United States Patent

[11] 3,625,387

[72] Inventor **Edward E. Schaefer**
Lake Forest, Ill.

[21] Appl. No. **867,162**
[22] Filed **Oct. 17, 1969**
[45] Patented **Dec. 7, 1971**
[73] Assignee **Research and Safety Devices Corporation**

[54] **SAFETY CLOSURE**
18 Claims, 13 Drawing Figs.

[52] **U.S. Cl.** **215/9,** 215/43.1
[51] **Int. Cl.** **A61j 1/00,** B65d 55/02
[50] **Field of Search** 215/9, 43.1

[56] **References Cited**

UNITED STATES PATENTS

3,338,444	8/1967	Velt	215/9
3,531,008	9/1970	Achabat et al.	215/9

Primary Examiner—George T. Hall
Attorney—Hibben, Noyes and Bicknell

ABSTRACT: A safety closure for closing an opening in a container such as a bottle having a threaded neck. The closure includes an inner, cup-shaped closure member and an outer, cup-shaped closure member enclosing the inner closure member and freely the relative thereto. A separable key prevents relative rotation between the closure members when the key is engaged with the closure members so that the closure may be threaded onto or off of the container. The key is releasably retained in engaged relation with the closure members, but is separable therefrom to render the closure operable as a safety closure. However, if it is desired to use the closure in an ordinary manner, the key is not separated from its engaged position with the closure members. Resilient means in the form of at least one resilient arm, or a snapring, permits rapid and permanent interconnection of the closure members during assembly of the closure.

