

[54] SAFETY BOTTLE CAP

[75] Inventors: Hisao Naito, Osaka; Kiyoshi Nakabayashi, Kawanishi; Terumi Matsuda, Hyogo, all of Japan

[73] Assignee: Takeda Chemical Industries Ltd., Osaka, Japan

[22] Filed: Dec. 18, 1972

[21] Appl. No.: 315,829

[30] Foreign Application Priority Data

Dec. 25, 1971 Japan..... 46-2399

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

[51] Int. Cl. B65d 43/02

[58] Field of Search..... 215/9, 43, 46 R

[56] References Cited

UNITED STATES PATENTS

3,716,161 2/1973 Julian..... 215/9
 3,776,407 12/1973 Cistone..... 215/9

Primary Examiner—George T. Hall
 Attorney, Agent, or Firm—Wenderoth, Lind & Ponack

[57] ABSTRACT

A safety bottle cap for closing the opening of a bottle which essentially comprises a screw cap with internal threads for screwing the cap detachably over the external threads of the bottle neck, a ratchet secured on the screw cap, and an outer cover completely covering the ratchet and the screw cap, and having internal toothed portions, which can always be engaged with the flexible ratchet teeth of the ratchet in the thread direction of the screw cap, and projections, which can be engaged with the holes of the ratchet when the outer cover is pressed downward against the raising force of a spring element provided between the ratchet and outer cover, whereby the safety bottle cap can be screwed freely on the external threads of the bottle neck by turning it in the thread direction and can be unscrewed only by turning it in the opposite direction while it is pressed down, and thus eliminates the dangers associated with bottles that can be easily opened only by unscrewing action.

