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| [45] | Patented | Sept. 7, 1971 |
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|-----------|-----------------------|----------------|-------|
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| [54] | COMPRESSIBLE SAFETY CLOSURE
11 Claims, 4 Drawing Figs. | |
| [52] | U.S. Cl. | 215/9,
215/46 |
| [51] | Int. Cl. | A61j 1/00,
B65d 55/02 |
| [50] | Field of Search | 215/9, 41,
46 |

ABSTRACT: A safety closure to prevent children from opening containers such as those holding medicines. The closure includes a skirt for fastening to the container, an overcap for sealing the container opening and a locking mechanism for securing the overcap to the skirt. The skirt has a vertical section having a portion of the locking mechanism thereon and an adjoining outwardly flaring section. On pressing the outwardly flaring section the locking mechanism, including a portion on the overcap, disengages to release the overcap, whereas a similar force applied to the vertical section of the skirt will not result in such disengagement.

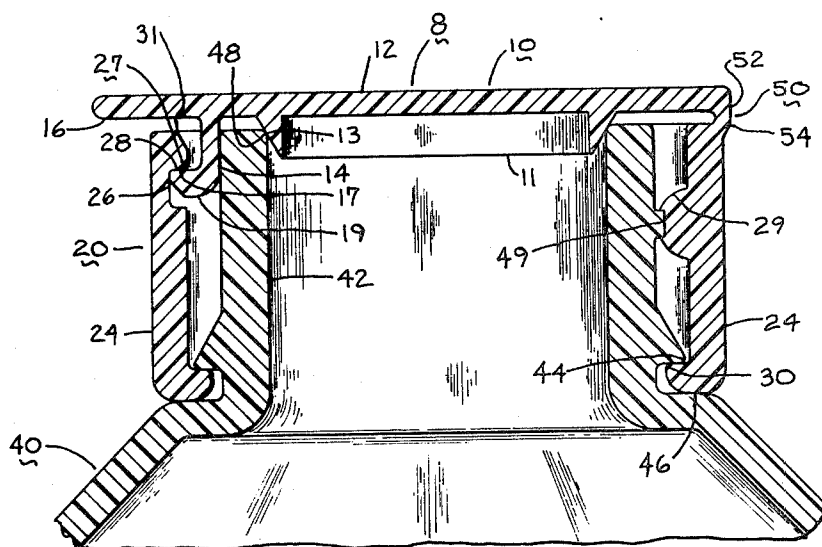


FIG. 1

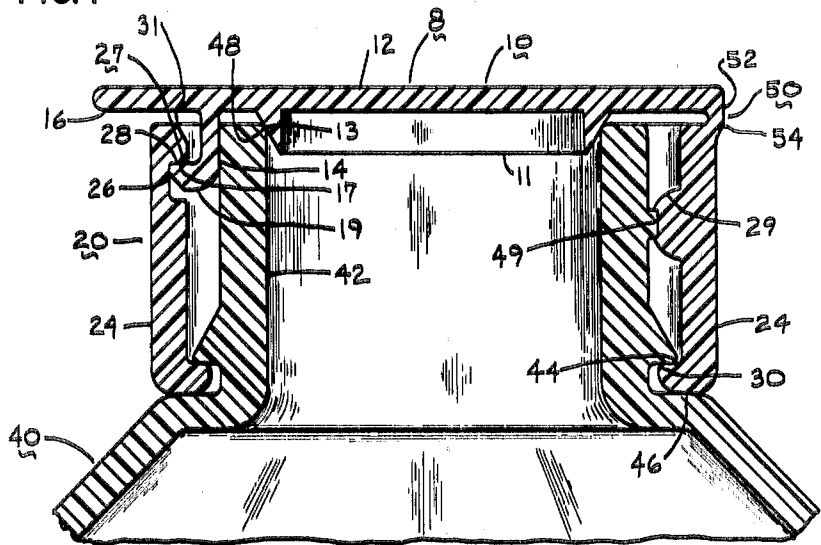
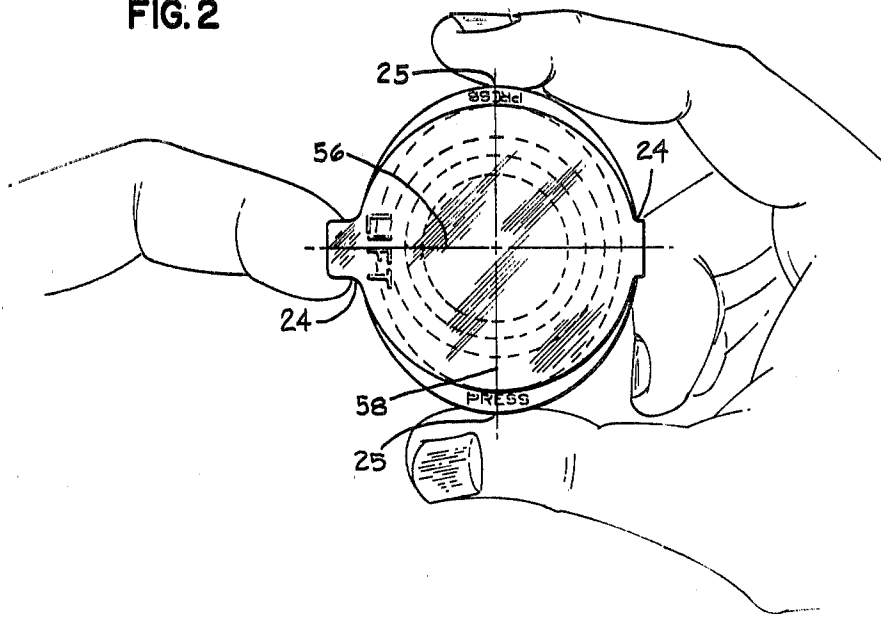


FIG. 2



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FIG. 3

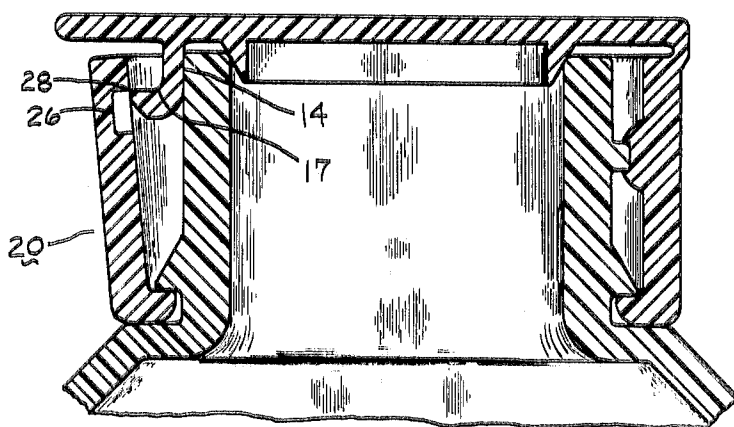
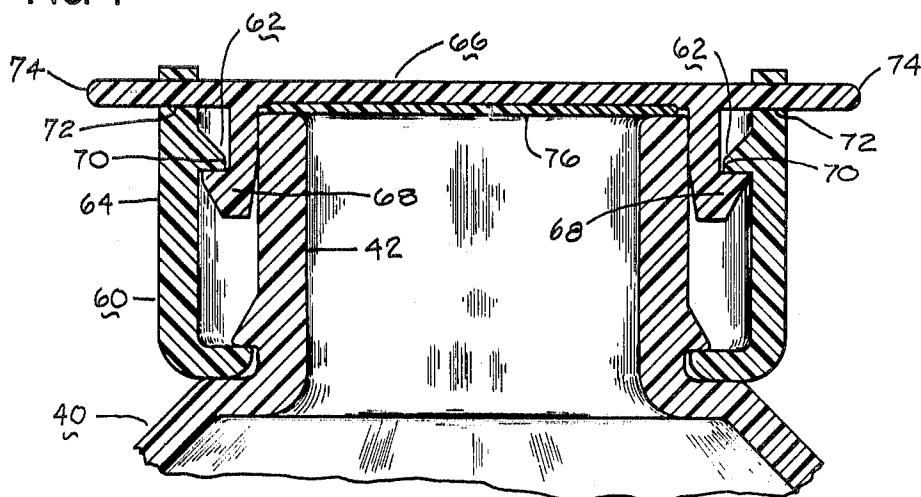


FIG. 4



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COMPRESSIBLE SAFETY CLOSURE

BACKGROUND OF THE INVENTION

1. Field of The Invention

This invention relates to a closure for a container and more specifically to a safety closure for a container used to store medicaments and other potentially dangerous substances.

