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Deussen

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[54] **CHILDPROOF CONTAINER CLOSURE**

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[52] **U.S. Cl.** ..... **215/9,** 215/41, 215/46 R

[51] **Int. Cl.** **A61j 1/00**

[58] **Field of Search** ..... 215/9, 41, 7, 46 R; 81/3.4

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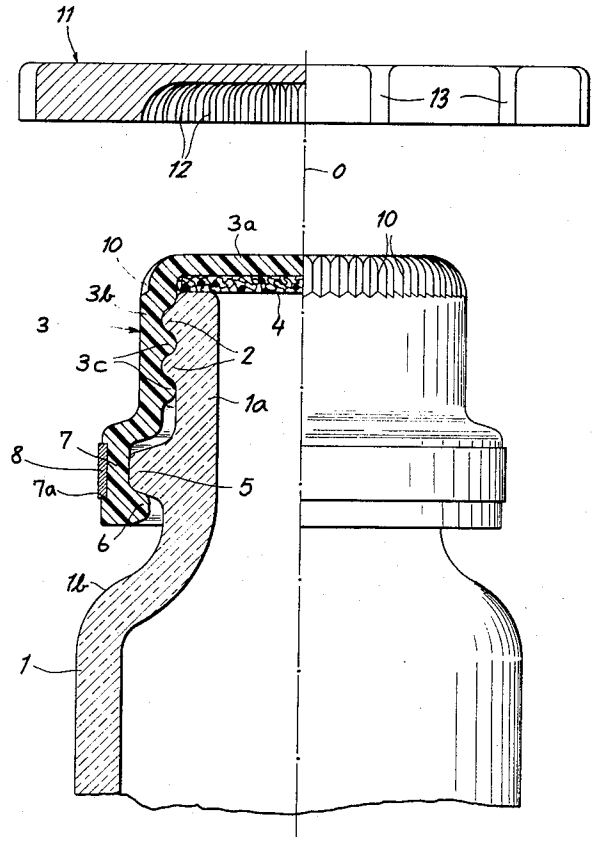
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[57] **ABSTRACT**

The neck of a container, such as a medicine bottle, has a bead gripped from below by an annular lip of an elastic closure member which is slipped around that neck from above. A cover for the open top of the neck is integral with that member or threaded into same and can be removed only with the aid of a special key engaging the cover under slight downward pressure from above.