6 Claims, 12 Drawing Figures

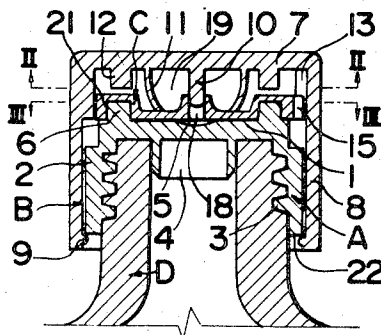


FIG. 1

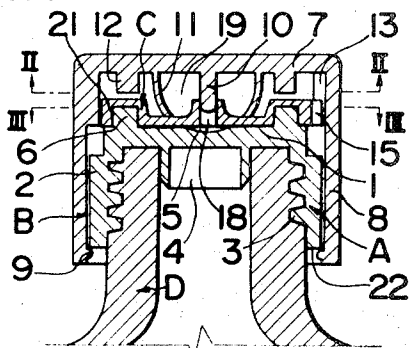


FIG. 2

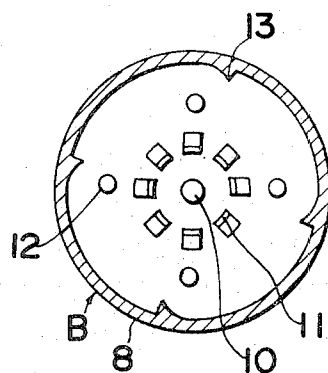


FIG. 4

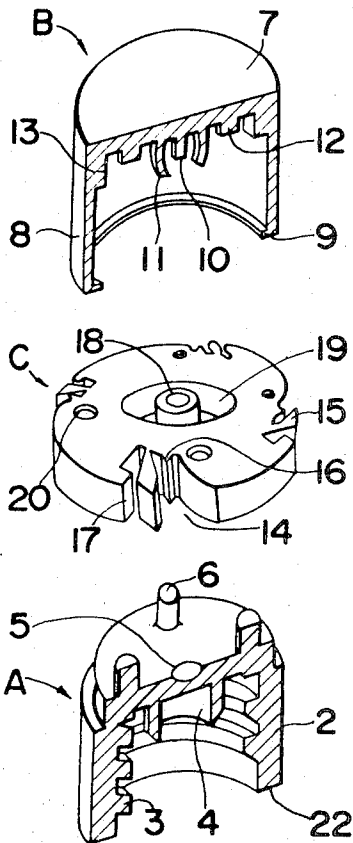


FIG. 3

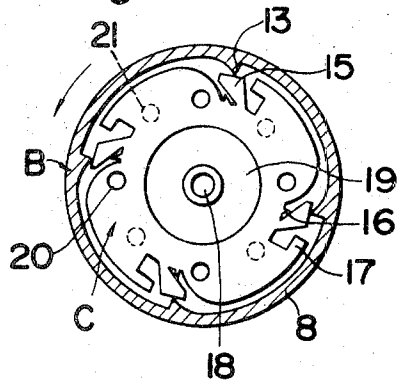
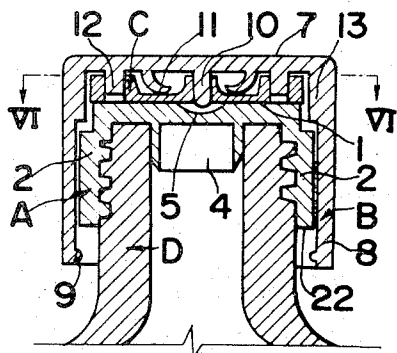
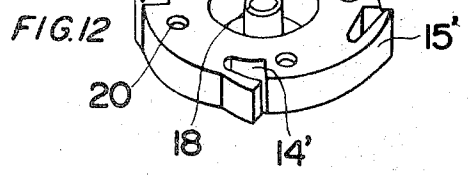
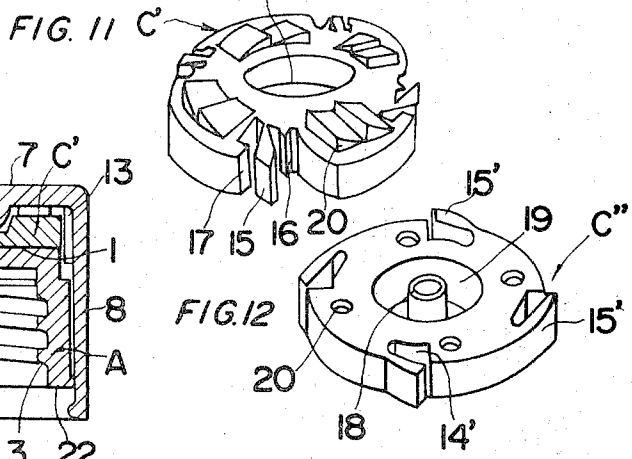
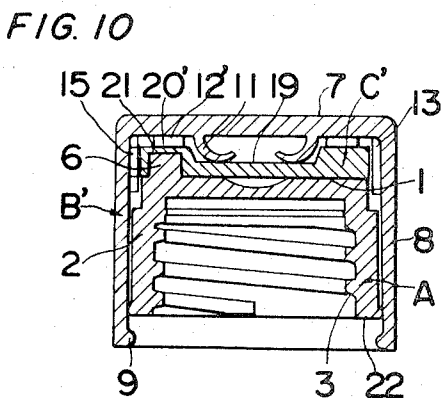
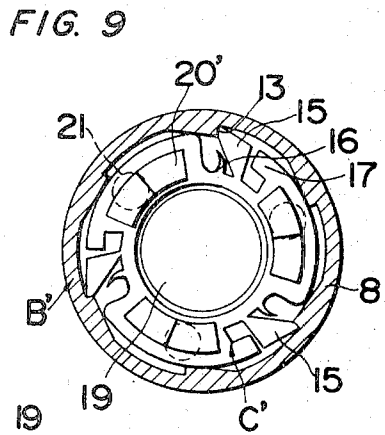
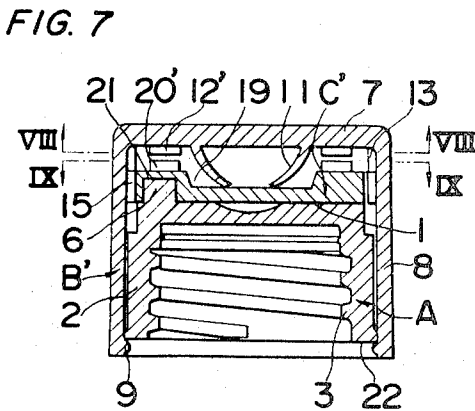
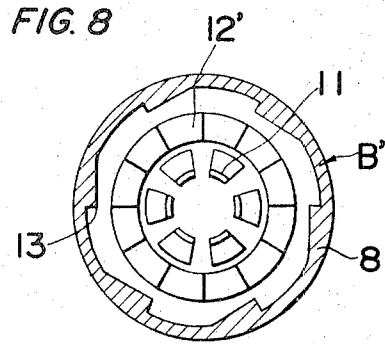
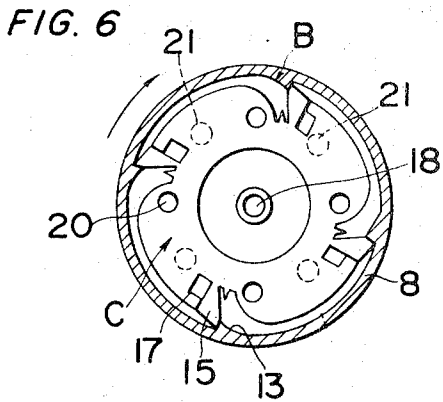