2. Description of the Prior Art

Medicines, drugs and other potentially dangerous substances such as insecticides, weed-killing chemicals, fungicides, harsh detergents and the like must occasionally be stored in containers kept in a home. This creates a problem because children must not gain access to such substances. Therefore, it is desirable and necessary to provide a closure for such a container which can be readily opened by an adult but which requires more manual dexterity and coordination than can be achieved by a child. A number of safety closures have been proposed in the past but these have suffered from various defects. One is that the secret to opening the container is frequently so simple that a child can accidentally discover it. Others depend on the strength of the user. The latter is unsatisfactory since a small boy may be stronger than an elderly person or someone weakened by illness. Another is that such closures frequently embody complicated mechanical structures having a number of parts, making them too expensive and untrustworthy for general application. Still others are too difficult to refasten to the container and users have a tendency not to fully secure the safety mechanism.

SUMMARY OF THE INVENTION

Now there has been developed a new combination safety closure, hereto unknown to the prior art, which resolves the problems described above.

Accordingly, the main object of the present invention is to provide an improved safety closure for a container.

Another object of the present invention is to provide a plastic safety closure which can be used on containers having conventional neck finishes.

An additional object of the present invention is to provide a safety closure having a self-contained locking system entirely associated with the closure itself, without any dependence on special container finishes.

A further object of the present invention is to provide an integral safety closure with a captive hinged overcap.

Another object of the present invention is to provide a safety closure which does not leak despite tolerance variations in the dimensions of a container and the closure.

A still further object of the present invention is to provide means for automatically orienting a safety closure with respect to the container upon which it is mounted.

Other objects and advantages of the present invention will in part be obvious and will in part appear hereafter.

These and other objects are attained by providing a safety closure for the opening of a container comprising an overcap to cover the opening of the container, a resilient skirt having a first portion and a second portion alongside the first portion, the second portion flaring outwardly with respect to the first portion, locking means associated with the overcap and the first portion of the skirt for releasably securing the overcap to the skirt, the locking means being adapted to unlock when inward compressive force is applied to the second portion of the skirt, yet remain locked when inward compressive force is applied to the first portion of the skirt, means for sealing the opening of the container, and means for fastening the closure to the container.

The preferred configuration of the closure includes a hinge interconnecting the overcap and skirt to ensure that the cooperating portions of the locking mechanism on the overcap and on the skirt will be properly aligned when the overcap is lowered into locking position. The container is preferably sealed by means of an inwardly flaring sealing ring connected to the underside of the overcap to frictionally engage and form

a seal along the inner surface of the wall defining the mouth of the container.

BRIEF DESCRIPTION OF THE DRAWINGS

In describing the overall invention, reference will be made to the accompanying drawings in which:

FIG. 1 is a side view section of a hinged safety closure in locking position on a container;

FIG. 2 is an overhead view of a hinged safety closure illustrating the position of the fingers to compress the skirt and release the locking mechanism;

FIG. 3 is a side view section of a hinged safety closure in unlocked position on a container; and

FIG. 4 is side view section of an alternate embodiment of a safety closure mounted on a container.

DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

With reference to the drawings, there is shown in FIG. 1 a safety closure 8 for an opening in a container 40 comprising an overcap 10, a skirt 20, a hinge 50, and a locking means 27.

The overcap 10 has a generally circular planar cover 12, a hooklike member 14 depending from the underside of cover 12, and a manipulating tab 16 extending horizontally from the periphery of the cover 12 and overlying hooklike member 14.

