

[54] **SAFETY LID**

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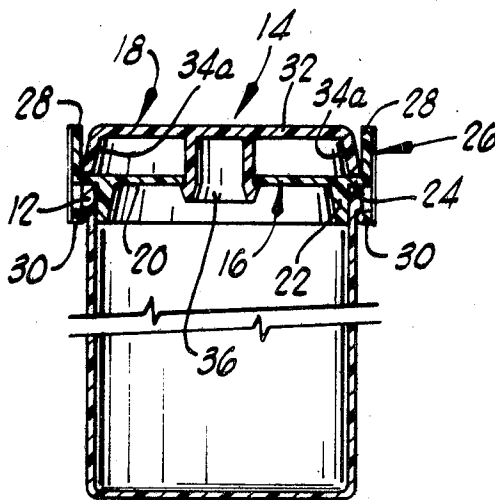
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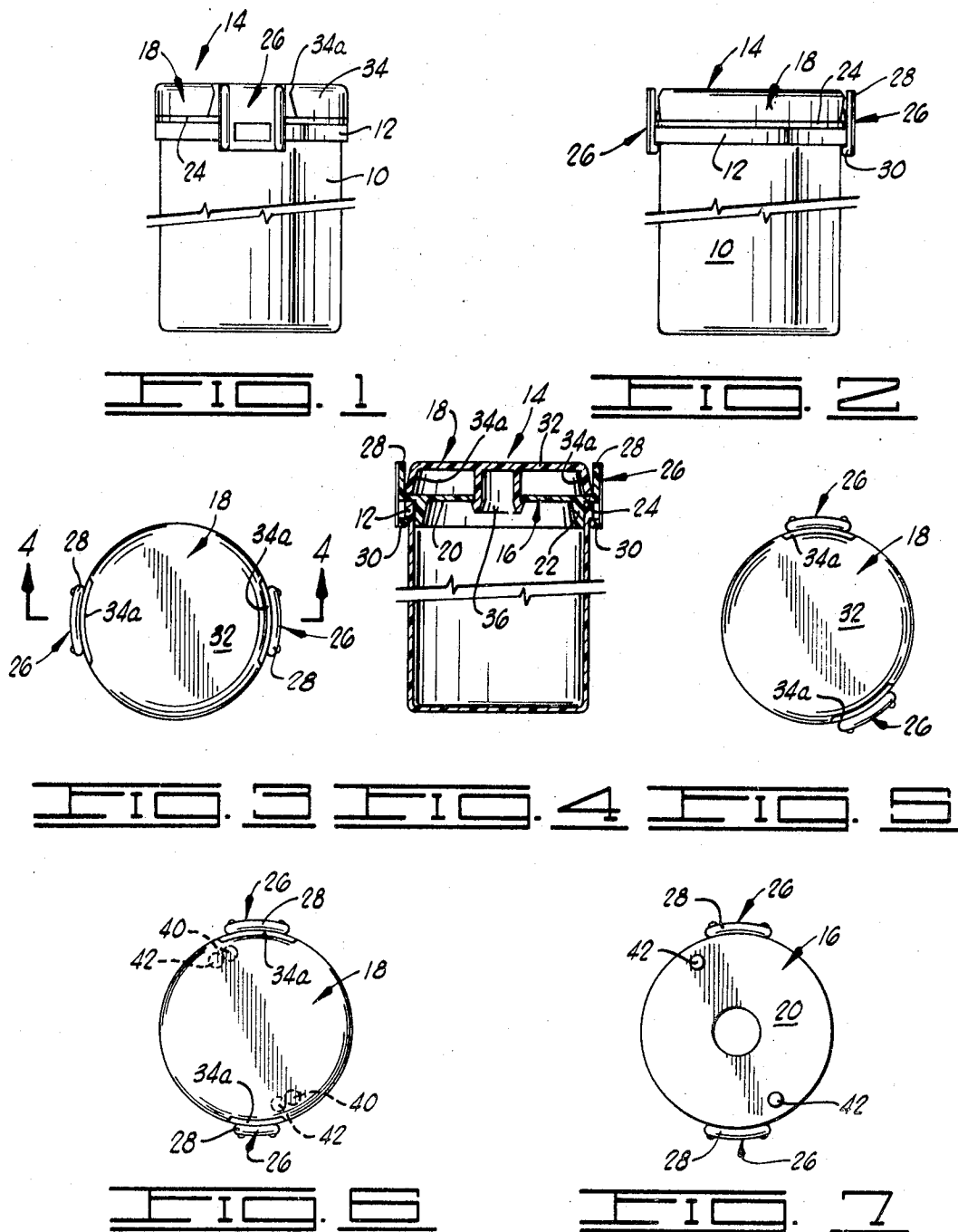
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ABSTRACT