FIG. 5





SAFETY BOTTLE CAP

The present invention relates to a safety bottle cap having a tubular body topped by a roof and threaded internally with threads engageable with the external thread of the bottle neck, and, more particularly, to a safety bottle cap which can be screwed freely on the external threads of the bottle neck by turning it in one direction for closing the bottle and unscrewed only by turning in the other direction while it is pressed down for opening the bottle.

Generally bottle stoppers or caps for bottles of these kinds are made for easy removal from the bottles by a pulling action or an unscrewing action, which, however, means that they can also be removed by young children, and it is not uncommon for there to be accidents due to young children thus opening bottles and getting into trouble with the contents therein.

In view of the above fact, the present invention has as its object the provision of a safety cap for bottles, the removal of which, while easy, cannot be achieved merely by a simple unscrewing action, but requires a certain technique, which consists of a pair of actions, that is, turning it while it is pressed down, so that bottles with this cap cannot be opened by young children, who are capable of simple operations only, the cap thus being eminently suitable for safety use with bottles containing medicinal or other contents that could be dangerous if taken carelessly by young children.

The safety bottle screw cap according to the present invention comprises a screw cap having a tubular body topped by a roof, in the upper surface of which is provided with protrusions or holes, and threaded internally with threads for engaging detachably with the external threads of the bottle neck to close the opening of a bottle, a ratchet on the roof of the screw cap, which has holes or protrusions in its lower surface engaging with the protrusions or holes of the screw cap, flexible ratchet teeth on its outer periphery engaging in the threading direction of the screw cap, and fitting portions in its upper surface, an outer cover which covers the top and sides of the screw cap with the ratchet, and has at its bottom an inwardly turned rim which latches onto the bottom of the screw cap, toothed portions at the upper part of the inside thereof which engage the ratchet teeth of the ratchet in the threading direction of the screw cap, and on lower surface of the roof of which are provided fitting portions and a flexible spacer element or elements extending downward in sliding contact with the upper surface of the ratchet during its rotation, the outer cover being normally held raised by the elastic force of the spacer element so as to keep the fitting portions of the outer cover disengaged from the fitting portions of the ratchet, but, the former being able to engage with the latter when the outer cover is pressed down against the elastic force of the spacer elements.

