my invention showing a modified sealing web structure and stiffening ribs on the closure skirt.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring in particular to the drawings, a primary closure 10 is illustrated as having a collar or skirt portion 12 integrally joined to a transversely disposed top wall 14 to which a secondary closure or overcap 16 is hingedly connected by means of a hinge 18. The top wall 14 has an outlet spout 19 (partially shown) with an opening passing axially therethrough into communication with the inside of a container or bottle 20.

The secondary closure or overcap 16 is provided with means for closing and sealing the spout and includes child-proof or child-safe means 22 for preventing ready access to the contents of the container except by an adult manipulation. Any child-proof or child-safe secondary closure for sealing the spout can be incorporated on the primary closure 10 without departing from the spirit of this invention which is directed to a structure for locking the primary closure to the container in a reasonably permanent and resiliently sealable manner.

The primary closure 10 is intended to be secured onto the neck 24 of the open mouth 26 of the container or bottle 20. As an example, in the detergent field, it is necessary to fill the container as fast as possible without creating foam or suds in the container. Foam or suds will slow down filling the container and waste material. To accomplish a nonfoaming fill, as wide an opening in the container as is possible is provided into which a filling nib or tube is inserted and, as filling progresses, the nib is withdrawn. Heretofore, when the container was filled, the primary closure was then threaded onto the neck of the container. For complete child-proofing or safety sealing, not only must the manipulation of the secondary closure or overcap 16 be child-proofed, but also a means must be provided for preventing removal of the primary closure 10 from the container and various versions of such a means are shown in FIGS. 2-8. The container 20 has a flat planar annular lip 28 formed around the mouth or opening 26 of the neck 24 and has a continuous outwardly projecting circular

flange 30 formed around the outside wall of said neck in axially spaced relation to said lip 28. The flange 30 has a tapered top surface 32 and a relatively flat bottom or ledge 34 facing away from and lying substantially parallel to said lip 28.

As shown in FIG. 2, the top wall portion 14 of the primary closure has an annular channel 36 in the top surface concentrically disposed relative to the outer peripheral edge portion of the top wall 14 in relatively close proximity to said outer edge. A mating channel 38 is formed in the bottom surface of said top wall in alignment with said channel 36. The sloping walls of the channels 36, 38 angle to a thinned central web 40 from the bottom of which projects an annular sealing ring or bead 42 adapted to engage the lip 28 when said primary closure 10 is assembled on said container 20. The collar or skirt 12 of the primary closure has formed on the inside surface 44 thereof, in close proximity to the bottom edge 46, either a continuous lug or ear or a plurality of circumferentially spaced arcuate lugs or ears 48 projecting radially inward therefrom. When the material of the skirt of the primary closure is thicker or fairly rigid and a plurality of spaced lugs 48 are used, as shown in FIG. 4, the outer wall of the collar or skirt 12 is thinned in the area between the lugs 48 by forming recesses 50 in the outer wall of said skirt which recess extends from the bottom edge of the skirt to an intermediate point part way up said outer wall and at least in overlapping relationship with said lugs 48. The thinning of the skirt between the lugs 48 provides more resilient or weakened wall spans 52 therebetween. The lugs or ears 48 may be substantially rounded or mound shaped in vertical cross-section as shown in FIG. 2 or may be arcuately shaped on the axial outward surface 54 and substantially flat on the axially inward facing surface 56 as shown in FIG. 3. The rounded or mound shape of the lugs 48 of FIG. 2 can be made using the economical core stripping type molding process while the sharp edge, flat surface 56 version of lugs 48 of FIG. 3 can be made using the collapsible core process. In both FIGS. 2 and 3 forms, the axial outward surface 54 of the ears or lugs 48 is shaped to aid in camming the ears or lugs 48 past the tapered surface 32 of the flange 30. The flange 30 on the container neck 24 can be made using a split shell blow-mold process when a sharp flat ledge 34 is desired or a core stripping type molding process can be used for a more rounded flange.