A skirt 20 surrounds neck 42 of the container 40 and has two vertically disposed sections 24 on opposite sides of the skirt 20 and two outwardly flaring sections 25, each outwardly flaring section 25 being located intermediate the two vertical sections 24, as illustrated in FIG. 2. Each section 25 flares upwardly and outwardly with respect to the vertical sections 24. The outwardly flaring sections provide a generally oval configuration in the upper portion of the skirt 20 while the lower portion of the skirt 20 has a generally circular configuration.

The locking means 27 includes the hooklike member 14 and a cooperating locking groove 26, located on the inner surface of the skirt 20 near one end of the minor axis 56 of the oval portion. When the overcap is in locked position, the upper horizontal surface 17 of the laterally extending member 19 of the hooklike member 14 frictionally engages the upper horizontal surface 28 of the locking groove 26. The length of the major axis 58 must exceed the length of the minor axis 56 by an amount greater than the radial length of the portion of the horizontal surface 28 in contact with the horizontal surface 17 of the hooklike member 14. This relationship between the major and minor axis is important because the simultaneous application of inward compressive forces near each end of the major axis 58 must expand the minor axis 56 sufficiently to cause the vertical section 24 to move outwardly a minimum distance which will disengage surface 17 of hooklike member 14 from contact with the upper horizontal surface 28 of the locking groove 26.

A means for fastening the skirt 20 to the container 40 is provided such as the fastening rim 30 projecting inwardly from the lower circular portion of the skirt 20. When the skirt 20 is fastened onto the container neck 42 an outwardly projecting bead 44 lies above rim 30 and shoulder 46 lies below rim 30 to prevent the skirt 20 from moving up or down in a vertical direction along neck 42.

A resilient hinge 50 interconnects the skirt 20 and overcap 10. The hinge 50 is connected to overcap 10 on the outer peripheral edge 52 of cover 12 at a position directly opposite tab 16 and hooklike member 14. The hinge 50 is connected to the upper edge 54 of skirt 20 at a position directly opposite to locking groove 26. This location of the hinge 50 prevents misalignment of the hooklike member 14 and the locking groove 26 when the overcap 10 is lowered into locking position.

Also provided as an integral part of the overcap is a resilient, circular seal ring 11 depending from the underside of cover 12 and flaring inwardly toward the center of overcap 10. A portion of the outer surface 13 of the seal ring 11 is adapted to frictionally engage the upper edge 48 of the inner surface of neck 42 such that seal ring 11 of overcap 10 will remain wedge

into sealing position while the major axis 58 is compressed and the locking means 27 is disengaged, as illustrative in FIG. 3. Therefore, in order to open the container a lifting force must be applied to tab 16 of overcap 10 simultaneously with the application of compressive forces to the outer surface of the skirt 20 near opposite ends of the major axis 58 of the oval portion.

An orientation member 29 projects inwardly from skirt 20 and is adapted to cooperate with a protrusion 49 on the outer surface of the container neck 42 when the skirt 20 is fastened onto neck 42 and is rotated with respect to neck 42. The orientation member 29 and protrusion 49 make possible the automatic orientation of the tab 16, hinge 50, and locking means 27 with respect to a container label. The outer edge of protrusion 49 lies within the inner perimeter of rim 30 when skirt 20 is lowered into fastening engagement with neck 42, so as not to interfere with the capping operation.

