

[54] **SAFETY CLOSURE FOR A MEDICINE BOTTLE**

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[57] **ABSTRACT**

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Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 134,702, April 16, 1971, Pat. No. 3,679,085.

[52] U.S. Cl.215/9

[51] Int. Cl.B65d 55/02

[58] Field of Search.....215/9, 43 A

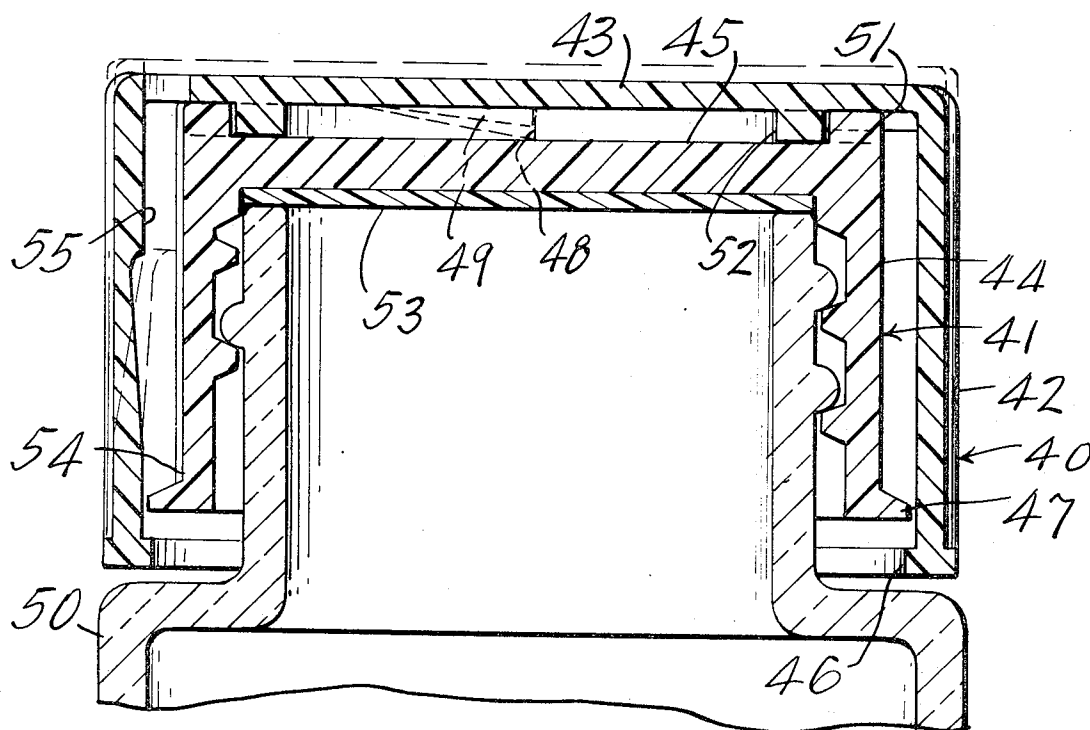
A child-proof closure for a medicine bottle or the like. The closure consists of a threaded cap and relatively flexible over-cap or driver. The cap and driver have cooperating ratchet drive means for screwing the cap onto the bottle by rotating the driver. The driver normally is rotatable in the opposite direction relative to the cap. The cap has a recess in its outer wall and a portion of the wall of the driver is radially inwardly displaceable for engagement in the recess for delivering unscrewing torque from the driver to the cap.