A safety lid for flanged containers including a base cap dimensioned to fit upon the upper end of the container and having a central aperture therethrough. An upper cap is rotatable mounted on the base cap and includes a downwardly extending flange having zones of depressions or relief formed therein at circumferentially spaced points. The base cap carries a pair of flexible, resilient locking fingers which project substantially parallel to the sides of the container upon which the cap is utilized. Each locking finger carries at its lower end, a locking toe adapted to engage a flange carried around the outer periphery of the upper end of the container upon which the cap is utilized. Each locking finger carries an upwardly extending portion which can be biased by digital manipulation into the relieved zones in the peripheral flange carried by the upper cap when the upper cap is rotated to a position with respect to the base cap such that the relieved zones are aligned with the locking fingers. Pivotation of the locking fingers into the zones of relief by pressing the upwardly extending portions into such zones biases the locking toes radially outwardly with respect to a container upon which the cap is mounted so that the entire cap may be removed from the container.

14 Claims, 7 Drawing Figures





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SAFETY LID

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to safety caps for use on containers for the purpose of preventing access to the contents of the container by children and irresponsible persons. More specifically, the present invention relates to safety caps of the type which may be utilized on generally cylindrical containers carrying a rib or flange around the outer periphery thereof adjacent the upper end of such container.

2. Brief Description of the Prior Art

The problem of diminishing the ease with which small children may gain access to the contents of vials used for the storage and containment of drugs and medicines is well known. Various types of locking mechanisms for retaining the caps on such vials or containers have been devised which have as their primary objective, the foiling of attempts by children of tender years to remove the caps from such vials or containers. Many of these devices, which may be generally denominated as safety caps, have been of such structural complexity that their manufacture has been unfeasible, or the cost of such devices has rendered them economically impractical. Others have been relatively simple, but have been ineffective to prevent access to the contents of the container by children.

BRIEF DESCRIPTION OF THE PRESENT INVENTION

The present invention provides an improved, easily fabricated and easily used safety cap which achieves the object of effectively preventing removal of the cap by children from the container on which it is located, yet may be relatively easily manipulated by adults for removal.

Broadly described, the safety cap of the invention comprises a composite assembly of two molded parts which are preferably fabricated from a synthetic resin material having such properties of flexibility and elasticity or resilience as to permit the parts to function in a manner hereinafter described. The parts of the assembly include a base cap, which is configured to facilitate its attachment to the upper end of a vial or container which the cap is to close. In a preferred embodiment of the invention, the base cap includes a downwardly extending flange which extends along, and in contact with, the inside wall of the container over at least a portion of the circumferential extent of the wall. The base cap further carries a radially outwardly projecting flange which projects across the upper end of the side wall of the container upon which the base cap is located. At the outer peripheral edge of the radially outwardly extending flange, one or more locking fingers are movably attached to the flange so that they may be pivoted, through flexure about a generally horizontally extending axis, and thereby cause the opposite end of each locking finger to pivot in a radial sense with respect to the locking cap and the container on which it is located. At its lower end, each of the locking fingers carries a locking toe which projects radially inwardly to an extent such that this locking toe, in one unstressed or relaxed position of the locking finger, extends under and frictionally engages, a radially outwardly projecting flange which is located adjacent the upper end of the vial or container, and which is presently a relatively standard structure upon plastic and glass medicine vials and the like used to contain capsules or pills as dispensed in conventional pharmaceutical procedures.

