June 17, 1969 V. J. ESPOSITO, JR 3,450,289

INTEGRAL CHILD-PROOF CAP

Filed July 24, 1967

FIG. 2

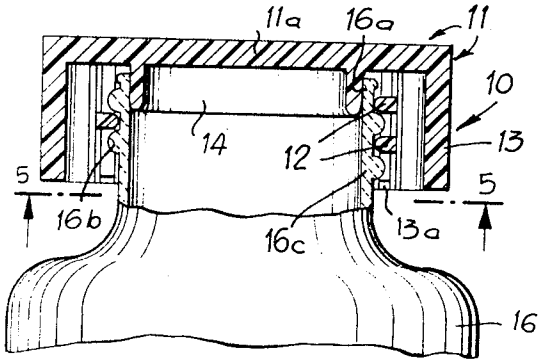


FIG. 3

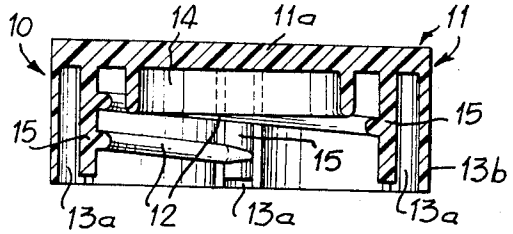


FIG. 6

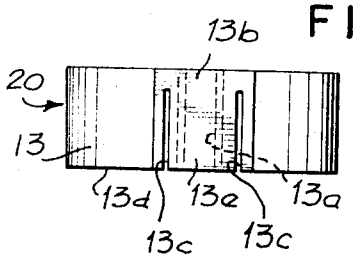
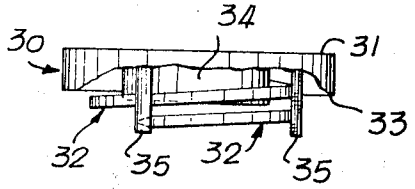


FIG. 7



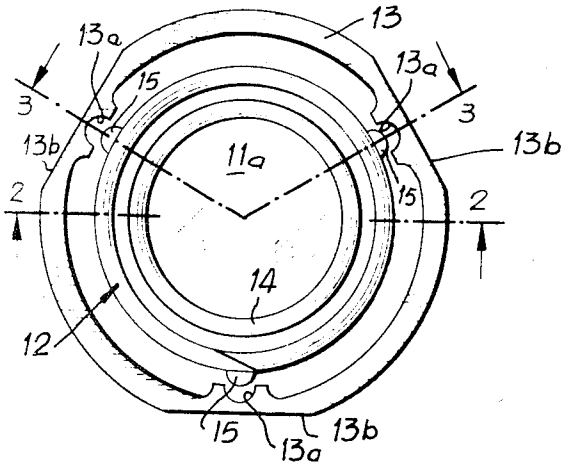


FIG. 1

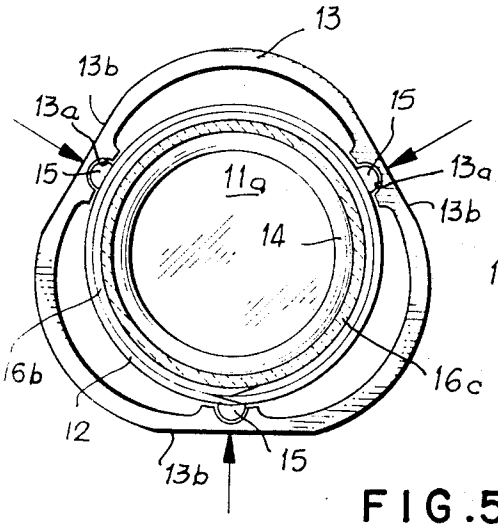


FIG. 5

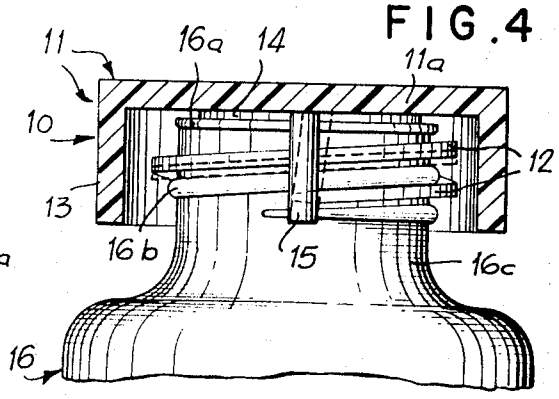


FIG. 4

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INTEGRAL CHILD-PROOF CAP

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ABSTRACT OF THE DISCLOSURE

A one piece plastic molded cap comprising a top wall and peripheral skirt and having threads loosely suspended from the top wall and separated from the surrounding skirt so that the threads distort and resist unscrewing from a threaded engagement with a container neck when the unscrewing is attempted by application of simple torque to the top wall and skirt. The skirt is inwardly deformable and has means which lockingly engage the threads to prevent said distortion simultaneously with the application of said torque to enable unscrewing and removal of the cap.

Background of the invention

Field of the invention.—The invention relates to threaded caps for bottles and the like containers and more particularly is directed to screw caps molded of resilient plastic resinous material having so-called child-proof characteristics in the form of integral means for preventing removal from a container by the application of simple torque but requiring the simultaneous application of another force in a different direction to effect said removal.

Description of the prior art.—The invention satisfies the current need for a simple, inexpensive, and practical child-proof bottle cap.

Summary of the invention

Among the objects of the invention is to provide a child-proof cap for bottles having threaded necks of conventional construction. The cap may be molded of resilient material as a one piece integral structure in low cost quantity production by modern molding methods and comprise a cover portion and a helical or thread member. The cover portion has a top wall, peripheral skirt and inner concentric annular flange for sealingly engaging the interior of the bottle mouth. The helical member is relatively loosely suspended from the top wall concentric with and spaced between the skirt and flange to engage the exterior threads of the bottle neck and retains the top wall and flange in position to seal the bottle. The child-proof characteristic of the cap is achieved by the action of the helical member with respect to the cover. The helical member, by virtue of said relatively loose suspension, distorts when simple, unscrewing torque is applied to the cover by means of the skirt which may surround and conceal the helical member. This distortion serves to cause the helical member to more tightly grip the bottle neck and prevents unscrewing therefrom. The skirt in turn is pliable, permitting radially inward deformation of certain designated areas whereby interengagement of the skirt and helical member is effected to secure the parts for movement together and to prevent distortion of the helical member. The required finger pressure and coordination to unscrew the cap by simultaneous exertion of inward deformation and torque forces on the skirt will be impossible for small children to achieve. In a simplified form of the invention the skirt is substantially shortened permitting finger access to the helical member to which torque can be directly applied, the prominence and attractiveness of the cover portion as compared to the relative obscurity and the difficulty of direct manipulation of the helical member by

a child's fingers serving as the child-proof characteristic. The cap is also corrosion resistant, sanitary for use on comestibles, practical and efficient to a high degree in use.

Brief description of the drawing

FIG. 1 is a bottom plan view of a child-proof cap constructed to embody the invention.

FIG. 2 is a vertical section of the cap taken substantially along line 2—2 in FIG. 1 but showing the cap mounted upright on a bottle neck.

FIG. 3 is a vertical section of the cap removed from the bottle taken along line 3—3 in FIG. 1.

FIG. 4 is a front elevational view of the cap mounted on a bottle neck with the skirt broken away to illustrate the action of the helical member, the broken line indicating the distorted position of the suspension strip and helical member when counterclockwise torque is applied to the cover portion.

FIG. 5 is a horizontal sectional view as seen on line 5—5 in FIG. 2 but showing the interengagement between the skirt and helical member when the designated areas are radially inwardly deformed as indicated by the arrows.

FIG. 6 is an elevational view of a modified form of cap made of a more rigid material having a pair of spaced slits formed in the skirt to provide a depressible tab for each designated deformable area, and

FIG. 7 is an elevational view of another modified form of cap having a shortened skirt for direct finger access to the helical member, a portion of the shortened skirt being broken away to show interior structure.

Description of the preferred embodiments

Referring in detail to FIGS. 1 to 5, inclusive, of the drawing, **10** generally denotes a child-proof cap molded as an integral unit of a suitable elastomeric material, such as, polyolefins, polyvinyls, polyurethanes, ethylenevinylacetate and the like, to comprise a cover **11** and a helical or thread member **12**. The cover **11** is formed with a top wall **11***a* and a peripheral skirt **13** and may also have an interior annular flange **14** concentric with the skirt **13** for fitting into and engaging the mouth **16***a* of a bottle **16**.

Helical member **12** is shaped and sized to engage external threads **16***b* on the neck **16***c* of bottle **16** and is suspended between and spaced from skirt **13** and flange **14** by means of a plurality of suspension strips **15**, here shown as three in number, and symmetrically arranged about helical member **12**. Strips **15** are integrally formed to project downwardly from top wall **11***a* forming a loose connection between cover **11** and helical member **12** permitting relative torque therebetween. As will be clear from FIG. 3, each strip **15** connects to no more than two coils of the helical member **12** to provide the lock thread action hereinafter more fully described.

Each suspension strip **15** may be formed to interlock with skirt **13** for movement therewith when the latter is deformed radially inwardly to engage strip **15**. To this end, each strip **15** may be suitably shaped to project radially, here shown as being semicircular in cross-section, for fitting in tongue and groove fashion into a cradle **13***a* formed on the interior surface of skirt **13** in radial register therewith. Suitable means are provided to indicate the locations of cradles **13***a* and the areas for applying radially inward finger pressure, here shown as flat faces **13***b* on skirt **13** which are centralized opposite cradles **13***a*.

The operation of child-proof cap **10** will now be apparent. Cap **10**, molded as a one piece integral structure with helical member **12** supported in concentric relation to skirt **13**, is threaded onto bottle neck **16***c* by helical member **12** engaging threads **16***b* and tightened so that interior flange **14** enters and seals bottle mouth **16***a*. In this position helical member **12** grips bottle neck **16***c* by the lock thread action, that is, so that when counterclockwise torque

is applied to cover **11** to unscrew cap **10**, the portion of helical member **12** remote from top wall **11***a* will resist movement causing suspension strips **15** to flex from the normal position, here shown as parallel to the axis of helical member **12**, to an oblique position as seen in broken lines in FIG. 4. This flexure in turn distorts helical member **12**, tightening the grip on bottle neck **16***c*. The lock thread action may be improved by providing the coils of helical member **12** with a minor diameter smaller than that of the bottle neck threads **16***b*.

To remove cap **10**, skirt **13** is gripped by the thumb and two fingers at flat faces **13***b*. Radially inward pressure is then exerted to flex skirt **13** inwardly, as seen in FIG. 5, to engage at least one of the cradles **13***a* with its respective suspension strip **15**. Simultaneously, torque is applied to unscrew the cap, flexure of suspension strips **15** and hence the lock thread action being prevented by skirt **13** and helical member **12** moving as a unit.

A modified form of cap **20** is shown in FIG. 6 which may be made of a more resilient material, such as, high impact styrene, acetal resin or nylon and the like. Cap **20** may be identical in construction to cap **10** except for a pair of spaced slits **13***c* which extend vertically up from the bottom edge **13***d* of skirt **13** on each of the flat faces **13***b*. Each pair of slits **13***c* provide a resilient tab **13***e* carrying the cradle **13***a* on the interior surface thereof for resiliently bending on application of inward radial pressure to engage suspension strip **15**. Slits **13***c* and tabs **13***e* may also serve to indicate pressure areas so that skirt **13** may be made entirely circular or of another desired configuration eliminating flat faces **13***b*.

Another modified form of cap embodying the invention is shown in FIG. 7 as cap **30** comprising a cover **31**, helical member **32** annular flange **34** and suspension strips **35** all similar to corresponding cover **11**, helical member **12**, annular flange **14** and suspension strip **15** of cap **10**. In cap **30** skirt **33** is shortened to expose helical member **32** and strips **35** for direct finger manipulation when removal of cap **30** from a bottle neck is desired. As in cap **10**, torque applied to cover **31** results in a lock thread action which may be overcome by gripping strips **35** directly with the fingers preferably adjacent the free ends thereof to rotate helical member **32**.

The improved child-proof caps herein disclosed are seen to achieve the several objects of the invention and to be well adapted to meet conditions of practical use. As various possible embodiments might be made in this invention, and as various changes might be made in the disclosed constructions, it is to be understood that all matter herein set forth or shown in the accompanying drawing are to be interpreted as illustrative and not in a limiting sense.

I claim:

1. A child-proof cap molded of resilient material comprising a cover formed with a top wall sized to overhang the mouth of a bottle, a helical member for engaging external bottle neck threads loosely suspended from the top wall, said loose suspension permitting limited relative rotary movement between the top wall and helical member, the latter being constructed and arranged to resist unscrewing from threaded engagement with the bottle neck threads when torque is applied to said cover.

2. The child-proof cap defined in claim **1** in which a plurality of spaced suspension strips extend from said top wall and attach to the exterior of said helical member serving as said loose suspension.

3. The child-proof cap defined in claim **1** in which the cover includes a peripheral skirt formed about said top wall concentric with and spaced outwardly from said helical member and extending downwardly to conceal the latter, said skirt having a radially inwardly deformable portion, interengaging means carried by said helical member and said skirt deformable portion for interlocking the skirt with the helical member for rotary movement when said skirt deformable portion is deformed for said interlockment simultaneously with application of torque to the cover to effect unscrewing and removal of the cap.

4. The child-proof cap defined in claim **1** in which said helical member is accessible for direct finger torque application thereto to effect unscrewing and removal of the cap.

5. The child-proof cap defined in claim **3** in which a plurality of spaced suspension strips extend from said top wall and attach to the exterior of said helical member serving as said loose suspension, said interengaging means being part of one of said suspension strips projecting toward said skirt and a complementary groove formed in said skirt deformable portion opposite said strip.

6. The child-proof cap defined in claim **3** in which said cover is formed with means for indicating said skirt deformable portions.

7. The child-proof cap defined in claim **3** in which said skirt deformable portion is an integral tab formed by a pair of spaced slits in the skirt extending upwardly from a bottom edge thereof.

8. The child-proof cap defined in claim **3** in which said skirt has a plurality of said deformable portions equally spaced from each other.

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U.S. Cl. X.R.

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