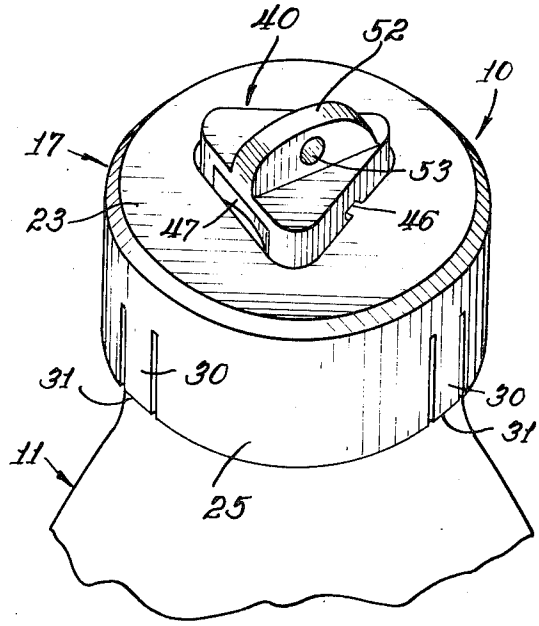


Fig. 1

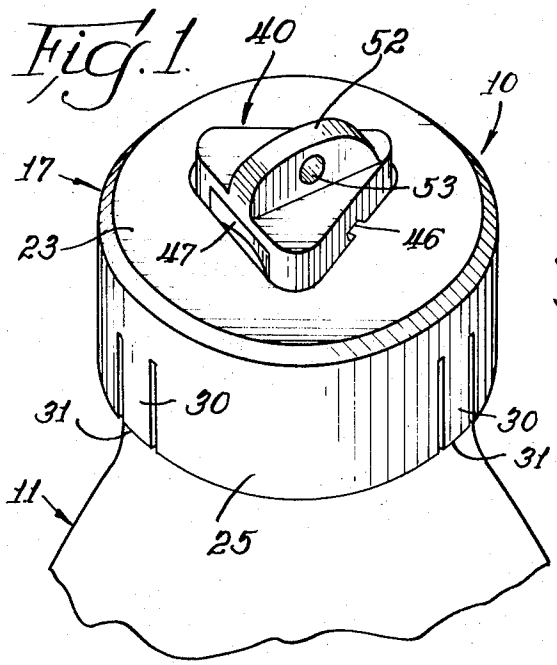


Fig. 3

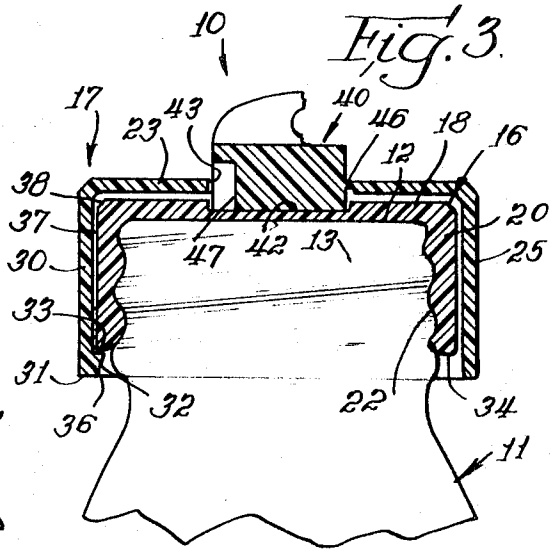


Fig. 2

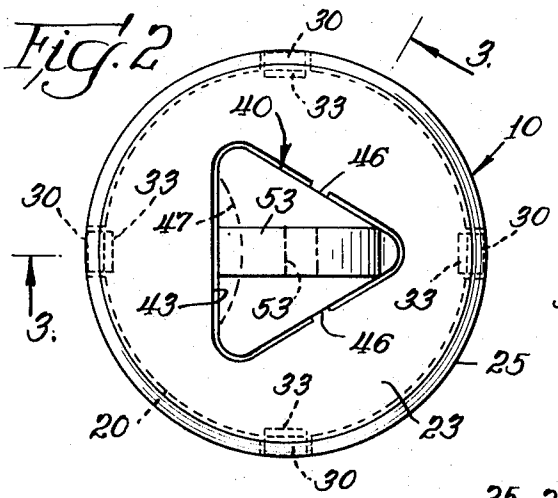


Fig. 5

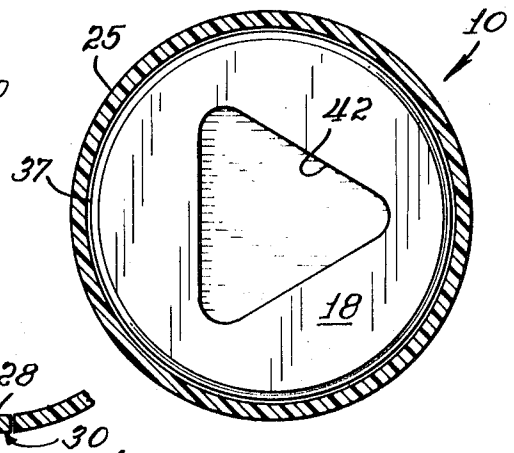


Fig. 4

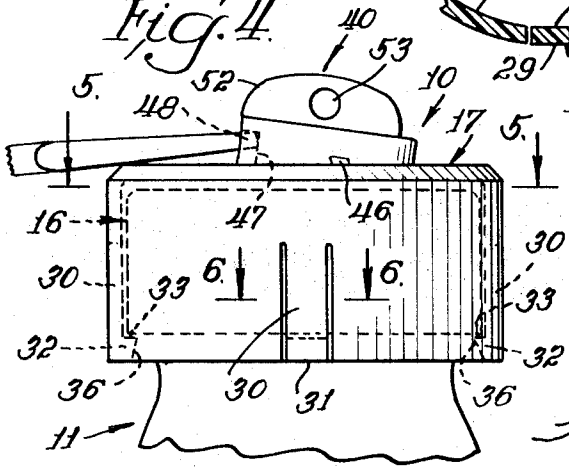
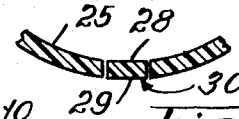


Fig. 6



Inventor
Edward E. Schaefer
By
Hibben, Noyes & Bicknell
Att'ys.

