Nov. 18, 1958 G. A. LYON, JR 2,860,813

SPRING FASTENER

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Fig. 1

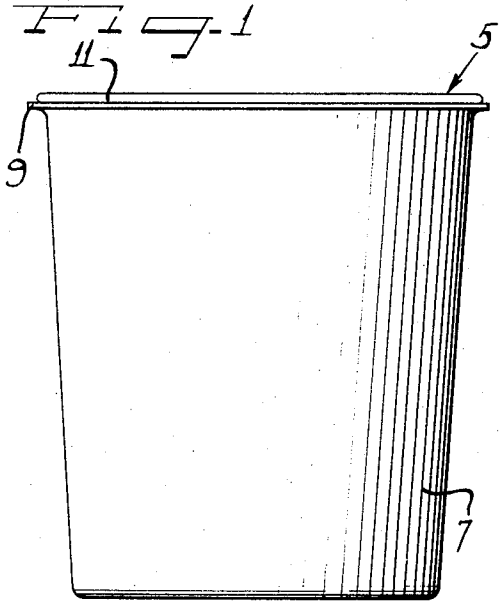


Fig. 2

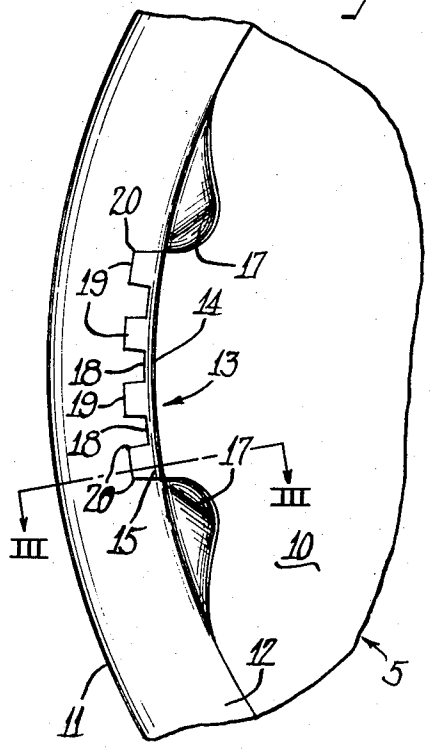


Fig. 3

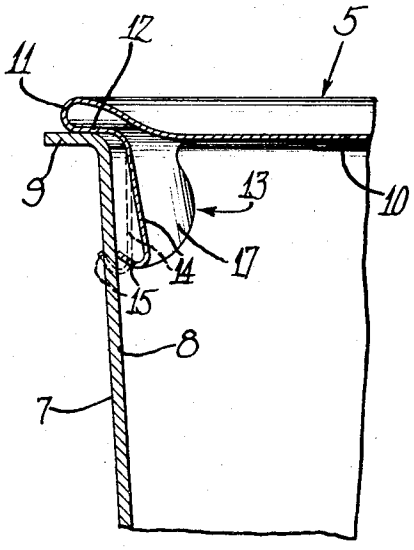
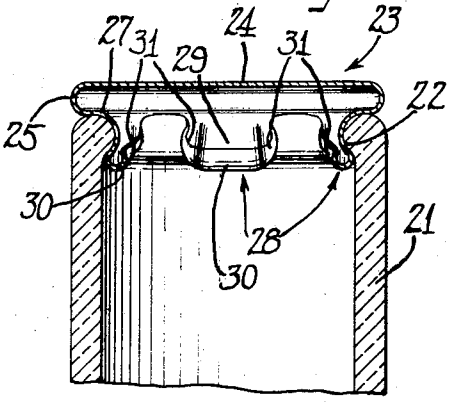


Fig. 4



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SPRING FASTENER

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3 Claims. (Cl. 220—59)

This invention relates to spring fastener means for circular articles such as covers, and more particularly to spring retaining means for detachably retaining a closure member in a hollow object such as a container or the like.

An object of the present invention is to provide in a circular closure member improved retaining means for detachably holding the closure member on an object such as a container or the like.

Another object of the present invention is to provide improved retaining means for a closure member, which retaining means includes a plurality of circumferentially spaced resiliently yieldable fingers so constructed and arranged that although they are more or less independently constructed, they will resist resilient deflection to a substantial extent by virtue of novel resiliency enhancing means thereon.

A further object of the invention is to provide improved retaining finger means for press-on, pry-off closure caps.

Other objects, features and advantages of the present invention will more fully appear from the following detailed description taken in conjunction with the accompanying drawings illustrating certain embodiments thereof, and in which:

Figure 1 is a side elevational view of a frusto-conical container having a closure member with retaining means embodying features of the present invention applied thereto.

Figure 2 is a fragmentary bottom plan view of the closure member of Figure 1, showing one of the retaining fingers;

Figure 3 is a fragmentary vertical sectional detail view taken substantially along line III—III of Figure 2, drawn to a reduced scale and showing the closure member right side up and mounted on a container, with one of the retaining fingers having retaining engagement with the inner wall of the container, and

Figure 4 is a fragmentary vertical diametrical sectional view through the mouth end portion of a bottle with a modification of the closure applied thereto.