After the container is filled, the skirt 12 of the primary closure 10 is telescoped over the neck 24 of the container with the surface 54 of the lugs 48 in engagement with the tapered surface 32 of the flange 30. Downward pressure on the primary closure 10 cams the ears 48 and skirt 12 outward against the limited resilient yield properties of said skirt 12. The weakened wall spans 52 will permit temporary deformation of the skirt enough to permit the lugs 48 to snap past the rigid flange 30 with the inner top surfaces of the lugs 48 engaging the flat bottom surface 34 on the flange 30. The temporary deformed condition of the skirt 12 is portrayed in FIG. 5 at the time the lugs 48 move in behind the flange 30. The top surfaces of the lugs 48 are urged upward against the flange 30 by the resilience of the web 40 urging the bead 42 against the lip 28 of the container 20. That is, the spacing between the inner surface of the lugs 48 and the contact point of the bead 42 is less than the distance between the lip 28 and the flat

surface 34 of the flange 30, so that with the lugs 48 urged beneath the flange 30, the bead 42 will engage the lip 28 and form, not only a seal between the bead 42 and the lip 28, but also, a permanent attachment between the lugs 48 and the flange 30. After assembly of the primary closure to the container, the memory in the material of the skirt 12 restores the skirt to the shape shown in FIG. 4 with the lugs 48 firmly nested below the flange 30, whereby the radial inward forces on the lugs 48 will prevent removal of the closure from the container. Simultaneously, the axial forces of the lugs 48 against the flange 30 and the bead 42 on the lip 28 locks the primary closure to the container and deforms the web 40 into a permanent spring-loaded sealed position.

In FIG. 3, the lugs 48 have planar axially inward facing surfaces 56 which are adapted in use to seat against the planar surface 34 of the flange 30 to provide a more positive locking between the flange and the ears when in position. The version shown in FIG. 2 has the rounded radial inward facing surface on the lugs or ears 48 which, although not as positive in locking ability, are cheaper and simpler to make in production and will pass the tests required to qualify as child-proof. Although with sufficient force, the primary closure 10 can be rotated relative to the container, there is practically no way the two can be separated without destruction of either the primary closure or the container.

FIGS. 6 and 7 show a modified form of the invention including provision for an operative design allowing for practical and economical tooling for molding the primary closure 10. That is, a plurality of openings 70 are formed in the top wall 14 around the outer edge portion thereof outboard of the web 40. Aligned with each opening 70 is an ear or lug 72 having a tapered axially, outwardly facing surface 74 and an axially, inwardly facing surface 76 which surface 76 will be substantially planar and will lie parallel to the top wall 14 of the closure. A molding die (not shown) is provided with a plurality of movable core pins 78, shown in phantom in FIG. 7, which pins 78 are manipulatable in such a way that during the molding of the primary closure, openings 70 will be molded in the top wall 14 of the primary closure with the planar end faces of the core pins 78 forming the planar surfaces 76 on the ears 72. The ears 72 will be circumferentially spaced an amount equal to the spacing between the openings 70 and will be in alignment with the openings 70. The primary closure 10 may be molded of high density plastic material which has a very low yield factor.

The primary closure 10 of FIGS. 6 and 7 can be assembled with the flange 80 on the neck 82 of the container 84 in a manner substantially identical to that described with respect to FIGS. 1 through 5. That is, the flange 80 is continuous around the neck of the container and has an outwardly tapered surface 86 and a planar surface 87. The web 40 in the top wall 14 has the bead 42 which is adapted to engage the planar end face or lip 28 on the neck of the container. The primary closure 10 is telescoped over the neck of the container 84 with the tapered surface 74 on the ears 72 engaging with the tapered surface 86 on flange 80. Downward force on the primary closure will cam the ears 72 past the flange 80 whereupon the planar faces 76 on the ears 72 will be resiliently urged into contact with the continuous planar face 87 on the lower surface of the flange 80. The bead 42 will be resiliently urged against

the lip 28 on the neck of the container by means of the resilience of the web 40 in the top wall 14 at the same time that the planar faces 76 and 87 of the ears and flange, respectively, engage with each other to produce a positive latching arrangement which cannot be separated without destruction of the collar portion of the primary closure.

FIG. 8 shows a modification of the web 40 and bead 42 structure together with a modified and reinforced skirt portion of the closure. Specifically, the top wall 14 of the closure has a single recess 36 formed in the upper surface thereof around the outer peripheral edge portion to form the web 40 for supporting the bead 42 on the inner surface of said closure. On the outer surface of the collar or skirt portion 12 of the closure are formed a plurality of vertically disposed, equally spaced apart ribs 92 which extend from in alignment with the top wall 14 to a point just above the enlarged ears or lugs 96 formed on the inside of said collar or skirt 12. In assembling the closure of FIG. 8 with the container, the ears 96 bear against the taper 101 of the flange 103 and relative force between the closure and container stretches the collar 12 in the vicinity of the lugs or ears 96 with the ribs 92 reinforcing the balance of the collar to prevent distortion of the upper portion of the collar. Once the ears 96 snap past the high point of the flange 103, the material of the collar returns the collar to normal size with the bead 42 resiliently urged against the lip of the container. The resilient urging of the bead is caused by the forces as described hereinabove with respect to FIG. 2.

