Oct. 14, 1969 J. D. SLACK ET AL 3,472,409

SAFETY CLOSURE FOR CONTAINERS

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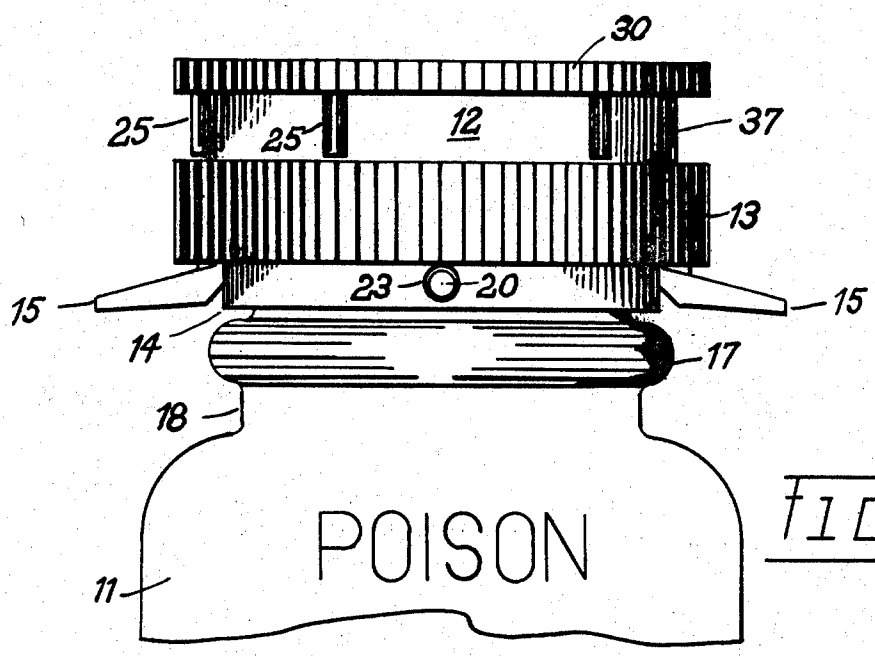


Fig. 1

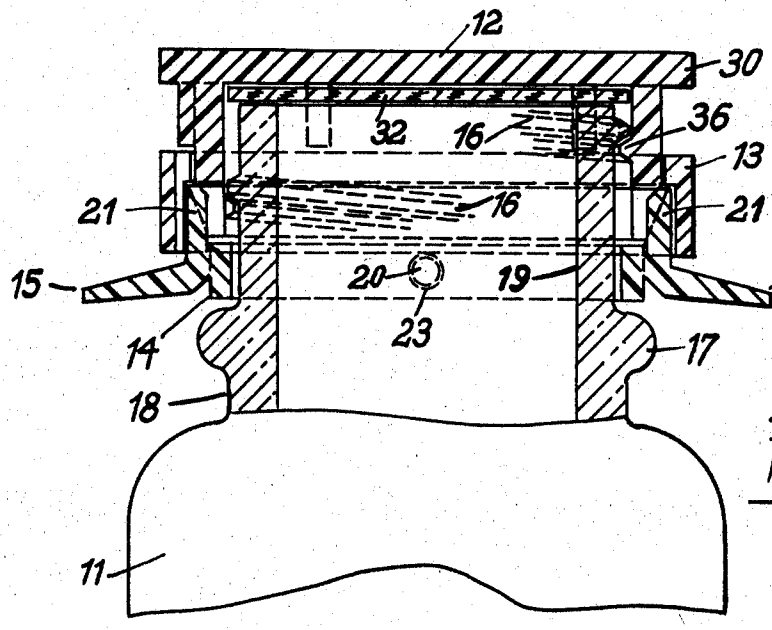


Fig. 2

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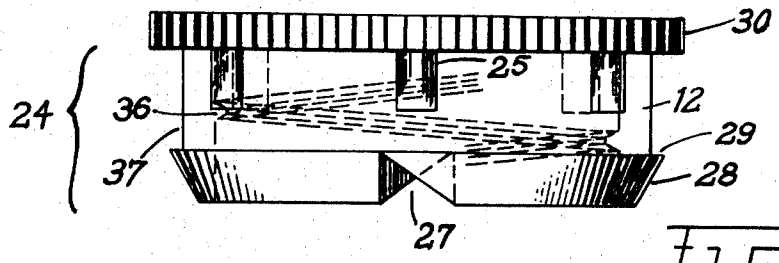