The entire closure, including the overcap 10, skirt 20, and hinge 50 are injection molded as one integral unit. To assemble the device by means of automatic equipment, the overcap 10 is releasably fastened to skirt 20 by forcing down on cover 12 or tab 16, thereby interlocking hooklike member 14 with locking groove 26. The thickness, resiliency, and dimensional tolerances of the skirt 20 and the hooklike member 14 can be fixed such that a predetermined force will be necessary to engage and disengage the locking means 27. For example, if the skirt is too thick and not sufficiently resilient it may be necessary to apply inward compressive force near the major axis 58 of the oval portion to expand the minor axis 56 and thus move the vertical section 24 of the skirt 20 contacting groove 26 outwardly and permit the hooklike member 14 to slide into locking position in groove 26. However, if the skirt 20 and hooklike member 14 are sufficiently resilient to flex when the hooklike member 14 is forced down against the upper edge 31 of the inner surface of the skirt 20, no additional compressive force will be necessary to engage the locking means 27. The entire assembly is fastened onto the neck 42 of the container 40 by forcing down on the overcap 10 to interlock rim 30 of skirt 20 between projecting bead 44 and shoulder 46 of neck 42. During fastening, the resiliency of skirt 20 permits rim 30 to pass over bead 44. The outer surface 13 of the seal ring 11 will press against the upper edge 48 of the inner surface of the container neck 42. Because of the inward flare of the seal ring 11, line contact between a portion of the outer surface 13 of the seal ring 11 and the upper edge 48 of the container neck is assured despite possible tolerance variations in dimensions of the skirt 20, overcap 10 and container 40. The hooklike member 14 must lie outside the perimeter of the seal ring 11 and there must be sufficient radial distance between the outer surface 13 of the seal ring 11 and the hooklike member 14 to permit the upper portion of the neck 42 to be wedged between the hooklike member 14 and the seal ring 11. To properly orient the hinge 50, tab 16 and locking means 27, with respect to a label on the container 40, the skirt 20 is rotated until the orientation member 29 on the inner surface of the skirt 20 contacts the cooperating protrusion 49 on the outer surface of the container neck 42. The device is unlocked by simultaneously applying inward compressive force to the outer surface of the skirt at points near each end of the major axis 58 of the oval portion as illustrated in FIG. 2. This compressive force will decrease the size of the major axis 58 of the oval portion and increase the size of the minor axis 56, thus expanding outwardly the vertical section 26 containing the locking groove 26 and disengaging the skirt 20 from the hooklike member 14, as illustrated in FIG. 3. By simultaneously lifting the tab 16 while continuing to apply compressive force at the two ends of the major axis of the oval portion 24, the overcap 10 can be removed from sealing position and the container 40 will be opened. To relock the overcap 10 into sealing position the skirt 20 is compressed while downward force is applied to the overcap, or as discussed above, if the skirt 20 and hooklike member are sufficiently resilient the overcap may be locked into sealing position by a downward force without a simultaneous compressive force.

Although the preferred embodiment was described as having a circular overcap, circular seal ring, and a skirt with a circular portion and oval portion, the invention can similarly be used on containers having noncircular openings. The only configuration requirement for the skirt is that the upper portion have an outwardly flaring section with a minimum radial dimension greater than the radial contact distance between the components of the locking means. This dimension will assure the disengagement of the locking means by the outward movement and expansion of the nonflaring section when inward compressive force is applied to the outer surface of the flaring section. The upper portion of the skirt must have at least one outwardly flaring section and will preferably have two as in the oval configuration of FIGS. 1, 2 and 3. Other possible configurations for the upper portion of the skirt are rectangular, triangular, pear-shaped etc.

FIG. 4 illustrates a particularly attractive alternate embodiment for a closure assembly including a nonhinged skirt 60 and overcap 66. The safety closure has two locking means 62 which engage at opposite ends of the minor axis of the upper oval portion 64 of the skirt 60. Each locking means includes an arm 68 depending from the bottom of the overcap 66 and a cooperating protrusion 70 projecting inwardly from the inner surface of the skirt 60 near the minor axis of the oval portion 64. The skirt 60 has two opposing registration slots 72 at the upper peripheral edge of the oval portion above the protrusions 70. The overlap 66 has two horizontally projecting manipulating tabs 74 overlying the arms 68. The tabs 74 are adapted to rest within registration slots 72 when the overcap 66 is in locking position. The combination of the tabs 74 and registration slots 72 facilitates the alignment of arms 68 and protrusions 70 when the locking means is to be utilized. When the overcap 66 is to be removed, inward compressive force is simultaneously applied at opposing outer surfaces of the skirt 60 near the major axis of the oval portion 64, while the overcap is lifted out of locking position by applying upward pressure to one or both tabs 74. A soft liner 76 is adhesively secured to the underside of overcap 66 and serves to form a seal along the inner periphery of the neck 42 of the container 40 when the overcap 66 is fastened into locking position on skirt 60 which has been fastened onto neck 42.