13 Claims, 3 Drawing Figures



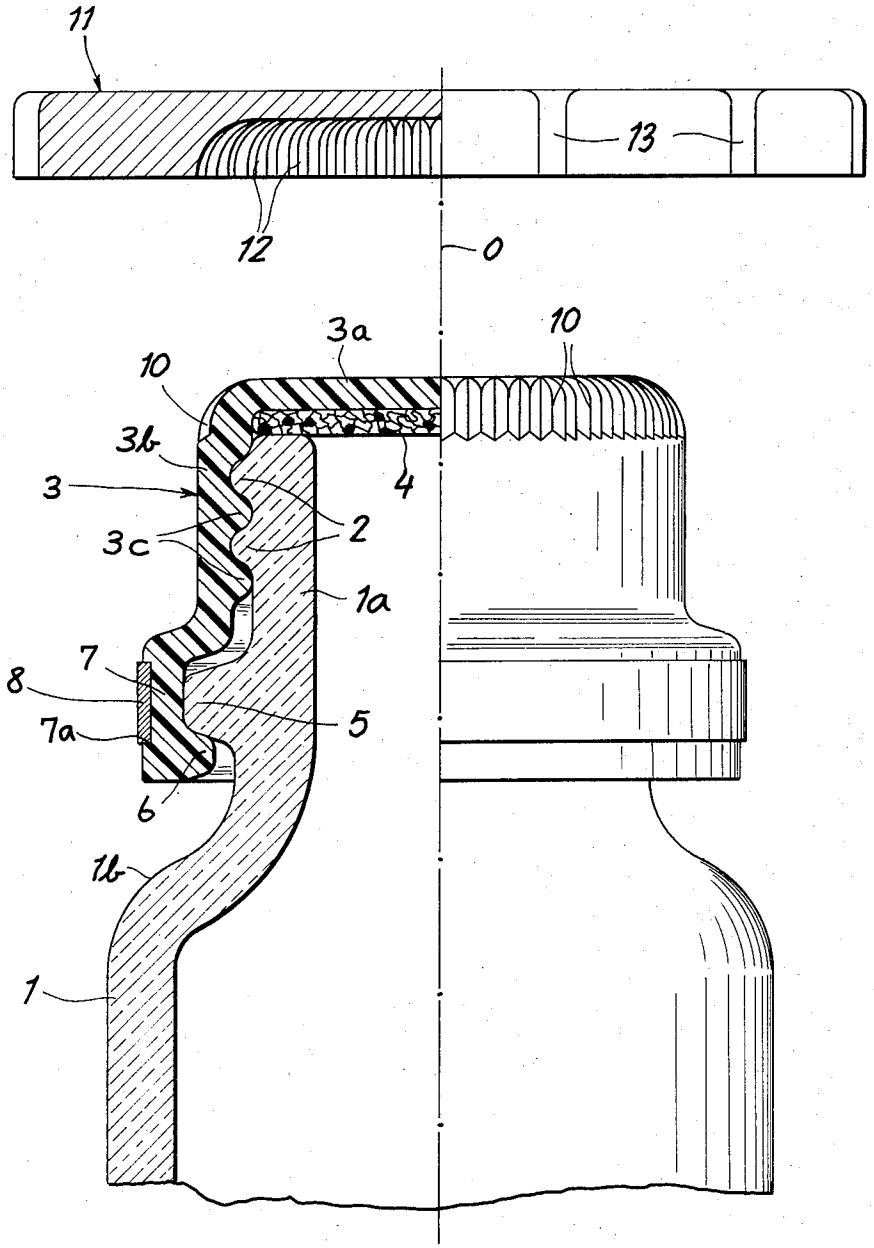


FIG. 1

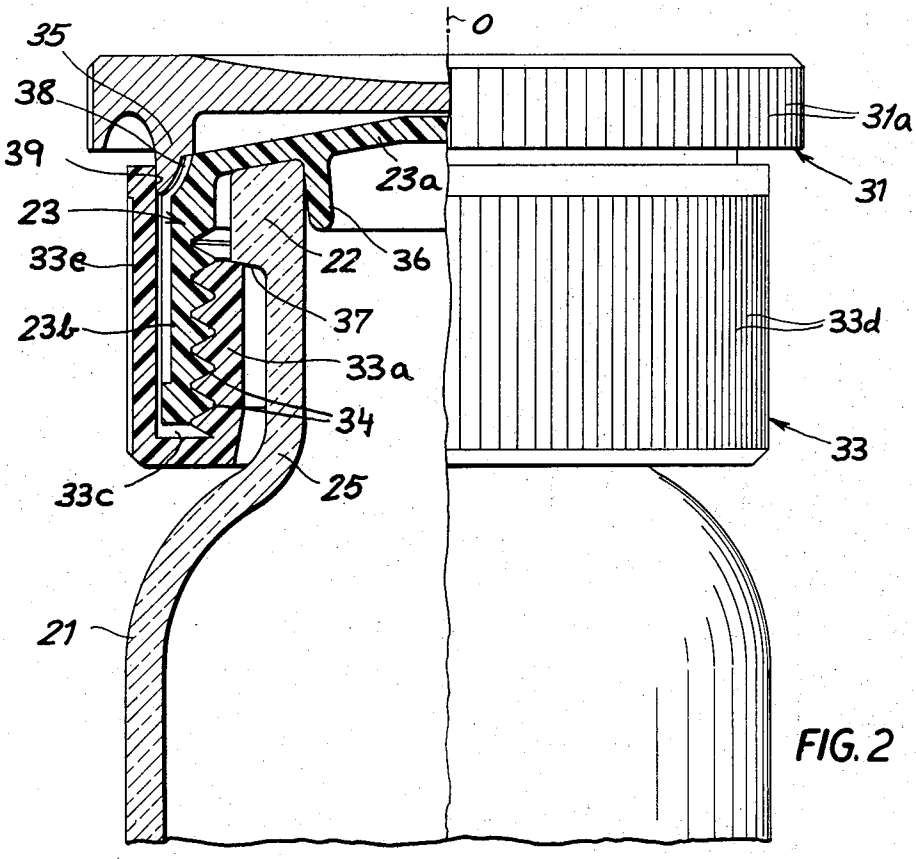

O
35
38
39
23
33e
23b
33c
21
23a
22
36
37
33a
34
25
31a
31
33d
33

FIG. 2

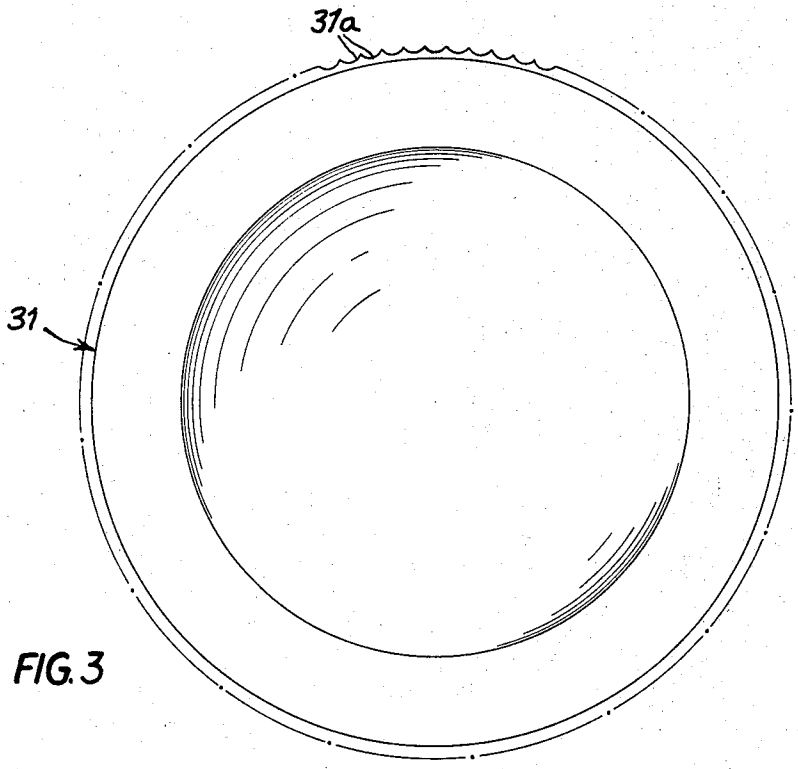

31a
31

FIG. 3

CHILDPROOF CONTAINER CLOSURE

My present invention relates to a childproof closure for a container, such as a medicine bottle, of the type having an open-topped neck normally overlain by a cover which is to be secured against removal by unauthorized persons, especially children.

Such containers, usually made of glass, metal or plastic material, have in the past been provided with a variety of closures designed to deny access to small children who could misuse their contents. Some of these conventional closures rely on a sequence of manipulations which, it is assumed, the very young are unable to perform; actually, however, some children are more adept than adults in carrying out these relatively complex operations. In other instances, reliance is placed on the sheer force required to remove the cover; frequently in such cases, however, weak or elderly grown-ups having need for the medicine area also unable to overcome the frictional resistance of the closure and must resort to coins, pliers or other readily available utensils which are equally accessible to unauthorized members of the household.

Thus, the general object of my present invention is to provide an improved closure for containers of this description which cannot be opened by unauthorized persons even with the aid of common household tools.

A more particular object is to provide a closure of this character utilizing a special key which can be kept in a safe place away from the container and which, in the hands of a small child somehow gaining access thereto, will be inoperative because of the need for the application of a certain pressure to open the cover.