Fig. 3

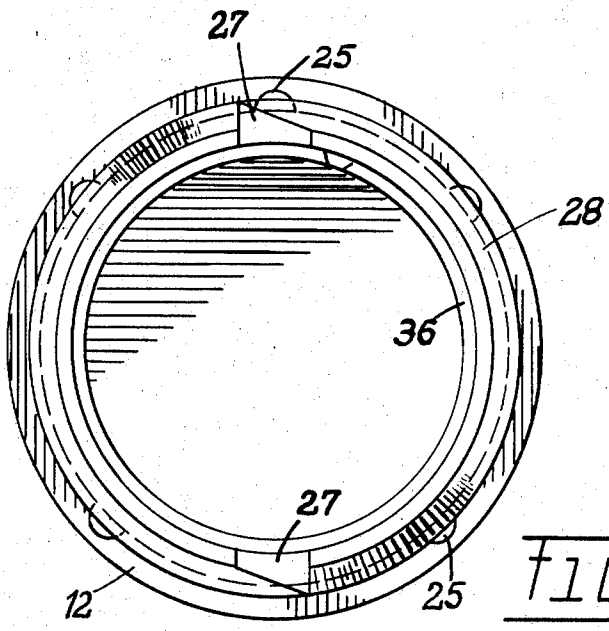


Fig. 4

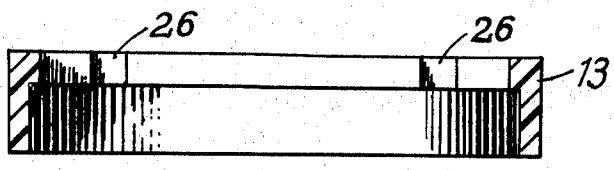
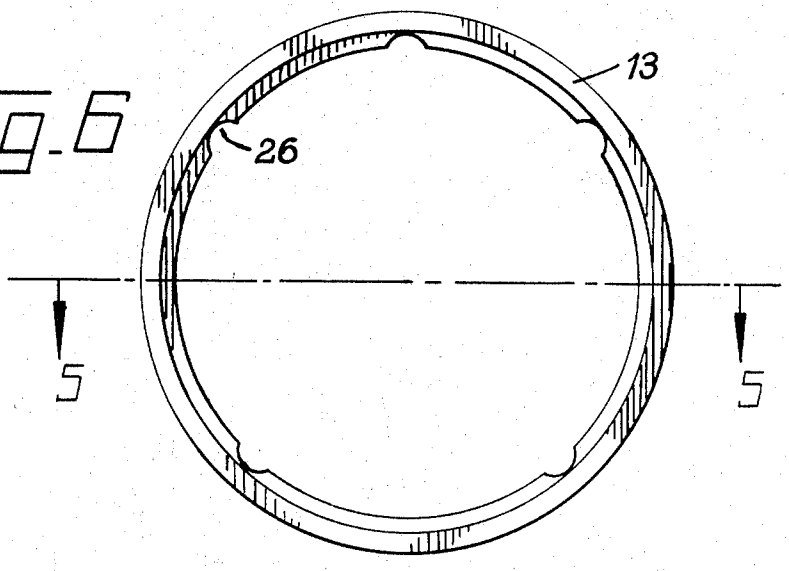