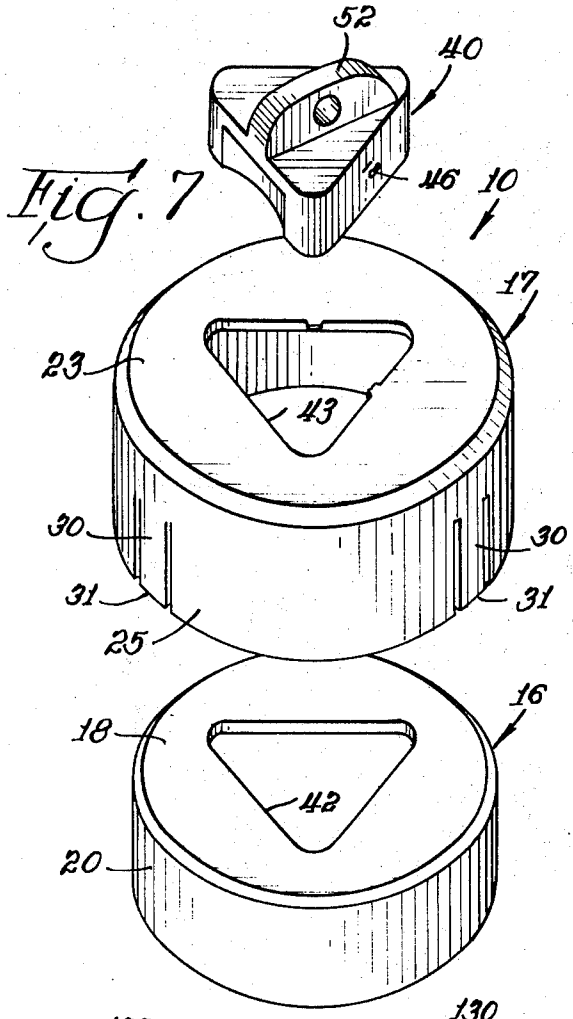


Fig. 7

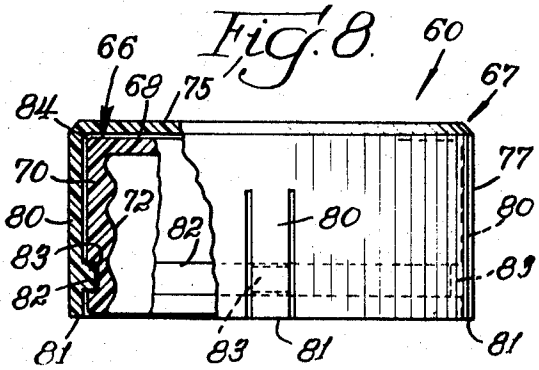


Fig. 8

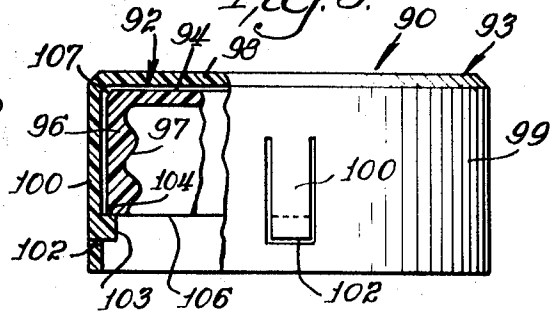


Fig. 9

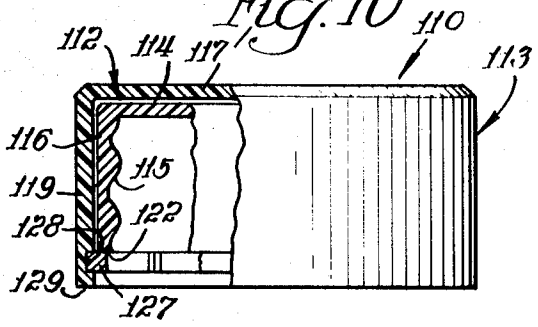


Fig. 10

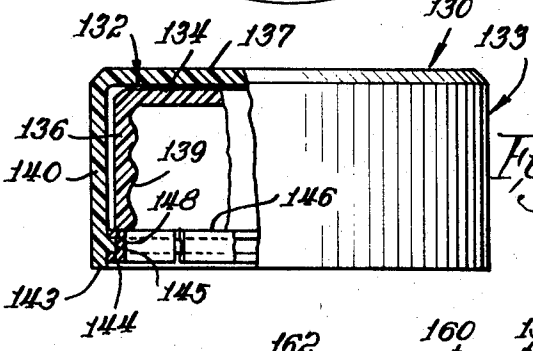


Fig. 11

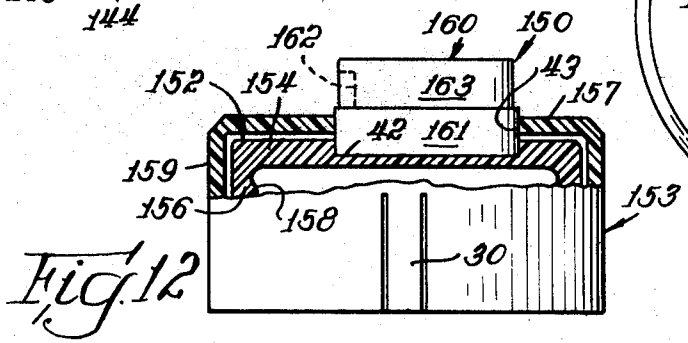


Fig. 12

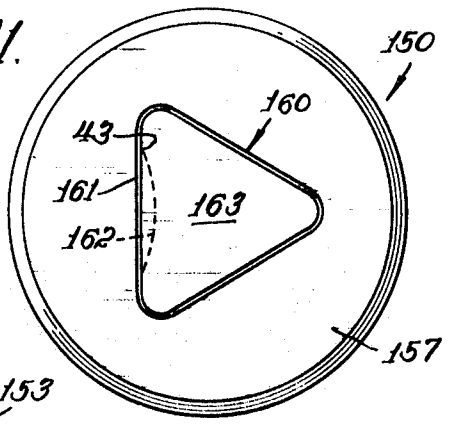


Fig. 13

SAFETY CLOSURE

This invention relates to safety closures for closing an opening in a container, and more particularly relates to a safety closure for a container which may be used either as an ordinary closure or as a safety closure requiring engagement of a key with the parts thereof in order to permit engagement of the closure with or disengagement thereof from the container.

Various types of safety closures have been heretofore advanced for preventing young children, incompetents and others from obtaining access to the contents of a container or bottle containing poisonous or other potentially harmful material. While many of such safety closures have proved generally satisfactory for their intended purpose, others have not for various reasons. Some of the factors which have rendered many of the prior closures unsatisfactory are complexity of construction and operation requiring careful manipulation and/or alignment of one or more relatively movable parts of the closure before the closure could be engaged with or disengaged from the container, high production and sales costs, and unreliability of operation.

Accordingly, it is the general object of the invention to provide a novel and improved safety closure which overcomes the aforementioned disadvantages and problems.

A more particular object is to provide a novel safety closure which may be used either as an ordinary closure or may be simply and rapidly converted for use as a safety closure.

Another object is to provide a novel safety closure in which the parts thereof may be easily and rapidly assembled, thereby lending the same to mass production techniques.

A further object is to provide a novel safety closure which is simple in construction, reliable in operation and economical to manufacture and merchandise.

Other objects and advantages will become apparent from the following description and accompanying sheets of drawings in which:

FIG. 1 is a perspective view of a safety closure embodying the features of the present invention, and showing the closure as it would appear when mounted on an associated container;

FIG. 2 is a top plan view of the safety closure shown in FIG. 1;

FIG. 3 is a sectional view taken along the line 3—3 of FIG. 2;

FIG. 4 is a side elevational view of the safety closure and container shown in FIG. 1, and showing one of the separable parts of the closure as it would appear while being separated therefrom by an associated tool;

FIG. 5 is a sectional view taken substantially along the line 5—5 of FIG. 4, and showing the closure as it would appear with the separable part thereof removed;

FIG. 6 is a fragmentary sectional view taken substantially along the line 6—6 of FIG. 4;

FIG. 7 is an exploded perspective view of the safety closure illustrated in FIG. 1;

FIG. 8 is a side elevational view, with portions thereof broken away and some parts in section, showing a different structural arrangement for interconnecting the two major components of the closure;

FIG. 9 is a side elevational view, with a portion thereof in section, showing another structural arrangement for interconnecting the two major components of the closure;

FIG. 10 is a view similar to FIG. 9, showing still another structural arrangement for interconnecting the two major components of the closure;

FIG. 11 is a view similar to FIG. 10, showing a further structural arrangement for interconnecting the two major components of the closure;

FIG. 12 is a side elevational view, with some parts in section, of another safety closure embodying the features of the invention; and

FIG. 13 is a top plan view of the safety closure illustrated in FIG. 12.

Briefly described, the present invention contemplates a novel safety closure for closing an opening in a container, which may be used either as an ordinary closure or as a safety closure requiring engagement of a special key in order to permit the closure to be engaged with or disengaged from an associated container. Such closure, to be hereinafter described in detail, comprises a first or inner, cup-shaped closure member that is adapted to threadedly engage an associated container and thus close or open the opening therein, and a second or outer, cup-shaped closure member which surrounds and substantially encloses the first closure member. Each closure member has an end wall and a cylindrical side wall, the end wall and cylindrical sidewall of the second closure member respectively overlying and surrounding the end wall and cylindrical sidewall of the first closure member when the closure is assembled.