The second basic component of the two-part cap assembly of the invention includes an upper cap which is rotatably mounted upon the base cap, preferably by the extension of an engaging protuberance carried by the upper cap through a centrally located, receiving aperture formed in the center of the bottom cap. The top cap includes a generally downwardly projecting flange which extends from its outer peripheral edge, and such flange includes at one or more locations around the periphery thereof, a recessed or relieved zone. These recessed zones permit the flange, at these locations, to be spaced a relatively greater radial distance from the upper

end of the locking finger carried by the base cap than the flange is spaced from this element at other points over its circumferential dimension. In other words, the downwardly extending flange located at the outer periphery of the top cap is configured so that, over a major portion of its extent, it is immediately adjacent the upper portion of the locking finger or fingers provided on the base cap, and by reason of such adjacency, prevents the locking finger from being pivoted radially with respect to the container wall so as to release the locking toe from the flange which it engages in the manner hereinbefore described. When the relieved zone on the flange carried at the outer peripheral edge of the top cap is aligned with the locking finger, however, the finger may at this time be pivoted inwardly by digital manipulation of a responsible person desiring access to the contents of the container. The locking toe carried at the lower end of the locking finger then becomes disengaged from the flange located adjacent the upper end of the container, and the entire cap assembly may then be removed from the container.

From the foregoing description of the invention, it will be perceived that it is an important object of the invention to provide a safety cap which, in certain positions of the cap relative to the container on which it is located, will prevent removal of the cap, and thus will assure that access to the contents of the container is not attained.

A further object of the invention is to provide a safety cap which may be manufactured relatively inexpensively, and which is simple in its construction and easily used by a consumer of sufficient maturity to perceive the simple mechanical principles which permit the safety cap to be used in the manner intended.

Another object of the invention is to provide a safety cap for use on medicine vials and containers which can be quickly placed in position and locked on the container to prevent access to the interior thereof by irresponsible persons, but which can be easily manipulated to allow removal of the cap by persons of mature years.

Additional objects and advantages of the invention will become apparent as the following detailed description of the invention is read in conjunction with the accompanying drawings which illustrate the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevation view of one embodiment of the locking cap of the present invention as it appears when placed on a vial or container in a position such that the safety cap may be removed from the container by digital manipulation of certain portions of the cap.

FIG. 2 is a side elevation view similar to FIG. 1, but showing the appearance of the safety cap, and the container on which it is located, when the assembly of the cap and container are rotated through 90° from the position in which they are illustrated in FIG. 1.

FIG. 3 is a plan view of the safety cap and container assembly depicted in FIGS. 1 and 2.

FIG. 4 is a sectional view taken along line 4—4 of FIG. 3.

FIG. 5 is a plan view illustrating another embodiment of a safety cap constructed in accordance with the present invention.

FIG. 6 is a plan view of yet another embodiment of a safety cap constructed in accordance with the present invention.

FIG. 7 is a plan view of a base cap utilized in the embodiment of the invention depicted in FIG. 6, and forming a portion of the safety cap there illustrated.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT OF THE INVENTION

Referring initially to FIGS. 1-3, shown therein is a cylindrical vial or container of the type commonly used to contain and store pills, capsules or other articles which may be of an inherently dangerous character, and as prescribed by a physician and as dispensed by a pharmacist. The container 10 is

most often of cylindrical configuration, and is frequently formed of a plastic or synthetic resin material. It is also a widespread practice to provide on such vials or containers, a flange or rib 12 which extends circumferentially around the outer periphery of the container 10 adjacent the upper end thereof. The flange or rib 12 will usually be molded integrally with the container as best illustrated in FIG. 4 of the drawings.

As previously explained, tragedies frequently occur as a result of the failure of the cap or other closure member to prevent children from removing such closure member or cap, with the result that small children frequently are able to open the container, and to consume quantities of the pills or capsules located therein, resulting in severe sickness and occasionally in death. The safety cap of the present invention undertakes to prevent the removal of the cap by small children, and to require a deliberate and knowledgeable manipulation of the cap in order to permit it to be removed from the container.

The safety cap of the invention is denominated generally by reference numeral 14 and includes two basic parts or elements, so described because each of these parts or elements is molded as a single piece, and such molded parts are then joined to each other in assembling the safety cap of the invention. The first of the parts or elements included in the safety cap 14 is a base cap 16 and the second is a top cap 18. The base cap 16 includes, in the illustrated embodiment of the invention, a circular or disk-shaped cover plate 20 which has a downwardly extending flange 22 formed at the outer peripheral edge thereof at a location such that the flange 22 will extend inside of, and will contact, the inside surface of the side wall of the container 10. It may be pointed out that the downwardly extending flange 22, though formed as a continuous annular flange in the illustrated embodiment of the invention, need not be completely circular or annular in configuration, but may be interrupted and include only a plurality of spaced arcuate segments. The function of the flange 22 is in large part to support and give reinforcement to the upper end portion of the side wall of the container adjacent its upper edge, and to prevent undesirable inward yielding of the upper edge of the container and thus facilitate the retention of locking engagement of the safety cap of the invention in a manner hereinafter described.