In Figs. 1, 2 and 3, a closure member or cap **5** is shown which is especially suitable for application in closing relation to the top of a receptacle or container **7** of the type having a frusto-conical side wall which has an inwardly slanting inner surface **8**. At its upper or mouth end, the container **7** may be provided with an outturned flange or lip **9** providing an upwardly facing seat or shoulder.

The closure member or cover **5** is preferably made from sheet material such as steel, stainless steel, brass, aluminum or the like, and of such character that the closure or cover member will be possessed of desirable resiliency to be employed in the retention of the cover on the container **7**. Such material readily adapts itself to mass production methods of manufacture as by die stamping and press operations.

A circular main body portion **10** of the cover or closure member **5** is of a diameter to overlie the marginal upper flange **9** of the container in concentric assembly with the container. A turned, bead-like reinforcing and finishing edge extremity portion **11** is provided about the periphery of the cover body **10**, including an underturned generally radially inwardly directed annular flange

12 arranged to seat upon or bottom against the upwardly facing surface of the marginal flange **9** of the container. This, it will be appreciated, provides a multi-thickness, or a multiple of layers of the material of the closure member **5** at the marginal extremity thereof for substantially stiffening such extremity. While the turned edge **11** and the underturned flange **12** have been shown as homogeneously integral, that is, in one piece with the closure body **10**, it is to be appreciated that such multiple thickness could be made up of layers of material made integral with the body **10** in a functional sense by fastening thereto such as by lock-seaming arrangement.

For press-on, pry-off retention of the closure member **5**, self-retaining means are provided thereon, herein comprising a plurality of generally axially inwardly directed resilient finger extensions **13** from the underturned flange **12** and projecting inwardly behind the outer marginal portion of the cover body **10**. To this end, the underturned annular flange **12** extends inwardly to a diameter somewhat smaller than the inside diameter of the container wall surface **8** adjacent to the outturned mouth flange **9** thereof. The retaining fingers **13** include generally axially inwardly extending respective body portions **14** having terminal extremity structure **15**, in the present instance comprising generally radially and axially outwardly turned short and stiff retaining flange portion engageable edgewise in retaining, gripping, radially outwardly thrusting relation against the container wall **8**. There may be as many or as few of the fingers **13** as desirable, depending upon the size of the container and of the cover, and service requirements in respect to holding or retaining resistance against unintentional displacement of the cover **5**, as may be advisable. For example, in a small size two of the retaining fingers **13** diametrically oppositely disposed may be sufficient, while in a larger size a proportionately larger number of the fingers may be advisable.

In any event, the fingers should be symmetrically located behind the circular margin of the container.

Since, in order to effect strong gripping of the retaining finger terminals **15** against the container wall **8**, the thrust of the tips of the retaining terminals **15** must be substantial, means are provided whereby the retaining fingers are possessed of substantial resiliency coupled with adequate resilient flexibility to enable accommodation of the fingers to reasonable tolerance variations in diameter and concentricity of the container wall **8** and the closure cap **5**. For this purpose, the finger bodies **14** are of substantial length to extend to a substantial distance axially inwardly alongside the container wall mouth portion. Moreover, each of the finger body portions **14** is of substantial width and curved circumferentially of the cover so as to be transversely of arcuate shape (as best seen in Fig. 3), so as to enhance the resiliency of the fingers.

Initially, the retaining finger bodies **14** extend axially inwardly on a diameter at their retaining terminal portions and more particularly the tips of the terminal flanges **15** which is somewhat greater than the diameter described about the corresponding portion of the container wall **8** ultimately to be engaged retainingly by the finger terminals. Such relationship is shown in dash outline in Fig. 2.

Then, when the cover **5** is applied into closing position over the container **7**, the finger terminals **15** cam axially inwardly and radially inwardly along the obliquely inwardly sloping surface **8**, whereby the terminal portions of the fingers are deflected radially inwardly and thereby cause radially inward resilient deflection of the retaining finger bodies **14** under resilient tension to the ultimate position as shown in full outline in Fig. 2.

According to the present invention, in order to further

enhance and assure strong resilient retaining tensioning of the retaining finger **13**, resiliency enhancing means in the form of side marginal reinforcement for the retaining finger bodies **14** is provided. In a desirable form such side reinforcement comprises generally radially inwardly angled side reinforcing wing flanges **17** at the respective opposite sides of the retaining finger body. By preference the side wing flanges **17** are respectively of substantial width merging at their axially inner ends with the terminal portion of the finger of which the flange is a part and with the remote or distal sides of the fingers tapering or flaring into the underturned marginal flange **12** of the cap. It will be appreciated that by reason of the angular relation to the retaining finger body **14**, the reinforcing and resiliency enhancing side wing flanges **17** will afford substantial resilient resistance to radially inward yielding of the retaining finger bodies **14** during radially inward deflection incident to application of the cap to the container.

