United States Patent [19]

Lawrence

[11] **3,712,498**

[45] **Jan. 23, 1973**

[54] CONTAINER CLOSURE

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[73] Assignee: **Aluminum Company of America**, Pittsburgh, Pa.

[22] Filed: **Oct. 27, 1971**

[21] Appl. No.: **193,129**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 155,731, June 23, 1971.

[52] **U.S. Cl.** ..... **215/38 R**, 215/40, 215/7

[51] **Int. Cl.** **B65d 41/42**

[58] **Field of Search** ..... 215/38 R, 40, 7

[56] **References Cited**

UNITED STATES PATENTS

3,587,897	6/1971	Rohde	215/38 R
3,073,468	1/1963	Arneson	215/7

Primary Examiner—George T. Hall

Attorney—Arnold B. Silverman

[57] **ABSTRACT**

A container assembly for providing a sterile sealed container including a container having a neck provided with an annular mouth defining bead and a multipiece closure having a sealing member, a locking member and a cover secured thereto. The mouth defining bead has an upper surface, an exteriorly disposed downwardly and inwardly inclined closure anchoring shoulder defining surface and an outer surface connecting the upper surface with the shoulder defining surface. The locking member has a top panel with an opening therein and a depending skirt which has a lower surface radially inwardly deformed into locking engagement with the anchoring shoulder. At least two radially outstruck lugs formed within the locking member skirt. A portion of the sealing member compressively secured between the locking member and the container neck. The cover having a top panel and a skirt having a lower portion deformed radially inwardly to a diameter less than the diameter of the locking member taken at the position of at least one outstruck lug. At least one radially inwardly directed embossment formed in the cover skirt at a height generally the same as the lugs. Rotation of the cover with respect to the locking member causes the embossment to permanently inwardly reform the outstruck lugs and permit relative axial separation of the closure and locking member.

16 Claims, 10 Drawing Figures

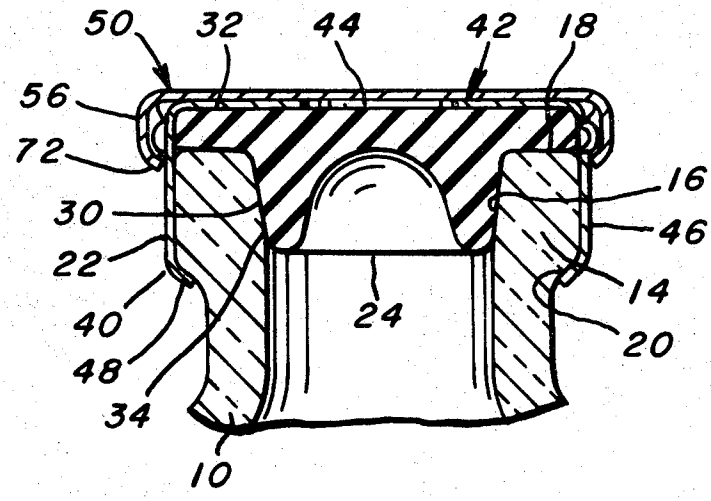


FIG. 1.

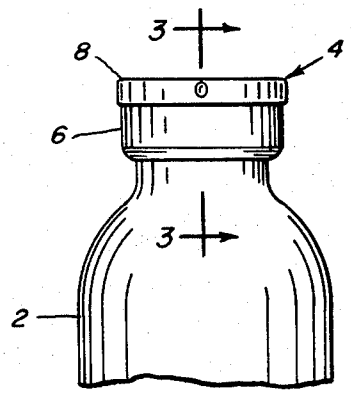


FIG. 2.