A horizontally extending peripheral flange 24 is formed around the outer peripheral edge of the base cap 16 contiguous to the downwardly extending flange 22. The horizontally extending flange 24 bears against the upper edge of the container 10 when the safety cap is in position as illustrated in FIG. 4. At one or more points spaced around the periphery of the horizontally extending flange 24, one or more locking fingers, designated generally by reference numeral 26, are secured to the horizontally extending flange and project normal thereto. Each locking finger has an upper end portion 28 and a lower portion which carries a locking toe 30. The length of the locking fingers and their method of joinder to the horizontally extending flange 24, are such that when the upper portion 28 of each locking finger is pressed radially inwardly with respect to the central axis of the container 10 and the safety cap 14, the lower end thereof is biased outwardly so that the locking toe 30 is disengaged from the flange 12 formed at the upper end of the container 10. It will be noted that in the illustrated embodiment of the invention, a pair of locking fingers 26 are provided and are disposed on opposite sides of the safety cap 14, or, stated differently, are spaced from each other 180° around the horizontally extending flange 24.

The second part of the safety cap 14 which is used in conjunction with the base cap 16 is the top cap 18. The top cap 18 includes a substantially horizontally extending plate 32 which has extending downwardly from the peripheral edge thereof a downwardly extending flange 34. The downwardly extending flange 34 extends normal to the plate 32 at all locations except over two arcuate sectors where it is recessed inwardly and thus inclined slightly to the vertical. The inclined sectors of the

flange 34 are shown in the sectional view of FIG. 4, and are designated by reference numerals 34a. These recessed or relieved sectors also appear in FIGS. 1 and 3. The purpose of the relieved sectors 34a of the flange 34 will be hereinafter described.

Extending downwardly from the central portion of the plate 32 is a locking projection 36. The locking projection 36, in the embodiment of the invention illustrated, is a tubular element carrying a locking rib adjacent the lower end thereof. The locking projection 36, due to the flexibility and resiliency of the synthetic resin material of which the top cap 18 is constructed, can be compressed slightly and forced through the opening formed in the center of the cover plate 20 of the base cap 16, and then allowed to spring back to its relaxed or unstressed configuration so that the rib carried near the lower end thereof engages the cover plate 20 to pivotally support the top cap on the base cap. It will also be noted that the lower edge of the downwardly projecting flange 34 forming a portion of the top cap 18 bears against the horizontally extending flange 24 forming a portion of the base cap 20. When the top cap 18 is secured to the base cap 16 in this manner, the top cap may be pivoted about a pivotal axis extending through the center of the locking projection 36.

With the safety cap 14 and container 10 assembled in the manner described, the safety cap may be placed in a locked safety position by rotating the top cap 18 from the position which it occupies in FIGS. 1-4, to a position in which the recessed or relieved sectors 34a of the downwardly extending flange 34 of the top cap are out of alignment with the upper portions 28 of the locking fingers 26. The position of the top cap 18 in which the recessed or relieved sectors 34a are aligned with the locking fingers 26 has been illustrated in the drawings. When the top cap has been rotated to a position in which the relieved sectors 34a are misaligned with the locking fingers 26, the flange 34 bears against the upper portions 28 of the locking fingers 26 so that the locking fingers cannot be digitally biased about their line of connection to the horizontally extending flange 24. Thus, the locking fingers 26 cannot be moved in a way such that the locking toes 30 become disengaged from the rib or flange 12. It is thus not possible at this time to remove the safety cap 14, and the contents of the container 10 are therefore inaccessible to children.

When it is desired to manipulate the safety cap 14 so that the container 10 may be opened and the contents thereof made accessible, the top cap 18 is rotated upon the base cap 16 so as to bring the relieved or recessed sectors 34a of the flange 34 into alignment with the locking fingers 26. When such alignment has been achieved, the upper portions 28 of the locking fingers 26 can be pressed inwardly with the fingers to cause the lower ends carrying the locking toes 30 to be pivoted outwardly. This disengages the locking toes 30 from the rib or flange 12 carried at the upper end of the container 10, and the safety cap 14 may be easily removed from the container.