Basically, a childproof closure according to my invention comprises a cover provided with a depending skirt designed to be fitted around the container neck, the neck and the skirt having respective external and internal cam means (such as screw threads or a bayonet lock) normally engaging each other for holding the cover onto the open top of the neck with sufficient frictional force to resist removal by the bare hands of a child. Such removal can be effected, however, with the aid of a key detachably fitting onto the cover for imparting thereto an untwisting rotary motion about the axis of the neck, the key and the cover being respectively provided with mating first and second formations such as teeth or serrations arrayed about that axis.

Advantageously, pursuant to another feature of my invention, the serrations on the cover and on the key have flanks which, in their position of operative engagement, are inclined with reference to the neck axis at an angle sufficient to exert upon the key an upward camming force requiring a countervailing downward pressure for keeping the key engaged with the cover. This downward pressure need not be particularly great but must be exerted in a direction (downward) which seemingly opposes the intended result of lifting the cover; thus, a small child is extremely unlikely to apply such a pressure correctly whereas a reasonably alert adult, even if physically weak, will be able to open the closure with little difficulty.

Thus, I prefer to dispose the two sets of mating serrations on complementary annular surfaces on the key and the cover, these surfaces being of frustoconical or rounded configuration so as to have straight or curved generatrices whose extensions converge on the axis of the neck. In a very convenient arrangement of this nature, the serrations of the cover occupy an upwardly converging outer peripheral surface thereof, the key forming a socket for this peripheral surface.

The external cam means may be formed directly on the container neck or on an ancillary member secured to that neck. Such an ancillary member may be an elastic ring slipped from above around an outer peripheral bead of the container neck so as to come to rest below that bead which thereby prevents the ring from being stripped off. According to a more particular feature of this aspect of my invention, the ring is part of a sleeve with a J-profile defining an upwardly open annular channel whose inner wall is constituted by that ring and whose outer wall rises past the serrated peripheral surface of the cover to form therewith an upwardly diverging annular gap adapted to receive an annular flange of the key having a downwardly converging profile. The sleeve, which affords only restricted access to the serrations of the cover while being freely rotatable with reference thereto, defeats any attempt to unscrew the cover by gripping the skirt with a pair of pliers. Such a protective sleeve, held against rotation, could also be used in an embodiment in which the cover skirt is directly threaded onto the container.

The above and other features of my invention will now be described in detail with reference to the accompanying drawing in which:

FIG. **1** is an elevational view, partly in section, of a container top provided with a closure according to the invention, including a detachable key illustrated in disengaged position;

FIG. **2** is a view similar to FIG. **1**, showing a modified closure according to the invention with its key in engaged position; and

FIG. **3** is a top view of the key shown in FIG. **2**.

Reference will first be made to FIG. **1** which shows the upper part of a container **1**, such as a glass bottle, terminating in an upwardly open neck **1***a* with integral male threads **2** and an integral outer peripheral bead **5** below these threads. Bead **5**, sometimes referred to as a transport ring, is conventionally used during manufacture to help transfer the molded preform or parison of a bottle to a blow mold in which it receives its final shape; the outer diameter of this bead is generally larger than that of the threads **2**.

A closure member **3**, of rubber or synthetic elastomeric material, forms a cover **3***a* for the open top of neck **1***a* and a depending skirt **3***b* integral with that cover, this skirt having female threads **3***c* mating with the male threads **2** of neck **1***a*. The skirt **3***b* is flared outwardly at **7** and terminates in an inner peripheral lip **6** which underlies the bead **5** and resists the detachment of closure member **3** from neck **1***a* by an unscrewing motion. The elasticity of member **3** is sufficient to let the lip **6** clear the bead **5** when that member is fitted onto the container with a downward thrust, the lip **6** thereupon contracting and bearing from below upon the bead **5** with sufficient force to hold the cover **3***a* firmly onto a gasket **4** (e.g. of cork) which rests on the neck **1***a*. In some instances, especially if the material of the cover **3***a* does not interact with the contents of vessel **1**, the gasket **4** may be omitted.