The ribs 92, since they terminate above the location of the ears 96, serve to reinforce the upper portion of the collar against deformation (bulge) when sufficient force is applied to the top of the closure to force the ears 92 to override the flange. Although it is recognized, the bead to flange snap cap closures have been in common use for several years, basically the elements described herein matches the skirt structure that embodies varied physical properties in order to respond to and withstand sizable forces applied to affect a strong nonretractable grip of the closure to the container.

The resiliently loaded beads 42 of FIGS. 2, 3, 7 and 8 form an important element of the closure lock to the container in a tightly sealed manner. That is, due to the dimensioning between the bead 42 and the sloped upper surface of the ears 48, 72 and 96, the bead 42 is resiliently urged against the lip 28 of the container in a sealed relationship. The recesses 36 and/or 38 provide the web 40 with the resilience needed, but at the same time prevents distortion of the top wall 14 of the closure. Heretofore, closures that were screwed or torqued onto threaded necks of containers, had seals on the inner surface of the closure that engaged with the lip of the container. Generally to tightly seal the closure on the container, the closure was overthreaded or overtorqued so that the top wall of the closure became distorted or bulged due to the interference fit. Where the top wall of the closure has elements used in effecting a secondary sealing operation such as illustrated in FIG. 1 with the cap 16, any distortion of the top wall will misalign elements such as the upstanding latching posts preventing the secondary sealing operation from being effective. Using the recesses 36 and/or 38 and bead 42 prevents distortion of the top wall 14 and thereby permits the secondary sealing operation to function. The web 40 absorbs the deformation forces

and thereby prevents interference with the flatness of the top wall 14 of the closure.

I claim:

1. A safety attachment for a primary closure to a container having a neck portion with an axially facing planar lip, said neck portion having a flange spaced axially from said lip, said primary closure having a top wall portion and a depending skirt portion, said wall portion having a resilient web formed by a recess in one of the surfaces around the peripheral portion thereof, a depending bead formed on said web and projecting axially into the open area within the confines of said skirt portion and adapted to be aligned with said lip on said container, means on the inside surface of said skirt portion whereby said closure is permanently affixed to said container by forcing said means past said flange on said neck of the container so that said means lock below the flange and the web is deformed as it urges said bead into sealing relation with said lip on said container.

2. A safety attachment for a primary closure as claimed in claim 1 wherein said lug means on the inside surface of the skirt portion includes at least two circumferentially spaced apart portions with said skirt portion having reduced thickness between said spaced apart portions which reduced thickness portions temporarily deform during the forcing of the lug means past the flange.

3. A safety attachment as claimed in claim 1 wherein said flange has a tapered upper surface for camming said means past said flange and said flange has a flat planar lower surface for positively locking said means on said closure axially beyond said flange, and the spacing between said lip and the axially remote surface of said flange on said container is slightly greater than the spacing between the bead on said web and axially facing surfaces on said means so that the means and bead are compressed axially against the flange and the lip, respectively, of said container.

4. A safety attachment for a primary closure to a container having a neck portion with an axially facing planar lip, said neck portion having a continuous flange therearound and spaced axially from said lip, said primary closure having a wall portion and a depending skirt portion, said wall portion having a resilient web formed by a pair of mating annular recesses in the upper and lower surfaces thereof around the outer peripheral portion thereof, a depending bead formed on said web and projecting axially into the open area within the confines of said skirt portion and adapted to be aligned with said lip on said container, lug means radially projecting from the inside surface of said skirt portion, whereby said closure is permanently affixed to said container by forcing said lug means past said flange on said neck of the container so that the lug means lock below the flange and the web is deformed as it urges said bead into sealing relation with said lip on said container.

5. A safety attachment as claimed in claim 4 wherein said flange has a tapered upper surface for camming said lug means past said flange and said flange has a flat planar lower surface for positively locking said lug means axially beyond said flange, and the spacing between said lip and the axially remote surface of said flange on said container is slightly greater than the spacing between the bead on said web and the axially inward facing surfaces on said lug means so that the lug means and bead are compressed axially against the flange and the lip, respectively, of said container.

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