As a result, highly effective radially outward resilient thrust is developed in the retaining fingers and more particularly in the retaining terminal portions thereof when the fingers are in the cover retaining engagement with the container wall. By virtue of the cold working to which the side reinforcing flanges **17** are subjected in the stamping and drawing thereof into shape, whereby to impart substantial hardness and resilience thereto, and further due to the generally concave-convex, sinuous shape thereof, efficient resilient stiffening is afforded for the retaining fingers **13**. Thus, as the retaining finger bodies **14** are flexed radially inwardly during application of the cap to the container, the resiliency enhancing wing flanges **17** may resiliently buckle or bend and yield resiliently, but in so doing generate substantial resilient resistance or tension directed toward the retaining finger body **14** and more particularly toward the retaining terminal **15** thereof, thereby enhancing the grip of the tip of the terminal against the container wall.

In order further to improve the retaining grip of the retaining terminals **15** upon the container wall, the finger terminals are preferably notched out as at **18** (Fig. 3) to subdivide the same into a plurality of circumferentially aligned sections. This affords a plurality of self-adjustable sections **19** providing a plurality of corners **20** which are grippingly and more or less bitingly engageable retainingly with the container wall surface **8** even though the edge extremities of the retaining terminal sections **19** may not make complete engagement with the contiguous container wall surface.

Application of the cover or cap **5** to the container is, of course, effected by pressing the same axially inwardly into closing position upon the container. Removal of the cap may be effected by inserting a pry-off tool behind the reinforced margin of the cap and applying pry-off leverage to withdraw the retaining fingers **13** by imposition of axially outward pry-off force.

For use with containers provided with internal shoulder means adapted for retaining engagement by retaining fingers on a cap, such as a container structure as depicted in Fig. 4, comprising a bottle **21** having internal generally axially inwardly facing shoulder means **22**, herein comprising an annular mouth rib or bead **22**, a closure cap **23** may be provided. This cap includes a main body or crown portion **24** having a turned bead-like reinforced annular margin **25** from which extends an underturned generally radially inwardly extending flange **27**. The flange **27** is arranged to seat upon the shoulder provided by the end extremity of the container **21**.

For retaining the closure cap or cover **23** on the container in snap-on, pry-off relation, a plurality, herein four generally axially inwardly extending retaining fingers **28** are provided. Each of the fingers has an axially inwardly extending resiliently flexible elongated body portion **29** terminating in a turned, herein bead-like retaining terminal **30** which may be turned inwardly but projects generally radially outwardly so as to be resiliently grippingly engageable behind the container shoulder **22**. By preference, the retaining bead **30** merges into generally radially inwardly angular respective side wing resiliency enhancing flanges **31** at each opposite side of each of the retaining finger bodies **29**. The cooperation of the side wing flanges **31** with the retaining finger bodies is substantially like that described in connection with the side wing resiliency enhancing flanges **17** described herein above.

Thus, to apply the closure cap **23** to the container **21**, the cap is generally centered with respect to the open end of the container and the cap then pressed axially inwardly to snap the retaining fingers **28** into regaining engagement with the shoulder **22** of the container. To remove the cap pry-off leverage force is applied to the reinforced marginal extremity of the cap to pry the same, and more particularly the retaining fingers **28** from engagement with the container.

It will be appreciated, of course, that in both forms of the closure cap described herein, suitable fluid sealing gasket means may be provided between the underturned marginal flange and the shoulder of the container against which such flange seats in the closing relation of the cap or cover to the container. Other types of fluid sealing means may be employed if desired.

It will be understood that modifications and variations may be effected without departing from the scope of the novel concepts of the present invention.

I claim as my invention:

1. Spring retaining means on a circular closure member for a hollow object, having an outer peripheral margin reinforced by multiple layers of metal extending generally radially and defining an abutment shoulder for engagement with the hollow object, said margin having therebehind and spaced radially inwardly from its edge a plurality of generally axially inwardly projecting circumferentially spaced retaining finger extensions resiliently yieldable in a radial direction, said finger extensions having body portions connected at one end to said margin and provided with a reinforcing structure at each side thereof to enhance the resilient resistance to yielding of the body portions, said reinforcing structure comprising wing flanges integrally connected to said body portion ends and said peripheral margin and extending substantially perpendicular thereto at the lines of juncture of said wing flanges with said body portion ends and said peripheral margin, said body portions of the finger extensions having outwardly and reversely bent relatively stiff retaining terminals engageable under radially deflected resilient tensioning of the retaining fingers and said angular reinforcing structure with the hollow object.

2. A spring retaining means in accordance with claim 1 in which the retaining finger extensions have turned bead-like retaining terminals.

3. A spring retaining means in accordance with claim 1 in which the retaining finger extensions have turned bead-like formations merging at the sides of the finger extensions into said reinforcing wing flange structure.

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