Resilient means is provided for effecting a rapid and positive interconnection of the closure members. Such resilient means, in certain of the embodiments to be hereinafter described, comprises at least one resilient arm on one of the closure members and having a portion which engages the other of the closure members. In the other embodiments, the resilient means comprises a resilient, split ring carried by one of the closure members and having a portion engaging the other closure member.

The safety closure herein disclosed also includes locking means for rendering the closure operable either as an ordinary closure or as a safety closure. Such locking means includes a recess in the end wall of the first closure member, an opening in the end wall of the second closure member and a key positioned in the recess and opening and preventing relative rotation therebetween. The locking means further includes means for releasably retaining the key in the recess and opening in the closure members.

In one embodiment of the invention, such releasable retaining means comprises a frangible interconnection between the key and one of the closure members, and in the other embodiment the releasable retaining means comprises a portion of the key which is sized to fit snugly in either the recess or opening in the closure members, or both. In all embodiments, the interconnection between the key and the closure members is such as to require the application of a predetermined amount of force to effect initial separation of the key from the closure members, but to require little or no effort to subsequently effect engagement of the key with the closure members when it is desired to thread the closure onto or off of an associated container. Such subsequent ease of engagement of the key with or disengagement thereof from the recess and/or opening in the closure members results from the destruction of the frangible interconnection between the key and closure members in one of the embodiments, and the positioning of another and smaller portion of the key in the recess and opening in another embodiment.

In FIGS. 1–7, inclusive, a safety closure 10, embodying the features of the present invention is illustrated. The safety closure 10 is shown mounted on a container such as a bottle 11 having an open end 12 and threads, indicated at 13, adjacent to the end 12. It will be understood that the closure 10 may be used with a wide variety of containers or bottles of different sizes and shapes, and that the shape and proportions of the bottle 11 shown in the figures is merely exemplary.

As best seen in FIGS. 3 and 7, the closure 10 generally comprises a first or inner closure member 16, and a second or outer closure member 17. The inner closure member 16 is preferably cup-shaped and thus includes an end wall 18 that is adapted to engage and close the open end 12 of the associated container 11, and a cylindrical sidewall 20 having a threaded inner surface 22 that is adapted to mate with the threads 13 adjacent the end 12 of the bottle 11.

The second closure member 17 is also preferably cup-shaped and likewise includes an end wall 23 and a cylindrical sidewall 25. When the closure 10 is assembled, as shown in FIGS. 1 and 3, the end wall 23 of the outer closure member 17 overlies the end wall 18 of the inner closure member 16, and the cylindrical sidewall 25 of the closure member 17 surrounds the cylindrical sidewall 20 of the closure member 16.

In order to facilitate rapid assembly of the closure members 16 and 17 and to assure a permanent interconnection after assembly, resilient means is provided. Such resilient means, in the present instance, comprises at least one and preferably four circumferentially spaced, axially extending, resilient arms 30 carried by the outer closure member 17 for engaging and retaining the inner closure member 16 in nested or telescoped relation in the outer closure member 17. Each arm 30 is preferably formed integrally with material of the cylindrical sidewall 25 so that the upper end of each arm is fixed with respect to the sidewall 25, and the lower end, indicated at 31, of each arm 30 is movable radially relative to the sidewall 25. The inner and outer surfaces, respectively, indicated at 28 and 29 in FIG. 6, of each arm 30 are preferably flat and parallel to facilitate flexure of the arm.

A radially inwardly extending lug or flange 32 is provided on the lower end 31 of each arm 30, the lug 32 defining a ledge or shoulder 33 of sufficient radial depth to extend under and engage the lower edge, indicated at 34, of the sidewall 20 of the inner closure member 16 when the members are assembled. To facilitate such assembly, the radially inner edge of each lug 32 is inclined or beveled, as at 36, to provide a cam surface which contacts the outer surface, indicated at 37, of the cylindrical sidewall 20 of the closure member 16 and deflects the lower end 31 of the arm 30 outwardly as the outer closure members 16 and 17 are being assembled. In addition, the upper edge of the cylindrical sidewall 20 of the inner closure member 16 may be beveled or chamfered, as at 38, to facilitate such outward deflection of the lower end 31 of the arm.

The axial length of the sidewall 25 of the outer closure member 17 is greater than the axial length of the cylindrical sidewall 20 of the inner closure member 16 so that the lug 32 will snap under the lower edge 34 of the sidewall 20 when the members are fully telescoped. Once assembled, the ledge 33 of the lug 32 prevents the inner closure member 16 from being pulled out of the outer closure member 17.

Thus, when it is desired to assemble the closure 10 so that the inner closure member 16 is telescoped into and substantially enclosed by the outer closure member 17, the inner closure member 16 is merely aligned with the open end of the outer closure member 17, and then pressed into the closure member 17. When the inner closure member 16 is fully telescoped into the outer closure member 17, the resiliency of the arm will cause the lug 32 at the lower end 31 thereof to snap under the lower edge 34 thereof. The closure members 16 and 17 thus become permanently interconnected and cannot be separated without destroying the closure. However, the closure members 16 and 17 are sized so that clearances are provided between the members after assembly so that the members are freely relatively rotatable.

It will be understood that while four circumferentially spaced arms 30 are shown for retaining the inner and outer closure members 16 and 17 in assembled relation, fewer or more than this number of arms could be provided.