Fig. 5

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Fig. 6



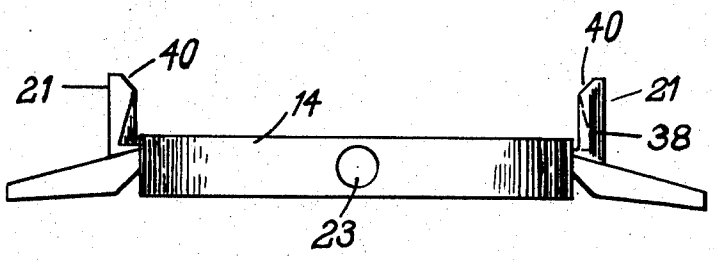


Fig. 7

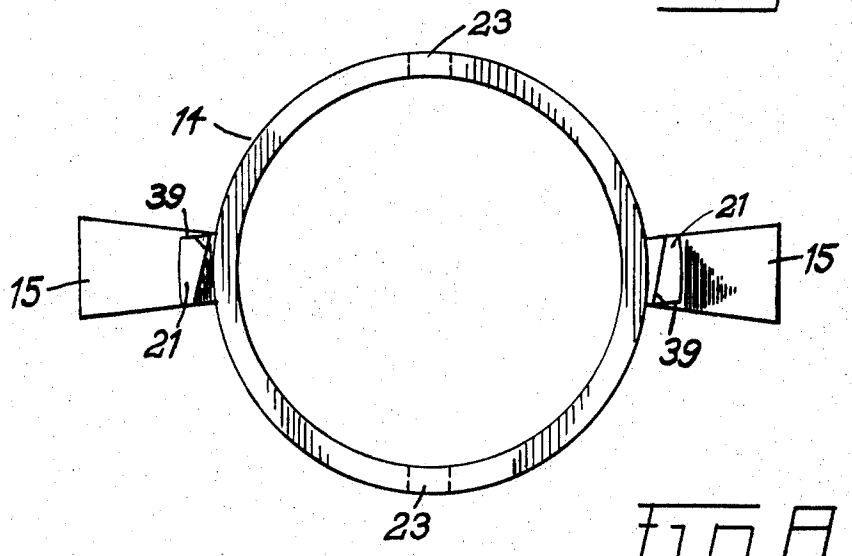


Fig. 8

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SAFETY CLOSURE FOR CONTAINERS

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U.S. Cl. 215—9 7 Claims

ABSTRACT OF THE DISCLOSURE

This invention relates to new and useful improvements in safety closures for containers and, more specifically, for a closure cap for containers where the contents may be drugs or chemicals and where it is desired to prevent children from removing the caps or to prevent the removal of the cap by any person or persons inadvertently. The device is of such construction, combination and arrangement of parts as only one with knowledge of the sequence of disengagement of the safety closure could successfully remove the device from the container. It has generally been accepted in the previous state of the art that a safety closure device be of an unchangeable, fixed arrangement which, once incorporated as a closure device on a container, was not acceptable to any further modification. Our invention overcomes these deficiencies in offering the possibilities of several versions while, at all times, remaining a closure for a container which is liquid proof and air tight. In its simplest form, on a plastic container, it is possible to mould the locking arrangement, that is teeth and wings, as a part of the container when the closure cap simply screws on to complete a locked safety closure. In this form it is a one-part safety closure device. On a glass or metal container its simplest form is where the locking ring is slipped over the neck of the container onto locating studs and when the closure cap is screwed on it completes a safety closure. In this case it is a two part device. Where maximum security is required a safety collar is added and in this form it is a three part device.

An advantage of the invention is that, where a user suffers an encumbrance in the use of the hands, the locking arrangement can be removed whereupon the closure becomes a conventional screw-cap closure which is liquid proof and air tight. Besides having several possible forms of manufacture in its mechanical form it can be readily adapted not only for varying sizes of screw-capped containers but for others such as the aerosol type.

This invention relates to new and useful improvements in safety closures for containers and, more specifically, for a closure cap for containers where the contents may be drugs or chemicals and where it is desired to prevent children from removing the caps or to prevent the removal of the cap by any person or persons inadvertently. The device is of such construction, combination and arrangement of parts as only one with knowledge of the sequence of disengagement of the safety closure could successfully remove said device from the container.

The principal object of the invention is to provide a substantially tamper-proof safety closure of the character herewithin described which although it has a two stage locking action, it is nevertheless, easily manipulable to engage and disengage from the container.