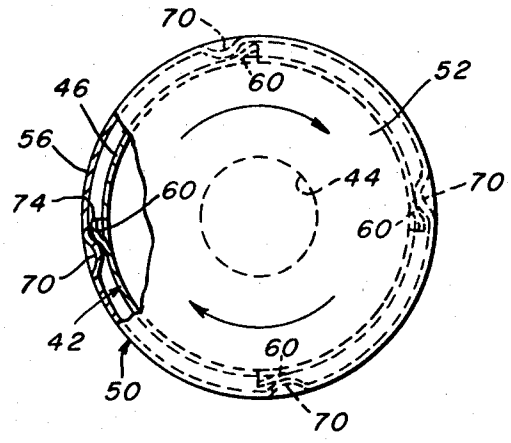


FIG. 3.

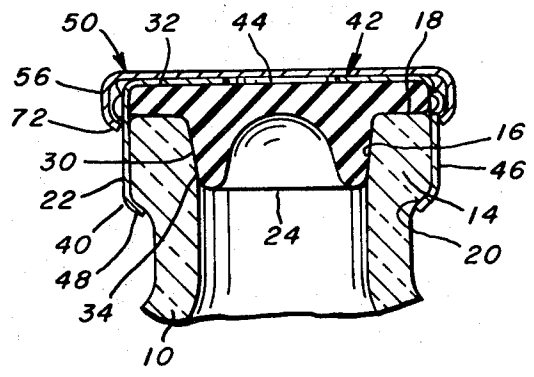


FIG. 5.

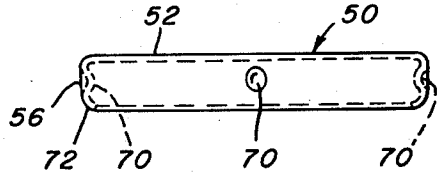


FIG. 4.

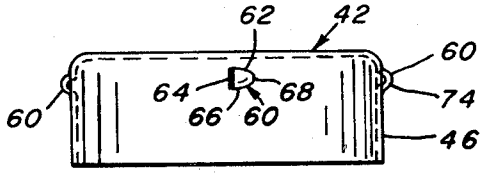


FIG. 6.

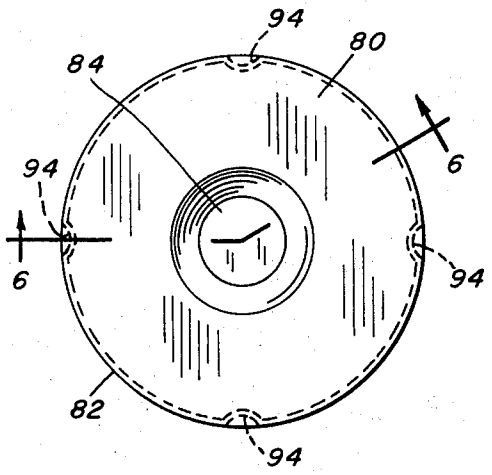


FIG. 7.

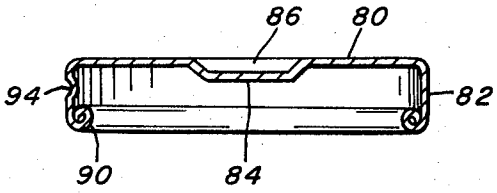


FIG. 8.

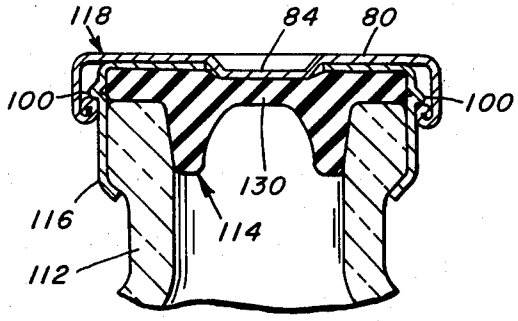


FIG. 9.