Other embodiments which decrease the likelihood of fortuitously perceiving the manner in which the safety cap may be removed from the container 10 are illustrated in FIGS. 5-7. In FIG. 5 of the drawings, the location of the locking fingers 26 on the safety cap 14 has been changed so that the locking fingers are spaced from each other by some angle other than 180°. In the illustrated embodiment of the invention, this spacing is about 160°. The relieved sectors 34a of the flange 34 are correspondingly relocated, and are spaced in the same way with respect to each other as are the locking fingers 26. With this arrangement, it will be apparent that there is only one position of rotation of the top cap 18 with respect to the base cap 16 in which the locking fingers 26 can be aligned with the relieved or recessed sectors 34a of the flange 34. In any other position of the top cap 18 with respect to the base cap 16, such alignment cannot be realized. Thus, the possibilities of achieving the necessary alignment of the locking fingers 26 with the recessed or relieved sectors 34a are reduced from two possible ways to one possible way in the case of the FIG. 5 embodiment

of the invention, as contrasted with the embodiment depicted in FIGS. 1-4.

In FIGS. 6 and 7 of the drawings, yet another embodiment of the invention is illustrated which provides an advantage in reducing the number of ways in which the top cap 18 may be manipulated with respect to the base cap 16 in order to place the safety cap in the proper position for removal. In the embodiment of the invention depicted in FIGS. 6 and 7, the top cap 18 is constructed identically to the top cap 18 utilized in the embodiment of the invention shown in FIGS. 1-4, except that a downwardly projecting stud or protuberance 40 is provided on the plate 32 and extends toward the cover plate 20 forming a portion of the base cap 16. A second stud 40 is disposed across the top cap 18 from the first mentioned stud 40, and is spaced circumferentially therefrom by 180°. These studs are shown in the plan view of FIG. 6 in dashed lines to illustrate their location on the inner side of the top cap 18.

In FIG. 7, the top cap 18 has been removed from the base cap 16 to expose the upper surface of the cover plate 20 of the base cap. Thus, it will be perceived that the cover plate 20 of the base cap 16 carries a pair of upwardly projecting studs 42 or protuberances, with such studs being disposed on opposite sides of the cover plate, and spaced from each other by 180° around the plate. The studs 42 are radially spaced from the central axis of the base cap 16 by a distance which is equivalent to the radial spacing of the studs 40 from the central axis of the top cap 18. Thus, as the top cap 18 is rotated on the base cap 16 in the manner hereinbefore described, the studs 40 ultimately come into contact with the studs 42 and prevent further rotation of the top cap.

This status of the studs 40 and 42 is shown in FIG. 6. It will be noted in referring to this figure that when contact is established between the studs 40 and 42 to prevent further rotation of the top cap 18 with respect to the base cap 16, at this time the recessed or relieved sectors 34a of the flange 34 are aligned with the locking fingers 26 so that the top cap is in the unlocking position. It will further be understood, upon reflection, that the function of the studs 40 and 42 located on the top cap 18 and the base cap 16, respectively, is to prevent the achievement of the unlocking status of the caps other than by rotation of the top cap 18 in a single direction. If it is attempted to rotate the top cap 18, for example, in a clockwise position as the top cap is viewed in FIG. 6, such rotation cannot be utilized to achieve alignment of the recessed sectors 34a of the flange 34 with the locking fingers 26, and thus the locking fingers cannot be biased inwardly in a way so as to detach the locking toes 30 from the rib or flange 12 until a sufficient counterclockwise rotation has been effected.

From the foregoing description of the invention, it will be perceived that a safety cap is provided for safely isolating the contents of a container or vial from a child of tender years. The safety cap of the invention, on the other hand, is not sufficiently complex in its construction, or complicated in its operation, that the average adult cannot quickly and easily remove the safety cap from the vial or container in order to obtain access to the contents thereof. Moreover, the safety cap of the invention is not expensive to fabricate and manufacture, and is susceptible to usage with a great many types of vials or containers which characteristically carry a rib or flange adjacent the open upper end thereof.