According to the present invention, the closure 10 may be used either as an ordinary closure or as a safety closure. To this end, locking means is provided for selectively rendering the closure members 16 and 17 fixed, or relatively rotatable, with respect to each other. Such locking means comprises a key 40 for engaging and preventing relative rotation between the closure members 16 and 17. The key 40 is noncircular in plan, preferably triangular, and engages the closure members 16 and 17 when disposed in a recess 42 (FIGS. 3 and 5) in the upper surface of the end wall 18 of the inner closure member 16, and an opening 43 (FIGS. 2 and 3) in the end wall 23 of the outer closure member 17. The key 40 is preferably somewhat smaller than the recess 42 and opening 43.

Since the closure 10 is intended for use both as an ordinary and safety closure, and since its likelihood of use in either application is about the same, the closure 10 includes means for releasably retaining the key 40 in engaged relation with the closure members 16 and 17 so that the closure 10 is initially useable only as an ordinary closure. Such releasable retaining means, in the present instance, comprises at least one and preferably a pair of connecting webs or bridges 46 (FIGS. 1, 2, 3 and 4) extending between the sides of the key 40 and the opening 43 in the end wall 23 of the outer closure member 17. While the webs or bridges 46 are preferably formed from the same material as the outer closure member 17 and key 40 at the time that these parts are formed, they could also be formed subsequent to the formation of the outer closure member 17 and key 40. Thus, the webs 46 could be formed by bridging the space between the key 40 and edge of the opening 43 with a small quantity of adhesive, or the like, instead of the material of the closure member 17 and key 40. The webs or bridges 46 are preferably dimensioned so that they will deform when torque is applied to the outer closure member 17 for effecting engagement or disengagement of the closure 10 from the container 11 and thereby permit the torque to be applied to the inner closure member 16 through the key 40.

With the foregoing construction, it will be apparent that when the key 40 is disposed in the recess 42 and opening 43 in the end walls of the inner and outer closure members 16 and 17, respectively, any rotative torque applied to the outer cap member 17 will be transmitted through the key 40 to the inner cap member 16. Accordingly, the inner closure member 16, and consequently the closure 10, can then be threaded onto or off of the open end 12 of the container 11 in the manner of an ordinary closure. However, if the container 11 contains poison or some other dangerous substance, or if the user merely desires to prevent unauthorized access to the contents of the container 11, the closure 10 may be readily rendered operable as a safety closure by separating the key 40 from the closure members 16 and 17. To this end, the key 40 may be provided with a cavity 47 in one side face thereof for receiving a tool, such as the tip 48 of a screwdriver or the like.

Thus, when the tip of the screwdriver blade is inserted into the cavity 47, the key 40 may be easily separated from the closure members 16 and 17, merely by prying upwardly on the key 40 with the tip 48 of the screwdriver, in the manner illustrated in FIG. 4, until the webs 46 are broken. After the webs 46 have been broken and the key 40 disengaged from the closure members 16 and 17, torque cannot be applied to the inner closure member 16 from the outer closure member 17 to effect engagement or disengagement of the closure 10 from the container 11. However, after the key 40 has been removed from its engaged position with the closure members 16 and 17 and it is desired to either thread the closure 10 onto or off of the container 11 to gain access to the contents thereof, a user need only insert the key 40 into the opening 43 and recess 42 in the end walls of the closure members, in the manner illustrated in FIG. 3. When so positioned, the key 40 again interlocks the inner and outer closure members 16 and 17 so that torque may be applied from the outer closure member 17 through the key 40 to the inner closure member 16 so that the closure 10 may be threaded off of or onto the container 11, as desired.

After the key 40 has been separated from the closure members 16 and 17, displacement or loss thereof may be prevented by engaging the latter with a hook or other retaining device. To this end, the key 40 may be provided with an upstanding rib 52 having an opening 53 therethrough, for this purpose.

Referring now to FIG. 8, another safety closure 60 embodying the features of the invention, is illustrated. The closure 60 is similar in general construction to the closure 10 in that it includes a first or inner, cup-shaped closure member 66, a second or outer, cup-shaped closure member 67 which encloses the inner closure member 66, and locking means (not shown) for rendering the closure operable either as an ordinary closure or as a safety closure. The closure 60 differs from the previous embodiment in the construction of the resilient means for interconnecting the closure members 66 and 67, as will be described more fully hereinafter.

Thus, the inner closure member 66 includes an end wall 68 that is adapted to engage and close the open end of an as-

sociated container, such as the end 12 of the bottle 11, and a cylindrical sidewall 70 having a threaded inner surface 72 that is adapted to mate with the threads 13 of the bottle 11.

The second or outer closure member 67 likewise includes an end wall 75 and a cylindrical sidewall 77. The inner surface of the end wall 68 may be provided with a recess (not shown), such as the recess 42 of the closure 10, and the end wall 71 of the outer closure member 67 may be provided with an opening (not shown), such as the opening 43 of the closure member 10, for receiving a key (also not shown), such as the key 40.

As heretofore mentioned, the closure 60 also includes resilient means which facilitates rapid assembly of the closure members 66 and 67 and assures a permanent interconnection thereof. Such resilient means comprises at least one and preferably four circumferentially spaced, axially extending resilient arms 80 carried by the outer closure member 67 and engaging and retaining the inner closure member 66 in nested or telescoped relation in the outer closure member 67.

Each arm 80 is preferably formed integrally with the material of the cylindrical sidewall 73 so that the upper end of the arm is fixed with respect to the sidewall 73. The lower end of each arm 80, indicated at 81, is free to move relative to the sidewall 77. A circumferential groove 82 is provided in the outer surface of the cylindrical sidewall 70 of the closure member 66, and a radially inwardly extending lug 83 is provided on the inner surface of the arm 80, adjacent the lower end 81 thereof, for extension into the groove 82 when the closure member 66 is fully telescoped into the closure member 67, as shown in FIG. 8.