In general, the preferred materials which find particular use in this invention are flexible plastics such as polyethylene, polypropylene, and polyurethane. The resilient characteristics of polyethylene, polypropylene, and polyurethane are especially suitable for use in the integral skirt, hinge, and overcap embodiment. In the nonhinged embodiment, the material of the overcap does not have to be as resilient as the skirt material.

The present invention finds utility in safety closures for containers which must be used to store potentially dangerous substances, including solids and liquids. The unique construction of a resilient skirt permits an adult to easily disengage the locking means, while preventing the careless removal of the overcap by a mischievous child. The entire locking means is self-contained in the skirt and overcap portions of the closure. Therefore, there is no requirement of special container finishes. Furthermore, because the entire locking means is on the closure itself, the molding operation is simplified and the cooperating portions of the locking means are assured of being within the required tolerances, without any dependence on the tolerance variations of the container dimensions.

Although the invention has been described with a certain degree of particularity, it is understood that the present disclosure has been made only by way of example, and that many variations and modifications of the details of construction and combination and arrangement of parts herein described will be obvious to those skilled in the art and may be carried out without departing from the spirit and scope of the invention as hereinafter claimed.

What is claimed is:

1. A safety closure or an opening in a container comprising:
 - a. an overcap to cover the opening of said container;

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b. a resilient skirt having a first section and a second section alongside said first section, said second section flaring outwardly with respect to said first section;

c. locking means associated with said overcap and said first section of said skirt for releasably securing said overcap to said skirt, said locking means being adapted to unlock when inward compressive force is applied to said second section of said skirt, yet remain locked when inward compressive force is similarly applied to said first section of said skirt;

d. means for sealing the opening of said container; and
e. means for fastening said closure to said container.

2. The device of claim 1 wherein said locking means comprises a groove on the inner surface of said first portion of said skirt and a member depending from said overcap for cooperating with said groove.

3. The device of claim 1 wherein said locking means comprises an inwardly projecting flange on the inner surface of said first portion of said skirt and a member depending from said overcap, said member extending beneath said flange when said overcap is in a locked position on said skirt.

4. The device of claim 1 including a resilient hinge interconnecting said skirt and said overcap, said hinge being attached to said skirt at a position substantially opposite to said first portion.

5. The device of claim 1 wherein said sealing means comprises a soft liner integral with said overcap.

6. The device of claim 1 wherein said sealing means comprises a resilient sealing member depending from said overcap, said sealing member flaring inwardly toward the center of said overcap and forming a seal along the inner periphery of the sidewall defining the opening of said container.

7. The device of claim 1 wherein the overcap has a substantially horizontally projecting tab to facilitate removal of said overcap.

8. The device of claim 1 wherein said fastening means is associated with the inner surface of said skirt and the outer sur-

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face of said container, said fastening means comprising a protruding bead on one of said surfaces, and a cooperating depression in the other of said surfaces for receiving the bead on deforming one of said surfaces.

9. The device of claim 7 wherein said skirt has a projecting orientation member connected to the inner surface of said skirt, said projecting orientation member being adapted to cooperate with a corresponding protrusion on the outer surface of said container when said skirt is rotated with respect to said container while fastened thereon.

10. The device of claim 7 wherein said skirt has a registration slot at the upper peripheral edge of said skirt for receiving said tab.

11. A safety closure for the opening of a container comprising:

a. an overcap to cover the opening of said container;

b. a resilient skirt having two opposing substantially vertical sections and two opposing outwardly flaring sections intermediate said vertical sections, said sections forming a generally circular lower portion and a generally oval upper portion in said skirt;

c. locking means comprising a member depending from said overcap and a cooperating groove on the inner surface of said skirt near one end of the minor axis of said oval portion, said hooklike member being adapted to frictionally engage a surface forming said groove and to disengage from said groove surface when inward compressive force is applied to the outer surface of said skirt near the major axis of said oval portion, yet remain locked when inward compressive force is similarly applied near said minor axis of said oval portion and to said circular portion of said skirt;

d. a resilient hinge interconnecting said skirt and said overcap, said hinge being attached to said skirt at a position substantially opposite to said groove;

e. means for sealing the opening of said container; and

f. means for fastening said closure to said container.

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