Although certain preferred embodiments of the present invention have been illustrated in the accompanying drawings, it will be understood that various changes and modifications in the structures depicted and described can be effected without departure from the basic principles which underlie the invention. Changes and modifications of this type are therefore deemed to be circumscribed by the spirit and scope of the invention except as the same may be necessarily limited by the appended claims or reasonable equivalents thereof.

What is claimed is:

1. A safety lid for containers comprising:

a base cap adapted for frictional engagement with the open upper end of the container and including at least one ver-

tically projecting locking finger pivotal about a horizontal axis, said locking fingers carrying locking toes engageable with said container in one position, and releasable from said container on pivotation to a second position; and a top cap pivotally mounted on said base cap for pivotation about a vertical axis and including a vertically extending flange extending concentrically around the axis of pivotation of the top cap, and in juxtaposition to said locking fingers, said flange having a recessed sector therein for accommodating the pivotal movement of each of said locking fingers when said recessed sectors are aligned with said locking fingers.

2. A safety cap as defined in claim 1 wherein said base cap is further characterized as including:

a cover plate;

a downwardly extending flange around the outer peripheral edge of the cover plate; and

a horizontally extending flange projecting horizontally from at least a portion of the outer peripheral edge of the cover plate and secured at its outer edge to said locking fingers.

3. A safety cap as defined in claim 2 wherein said base cap is further characterized in having an opening formed in the center thereof;

and wherein said top cap is further characterized in having a downwardly extending locking projection extending through said opening and rotatably engaging said bottom cap for pivotally mounting said top cap on said base cap.

4. A safety cap as defined in claim 1 wherein said base cap is an integrally molded, one-piece synthetic resin member.

5. A safety cap as defined in claim 4 wherein said top cap is an integrally molded, one-piece synthetic resin member.

6. A safety cap as defined in claim 1 wherein said base cap includes two of said locking fingers disposed on opposite sides of said base cap entity from each other;

and wherein said top cap flange includes two of said recessed sectors disposed 180° from each other around said top cap flange for concurrent alignment with said locking fingers.

7. A safety cap as defined in claim 1 wherein the top cap and base cap are round in configuration, and wherein said base cap includes two of said locking fingers disposed around the outer periphery of the base cap and circumferentially spaced from each other therearound by less than 180° whereby said top cap can be rotated to only one position in which said locking fingers are aligned with said recessed sectors.

8. A safety cap as defined in claim 1 and further characterized as including:

a downwardly projecting stud extending downwardly from said top cap; and

a stud projecting upwardly from said base cap in a position to be contacted by said downwardly projecting stud when said top cap is rotated thereon whereby the rotational movement of said top cap on said base cap may be arrested.

9. A safety cap as defined in claim 2 wherein said base cap is an integrally molded, one-piece synthetic resin member.

10. A safety cap as defined in claim 4 wherein said base cap is further characterized in having an opening formed in the center thereof;

and wherein said top cap is further characterized in having a downwardly extending locking projection extending through said opening and rotatably engaging said bottom cap for pivotally mounting said top cap on said base cap.

11. A container and safety cap for safely storing dangerous substances comprising:

a cylindrical container;

a flange around said container adjacent the open upper end thereof;

a base cap of generally circular configuration for closing the open upper end of the container, and having a pair of vertically extending locking fingers on the outer periphery thereof and pivotal about a horizontal axis, said locking

7

fingers each extending downwardly along the outside of said container and each carrying a locking toe engaged with said flange;

- a top cap of generally circular configuration rotatably mounted on said base cap for pivotation about a vertical axis, said top cap including portions extending partially around its outer periphery positioned adjacent said locking fingers for preventing pivotal movement of said locking fingers when said top cap is in one position relative to said base cap, and said top cap further includes recessed portions at its outer periphery for accommodating pivotal movement of said locking fingers when said top cap is in a second position relative to said base cap.

12. A container and safety cap as defined in claim 11

8

wherein said base cap and locking fingers comprise a unitary, one-piece molded member.

13. A container and safety cap as defined in claim 12 wherein said top cap comprises

a circular plate; and

a downwardly extending annular flange on said plate and bearing against said base cap, said flange having relieved sectors constituting said recessed portions.

14. A container and safety cap as defined in claim 12 wherein said base cap has an opening in the center thereof and said top cap has a downwardly extending projection journaled in said opening in the base cap for rotatably mounting the top cap on the base cap.

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