[56] **References Cited**

5 Claims, 11 Drawing Figures

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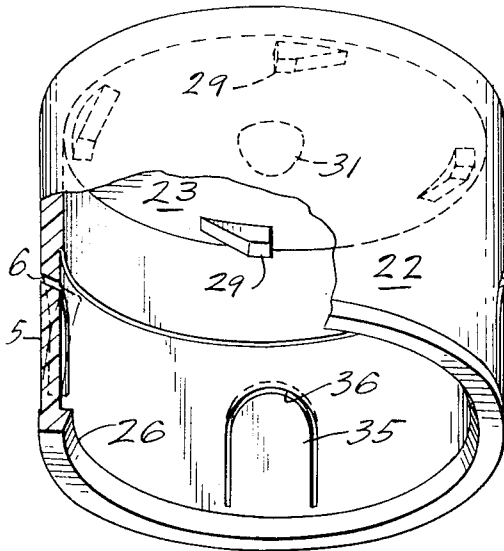


FIG. 1-

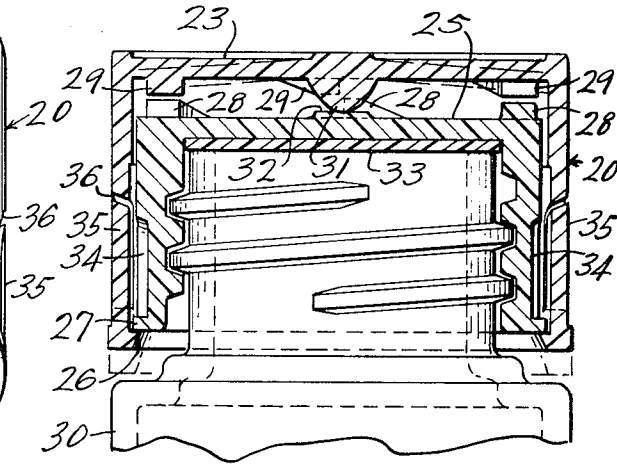


FIG. 3-

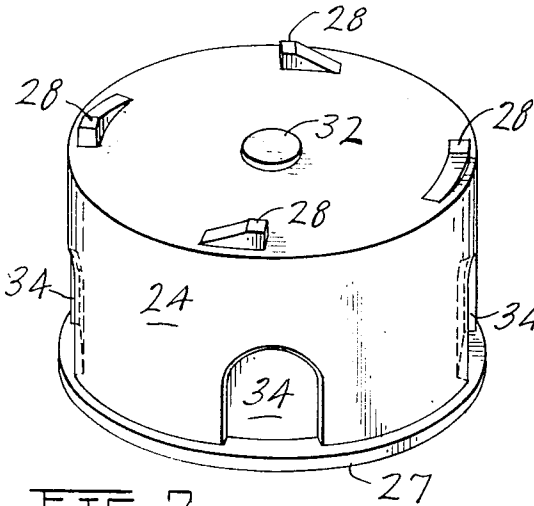


FIG. 2-

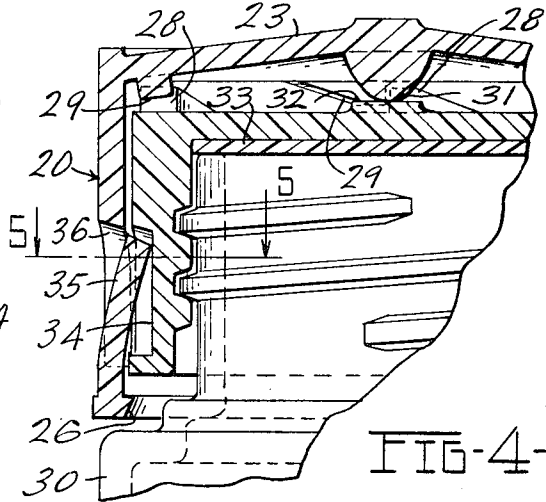


FIG. 4-

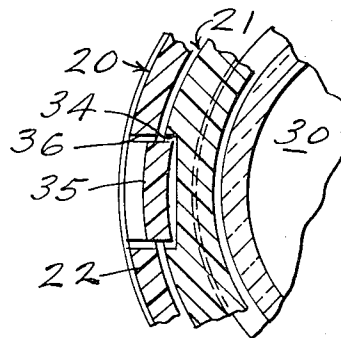


FIG. 5-

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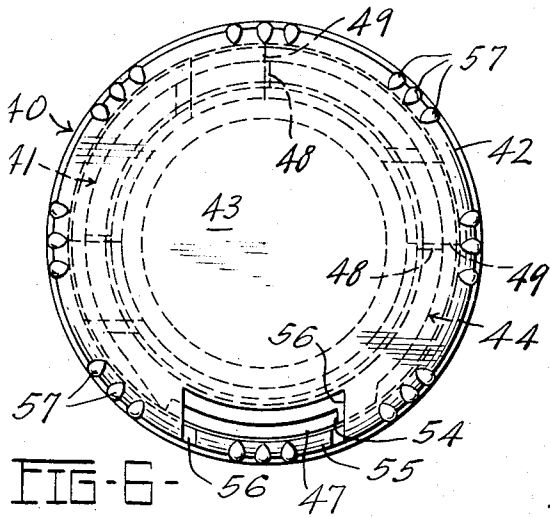


FIG. 6-

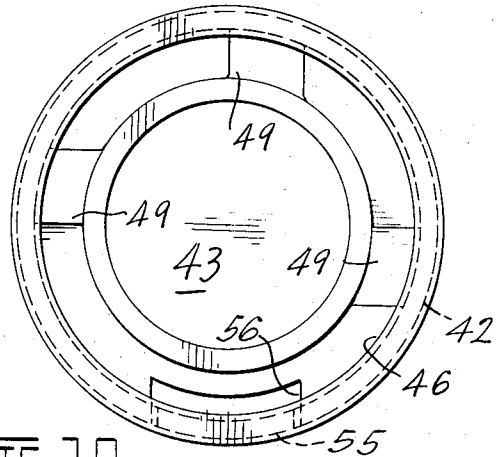


FIG. 10-

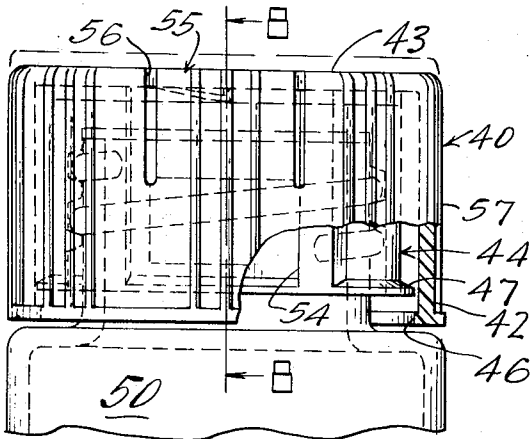


FIG. 7 -

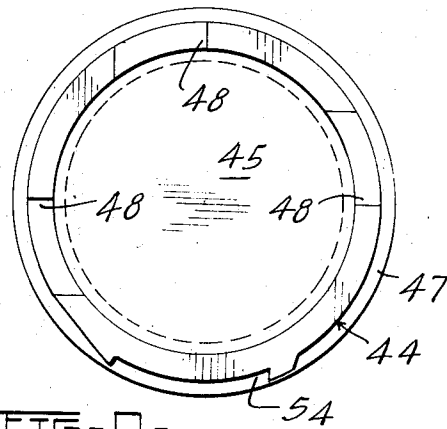


FIG. 9-

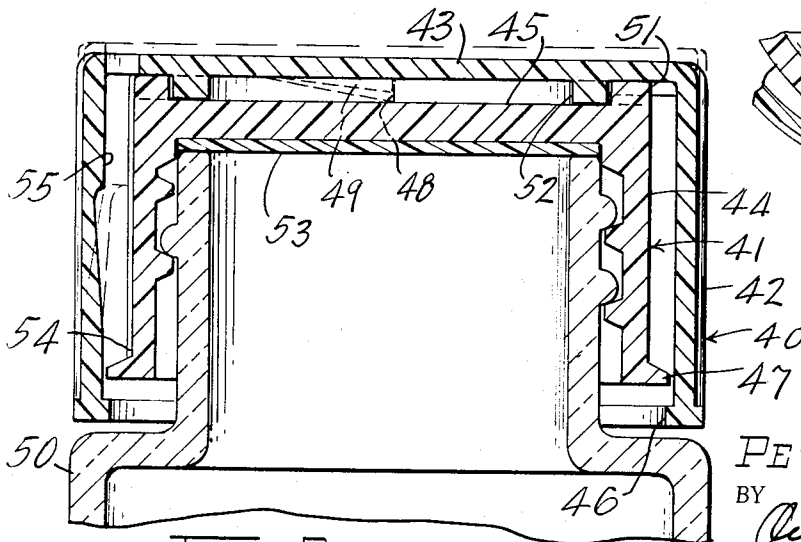


FIG. 8-

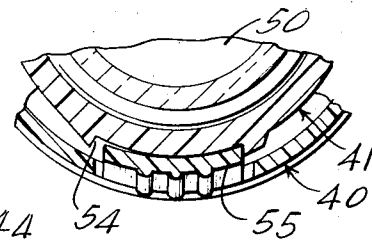


FIG. 11-

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SAFETY CLOSURE FOR A MEDICINE BOTTLE

This application is a continuation-in-part of my application, Ser. No. 134,702 filed Apr. 16, 1971, now U.S. Pat. No. 3,679,085 of July 25, 1972.

BACKGROUND OF THE INVENTION

Many so-called child-proof bottle caps have been suggested in the past the purpose of which is to make it difficult for a small child, say less than 6 years old, to open the bottle and thus obtain access to medicine, poisons, or other dangerous or harmful substances.

Many of these prior art closures are extremely complicated comprising combination locks, requiring multiple operations to put the caps on the bottles as well as to remove them from the bottles, or involving expensive shapes, and thus most of them have not been successful in the market place.

Many other so-called child-proof bottle caps have been designed which were effective to contain tablets or pills in the bottle but which did not make a tight enough seal with the neck of the bottle in order to package liquid materials.

In some prior art safety closures the above objectives have been achieved but the closures are not adapted to be put on the bottles by conventional automatic bottling machinery which usually has a collect-type chuck or a series thereof, each chuck picking up one of the caps, coming down and spinning it on to the bottle neck. If a particular manipulation or series of manipulations is required to put the bottle cap onto the neck, a conventional capping machine cannot be used.

It is therefore the principal object of the instant invention to provide a simple closure for a bottle having a threaded neck which is significantly difficult of removal by a small child but which can readily be put onto the bottle neck both by automatic machinery and by a person desiring to close the bottle and can rather readily be removed from the bottle by an older child or an adult.

It is yet another object of the instant invention to provide a closure for a medicine bottle or the like which has only two pieces, one being the actual cap for the bottle and the second being an over-cap or a driver which covers the inner cap and which is rotatable relative to the cap when the driver is turned in the direction which would normally be expected to unscrew the cap from the bottle, unless certain manipulations are performed to engage the driver with the cap.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a bottom view in perspective with parts broken away of an overcap or driver designed according to a first embodiment of the instant invention;

FIG. 2 is a top view in perspective of an inner cap designed to cooperate with the overcap shown in FIG. 1 to constitute a closure embodying the invention;

FIG. 3 is a vertical, sectional view, with a bottle shown fragmentarily, of the driver and cap of the instant embodiment of the invention in "closed" position;

FIG. 4 is a fragmentary view similar to FIG. 3 but illustrating the driver and cap of this embodiment of the invention in their position for unscrewing the bottle cap;

FIG. 4 is a fragmentary, horizontal sectional view taken along the line 5—5 of FIG. 4;

FIG. 6 is a top plan view of a closure embodying a second modification of the instant invention;

FIG. 7 is a side view in elevation, with parts broken away and parts shown in phantom, of the closure illustrated in FIG. 6;

FIG. 8 is a fragmentary, vertical sectional view taken along the line 8—8 of FIG. 7 and shown on an enlarged scale;

FIG. 9 is a top plan view of the inner bottle cap of this embodiment of the invention;

FIG. 10 is a bottom plan view of the overcap or driver of this embodiment of the invention; and

FIG. 11 is a fragmentary, horizontal sectional view taken substantially along the line 11—11 of FIG. 8 but illustrating the cooperating parts of the closure by which torque applied to the overcap or driver is delivered to the inner bottle cap in order to remove the closure from the bottle.

DESCRIPTION OF PREFERRED EMBODIMENTS

The embodiment of the invention illustrated in FIGS. 1–5 consists of an overcap or driver 20 and an inner or bottle cap 21. The driver 20 has a generally annular skirt 22 and a closed top 23. The inner cap 21 has an annular skirt 24 and a closed top 25.

The outside diameter of the inner cap 21 and the axial length of its skirt 24 are less than the inside diameter and axial length of the skirt 22 of the driver 20. The two elements, viz the driver 20 and the cap 21 are thus designed and adapted to be telescoped and a lip 26 at the lower margin of the driver skirt 22 has an inside diameter which is less than the outside diameter of an outwardly directed rim 27 at the lower margin of the cap skirt 24. Engagement of the rim 27 with the lip 26 retains the driver 20 and cap 21 in telescoped position as shown in FIGS. 3 and 4.

A closure according to this embodiment of the invention has cooperating one-way drive means consisting of ratchet dogs 28 formed on the cap 21 and cooperating, oppositely directed ratchet dogs 29 formed on the driver 20. While the dogs 28 and 29 are illustrated in this embodiment of the invention as being located on the top of the cap 21 and the underside of the top of the driver 20, it will be appreciated that they may also be located at the shoulders of the cap and driver 20 and 21 or even on their peripheral surfaces. The only requirement is that the dogs or teeth 28 and 29 shall be engageable for transmitting torque only when the driver 20 is rotated in a direction to screw the cap 21 onto the threaded neck of a bottle 30, fragmentarily illustrated in FIGS. 3 and 4.

In this embodiment of the invention, as can best be seen by comparing FIGS. 3 and 4, the underside of the top 23 of the driver 20 has a central fulcrum 31 which is aligned with and engages a central pad 32 erected at the center of the top 25 of the cap 21.

The cap 21 is fabricated by molding, for example, from a relatively stiff resinous material such as medium impact polystyrene and the overcap or driver 20 is fabricated as by molding from a comparatively resilient material such as polypropylene. The relative stiffness of the screw cap 21 is necessary in order that it may be threaded down onto the neck of the bottle 30 sufficiently tightly to compress the marginal edges of a disc-like liner 33 in order to seal the bottle against leakage,

particularly when the contained material is liquid or is harmed by exposure to atmosphere.

When it is desired to close the bottle, either during the filling process or after it has been opened to dispense a part of the contents thereof, the rim of the top 23 of the driver 20 is pushed downwardly, for example by the fingers of a person or by the capping chuck, flexing the top 23 (see FIG. 4) around the fulcrum 31 to engage the one-way drive dogs 28 and 29. Torque can then be directly delivered from the driver 20 to the cap 21 by the engagement of the two sets of dogs 28 and 29.

If a person endeavors to open the bottle either by merely rotating the driver 20 in a counterclockwise direction (conventional threading) or even by depressing the rim of its top 23 as illustrated in FIG. 4, the overcap 20 will either freely rotate relative to the cap 21 or it will ratchet backwardly and no driving torque can successfully be transferred to the threaded cap 21.

A closure embodying this modification of the invention also comprises an engageable drive means so designed as to enable the transfer of torque from the driver 20 to the threaded cap 21. This engageable drive means comprises cooperating elements illustrated as recesses 34 molded in the outer surface of the cap skirt 24 and at least one radially displaceable segment 35 formed in the skirt 22 of the driver 20. In this embodiment of the invention there are shown four recesses in the cap 21 and four segments 35 in the skirt 22. The segments 35 are illustrated as being defined by inverted horseshoe-shaped slots 36 enabling the segments 35 to be flexed inwardly at their upper edges in order to engage them in the recesses 34 when the driver 20 and cap 21 are angularly aligned.

It will also be observed by comparing FIGS. 3 and 4 that during the "normal" positions of the driver 20 and the cap 21, the upper ends of the segments 35 are held at a level above the upper ends of the recesses 34 by the engagement of the fulcrum 31 with the pad 32. It is thus necessary to depress the shoulders of the driver 20 not only to turn the cap 21 on to the bottle 30 but also to permit the segments 35 to be squeezed radially inwardly into the recesses 34 in order to transfer torque from the driver 20 to the cap 21 so that the cap 21 can be unscrewed from the bottle 30. By requiring both that the top 23 be flexed as shown in FIG. 4 and that the segments 35 be flexed radially inwardly in order to deliver torque to the cap 21, the necessary actions are well beyond the capabilities of small children in the age bracket of say, three to six, or, possibly, even slightly older.

FIGS. 6-11

A second embodiment of a closure according to the invention is illustrated in FIGS. 6-11. As in the first embodiment of FIGS. 1-5 inclusive, this second embodiment consists of a driver or overcap 40 and a threaded inner cap 41. The driver 40 has an annular skirt 42 and a flat top 43. The cap 41 has an annular skirt 44 and a generally flat top 45. The inside diameter and the axial length of the driver skirt 42 are both greater than the outside diameter and axial length of the cap skirt 44. An inwardly directed lip 46 on the driver skirt 42 has a slightly smaller diameter than an outwardly directed rim 47 on the cap skirt 44 to retain the driver 40 and

cap 41 in telescoping position after they have been initially assembled.

This second embodiment of a closure according to the invention also has a one-way ratchet drive means consisting, in this instance, of notches 48 formed at the top of the cap 41 and drive dogs 49 formed on the bottom surface of the driver top 43.

In contrast, however, to the first embodiment of the invention illustrated in FIGS. 1-5, inclusive, it is not necessary to flex the driver top 43 in order to engage the drive dogs 49 in the notches 48. Gravity pulls the driver 40 downwardly so that these elements engage immediately as soon as torque is applied to the driver 40. Thus, immediately upon insertion of the threaded neck of a bottle 50 into the open bottom ends of the cap 41 and driver 40, the driver 40 can be rotated by either a capping chuck or by the fingers of a person seeking to re-close the bottle.

The notches 48 are cut or molded into an annular up-standing rim 51 at the margin of the cap top 45 and the dogs 49 are located radially at the same distance from the axis of the driver 40 and the cap 41. A downwardly extending ring 51 of a diameter less than the inside diameter of the rim 50 is formed on the under surface of the driver top 43 to mate with the larger rim 50 in order to maintain the driver 40 and the cap 41 in coaxial relationship relative to each other when the two are telescoped together.

It will also be observed, particularly in FIG. 8, that the axial depth of the notches 48 is greater than the axial depth of the dogs 49. The previously mentioned difference in length of the driver skirt 42 and the cap skirt 44 is enough so that when the driver 40 is rotated in a counterclockwise direction relative to the cap 41, and the ratchet action of the dogs 49 and notches 48 causes the driver 40 to be lifted, the difference in length of their respective skirts provides for this lifting, ratcheting action.

As in the embodiment illustrated in FIGS. 1-5, inclusive, however, torque applied to the driver 40 by either the capping chuck or the fingers of the user is transferred directly to the inner cap 41 by the engagement of the one-way ratchet means 48-49 so that the inner cap 41 can be tightly threaded downwardly onto the neck of the bottle 50 to compress a disc-like liner 53 in order to seal the bottle 50.

Also in common with the embodiment of the invention illustrated in FIGS. 1-5, inclusive, this second embodiment of the invention as illustrated in FIGS. 6-11, includes an engageable drive means which must be specially actuated in order to deliver torque from the driver 40 to the cap 41 in order to screw the cap 41 off of the bottle 50. This engageable drive means is illustrated as consisting of an axially extending recess 54 molded in the outer side of the cap skirt 44 and a segment 55 formed in the driver skirt 42. In this embodiment, however, the segment 55 is defined by a short arcuate slot 56 in the driver top 43 which provides space inwardly of the segment 55 so that the segment 55 may be flexed radially inwardly to engage it in the recess 54. Although only one recess 54 and one segment 55 are shown in FIGS. 6-11, inclusive, if found desirable, additional cooperating engageable drive means of the same nature may also be provided at the side of the driver 40 and the cap 41 opposite to that at which the illustrated recess 54 and segment 55 are shown.

In addition, and as illustrated in FIGS. 7 and 8, the outer side of the driver skirt 42 may be provided with ribs 57 in order to facilitate grasping the driver 40 in the fingers of a person desiring to rotate the driver 40 either for sealing the bottle 50 tightly or for delivering torque to the cap 41 in order to open the bottle 50.

What I claim is:

1. A substantially child-proof closure for a medicine bottle or the like having a threaded neck, said closure consisting of:
 1. an inner cup-shaped cap having
 - a. an annular skirt and
 - b. a closed top,
 - c. the inner surface of said skirt being threaded to mate with the threaded neck of the bottle, and
 2. an outer cup-shaped driver having
 - a. an annular skirt and
 - b. a closed top at least generally complementary to the closed top of said cap,
 - c. the length and interior diameter of the skirt of said driver being greater than the length and exterior diameter of the skirt of said cap,
 3. co-operating one-way drive means on adjacent parts of said cap and said driver, said drive means being operable for screwing said cap onto said bottle neck by rotating said driver
 4. and co-operating engageable drive means for unscrewing said cap by rotating said driver, said engageable drive means comprising
 - a. at least one axially extending abutment on the outer surface of the skirt of said cap and
 - b. at least one radially inwardly displaceable portion in the skirt of said driver which is adapted to engage said abutment when squeezed radially inwardly for transferring unscrewing torque from said driver to said cap for removing the same.
 2. A child-proof cap for medicine bottles and the like, having threaded necks, said cap consisting of
 - a. an inner, inverted, cup-shaped closure having,
 1. a tubular side wall,
 2. a disc-shaped top,
- the interior of said side wall having threads adapted to be screwed on to and off of such bottle neck,

- b. an outer, inverted driver having,
 1. a tubular side wall of axial length greater than the side wall of said closure,
 2. an inwardly directed lip at the lower end of said side wall adapted to snap beneath the lower edge of the side wall of said closure for retaining said driver on said closure,
- c. first co-operating one-way driving means on said closure and said driver,
 1. said first driving means being engaged by moving said driver downwardly onto said closure and effective for rotating said closure onto the bottle, and
- d. second, co-operating driving means,
 1. a first element thereof comprising an axially extending abutment on the exterior of the side wall of said closure near the top thereof, and
 2. a second element thereof being a radially inwardly displaceable segment at the top of the side wall of said driver.
3. A closure according to claim 2 and an inwardly directed lip on the lower margin of the skirt of said driver for retaining said cap and said driver in telescoped relationship, said lip being axially spaced from the top of said driver a distance greater than the axial length of said cap whereby said cap and driver are movable axially relative to each other as required during reverse relative rotation of the parts of the one-way drive means.
4. A closure according to claim 2 in which the recess in the skirt of the cap extends axially thereof and is defined by substantially parallel side walls lying in radial planes and the displaceable portion in the skirt of said driver is a hingedly movable segment of said skirt.
5. A closure for the threaded neck of a bottle, said closure comprising an internally threaded cap, an overcap adapted to fit over said cap and normally freely rotatable relative to said cap in cap unscrewing direction and torque transfer means comprising a recess in the outer wall of said cap and a radially inwardly displaceable portion in the wall of said overcap engageable in said recess for delivering torque from said overcap to said cap for unscrewing said cap off of said bottle.

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