Thus, when it is desired to assemble the closure 60, the inner closure member 66 is merely aligned with the open end of the outer closure member 67 and then pressed into the closure member 67. As the closure member 66 is shifted into the closure member 67, the lower end 81 of each arm 80 is sprung or deflected outwardly by engagement of the upper edge, indicated at 84, of the inner closure member 66 with the lug 83. Outward deflection of each arm 80 is facilitated by chamfering or beveling the edge 84. After the lugs 83 snap into the groove 82, the members 66 and 67 become permanently interconnected. However, the inner and outer closure members 66 and 67, as well as the lugs 83 and groove 82, are sized so that clearances are provided between the members after assembly so that the members 66 and 67 are freely relatively rotatable. The inner and outer surfaces of each arm 80 may be flat to facilitate flexure of the arms 80 during assembly of the closure.

In FIG. 9, another safety closure 90 is illustrated. The closure 90 is similar in general construction to the previous embodiments in that it includes a first or inner, cup-shaped closure member 92, a second or outer, cup-shaped closure member 93, which encloses the inner closure member 92, and locking means (not shown) for rendering the closure operable either as an ordinary closure or as a safety closure. The closure 90 differs from the previous embodiments in the construction of the resilient means for interconnecting the closure members 92 and 93, as will be described more fully hereinafter.

Thus, the inner closure member 92 includes an end wall 94 that is adapted to engage and close the open end of an associated container, such as the bottle 11, and a cylindrical sidewall 96 having a threaded inner surface 97 that is adapted to mate with the threads on the bottle 11.

The outer closure member 93 likewise includes an end wall 98 and a cylindrical sidewall 99. When assembled, the end wall 98 of the closure member 93 overlies the end wall 94 of the closure member 92, and the cylindrical sidewall 99 of the member 93 surrounds the cylindrical sidewall 96 of the closure member 92.

The upper surface of the end wall 94 may be provided with a recess (not shown), such as the recess 42 of the closure 10, and the end wall 98 may be provided with an opening (not shown), such as the opening 43 of the closure 10, for receiving a key (also not shown), such as the key 40.

As heretofore mentioned, the closure 90 also includes resilient means which facilitates rapid assembly of the closure members 92 and 93 and which assures a permanent interconnection thereof. Such resilient means comprises at least one or preferably four circumferentially spaced, axially extending resilient arms 100 carried by the outer closure member 93 and engaging and retaining the inner closure member 66 in nested or telescoped relation in the outer closure member 93.

Each arm 100 is preferably formed integrally with the material of the cylindrical sidewall 99 so that the upper end of each arm is fixed with respect to the sidewall 99, and the lower end, indicated at 102, of each arm is free to move relative to the sidewall 99. The lower end 102 of each arm does not extend to the lower edge of the cylindrical sidewall 99 but instead terminates at a point thereabove, as shown in FIG. 9. In addition, a radially inwardly extending lug 103 is provide don the inner surface of each arm 100, adjacent the lower end 102 thereof, the upper surface of the lug 103 defining a ledge or shoulder 104. The ledge 104 is adapted to extend under and engage the lower edge, indicated at 106, of the cylindrical sidewall 96 of the inner closure member 92, when the closure members are in assembled relation. To this end, the cylindrical sidewall 96 is shorter than the sidewall 99. The upper edge, indicated at 107, of the sidewall 96 of the closure member 92 may be beveled or chamfered to facilitate assembly thereof with the closure member 93 and outward deflection of the lower end 102 of the arm 100.

In FIG. 10, another safety closure 110 embodying the features of the present invention, is illustrated. The safety closure 110 is similar to the previous embodiments in that is also includes a first or inner, cup-shaped closure member 112, a second or outer, cup-shaped closure 113, and locking means (not shown) for rendering the closure operable either as an ordinary closure or as a safety closure. The closure 110 also differs from the previous embodiments in the construction of the resilient means for interconnecting the closure members 112 and 113.

The inner closure member 112 includes an end wall 114 that is adapted to engage and close the open end of an associated container, such as the bottle 11, and a cylindrical sidewall 116 having its inner surface threaded as at 115 for engagement with threads on the container, such as the threads 13 on the bottle 11.

The outer closure member 113 likewise includes an end wall 117 and a cylindrical sidewall 119. When the closure members 112 and 113 are in assembled relation, as illustrated in FIG. 10, the end wall 117 of the member 113 overlies the end wall 114 of the member 112, and the cylindrical sidewall 119 of the member 113 surround the cylindrical sidewall 116 of the member 112.

The outer surface of the end wall 114 may be provided with a recess (not shown) and the end wall 117 may be provided with an opening (not shown), such as the recess 42 and opening 43 in the closure members 16 and 17 of the closure 10, for receiving a key (not shown) such as the key 40 of the closure 10, for selectively rendering the closure 110 operable either as an ordinary closure or as a safety closure.

As heretofore mentioned, the closure 110 also includes resilient means which facilitates rapid assembly of the closure members 112 and 113 and which assures a permanent interconnection thereof. Such resilient means comprises a split ring 127 sized to expand into and seat in a circumferentially extending groove 128 in the inner surface of the sidewall 119 of the outer closure member 113. To this end, the axial length of the cylindrical sidewall 116 of the closure member 112 is less than that of the cylindrical sidewall 119 of the closure member 113 so that the lower edge, indicated at 122, of the sidewall 116 is spaced above the upper edge of the groove 128 when the closure members are assembled. In addition, the radial thickness of the ring 127 is such that when the latter is seated in the groove 128, the lower edge 122 of the cylindrical side wall 116 of the inner closure member 112 will engage the ring. Consequently, the inner closure member 112 is retained in telescoped relation in the outer closure member 113 by the

ring 128. When so assembled, the closure members 112 and 113 are freely relatively rotatable because of clearances between the members for this purpose.