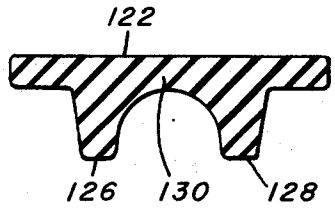
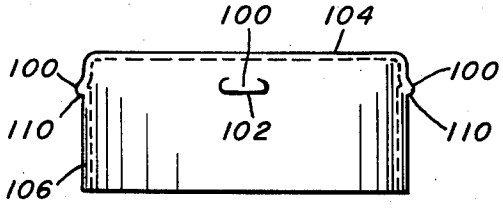


FIG. 10.



CONTAINER CLOSURE

This application is a continuation-in-part of U.S. application Ser. No. 155,731, filed June 23, 1971, entitled "Container Closure".

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to multipiece tamperproof closures to be employed with sterile containers. More specifically, this invention relates to such closures which may readily be opened without the need to exert a force sufficient to physically destroy the integrity of the cover member. Description of the Prior Art

Sterile containers for use with pharmaceuticals and similar materials must not only maintain their sterile internal condition, but must also be adapted for ready removal at the time the user requires access to the container contents. In addition, as the materials provided in such containers are frequently vital to human health, it is essential that the container provide a reliable indication of any prior use or access to the container contents as such exposure will generally have a potentially serious contaminating effect.

Various forms of sterile containers for such end uses have been known. These generally consist of multipiece closures with the innermost closure portion consisting of a resiliently compressible sealing member having a top panel portion which is adapted to rest upon the upper sealing surface of the container mouth defining neck. In addition, such sealing members frequently have portions extending downwardly into the container mouth in order to establish an inner side seal in addition to the top seal.

Another component generally employed is a locking element which has a top panel provided with an opening of sufficient size to permit access to the underlying sealing member by means of the needle portion of a syringe. The locking member is generally secured to the container by having a skirt portion which depends from the outer periphery of the panel portion deformed generally inwardly into locking engagement with a container bead. Frequently there is also provided an outer disc-like member which rests on the sealing member and not only serves to prevent access to the sealing member, but also serves as a dust cover to prevent accumulations of dirt and other foreign matter on the upper surface of the sealing member panel. Such accumulations could result in some of the materials entering the container interior when the needle portion of a syringe is inserted through the sealing member. The final component in such structures is generally an overlying closure element. The closure element is adapted to hold the disc-like member in place and prevent access to the resiliently compressible sealing member without first requiring that the user physically alter the structural characteristics of the outer member in such an irreversible fashion as to provide a clear indication of use. Frequently, the locking element, the disc-like member and overlying closure are eliminated and a unitary element, having a locking skirt portion and a generally continuous top panel provided with a removable sector defined by weakened lines, is substituted. Several forms of such closures are illustrated in U. S. Pat. Nos. 2,387,955, 2,387,956, 3,013,687, 3,193,128, 3,480,171 and 3,358,865.

As a result of the seriousness of risk involved were undetected tampering to occur, the above-described forms of closures have generally been designed so as to provide not only an indication of tampering, but also sufficient physical distortion of the overlying closure element to preclude restoration of the closure to its original condition. In connection with threaded closures, numerous forms of tamperproof devices have been suggested. As these closures generally provide a visual indication of tampering, but do not preclude restoration of threaded engagement between the threaded closure and container, such closures have not been used for sterile containers for pharmaceuticals and the like. Examples of such threaded closures are shown in U. S. Pat. Nos. 2,066,708, 2,414,420, 2,162,713, 3,106,808, 2,470,557 and 2,214,255. Not only do these structures present the serious risk of a second user not being provided with an effective indication that the closure has been used, but also many of the structures require the use of unconventional, unsymmetrical irregularly configurated glass finishes and unorthodox filling techniques which are cumbersome and relatively expensive.

There remains, therefore, the need for a tamperproof closure for use with sterile containers which will reliably leave visual as well as mechanical evidence of prior tampering. In addition, there remains a need for such a closure wherein the closure may be employed with conventional glass finishes and may be sealingly affixed to the container. Finally, ease of opening characteristics which will facilitate removal of the cover cap with one hand while a physician or nurse or other user is holding a syringe in the other hand is needed.