Another object of the invention is to provide a device of the character herewithin described, which is eminently suitable for manufacture in plastic, and for use on containers of either glass, metal or plastic, and, being of durable materials, would be of an indefinite life so as to encourage its re-use.

Another object of the invention is to provide a device

of the character herewithin described, which, though having extensions, is so arranged that it takes no more shelf space than the normal container and is of a readily acceptable relative size to said container.

Another object of the invention is to provide a device of the character herewithin described, which, is a locked, airtight closure, for liquids or solids for a container and renders the opening of a container equipped with the device a definite intentional act thereby eliminating a person, or persons, from using the contents unintentionally.

A still further object of the invention is to provide a device of the character herewithin described, which, while being secured by two locking actions, a primary and a secondary, is of such design that, where there are no children or where the user may suffer some encumbrance or hindrance in the use of the hands, the secondary lock can be removed without any deterioration of the sealing action of the closure. Such removal converts the closure to a conventional screw cap for a container.

With the foregoing in view, and all those objects, purposes and advantages which may become apparent from consideration of this disclosure and specification, the present invention consists of the inventive concept embodied in the method, process, construction, arrangements of parts or new use of same, as herein particularly exemplified in one or more specific embodiments of such concept, reference being had to the accompanying figures in which:

FIGURE 1 is front elevation of upper portion of container showing closure device in assembled condition.

FIGURE 2 represents elevated cross section of safety closure.

FIGURE 3 is elevated view of safety cap.

FIGURE 4 is bottom plan view of safety cap.

FIGURE 5 is cross section of safety collar taken at line 5—5 of FIGURE 6.

FIGURE 6 is bottom plan view of safety collar.

FIGURE 7 is elevated view of locking ring.

FIGURE 8 is top plan view of locking ring.

Proceeding therefore to describe the invention in detail, reference should first be made to FIGURE 1 which shows the embodiment of the invention.

Device consists of a cylindrical container neck **11** with an annular rim **17** and having single or multiple thread segments **16** for mating with closure cap **12** and having locking ring locating studs **20** which are diametrically opposed and externally positioned in area above annular rim **17** on upper container neck **19**. Said annular rim will prevent any axial movement when closure unit is assembled.

Moulded locking ring **14**, (the secondary lock), having recesses or apertures **23** in its cylindrical wall, which radially encloses upper container neck **19** in area adjacent to annular rim **17**, for accepting locating studs **20**. Said cylindrical wall is of such internal diameter as to provide a locational fit around locating studs, thereby preventing any axial or radial movement of locking ring **14** upon upper container neck **19**. Protruding externally and upwardly from said cylindrical wall are two teeth **21**, diametrically opposed and identical to each other, which when locating studs **20** are positioned within apertures **23** of locking ring **14**, and, when cap **12** is in closed position, will locate within cutouts **27** of skirt **24** of cap **12**. Teeth **21**, as seen from FIGURES 7 and 8 are provided with the following features: One flank of tooth, that which opposes unscrewing direction, presents a vertical plane **38** which is toed out **39** causing teeth to thrust inward should an attempt be made to unscrew cap without withdrawing said teeth **21** from cutouts **27**. Top of inner face of said tooth is bevelled **40** to facilitate the penetration of bevelled end **28** of skirt **24** between said teeth **21** and outer wall of upper container neck **19** during closure. Should a finer pitch of thread be used on container neck and cap, one which may require several turns of the cap

to reach its fully closed position, inner face of tooth is backed off outwardly which will permit tooth to be pushed out of skirt cutouts **27** by corresponding angle on leading edge of said cutouts on continued turning of cap, teeth **21** riding on bevelled end **28** of skirt **24** until cap completes its sealing action. Teeth **21** have wing-like extensions **15** which, upon application of downward pressure, will fold inward and, by lever action, withdraw locking teeth **21** from skirt cutouts **27** allowing subsequent unscrewing of cap **12**. Should no locking action be desired or where the user suffers from any encumbrance or hindrance to the use of the hands, locking ring **14**, (the secondary lock), can be removed from the upper container neck thereby converting closure cap **12** to a conventional screw cap for container.