In the embodiment illustrated in FIG. **1**, the outwardly flared portion **7** of skirt **3***b* is formed with a peripheral recess **7***a* receiving a band **8**, e.g. of sheet metal or plastic, which is slipped into that recess when a container is closed for the first time after having been

filled. The band **8**, which may be of a color contrasting with that of the closure member, is ruptured by the radial expansion of lip **6** upon the first removal of member **3** from the container; thus, the intact condition of the band indicates that the original contents of the vessel have remained untouched.

Even without the band **8** the removal of closure member **3**, resisted by the interengagement of bead **5** and lip **6**, requires a torque which cannot be applied to that member by gripping the smooth outer surface of skirt **3***b* with the fingers or even with a pressure-generating tool such as a pair of pliers. The only place where such torque can be effectively applied is a narrow annular zone along the periphery of the cover which is formed with serrations **10** engageable by mating serrations **12** of a flat key **11** whose external ribs **13** facilitate its manipulation. The serrated surface **10** is curved so as to converge upwardly, with the flanks of its teeth inclined relatively to the axis **0** of the neck **1***a* so as to give rise to an upward force component tending to separate the key **11** from the cover **3***a* when the key is rotated with reference to container **1** after having been fitted onto the cover. Thus, a certain downwardly directed axial pressure must be maintained to keep the serrations **10, 12** engaged during rotation.

Small children will be unable to exert enough leverage on the serrations **10** to open the bottle. Even a strong adult will have difficulty doing so, particularly as long as the band **8** is intact; the rounding or tapering of the serrated surface would cause any ordinary tool to slip. Thus, use of the key **11** is essential at least for the first removal of closure member **3.** Key **11** may be supplied with the container **1** in a common package, e.g. while being held in operative position by an envelope of transparent foil shrunk onto the container neck so that the purchaser will readily know how to use it; upon removal of the envelope, the key drops off and should be stored in a safe place inaccessible to children or other unauthorized members of the household.

The embodiment of FIGS. **2** and **3** provides additional protection against removal of a closure member by such means as pliers or perhaps the use of one's teeth. In this embodiment a container **21** has a neck **25** provided at its top with an outer peripheral bead **22.** A closure member **23,** which here may be of relatively rigid (e.g. plastic) material, forms a cover **23***a* and a depending skirt **23***b*, the latter being internally provided with female threads **34** engaging complementary male threads on a ring **33***a* which is entegral with a sleeve **33** embracing the neck **25.** Sleeve **33** has a J-profile defining an upwardly open annular channel **33***c* between the ring **33***a* and an outer wall **33***b*, the latter being provided with external corrugations **33***d*. Sleeve **33***a*, which constitutes the inner wall of channel **33***c*, bears with its upper edge upon the underside of bead **22.** Cover **23***a*, overlying the neck **25,** brackets the bead **22** between its skirt **23***b* and an inner annular flange **36.** Channel **33***c* is wide enough to enable free relative rotation of members **23** and **33.**

An outer peripheral zone **38** of cover **23***a* is upwardly tapered and serrated in a manner similar to that of zone **10** of FIG. **1.** Zone **38** is separated from the top of outer wall **33***b* by a narrow, upwardly diverging annular gap **39** accommodating a flange **35** of complementary profile on a key **31,** this flange forming a serrated socket similar to that shown at **12** in FIG. **1.** In this instance the skirt **23***b*, being entirely surrounded by the wall **33***b*, need not have a smooth outer surface so that the serrations of zone **38** may extend downwardly across that surface.

In assembling the closure of FIG. **2,** I first force the ancillary sleeve member **33** down around the neck **25** until the inner wall **38***a* thereof snaps into position below bead **22.** Thereafter, the skirt **23***b* of closure member **23** is screwed into the channel **33***c*, at least the last stage of this screwing motion requiring the use of the key **31** which can be readily rotated with reference to the sleeve **33** by being also externally corrugated or milled as shown at **31***a* (see also FIG. **3**). For unscrewing it is again necessary to use the key **31,** at least in the initial phase. Rotation of sleeve **33,** e.g. with the aid of pliers, will not unthread the member **23** since the latter will turn together with the sleeve, particularly if the outer surface thereof is serrated as noted above. On the other hand, the space between outer sleeve wall **33***b* and skirt **23***b* is so narrow as to prevent the insertion of a commonly available tool facilitating relative rotation of these parts. Flange **36** forms a fluidtight seal.

It will be apparent that a protective sleeve similar to member **33** could also be used with the container **1** of FIG. **1** if the skirt **3***b* terminates above bead **5** and the sleeve engages that bead with the aid of a formation similar to lip **6** fitting more or less snugly between the bead **5** and a shoulder **1***b* defined by the junction of the container body with its neck **1***a*. In such a case the sleeve should not be readily rotatable about the neck **1***a* but should grip that neck with sufficient force to resist any attempt at rotating the skirt **3***b* by a clamping force applied through that sleeve.

Other compatible features of the two disclosed embodiments may also be combined or substituted for one another. Thus, for example, the key **31** of FIG. **2** could be externally provided with the finger ribs **13** of key **11** in lieu of the corrugations **31***a*, or vice versa. It will also be apparent that the cover **3***a* or **23***a* could be designed as a serrated socket with upwardly diverging cavity, the key then having a downwardly tapering raised surface with mating serrations fitting into that socket, the resulting camming action again tending to separate the key from the cover upon the application of a torque. These and other modifications, readily understood by persons skilled in the art, are intended to by embraced within the scope of my invention except as otherwise limited by the appended claims.

I claim:

1. A childproof closure for a container having an open-topped neck, comprising:

external cam means on said neck;

a cover for said neck having a depending skirt provided with internal cam means matingly engaging said external cam means for normally holding said cover onto the open top of said neck with sufficient frictional force to resist removal by the bare hands of a child; and

a key detachably fitting onto said cover for imparting to the latter an untwisting rotary motion about an axis disengaging said cam means from each other, said key and said cover being respectively provided with mating first and second formations arrayed about said axis.

2. A childproof closure as defined in claim **1** wherein said skirt has a smooth outer surface.

3. A childproof closure as defined in claim **1** wherein said first and second formations are serrations having

flanks inclined with reference to said axis at an angle sufficient to exert upon said key an upward camming force requiring a countervailing downward pressure for maintaining same in mating engagement.

4. A childproof closure as defined in claim **3** wherein said key and said cover are provided with complementary annular surfaces bearing said serrations, said surfaces having generatrices whose extensions converge on said axis.

5. A childproof closure as defined in claim **4** wherein said surfaces include an upwardly converging outer peripheral surface of said cover, said key forming a socket for said outer peripheral surface.

6. A childproof closure as defined in claim **1** wherein said external cam means comprises a set of male threads on said neck.

7. A childproof closure as defined in claim **6** wherein said neck is provided with an outer peripheral bead below said male threads, said skirt consisting of elastic material and terminating in a inner peripheral lip underlying said bead for resisting a detachment of said cover from said neck by said untwisting motion.

8. A childproof closure as defined in claim **7** wherein said skirt is externally provided in the region of said lip with a frangible annular band rupturing upon radial expansion of said lip by said bead during untwisting.

9. A childproof closure as defined in claim **1**, further comprising a sleeve on said neck surrounding said neck and affording only restricted access to said second formations.

10. A childproof closure as defined in claim **9** wherein said sleeve has a J-profile defining an upwardly open annular channel bounded by an outer and an inner annular wall, said inner wall bearing said external cam means, said skirt being received in said channel with freedom of relative rotation.

11. A childproof closure as defined in claim **10** wherein said neck is provided near its top with an outer peripheral bead, said inner wall being elatic and bearing from below on said bead for preventing relative upward movement of said sleeve, the latter being freely rotatable on said neck.

12. A childproof closure as defined in claim **11** wherein said sleeve is provided with outer surface irregularities facilitating manual retention thereof during rotation of said cover by said key.

13. A childproof closure as defined in claim **10** wherein said cover has a beveled peripheral surface bearing said second formations, said outer wall spacedly girding said beveled surface and forming therewith an upwardly diverging annular gap, said key having an annular flange of downwardly converging profile fitting into said gap and bearing said first formations.

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