With this arrangement, turning the safety bottle cap of the present invention in the threading direction of the screw cap screws it on the external threads of the bottle neck to close the bottle by engagement of the toothed portions of the outer cover and the flexible ratchet teeth of the ratchet, and if, to unscrew it in the same manner as an ordinary screw cap, it is turned in the opposite direction, it merely spins freely, since the outer cover is held raised above the ratchet by the elastic force of the spacer elements and the fitting portions

of the outer cover do not therefore engage the fitting portions of the ratchet, and the bottle can only be opened if the cap is turned while it is pressed down so as to engage the fitting portions of the outer cover with the fitting portions of the ratchet, thereby eliminating the dangers associated with the bottle, etc., that can be easily opened by a simple unscrewing action by young children playing.

These and other objects and features of the present invention will become apparent from the following description taken in conjunction with preferred embodiments thereof with reference to the accompanying drawings, in which;

FIG. 1 is a cross sectional view of a safety bottle cap on the bottle neck of a bottle in accordance with one preferred embodiment of the present invention,

FIG. 2 is a cross sectional view of the safety bottle cap taken along the line II—II in FIG. 1,

FIG. 3 is cross sectional view of the safety bottle cap taken along the line III—III in FIG. 1,

FIG. 4 is an exploded perspective view, partially broken away, showing all of components of the safety bottle cap in FIG. 1,

FIG. 5 is a cross sectional view similar to FIG. 1, showing the parts in position during the opening operation of the safety bottle cap during which the outer cover of the safety bottle cap is pressed downward,

FIG. 6 is a cross sectional view of the safety bottle cap taken along the line VI—VI in FIG. 5,

FIG. 7 is a cross sectional view of the safety bottle cap according to another preferred embodiment of the present invention,

FIG. 8 is a cross sectional view of the safety bottle cap taken along the line VIII—VIII in FIG. 7,

FIG. 9 is a cross sectional view of the safety bottle cap taken along the line IX—IX in FIG. 7,

FIG. 10 is a cross sectional view similar to FIG. 7, showing the parts in position during the opening operation of the safety bottle cap during which the outer cover of the safety bottle cap is pressed downward, and

FIG. 11 is a perspective view of a ratchet similar to FIG. 7, and

FIG. 12 is a perspective view of the ratchet of the safety bottle cap according to further another preferred embodiment of the present invention.

Before the description of the present invention proceeds, it is to be noted that like parts are designated by the like reference numerals throughout the several views of the accompanying drawings.

Referring first to FIG. 1 to 6, the safety bottle cap of the present invention is preferably made of synthetic resin, and is composed of the three elements shown in FIG. 4, a screw cap A, the internal threads of which threadedly engage over the external threads of the bottle neck D of a bottle, an outer cover B, which is fitted slidably over and around the screw cap A, and a ratchet C, which is secured on the top of the screw cap A inside the outer cover B.

The screw cap A is a single unit consisting of a tubular body 2 threaded internally with threads 3 for engaging detachably with the external threads of the bottle neck D of a bottle, and topped by a roof 1, from whose lower surface extends downward a tubular projection 4 and at the center of the upper surface of which is formed a depression 5 around which are disposed four protrusions 6. The outer cover B is a single unit consist-

ing of a roofed tube 8, the lower end of the wall of which is bent in to form a latching rim 9 which latches onto the bottom of the screw cap A, and which is topped by a roof 7, which is large enough to cover completely the screw cap A and the ratchet C described below, and from the center of the lower surface of which extends downwards a rigid projection 10 around which are symmetrically disposed at regular intervals, first, flexible, petal-shaped tongue portions 11, then opening catch portions 12, and then four rigid toothed portions 13, for ratchet engagement, portions 11 and 12 extending downward from the roof 7, and portions 13 being formed at the upper end of the inside of the tube 8 so as to always engage with ratchet teeth 15 of the ratchet C in the threading or screwing on direction of the screw cap A. The ratchet C is formed as a single unit, is large enough to cover completely the roof 7 of the screw cap A, and has, at regular intervals in its periphery, four cut-out portions 14, in which there are flexible ratchet teeth 15, the end portions of which project from the inside to the outside of the cut-out portions 14 by the elastic force thereof so as to engage with the tooth portions 13 of the outer cover B upon rotation of the outer cover B in the threading direction of the screw cap A (as shown in FIG. 6), but to put them 15 inside the cut-out portions 14 against the elastic force thereof by pushing of the tooth portions 13 of the outer cover B upon rotation of the outer cover B in the opposite or unthreading or unscrewing direction of the screw cap A (as shown in FIG. 3), thereby not to engage them with the same; further the ratchet C has flexible projections 16 behind, in the threading direction, the flexible ratchet teeth 15 in the cut-out portions 14, rigid stoppers 17 ahead of, in the threading direction, the flexible ratchet teeth 15 on the edge of the cut-out portions 14, a rigid, hollow projection 18 surrounded by a tongue portion receiving groove 19 in its central portion, opening catch holes 20 in its upper surface, and underside holes 21 in its lower surface, the holes 20 and 21 being formed at regular intervals on the periphery of an imaginary circle around the groove 19, but not in alignment with one another.

With these components, the safety bottle cap is assembled, as shown in FIG. 1, in such a manner that the screw cap A is itself capped by the ratchet C, the protrusions 6 being engaged in the underside holes 21, so that the screw cap A always can be rotated together with the ratchet C in both the threading direction and the unthreading direction of the screw cap A, and the screw cap A and the ratchet C are covered by the outer cover B, the bottom-end in-turned latching rim 9 of which latches securely onto the outer peripheral portion of the bottom of the screw cap A, and which is free sliding over the screw cap A and the ratchet C but is normally held raised above the ratchet C by the elastic force of the tongue portions 11 pressing in and against the receiving groove 19, in which configuration the opening catch portions 12 are held disengaged from the opening catch holes 20 of the ratchet C, and the toothed portions 13 of which always can be engaged with the ratchet teeth 15 of the ratchet C in the threading direction of the screw cap A, but do not engage with the same in the unthreading direction, the tongue portions 11 being freely in sliding contact with the receiving groove 19 of the ratchet C during rotation of the outer cover B.

The safety bottle cap constructed as mentioned above is threaded on or removed from the opening of a bottle as follows. FIG. 1 shows the cap on a bottle neck D with no external force applied to the safety bottle cap. If now the outer cover B is grasped and turned to the right, i.e., the threading direction of the screw cap A, this rotation brings the toothed portions 13 of the outer cover B into engagement with the flexible ratchet teeth 15 of the ratchet C secured onto the screw cap A, through which engagement the screw cap A is also rotated, the internal threads 3 being threaded down over the external threads of the safety neck D of a bottle, and the bottle is closed by the bottle cap.

If, to try to open the bottle by turning the outer cover B to the left or the unthreading, the outer cover B is merely rotated in the unthreading direction, it simply spins freely without opening the bottle, since it is held raised above the ratchet C by the elastic force of the tongue portions 11 and the opening catch portions 12 do not therefore engage the opening catch holes 20 of the ratchet C, and also the toothed portions 13 do not engage the ratchet teeth 15 of the ratchet C in the unthreading direction of the screw cap A. To open the bottle, as shown in FIG. 5, the outer cover B must be pressed down against the elastic force of the tongue portions 11 to cause engagement between the opening catch portions 12 and the opening ratchet holes 20 of the ratchet C, and then turned to the left, i.e., the unthreading direction of the screw cap A while maintaining this pressure, whereby, the screw cap A is rotated, through the ratchet C secured onto the screw cap A, which is rotated due to the engagement of the opening catch portions 12 of the outer cover B and the opening catch holes 20 of the ratchet C, and the safety bottle cap is removed from the bottle. From the foregoing, it has now become clear that, turning the safety bottle cap of the present invention in one direction screws it on, and if, to unscrew it, it is turned in the opposite direction, it merely spins freely, and can only be opened if it is turned while it is pressed down.

In order to facilitate the engagement between the opening catch portions 12 and the opening catch holes 20 when the outer cover B is pressed down and turned to open the bottle, a second preferred embodiment is provided as shown in FIG. 7 to 11, in which the opening catch portions are formed as rigid ratchet projections 12' extending downwards from the roof 7 of the outer cover B and the opening catch holes 20 are replaced by rigid ratchet protrusions 20' projecting upward from the upper surface of the ratchet C, the former being brought into engagement with the latter when the outer cover B is pressed down and rotated in the unthreading direction of the screw cap A, while the other parts of the safety cap in this embodiment are the same as those in the first embodiment. When the outer cover B is not pressed downward, as shown in FIG. 7, the rigid ratchet projections 12' are held raised by the elastic force of the tongue portions 11 so as not to engage with the rigid ratchet protrusions 20', and, however, when the outer cover B is pressed downward against the elastic force of the tongue portions 11, as shown in FIG. 10, as the outer cover B is rotating in the unthreading direction of the screw cap A, the rigid ratchet projections are easily engaged with the rigid ratchet protrusions 20'.

Also, as an example of an alternative form of the ratchet C in FIG. 4, FIG. 12 shows a disk, at regular intervals in whose periphery are formed cut-out portions 14', each of which is partially enclosed by a flexible tooth 15' which projects outwardly from one side thereof and the position of which is flexibly changeable with respect thereto.

Further, instead of the tongue portions 11, other convenient means for elastically keeping the outer cover B raised above the ratchet C can be a sponge or a coil spring inserted therebetween.

Although the present invention has been fully described by way of examples, it is to be noted that various changes and modifications will be apparent to those skilled in the art and, therefore, the present invention is to be understood as including those changes and modifications unless otherwise they depart from the scope of this present invention.

What is claimed is:

1. A safety bottle cap comprising a screw cap having a tubular body topped by a roof and threaded internally with threads for engaging detachably with the external threads of the bottle neck of a bottle, a ratchet secured on the roof of the screw cap, and having flexible ratchet teeth in its outer periphery engaging in the threading direction of the screw cap, and fitting portions in its upper surface, and an outer cover which covers the screw cap with the ratchet, and has at its bottom an inwardly turned rim which latches onto the bottom of the screw cap, toothed portions at the upper part of the inside thereof which engage the ratchet teeth of the ratchet in the threading direction of the screw cap, and on lower surface on the roof of which are provided fitting portions and a flexible spacer element or elements extending downward in sliding contact with the upper surface of the ratchet during its rotation, the outer cover being normally held raised by the elastic force of the spacer elements so as to keep the fitting portions of

the outer cover disengaged from the fitting portions of the ratchet, but, the former being able to engage with the latter when the outer cover is pressed down against the elastic force of the spacer elements.

2. A safety bottle cap as defined in claim 1, wherein said screw cap has protrusions or holes in its upper surface, and said ratchet has holes or protrusions in its lower surface engaging with the protrusions or holes of the screw cap.

3. A safety bottle cap as defined in claim 1, wherein said spacer elements comprise flexible, petal-shaped tongue portions formed at and extending downward from the lower surface of the outer cover, by the elastic force of which the outer cover is normally held raised above the ratchet.

4. A safety bottle cap as defined in claim 1, wherein said spacer element comprises a coil spring inserted between the outer cover and the ratchet, by the elastic force of which the outer cover is normally held raised above the ratchet.

5. A safety bottle cap as defined in claim 1, wherein said fitting portions of the outer cover comprise opening catch portions formed at and extending downward from its lower surface, and said fitting portions of the ratchet comprise opening catch holes formed in its upper surface, the former being brought into engagement with the latter when the outer cover is pressed down.

6. A safety bottle cap as defined in claim 1, wherein said fitting portions of the outer cover comprise ratchet projections extending downwards from the lower surface of the outer cover, and said fitting portions of the ratchet comprise ratchet protrusions projecting upward from its upper surface, the former being brought into engagement with the latter when the outer cover is pressed down and rotated in the unthreading direction of the screw cap.

* * * * *

40

45

50

55

60

65