Cap **12**, being provided with a conventional seal **32**, and having a skirt **24** which is provided with diametrically opposed cutouts **27** within its lower portion for accepting locking teeth **21**. Interior wall of skirt **24** has single or multiple thread segments **36** for mating with thread segments **16** on upper container neck **19**. The exterior wall of skirt **24** is beveled at its lower end **28** to facilitate its penetration between locking teeth **21** and exterior wall of upper container neck **19** when closure cap **12** is screwed down on container neck. Closure plate **30** forming upper end closure of cap **12** is of greater diameter than portion of skirt between said closure plate and bevelled end **28**. Diameter of upper end of said bevel is greater than that of skirt thereby forming a lip **29** which serves to hold safety collar **13** captive on cap **12** between radially expanded closure plate **30** and said lip **29**. Upper end part of skirt **24** adjacent to radially extended closure plate **30** bears a multiplicity of external splines **25** which are so arranged that safety collar **13** can be raised only after its internal splines **26** are matched with their opposite number. External splines **25** are of such length that they permit unhindered radial movement of safety collar **13** when said collar is in closed position, i.e., when bearing on lip **29** thereby enclosing locking teeth **21** which are seated in cutouts **27** and preventing their withdrawal.

Safety collar **13** (the primary lock), consists of a cylindrical sleeve, open at its lower end, with a shoulder at its upper end, the inner diameter of which is less than the outer diameter of lip **29** thereby holding safety collar **13** captive upon assembly onto cap skirt **24**. The height of the shoulder is such as to permit a loose fit between lip **29** and lower end of splines **25**. The inner wall of said shoulder is provided with internal splines **26** which correspond in number and arrangement with external splines **25**. The outside diameter of said safety collar **13** is equal to the outer diameter of closure plate **30**, both may be provided with finger grips so that they may be gripped simultaneously, when safety collar is in open position, i.e., when splines **25** and **26** are engaged and said collar is raised to its uppermost limit, for transmission of torque when applying or removing closure cap to and from container.

To assemble the device the locking ring **14** is first fitted to the upper container neck **19**. The said ring locating stud recesses **23** being seated on the locating studs **20** with the locking teeth **21** uppermost. Preparatory to screwing closure cap **12** on container neck, safety collar **13** is rotated upon cap skirt **24** until internal splines **26** are mated with external splines **25**, which will then permit said safety collar to be raised to open position i.e., until its upper face abuts underside of radial extension of closure plate **30**. Cap **12** can then be screwed downward onto container neck whereupon bevelled end **28** of skirt **24** penetrates between locking teeth **21** and external wall of upper container neck **19** with bevelled face **40** of said teeth riding on bevelled end **28** of skirt **24** until locking position is reached when skirt cutouts **27** are lined up with teeth **21** allowing said teeth to spring inward and be seated within said cutouts forming secondary safety lock. Cap **12** cannot now be unscrewed unless teeth **21** are withdrawn from skirt cutouts **27**. Such withdrawal is prevented by safety collar **13** which, when teeth **21** have entered and are seated in skirt cutouts **27**, is moved downward until its shoulder rests on lip **29** and, with splines no longer engaging, allowing safety collar **13** to be rotated again, thereby effecting the primary safety lock, caused by cylindrical wall of said safety collar **13** enclosing skirt cutouts **27** wherein are seated teeth **21**.

To open closure, safety collar **13** is first rotated until external splines **25** can be engaged with internal splines **26** when safety collar **13** is moved axially until its upper edge abuts underside of radial extension of closure plate **30**, which then uncovers skirt cutouts **27** permitting teeth **21** to be withdrawn via lever action caused by depression of wings **15** and, when teeth **21** have cleared skirt **24**, further permitting closure cap **12** to be unscrewed.

What we claim as new is:

1. A substantially tamper proof closure device for a container which is provided with a cylindrical neck having an annular rim adjacent to the base thereof, this rim also preventing axial movement of the locking ring with closure unit assembled, being exteriorly screw threaded at its upper portion and having a multiplicity of locating studs being located between its screw threaded portion and the said annular rim, and being diametrically opposed, for the purpose of locating the locking ring teeth relative to the cut-outs in the skirt of closure cap with the cap in closed position, these locating studs also serve to retain, in a locational fit, the locking ring, bearing the said teeth, captive on upper container neck.