In FIG. 11 another safety closure 130 embodying the features of the present invention is illustrated. The safety closure 130 is similar to the previous embodiments in that it includes a first or inner, cup-shaped closure member 132, a second or outer cup-shaped closure member 133, and locking means (not shown) for rendering the closure operable either as an ordinary closure or as a safety closure. The safety closure 130 differs from the previous embodiments, however, in the construction of the resilient means for interconnecting the closure members 112 and 113.

The inner closure member 132 has an end wall 134 for closing the open end of an associated container, such as the container 11, and a cylindrical sidewall 136 having a threaded inner surface 139 that is adapted to engage threads on the associated container, such as the threads 13 on the container 11.

The outer closure member 133 likewise includes an end wall 137 and a cylindrical sidewall 140. When the closure 130 is assembled, the end wall 137 of the closure member 133 overlies the end wall 134 of the closure member 132, and the cylindrical sidewall 140 of the closure member 133 surrounds the cylindrical sidewall 136 of the closure member 132.

The outer surface of the end wall 134, and the end wall 137, may respectively be provided with a recess (not shown) and an opening (not shown), such as the recess 42 and opening 43 in the closure members 16 and 17, respectively, of the closure 10 for receiving a key, such as the key 40 of the closure 10.

As heretofore mentioned, the closure 110 also includes resilient means which facilitates rapid assembly of the closure members 132 and 133 and which assures a permanent interconnection thereof. Such resilient means comprises a split ring 144 sized to expand over and interlock with a radially inwardly extending circumferential bead 145 on the inner surface of the cylindrical sidewall 136 of the outer closure member 133.

To this end, the axial length of the cylindrical sidewall 136 is less than that of the cylindrical sidewall 140 of the closure member 133 so that the lower edge, indicated at 148, of the sidewall 136, terminates somewhat above the bead 145 when the members 132 and 133 are fully assembled. The radial thickness of the ring 144 is such that when the ring is seated on and interlocked with the bead 145, the lower edge 148 of the cylindrical sidewall 136 of the inner closure member 132 will engage the ring. Thus, the inner closure member 132 is permanently retained in telescoped relation in the outer closure member 133. When so assembled, the closure members 132 and 133 are also freely relatively rotatable because of clearances between the members for this purpose.

Referring now to FIGS. 12 and 13, another safety closure 150 embodying the features of the present invention, is illustrated. The safety closure 150 is similar to the previous embodiments in that it includes a first or inner, cup-shaped closure member 152 and a second or outer, cup-shaped closure member 153. The closure member 152 includes an end wall 154 that is adapted to engage and close the open end of an associated container, such as the container 11, and a cylindrical sidewall 156 having a threaded inner surface 158 that is adapted to mate with threads on the container, such as the threads 13 on the container 11.

The outer closure member 153 likewise includes an end wall 157 and a cylindrical sidewall 159. When assembled, the end wall 157 of the outer closure member 153 overlies the end wall 154 of the inner closure member 152, and the cylindrical sidewall 159 of the outer closure member 153 surrounds the cylindrical sidewall 156 of the inner closure member 152.

The closure 150 also includes resilient means for retaining the closure members 152 and 153 in the assembled relation. Such resilient means may comprise a plurality of flexible arms 30 carried by the cylindrical sidewall 159 of the closure 153, and having lugs thereon (not shown), such as the lugs 32 on the arms 30 of the closure 10, for engaging and permanently retaining the inner closure member 152 in telescoped relation in the outer closure member 153.

The closure 150 is also similar to the previous embodiments in that a recess 42 is provided in the upper surface of the end wall 154 of the inner closure member 152, and an opening 43 is provided in the end wall 157 of the outer closure member 153. The recess 42 and opening 43 are adapted to receive a key 160 for preventing relative rotation between the members 152 and 153 and hence threading of the closure 150 onto or off of an associated container, such as the container 11.

Thus, the key 160 includes a portion 161 that is noncircular in plan and sized to fit snugly in either the recess 42 or opening 43 in the end walls 154 and 157 of the closure members 152 and 153, respectively, or both. When the portion 161 of the key 160 is disposed in the recess 42 and opening 43 in the end walls 154 and 157, the closure members 152 and 153 are interconnected and torque may be applied to the inner closure member 152 from the outer closure member 153 through the key 160. Because of the snug fit of the portion 161 of the key 160 in the recess 42 and/or opening 43, a predetermined amount of force is required to disengage or separate the portion 161 of the key 160 from the recess 42 and opening 43 when it is desired to render the closure operable as a safety closure. The portion 161 of the key 160 may be separated from the recess 42 and opening 43 in any desired manner, such as by prying on the key with a screwdriver or other appropriate tool. To this end, a recess or cavity 162 is provided in an upper and somewhat similar sized portion 163 of the key 160 for receiving the associated tool.

Assuming that the user intends to use the closure 150 as a safety closure, and that he has initially pried out or separated the key 160 form the closure members 152 and 153, the key 160 may thereafter be easily engaged with the closure members 152 and 153 to permit the closure 150 to be threaded onto or off of the associated container without the use of an associated tool. Such reengagement of the key 160 is readily accomplished merely by inverting the key from the position thereof shown in FIG. 12 so that the smaller portion 163 thereof is aligned with the recess 42, and opening 43 in the end walls 154 and 157, respectively, and then shifting the portion 163 of the key 160 into the recess 42 and opening 43. Because of the smaller size of the portion 163, such engagement is readily accomplished. Thus, after initial removal of the key 160, its subsequent engagement or disengagement from the closure members 152 and 153 does not require the application of any particular amount of force or the use of a tool. The aforementioned close size relationship between the portion 161 of the key 160 and the recess 42 and opening 43 of the closure members 152 and 153, comprises means for resisting separation of the key from the closure 150.