SUMMARY OF THE INVENTION

The closure assembly of this invention has solved the above-described problems. It will effectively retain sterility and possess great ease of opening characteristics, while being adapted to be economically employed with existing glassware and sealing equipment.

The assembly of this invention provides a sealing closure, which may take the form of a headed rubber stopper, a locking member and a cover. The sealing member is secured to the container in normal fashion and the locking member is permanently anchored to the container neck in a conventional manner to provide a permanently sealed container with access to the container contents being permitted by means of the needle portion of a syringe or similar equipment, which is adapted to be extended through the resilient sealing member to establish communication with the container interior. The cover member overlies the locking member and has a continuous panel portion and a depending skirt which is preferably shorter than the skirt of the locking member. The locking member skirt is provided with at least two integrally formed outstruck lugs. The cover skirt is provided with at least one inwardly directed embossment which is disposed generally at the same height as the lugs. The lower portion of the cover skirt is directed generally radially inwardly and has a diameter which is less than the diameter of the locking member taken at a position of at least one lug. In this fashion access to the sealing member cannot be obtained without removing the cover and

leaving irreversible physical evidence of such removal. The dimensions of the outstruck lugs and restricted lower cover skirt portion are such that mechanical resistance to relative axial separation of the locking member and cover is provided.

In effecting opening of the container one need merely establish relative rotational movement between the cover and the locking member. This movement causes the embossment to engage one or more lugs and permanently deform the same radially inwardly, thereby establishing clearance for relative axial separation of the cover from the locking member. As the lugs cannot be returned to the precise position which would permit locking of the cover onto the closure assembly while resisting relative separation, irreversible tangible evidence of prior use is presented.

In a preferred form, at least two to four circumferentially spaced integral lugs would be provided and an equal number of embossments having the same circumferential spacing between adjacent embossments as between adjacent lugs would be provided. This facilitates increased ease of opening as the user need only rotate the cover through an angle which is not greater than 180° in order to permanently deform all of the lugs to a noninterfering position.

It is an object of this invention to provide a closure assembly which is adapted to effectively maintain the sterile condition of a sealed container while possessing improved ease of opening characteristics and providing tangible evidence of any effort to gain access to the container contents.

It is another object of this invention to provide such an assembly wherein there is positive mechanical interference to separation of the cover portion from the remainder of the assembly and such interference cannot be eliminated without permanently deforming a portion of the closure assembly.

It is another object of this invention to provide such a closure assembly which is adapted to be employed with conventional glass finishes, conventional sealing techniques and is adapted to function in the same manner as conventional containers of this type after the cover has been removed.

It is yet another object of this invention to provide such a closure assembly wherein the tamperproof closure can be opened with one hand in rapid fashion while providing a positive indication that the container has not been previously used.

These and other objects of the invention will be more fully understood from the following description of the invention, on reference to the illustrations appended hereto.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a partially broken away illustration of a type of sealed container contemplated by this invention.

FIG. 2 is a partially broken away plan view of a form of closure assembly contemplated by this invention.

FIG. 3 is a sectional illustration showing the respective closure assembly components in position taken through 3—3 of FIG. 1.

FIG. 4 is an elevational view of the locking member of the closure assembly of this invention.

FIG. 5 is an elevational view of the cover member of the closure assembly of this invention.

FIG. 6 is a plan view of a modified form of cover member for a closure assembly of this invention.

FIG. 7 is an elevational cross sectional illustration of the cover member of FIG. 6 taken through 6—6 of FIG. 6.

FIG. 8 is a cross sectional illustration generally similar to FIG. 3 but showing the cover member of FIG. 6 in a closure assembly.

FIG. 9 is an elevational cross sectional illustration of the form of stopper of FIG. 8.

FIG. 10 is an elevational view of a locking member of this invention showing a modified form of a lug structure.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now more specifically to FIG. 1, it is seen that there is shown a container 2 which has been illustrated as a small mouth bottle. A closure assembly 4 which has a locking member 6 and a cover member 8 is secured to container 2. As is shown in FIGS. 2 and 3, the container has a conventional form of container neck 10 which is provided with a mouth defining bead 14. The bead has an inner surface 16, an upper surface 18, an exteriorly disposed inwardly directed closure anchoring shoulder defining surface 20 and an annular outer surface 22 connecting upper surface 18 and anchoring shoulder surface 20. The anchoring shoulder surface 20 preferably is generally horizontally disposed or is disposed in a downward direction at an angle of less than about 15° with respect to the horizontal. The bead 14 serves to define the container mouth indicated generally by the reference numeral 24.

The closure assembly 4 has a resilient sealing member 30 which is provided with a top panel 32 and a depending annular sealing portion 34. It will be seen that the undersurface of the outer portion of top panel 32 is in sealing engagement with upper surface 18. The outer part of sealing portion 34 is in sealing engagement with inner surface 16.

Referring now to FIGS. 3 and 4, and considering the locking element 40, it is seen that the locking element has a top panel 42 which contains a generally centrally disposed opening 44. The locking element 40 also has a depending skirt 46 which extends downwardly and has a lower sector 48 which is deformed generally radially inwardly and downwardly into locking engagement with anchoring shoulder surface 20. In securing the closure 4 to the container 2 prior to establishment of lower sector 48, top pressure is applied in order to compress portions of top panel 32 of sealing member 30. In this fashion, forming sector 48 results in the gasket being secured and retained in its compressed sealing condition by locking element 40. When the cover 50 is removed, access to the container contents may be had by means of the needle of a syringe by passing the same through opening 44 and through the center portion of top panel 32 of sealing member 30. The material out of which the sealing member 30 is composed is generally such that withdrawal of the needle will result in reclosure of the opening previously established thereby.

Referring now to FIGS. 2, 3 and 5, the structure of the cover 50 will be considered. The cover 50 has a top panel 52 and a skirt 56. The top panel 52 is in overlying surface to surface contact with top panel 42 of locking

element 40. It is noted that in the preferred form which has been illustrated, skirt 56 is substantially shorter than the skirt 46 of locking element 40.

As is shown in FIG. 4, the skirt 46 of locking element 40 is provided with several radially outstruck integrally formed lugs 60. The lugs are defined by slit 64 and bends or slits 62, 66. They are connected to the skirt 46 by means of vertically disposed hinge 68. It is noted that the lugs 60 are disposed in the upper portion of the skirt 46 in a position closely adjacent to the top panel 42 but below the plane thereof.

Referring now to FIG. 5, it is seen that the cover skirt 56 is provided with a number of radially inwardly directed embossments 70 which originate at a position closely adjacent to top panel 52, but below the plane thereof and extend downwardly toward the lower skirt portion 72. The embossment 70 have an inwardly convexly curved configuration. In the preferred form the outward projection of the lugs 60 is generally equal to the amount of inward projection of embossments 70.

As will be appreciated from FIG. 3, the lower portion 72 of cover skirt 56 has a diameter which is less than the diameter of the locking element 40 taken at the position of one of the lugs 60. As a result, any effort to effect relative axial separation between locking element 40 and cover 50 will result in interengagement between lower cover skirt portion 72 and lugs 60 and thereby prevent such separation. In operation of the closure shown in FIG. 2, the cover is subjected to relative rotational movement in a clockwise direction. This causes the embossments 70 to engage the outstruck lugs 60 and permanently deform the same radially inwardly. In FIG. 2 the embossment 70 will first engage lugs 60 at hinge 68 and progressively move toward slit 64. After this has been accomplished, the cover 50 may be axially separated from the locking element 40 without the interference which previously was present as a result of the original configuration of lugs 60.

While it is only necessary to provide two lugs 60 and a single embossment 70, it is preferred to provide additional lugs 60 and embossments 70. It will be appreciated that as the number of lugs is increased the resistance to relative axial separation of locking element 40 and cover 50 is increased. It will further be appreciated that as the number of embossments 70 is increased the amount of rotation required to effect deformation of the lugs 60 is reduced. In the example shown in FIG. 2, there will be four outstruck lugs 60 and four embossments 70. As a result, rotation of the cover 50 through a quarter turn or 90° will cause each embossment 70 to permanently deform a lug 60 and thereby establish the desired clearance. If a single embossment 70 were to be employed, it would be necessary to rotate that embossment through at least 270° in order for the embossment to permanently deform all four of the lugs 60. It will also be noted that for ease of rotation it is desirable to have all of the free ends 64 of lugs 60 directed in the same circumferential direction. In addition, it is preferred where the number of lugs 60 equal the number of embossments 70 to provide substantially identical circumferential spacing for them on their respective closure assembly elements.

By way of further explanation of the characteristics of the respective closure assembly elements, it will be noted that the cover skirt 56 has a mean diameter at its lower extremity 72 which is greater than the mean diameter of the locking member skirt 46. Also, it will be noted that at least a major portion of the outstruck lugs 60 will be disposed at a level higher than the outer surface 22 of the container bead 14.

While for convenience of reference the lugs 60 have been discussed as being defined by two generally horizontally disposed slits 62, 66 connected by vertical slit 64 and hinged to the locking element 40 by vertical hinge 68, and this is the preferred orientation of the lugs 60, it will be appreciated that various lug configurations and orientations may be employed effectively. For example, vertical slit 64 could be deleted and the lug 60 could be provided with a more triangular orientation. Similarly, embossment 70 is shown as having a generally vertical orientation with a generally inwardly convexly curved profile. Other proportions and configurations may be employed in the embossment so long as it is dimensionally suitable for effecting the desired permanent deformation of the lugs 60.

It is preferred that the sealing member 30 be composed of a resilient material suitable for purposes of effecting the desired seal and permitting penetration of the needle while remaining inert with respect to the container contents. A suitable material for such use is rubber. The locking element 40 and cover 50 are preferably composed of substantially rigid materials such as aluminum and steel. While certain plastics might be employed effectively in the cover 50, use of the same in the locking element 40 would result in the need to fracture the lug 60 as opposed to permanently deforming the same.

Referring now to FIGS. 6 through 10 several modified structural embodiments of this invention will be considered. In FIGS. 6 and 7 there is shown a cover cap which has a top panel 80 and an annular depending skirt 82. The top panel 80 is provided with a generally downwardly directed hollow depression 84 which defines upwardly open recess 86. In the form shown, the depression 84 is provided with a generally circular configuration and is generally centrally disposed with respect to top panel 80.

Another feature of the cover member shown in FIGS. 6 and 7 is that the lower terminus of skirt 82 is provided with a hollow inwardly projecting, substantially continuous annular bead 90 which serves to provide increased rigidity for the cover skirt and facilities improved retention in the closure assembly when it is sealed to a container.

It is also noted that the embossment 94 shown in FIGS. 6 and 7 is generally similar to embossment 70 shown in FIGS. 2 and 5. The embossment 70 extends over at least a major portion of the skirt section disposed between the hollow bead 90 and the top panel 80. The skirt portions disposed between the circumferentially spaced embossments 94 are preferably substantially straight as viewed in vertical section, as is shown in the righthand portion of FIG. 7.

Referring now to FIG. 10, the locking element shown therein is generally similar to that shown in FIGS. 3 and 4. The locking element has a top panel 104 and a depending skirt 106 and is generally proportioned the same as that shown in FIG. 4. The lugs 100 are substantially horizontally oriented and are defined by substantially horizontal lanced lines 102. The lugs 100 each

have a lower edge **110** which projects radially outwardly. This lug structure is preferred as it provides improved cover cap retention as a result of the lower edge **110** of the lugs **100** engaging the lower portion of cover skirt **82** such as the curled bead **90** of the cover cap. As a result it resists relative axial separation of the cover and locking element until radially inwardly directed deformation of the lugs **100** has been effected.

Referring now to FIGS. **8** and **9** there is shown a closure assembly secured to neck **112** of a bottle. The closure assembly consists of a stopper element **114**, a locking element **116** and a cover **118**. The locking element **116** and cover **118** are of the type shown in FIGS. **10** and **7**, respectively. The stopper element **114** has a substantially flat upper surface **122**, a pair of depending legs **126, 128**. The legs **126, 128** cooperate with the stopper upper portion **130** to define a downwardly open recess **132**.

The depression **84** serves a double purpose in the closure assembly. First of all, as is shown in FIG. **8**, it distorts upper surface **122** of the stopper **114** and urges the same resiliently downwardly. This establishes a positive upwardly directed resiliently maintained force upon top panel **80** of the cover **118**. As a result, when relative rotation is established between the locking element **116** and the cover **118** to radially inwardly deform lugs **100** the resilient action of the deformed stopper upper section **130** tends to separate the cover **118** from the remainder of the closure assembly. This facilitates removal of the obstructing cover and permits access to the stopper member **114** by means of a syringe (not shown). In addition, the presence of this resiliently downwardly directed displacement of the stopper member upper portion **130** prevents effective replacement of the cover **118** on the container after deformation of the lugs **100**, as the stopper **114** will tend to displace the cover member **118** upwardly and resist seating of the cover member **118** in its original position.

It will, therefore, be appreciated that the sterile container assembly of this invention provides for effective maintenance of the sterile environment during storage while providing definite physical evidence of tampering without the need to exert sufficient opening force to fracture a portion of the closure assembly. In addition, the closure assembly is adapted to be readily opened while held in one hand without the use of any substantial amount of force, while preserving sufficient resistance to opening to clearly indicate whether there has been a prior use of the container. Also, the closure assembly of this invention is adapted to be employed with conventional glass and sealing equipment, while remaining economical to manufacture.

Whereas particular embodiments of the invention have been described above for purposes of illustration, it will be evident to those skilled in the art that numerous variations of the details may be made without departing from the invention as defined in the appended claims.

I claim:

1. A closure assembly comprising
a sealing member having a continuous upper panel portion and composed of a resilient material,
a locking member having a top panel provided with an opening and a depending skirt which is adapted to be anchored to a container neck,
a cover having a top panel and a depending skirt,
said sealing member disposed within said locking member,
said locking member disposed at least in part within said cover,
said locking member skirt having at least two integrally formed radially outstruck lugs,
said cover skirt having a radially restricted lower portion with a diameter less than the external diameter of said locking member taken at the location of at least one said lug,
said cover portion having at least one radially inwardly directed embossment disposed at generally the same height as said lugs, and
the minimum diameter of said cover skirt at said radially restricted skirt portion is less than the diameter of said locking member at said lug, whereby relative axial separation of said locking member and said cover is prevented until relative rotational movement of said cover with respect to said locking member has caused said embossments to permanently deform said lugs radially inwardly.

2. The closure assembly of claim **1** including
said cover skirt extends downwardly beyond said lugs and terminates short of the lower extremity of said locking member skirt, and
said embossment projects inwardly a distance substantially equal to the outward projection of said lugs.

3. The closure assembly of claim **2** including
said cover skirt lower extremity having a radially inwardly projecting hollow bead.

4. The closure assembly of claim **2** including
said locking member having at least three said lugs, and
each said lug having a radially outwardly projecting lower edge defined at least in part by a generally horizontally disposed slit.

5. The closure assembly of claim **2** including
said locking member has at least three said lugs,
said cover member has the same number of embossments as said locking member has lugs,
said lugs are defined by a pair of generally horizontal slits and a connecting vertical slit, and
said lugs are connected to said locking member skirt by a generally vertically disposed hinge portion.

6. The closure assembly of claim **2** including
said cover top panel having a hollow depressed section,
said sealing member being composed of a resiliently compressible material,
said hollow depressed section in overlying downwardly directed resilient deforming contact with said sealing member, whereby
said sealing member exerts on upward resiliently established force in said cover.

7. The closure assembly of claim **5** including
said lugs all have their free ends projecting in the same circumferential direction,
said embossments have a generally convex inward curvature,
said lugs originate at a position closely adjacent said locking member top panel,
said embossments originate at a position closely adjacent said cover top panel, and

the mean diameter of said cover skirt apart from said embossments is greater than the mean diameter of said locking member skirt apart from said lugs.

8. A container assembly comprising

a container having a neck provided with an annular mouth defining bead,

said mouth defining bead having an upper surface, an exteriorly disposed inwardly inclined closure anchoring shoulder surface and an outer annular surface connecting said upper surface with said shoulder surface,

a multipiece closure having a sealing member, a locking member and a cover,

said locking member having a top panel with an opening therein and a depending skirt which has a lower portion directed generally radially inwardly into locking engagement with said shoulder surface,

at least two radially outstruck lugs formed within said locking member skirt,

a portion of said sealing member compressively secured between said locking member and said container neck,

said cover having a top panel and a skirt having a lower portion directed generally radially inwardly to a diameter less than the mean diameter of said locking member taken across at least one said outstruck lug, and

at least one radially inwardly directed embossment formed in said cover skirt at such a height as to mechanically engage and reform said outstruck lugs when relative rotational movement is effected between said locking member and said skirt.

9. The container assembly of claim 8 including

said cover skirt having a diameter at its lower extremity which is greater than the mean diameter of said locking member skirt, and

said sealing member having a continuous top panel of larger diameter than said container mouth.

10. The container assembly of claim 8 including

each said lug has a radially outwardly projecting lower edge defined by a substantially horizontal slit.

11. The container assembly of claim 8 including

said lugs are defined by a pair of substantially horizontal slits which are connected by a vertical slit,

said locking member has three said lugs, and

said cover member has three said radially inwardly directed embossments.

12. The container assembly of claim 9 including

said cover skirt lower portion terminating in a radially inwardly projecting hollow bead.

13. The container assembly of claim 9 including

said sealing member composed of a resiliently compressible material,

said cover top panel having a depressed portion which is generally centrally disposed, and

said depressed top panel portion in overlying contacting relationship with respect to said sealing member top panel.

14. The container assembly of claim 9 including

said cover member having the same number of radially inwardly directed embossments as said locking member has lugs, and

the circumferential spacing between adjacent radially inwardly directed embossments is generally equal to the circumferential spacing between adjacent lugs, whereby all of said lugs will be radially inwardly reformed responsive to the establishment of relative rotation of said cover with respect to said locking member through an arc of not greater than 180° to permit relative axial separation between said cover and the remainder of said closure assembly.

15. The container assembly of claim 9 including

at least a major portion of each of said lugs disposed at a level higher than said outer surface of said container bead, and

said cover skirt terminating at a position lower than and closely adjacent to the lower extremities of said lugs.

16. The container assembly of claim 15 including

said cover and locking member composed of a substantially rigid deformable material,

said sealing member composed of a resiliently compressible material,

said outstruck lugs disposed at a level beneath the plane of said locking member top panel, and

said radially inwardly directed embossments disposed beneath the plane of said cover top panel.

* * * * *

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,712,498 Dated January 23, 1973

Inventor(s) Kenneth C. Lawrence

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Col. 5, line 18 Change "embossment" to --embossments--

Col. 7, line 19 After "recess" delete "132"

Signed and sealed this 26th day of June 1973.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

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