2. A subsantially tamper proof closure device for a container which is provided with a cylindrical neck having an annular rim and being screw threaded exteriorly at its upper portion and having a multiplicity of locating studs diametrically opposed and where, around the said neck a moulded locking ring is fitted, having a cylindrical wall, which, in a locational fit circumferentially encloses upper container neck in area between screw threaded portion and annular rim which prevents axial movement of the locking ring with closure unit assembled, the said cylindrical wall being provided with apertures or recesses within which project the locating studs which position the locking teeth relative to the cutouts in cap skirt when the cap is in the closed position and where the outer perimeter of the said cylindrical wall of the locking ring is provided with a multiplicity of integrally moulded locking teeth, diametrically opposed, which project upwardly and externally, which, at their lower end, have integrally formed wings protruding outwardly and below the closure cap when said cap is in closed position on the container neck.

3. A substantially tamper proof closure device for a container provided with a cylindrical neck having an annular rim and being screw threaded exteriorly at its upper portion and having a multiplicity of locating studs diametrically opposed and fitted with a moulded locking ring and having a closure cap on which the interior of its cylindrical wall is provided with screw threads for mating with the exteriorly threaded portion of the upper container neck and where the lower end of the closure cap is bevelled, containing within that bevel two diametrically opposed cutouts for receiving the locking teeth positioned on outer perimeter of the locking ring when closure cap is fully screwed downwardly upon container neck and where the upper end of the bevel adjoins externally circumferentially constricted portion of cylindrical wall of cap thereby forming a lip, and where upper end closure plate of closure cap expands radially beyond that so defined cylindrical wall to a diameter equal to the outer diameter of the safety collar and where, between the said lip and the radially expanded end closure plate, is held captive a safety collar which when assembled to the cap is free to move either radially or axially subject to the splines which extend downwardly from the radially expanded end closure plate and exteriorly on external cylindrical wall of

cap which are so arranged that they will allow only one mating position in 360° of radial movement of the safety collar, thereby permitting the collar to be moved axially, uncovering teeth of locking ring located in the cutouts of the cap skirt, permitting teeth to be withdrawn, freeing the closure cap, which can then be unscrewed from the container neck by gripping simultaneously the upper end closure plate and the safety collar, with the splines transmitting the torque from the collar to the cap and where the length of the splines on the cap cylindrical wall is such as to permit radial movement of the safety collar only when lower interior face of circumferentially constricted shoulder of said collar abuts the upper external face of the lip of the cap skirt.

4. A substantially tamper proof closure device for a container provided with a cylindrical neck having an annular rim and being screw threaded exteriorly at its upper portion and having a multiplicity of locating studs diametrically opposed and fitted with a moulded locking ring and having a closure cap which is interiorly screw threaded and having an upper end closure plate to the cap, radially expanding beyond externally, circumferentially, constricted cylindrical wall adjacent thereto, with a lip, formed by upper end of bevel forming lower end of the cap skirt, which extends radially beyond the said cylindrical of the closure cap, at its lower end and where the exterior of the wall is provided with a multiplicity of external splines and where, on this wall, by means of the expanded upper end closure plate and the lower end lip, is held captive, when assembled, a safety collar, consisting of a cylindrical sleeve the outer diameter of which corresponds to that of upper end closure plate of cap, open at its lower end with the uper end of the sleeve being formed by a shoulder, the internal diameter of which is less than the external diameter of upper end of bevel forming lip exteriorly of cap skirt and where the height of the said shoulder is such that it will permit unobstructed radial movement of the safety collar when it is in locked position, with said sleeve extending downwardly circumferentially enclosing the bevel of cap skirt within which the cutouts containing teeth of locking ring are located, preventing their withdrawal, and when the said shoulder is between the lower end of splines on cylindrical wall of cap and the lip of said cap skirt with the lower interior face of the shoulder abutting the upper exterior face of the said lip and where the interior cylindrical wall of the shoulder is provided with a multiplicity of splines which correspond in number and arrangement to the splines exteriorly positioned on wall of the cap, which afford only one mating position in 360° of radial movement of the safety collar and with splines of the collar lined-up relative with the splines of the cap, the safety collar can then be moved axially upwards to its uppermost limit uncovering the teeth of the locking ring, permitting the teeth to be withdrawn, unlocking the closure cap, preparatory to unscrewing cap from the container neck with the splines transmitting the torque from safety collar to closure cap.

5. A substantially tamper proof closure device for a container provided with a cylindrical neck, having an annular rim and being screw threaded exteriorly at its upper portion to receive interiorly threaded closure cap, said cap being bevelled externally at its lower end, and containing within the bevel two cutouts for receiving diametrically opposed locking teeth integrally moulded upon outer perimeter of locking ring, which, in a locational fit, circumferentially encloses the upper portion of the container neck in the area between the exterior screw threads and the annular rim, with a multiplicity of externally positioned and diametrically opposed locating studs upon the upper container neck and projecting within the cylindrical wall of the said locking ring, thereby preventing any axial or radial movement of the locking ring upon the container neck and where, moulded integrally and protruding outwardly from the teeth of the locking ring are wing-like extensions which, upon application of downward pressure fold inward, withdrawing the teeth from the cutouts in the closure cap skirt and where the characteristics of the teeth are that one flank, that which opposes the unscrewing direction, presents a vertical plane toed outward, which is parallel to the opposing plane on the cutout in the skirt of the closure cap, this will cause the teeth to be thrust inward should unscrewing of closure cap be attempted prior to withdrawing the teeth from the cutouts and the inner face of the tooth is bevelled at the apex to facilitate penetration of the closure cap between outer wall of upper container neck and the said teeth when the closure cap is screwed downwardly upon the neck and the inner faces are backed-off outwardly to allow the closure cap to push teeth out of cutouts, to ride on bevelled end of the cap skirt if more than one revolution to seal container is necessary.

6. A substantially tamper proof closure device for a container provided with a cylindrical neck, having an annular rim and being screw threaded exteriorly at its upper portion to receive interiorly threaded closure cap, the cap being bevelled externally at its lower end, and containing within that bevel two cutouts for receiving the diametrically opposed locking teeth which are integrally moulded upon outer perimeter of the locking ring which, in a locational fit, circumferentially encloses the upper portion of the container neck in the area between the exterior screw threads and the annular rim, with a multiplicity of externally positioned and diametrically opposed locating studs upon the upper container neck and projecting within the cylindrical wall of the locking ring, thereby preventing any radial or axial movement of the locking ring upon the said neck and where, on the locking ring there are, moulded integrally and protruding outwardly from the teeth are wing-like extensions so designed that, when downward pressure is applied, they fold inward and, through lever action, withdraw the teeth from the cutouts in cap skirt within which they are seated, where, when the teeth are seated in the cutouts, the secondary lock is accomplished and where, with downward pressure, the wings act as levers distorting the locking ring causing the teeth to be withdrawn from the cap skirt cutouts permitting closure cap to be unscrewed.

7. A substantially tamper proof closure device for a container provided with a cylindrical neck, having an annular rim and being screw threaded exteriorly at its upper portion to receive interiorly threaded closure cap, said cap being bevelled externally at its lower end and containing within the bevel two cutouts for receiving the diametrically opposed locking teeth integrally moulded upon the outer perimeter of the locking ring which, in a locational fit, circumferentially encloses the said upper portion of the conatiner neck in area between the exterior screw threads and the annular rim, with a multiplicity of externally positioned and diametrically opposed locating studs upon the said upper container neck and projecting within the cylindrical wall of the locking ring, thereby preventing any radial or axial movement of the locking ring upon the upper container neck, and where, when no locking action is desired, the locking ring may be removed and, in doing so, converts closure cap into a conventional screw cap.

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U.S. Cl. X.R.

215—98