From the foregoing it will be apparent that a novel safety closure construction has been herein illustrated and described which is capable of functioning either as an ordinary closure or as a safety closure, depending upon whether or not a separable key which interlocks the relatively rotatable inner and outer closure members of the closure is separated from the closure members or left engaged therewith. Because of the simplicity of its construction, the closure lends itself to mass production techniques and thus extends the safety advantages of the closure to applications where safety closures thus far advanced have heretofore been excluded.

I claim:

1. A safety closure adapted to close an opening in a container, comprising a first closure member having an end wall adapted to close the opening in said container and a cylindrical sidewall adapted to be threaded onto or off of said container, a second closure member carried by said first closure member and having an end wall overlying the end wall of said first closure member and a cylindrical sidewall surrounding the cylindrical sidewall of said first closure member, said second closure member being rotatable relative to said first closure member, locking means including a key engaging said closure members and preventing relative rotation

therebetween, and means releasably retaining said key in engaged relation with said closure members, said last-mentioned means being operable to prevent separation of said key from said closure members until a predetermined force is applied to said key but thereafter permitting said key to be freely engaged with or disengaged from said closure members to permit said closure to be threaded onto of off of said container, whereby said closure may be used either as an ordinary closure by leaving said key engaged with said closure members or as a safety closure by separating said key from said closure members.

2. The safety bottle closure of claim 1, further characterized in that said last-mentioned means comprises a frangible interconnection between said key and one of said closure members.

3. The safety closure of claim 2, further characterized in that said frangible interconnection extends between said key and said second closure member.

4. The safety closure of claim 2, further characterized in that said key is formed integrally with at least one of said closure members, and said frangible interconnection comprises a portion of the material of said key and closure member.

5. The safety closure of claim 1, further characterized in that the end wall of said first closure member is provided with a recess, the end wall of said second closure is provided with an opening, and said key extends through said opening and into said recess when engaged with said closure members.

6. The safety closure of claim 5, further characterized in that said key includes a first portion sized to fit snugly in at least one of said recess and opening and a second portion sized to fit loosely in said one of said recess and said opening, said first portion of said key and said one of said recess and opening comprising said releasable retaining means.

7. The safety closure of claim 6, further characterized in that said first portion of said key is sized to fit snugly in both said recess and said opening in said closure members.

8. The safety closure of claim 1, further characterized in that said key includes a cavity adapted to receive a tool for applying force to said key.

9. The safety closure of claim 8, further characterized in that said key is generally triangular, and said cavity is formed in at least one of the three sides thereof.

10. In a safety closure adapted to close an opening in a container, said closure including a first cup-shaped closure member adapted to engage said container and close the opening therein, and a second cup-shaped closure member enclosing said first closure member and preventing manipulation thereof, the improvement of resilient means for rapidly and positively interconnecting said first and second closure members, said resilient means being movable between a first position permitting said second closure member to telescope into said enclosing relation with said first closure member, and a second position engaging at least one of said closure members and retaining the same in interconnected relation while preventing any substantial relative telescoping

11. The safety closure of claim 10, further characterized in that said resilient means comprises at least one resilient arm having one end thereof fixed with respect to one of said closure members and the other end of said arm being movable with respect to said one closure member between said first and second positions, said other end of said arm being normally disposed in said second position and being deflectable to said first position.

12. The safety closure of claim 11, further characterized in that said first closure member has a cylindrical sidewall having a lower edge, said arm is carried by said second closure member and has a portion at its other end movable over said lower edge when in said second position.

13. The safety closure of claim 11, further characterized in that said first closure member has a cylindrical sidewall having an outer surface and said outer surface has a groove therein, said arm is carried by said second closure member, and said portion of said arm extends into said groove when in said second position.

14. The safety closure of claim 11, further characterized in that said first closure member has a cylindrical sidewall, said second closure member has a cylindrical sidewall surrounding the cylindrical sidewall of said first closure member, and said resilient arm is formed integrally with the cylindrical sidewall of said second closure member and is joined thereto at said one end.

15. The safety closure of claim 14, further characterized in that a plurality of circumferentially spaced, resilient arms are provided on said cylindrical sidewall of said second closure member.

16. The safety closure of claim 14, further characterized in that said arm has inner and outer surfaces, and at least one of said surfaces is flat to facilitate flexure of said arm.

17. The safety closure of claim 14, further characterized in that said resilient means comprises an expansible and contractable split ring, said ring being disposed in said first position when separated from said closure members and being disposed in said second position when engaged with one of said closure members with a portion thereof providing an abutment preventing said other closure member from being moved out of enclosing relation with said one closure member.

18. The safety closure of claim 17, further characterized in that first closure member has a cylindrical sidewall having a lower edge, said second closure member has a cylindrical sidewall, and said ring is carried by the cylindrical sidewall of said second closure member with said ring engaging the lower edge of the cylindrical sidewall of said first closure member when said ring is disposed in said first position.

* * * * *

PO-1050
(5/69)

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,625,387 Dated December 7, 1971

Inventor(s) Edward E. Schaefer

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the Abstract: line 5, "the" should read --rotatable--; line 14, "snapring" should read --snap ring--.
Col. 6, line 16, "provide don" should read --provided on--; line 30, "is" (second occurrence) should read --it--. Col. 8, line 28, "similar" should read --smaller--; line 32, "form" should read --from--. Col. 9, line 7, "of" should read --or--. Col. 10, line 3, after "telescoping" should appear --movement therebetween.--.

Signed and sealed this 23rd day of May 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents