

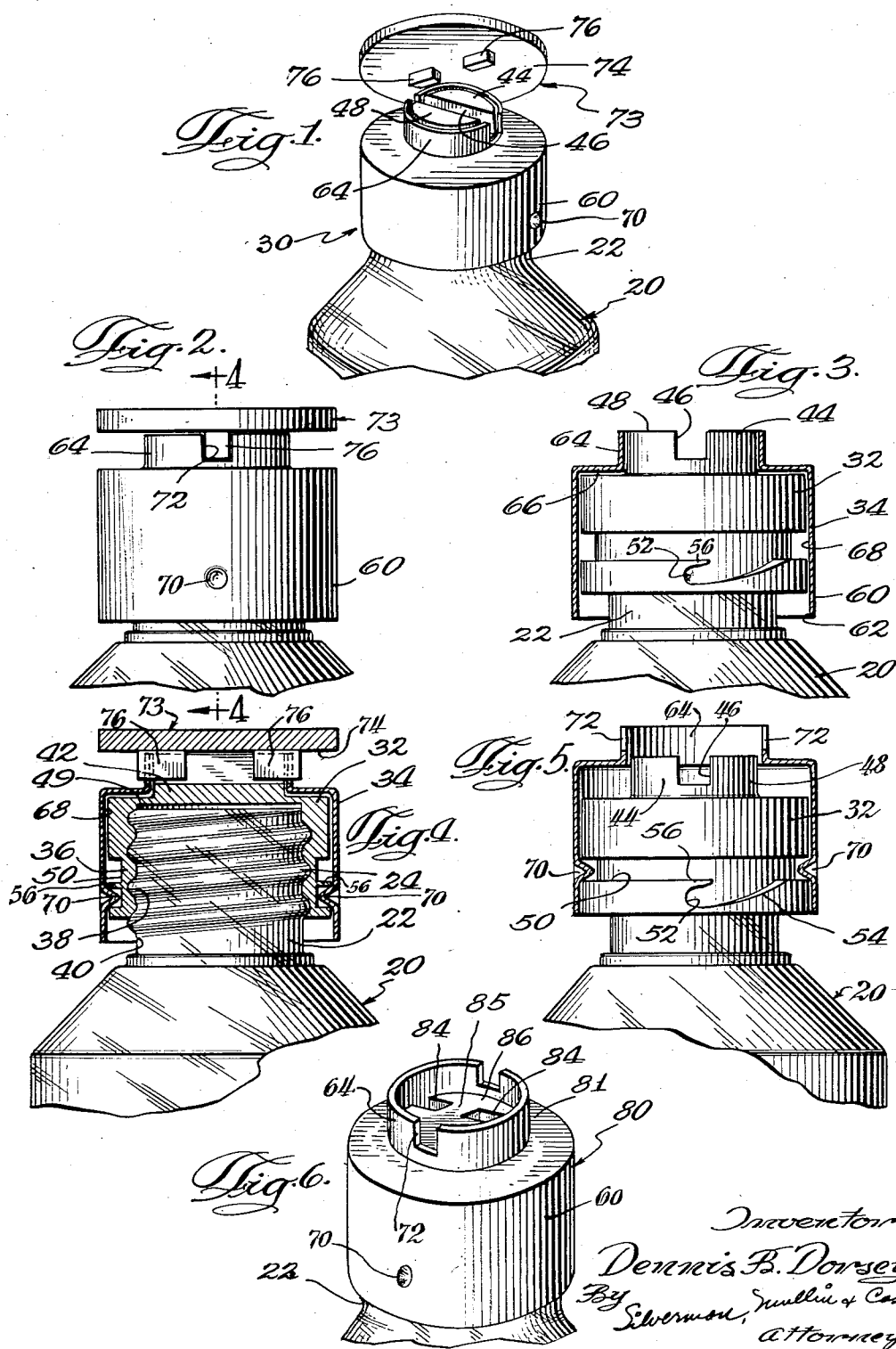
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D. B. DORSEY
SAFETY CLOSURE

2,921,705

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2 Sheets-Sheet 1



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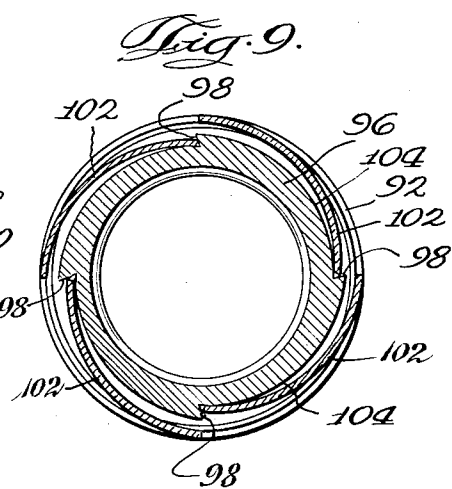
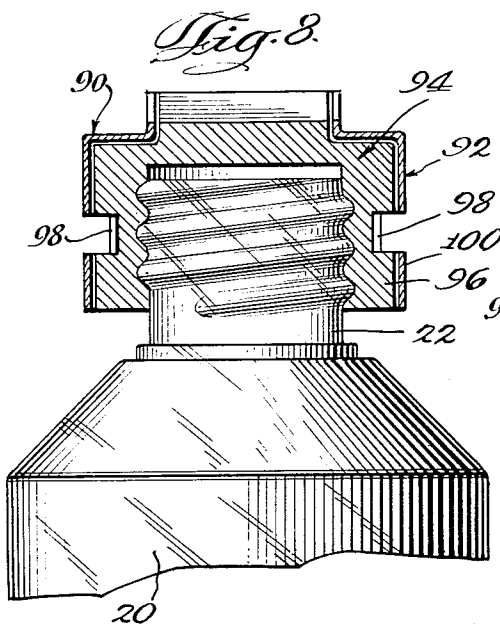
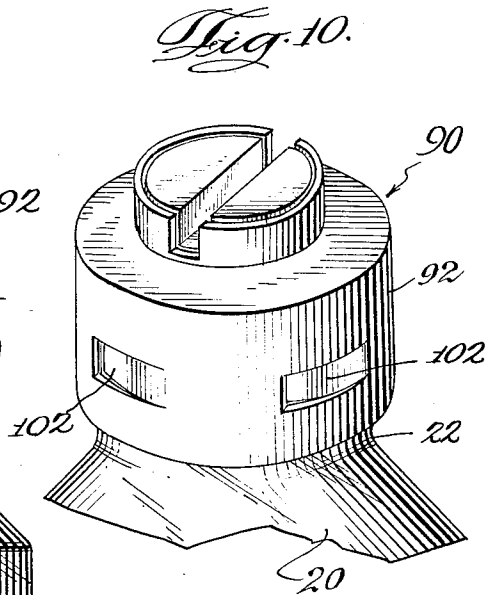
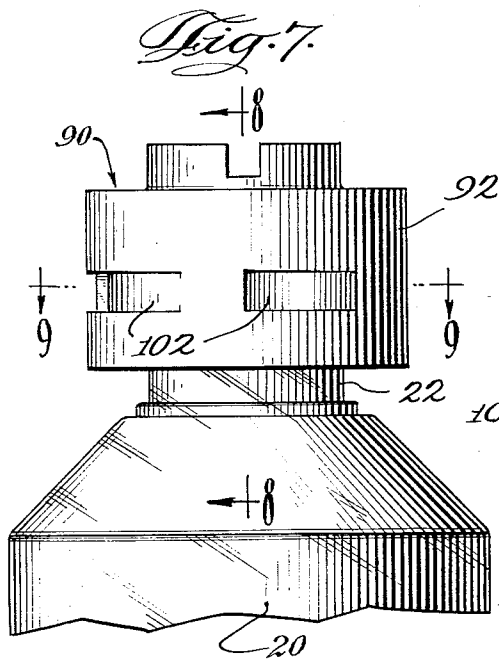
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2 Sheets-Sheet 2



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SAFETY CLOSURE

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13 Claims. (Cl. 215—9)

This invention relates generally to closure devices for containers having reduced dimension neck formations and more particularly, relates to improvements in a safety closure capable of being installed on the dispensing neck of such a container to positively prevent access to contents except by predetermined manipulation of the components of said safety closure.

Annual surveys of the National Safety Council, as well as investigations of pediatricians, manufacturers and others, indicate clearly that fatal and serious injuries from accidental poisoning remains a hazard which continues unabated. (See Journal of American Medical Association, vol. 163, No. 15, pp. 1333 ff., 1344.) Although not limited thereto, such accidents occur commonly in the home and accidental poisonings of children, especially of pre-school age, appear to be increasing. This is understandable in the light of the greater number of potentially toxic articles being brought into the home with increasing incidence. Common examples of such articles include the insecticides which contain organic phosphorus compounds capable of causing serious or fatal injury when applied to unbroken skin areas of a child or adult. Hair waving, dyeing and bleaching solutions, cleaning, polishing and disinfecting substances, medicants for external use, fertilizers containing certain poisoning agents, herbicides, pharmaceuticals such as laxatives and sedatives, paints capable of causing lead poisoning and many others represent the range of commonly available and used household products which are potential sources of accidental poisonings. A particularly insidious agent of accidental poisonings is aspirin, which when taken in over-doses is capable of and presently contributes to an unexpectedly large number of fatalities.

Although the gravity of the problem of accidental poisoning has been recognized for years, the fact that the incidence of such accidents remains unabated and even in increasing in certain areas is not indicative of lack in time and effort expended to achieve control over the evil. In particular, the prior art in connection with safety closures for conventional containers in which such toxic chemicals are sold evidences the great amount of ingenuity and thought which has been directed toward solution of this serious problem, albeit, without significant success. One important reason for the failure of the prior to satisfy the long-felt need for a satisfactory safety closure is that prior closures sought to make it more difficult to gain access to the container instead of making it impossible to do so except by a predetermined manipulation of the components of the safety closure. In providing for such intentionally complicated manipulations of said components, the avenue was still open for gaining access to the contents of the container by shrewd or lessened manipulation. On the other hand, the complicated procedure required actually tended to discourage more universal use of safety closures where convenient, rapid and easy access to the contents was desired or desirable.

Another reason for failure of the prior art structures

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to solve this problem is believed attributable to the increased cost of the packaged product resulting from addition of the safety closure. Although some increment of additional cost is expected, public inertia to any significant price increase in such commonly used products can be expected to deter against their purchase, even with the addition of such a protective closure. Consequently such safety closures have not been universally accepted with the result that the incidence of accidental poisonings over the entire country still is an alarming problem and purports to become more severe with the increasing availability of products containing toxic and harmful ingredients.

Accordingly, it is a primary object of the invention to provide a safety closure of the character described which by reason of its singularly advantageous construction is capable of substantially eliminating the disadvantages herein enumerated.

Another important object of the invention is to provide a safety closure of the character described comprising a pair of rotatable components coupled together by unidirectional coupling means which permit simultaneous rotation of the components only in a direction locking same on the dispensing neck of the container and normal rotation of only one of the components in the opposite direction required for unlocking same, and said components have co-operating means required to be positioned in a predetermined alignment one relative the other to permit manual coupling of the components for purposes of simultaneously rotating same in the said opposite direction for unlocking the closure.

Another significant object of the invention is the provision of a protective closure of the character described which can be used with the conventional container having an external, screw threaded dispensing neck or other conventional structure for installing a cap on the container.

Still another cardinal achievement of the invention is the provision of a safety closure of the character described which can be manufactured by economical mass-production techniques at a cost which will not materially detract from the commercial attractiveness of the product on which the said safety closure is installed.

The foregoing and other objects of the invention will become apparent from the description thereof which follows. In order to instruct the artisan in the understanding and practice of the invention, several preferred embodiments have been described in detail in the specification and illustrated in the accompanying drawings. It is contemplated that minor variations in the size, arrangement, construction and proportion of the several parts thereof may occur to the skilled artisan without departing from the principles or sacrificing any of the advantages of the invention.

In the drawings, where the same characters of reference have been employed to identify the same or similar parts throughout the several figures thereof:

Fig. 1 is a perspective view of one form of the safety closure embodying the invention installed on a container, partially shown and illustrating the components thereof aligned for being manually coupled by a tool; shown in position poised for this procedure; for unlocking the closure.

Fig. 2 is a side elevational view of said safety closure in which the tool has been positioned to manually couple the components of the closure to unlock same.

Fig. 3 is a vertical section taken through said closure with said components shown with the unidirectional coupling means arranged to be locked.

Fig. 4 is a vertical sectional view taken through said closure along the line 4—4 of Fig. 2 and in the direction indicated.

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Fig. 5 is a vertical sectional view taken through said closure embodying the invention illustrating the shell in position to be rotated freely relative the internal cap.

Fig. 6 is a perspective view of another modified form of the said closure which provides for use of a special manual coupling tool.

Fig. 7 is a side elevational view of another embodiment of the invention.

Fig. 8 is a sectional view taken along the line 8—8 of Fig. 7 and in the direction indicated generally.

Fig. 9 is a sectional view taken along the line 9—9 of Fig. 7 and in the direction indicated generally.

Fig. 10 is a perspective view of the closure of Fig. 8 in a locked position.

Referring now to the drawings, a representative container of the type with which the invention may be employed is shown partially as identified by the reference character 20. Same may be made from glass, plastic or other appropriate material and has a dispensing neck 22 provided with external screw threads 24 to accommodate the ordinary screw-type cap for sealing the mouth of the container. The safety closure embodying the invention may be installed directly on the dispensing neck or may be made of suitable dimensions to fit on the cap itself, provided, said cap also has screw threads on the exterior lateral surfaces thereof. It is contemplated that other types of co-operating locking means between the neck and a cap also may be employed so long as rotary movement therebetween is required to lock and unlock the same.

The embodiment of the invention shown in Figs. 1 through 5 is designated generally by the reference character 30. Closure 30 includes an internal cap 32 and an outer shell or sleeve 34 both of which may be formed of plastic, metal or other suitable material. Cap 32 is an inverted cup-shaped member having an annular wall or skirt 36 provided with internal annular grooves 38 and is open at its end 40 to permit said cap to be selectively screwed on and off the neck 22. The opposite end of said skirt 36 has an imperforate wall 42 thereacross. On the exterior surface of wall 42 is formed an upstanding, central boss 44 of cylindrical formation which has a transverse slot 46 extending across boss 44 and opening to the end face 48 thereof. Said cap 32 may be screwed over neck 22 to a tightened position in which wall 42 is engaged on the lip 49 of said neck 22. The exterior surface of skirt 36 is scored with an annular groove or track 50 adjacent the bottom end 40 of the cap. On diametrically opposed surfaces of said skirt, said groove 50 has a downwardly slanted ramp-like portion 54, connected therewith which is undercut to provide a projecting overhang segment 56 separating the closed extremity 52 of the portion 54 from the groove 50, as seen in Fig. 5. Said ramp portions 54 are inclined in the same direction considering the direction of rotation for screwing cap 32 on neck 22. Thus, as seen in Fig. 5, ramp 54 is inclined downwardly in a clockwise direction and the opposite portion 54 is likewise so inclined.

Shell 34 includes a generally cylindrical hollow skirt or wall 60 the internal diameter of which is slightly greater than the external diameter of cap 32. Shell 34 is open at its bottom end 62 to permit telescoping thereof over cap 32 and by reason of such different diameters, shell 34 ordinarily would be freely rotatable relative cap 32. The upper end of said shell has a reduced diameter, upstanding, cylindrical flanged or ring formation 64 open at its top end and connected with skirt 60 by the transverse annular wall 66. The internal diameter of said flange or ring 64 is sufficient to permit the boss 44 to be accommodated therein. Preferably, the length of said ring or flange is substantially equal to that of boss 44. Skirt 60 preferably is longer than skirt 36 of said cap so that shell 34 may completely encase said cap when installed.

As explained, the internal diameter of the shell ordi-

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narily would enable the shell to be freely rotated relative the cap 32 when telescoped thereover. The invention contemplates unidirectional coupling means between the shell and cap comprising projections or protuberances on the interior surface 68 of skirt 60. Said protuberances or projections may each comprise a pin or lug 70 on diametrically opposed surfaces of said shell capable of being formed merely by depressing or indenting the skirt 60 at selected locations. The protuberances 70 thus formed are arranged to ride in the groove or track 50. The shell 34 is installed telescoped over the cap 32 and the protuberances 70 are engaged in the track 50, permitting the shell to be rotated relative the cap 32. However, as each protuberance reaches the ramp portion 54, continued rotation of the shell will cause said protuberance to ride down a said ramp into engagement with the dead end or stop 52 below overhang 56. Continued rotation of the shell in the same direction will cause the cap to turn simultaneously in this position of the pins 70. Axial movement of the shell relative the cap is prevented by the overhang segments 56.

Thus, the shell and cap are coupled to permit their movement together only when the lugs or pins 70 are engaged against stops 52. Conventionally, right hand screw threads may be used whereupon rotation in a clockwise direction would succeed only in locking the cap 32 more tightly on neck 22. However, if shell 34 is rotated in the opposite or counter-clockwise direction, each pin 70 will be withdrawn from beneath the adjacent overhang 56 and up the ramp portion 54 to permit free rotation of the shell relative the cap. As a consequence, the shell and cap no longer will be coupled and hence, the unidirectional coupling of shell 34 and cap 32 by means of the protuberances 70 and stops 52 enables simultaneous rotation of said shell and cap only in a direction locking cap 32 more tightly on the neck 22.

For opening the closure 30, I provide manual coupling means which function to enable simultaneous rotation of the cap and shell in the opposite or counter-clockwise direction for unscrewing said cap from the neck 22. Said means include a pair of diametrically opposed keyways or slots 72 cut in flanged formation 64 and opening to the top edges thereof. Referring to Figs. 2 and 3, said keyways 72 are arranged to align with the slot 46 in boss 44 when the shell has been rotated sufficiently to engage each pin 70 against a stop 52 so that shell 34 is in its lowermost position relative cap 32. In this position, boss formation 44 is received within flanged formation 64 and end face 48 of said boss is substantially flush with the top edge of flanged formation 64. There is thus formed a continuous slot across the upper end of the closure as seen in Fig. 1.

A suitable tool 73 for unlocking closure 30 is illustrated by way of example in Fig. 1 as comprising a disc or wafer 74 having a pair of spaced apart, medially arranged blocks 76 depending therefrom. Said blocks 76 are of suitable dimension to be inserted into the continuous slot formation resulting from alignment of slot 46 and keyways 72. Further, blocks 76 are arranged so that each will engage in said continuous slot formation between a keyway 72 and the adjacent extremity of slot 46 and span the juncture between said keyway and adjacent end of slot 46. As installed in Figs. 2 and 4, the tool 73 may be rotated counter-clockwise, for instance, to simultaneously rotate shell 34 and cap 32 in the same direction whereby cap 32 is unscrewed together with shell 34. It will be appreciated that instead of such a tool provided with the package, a knife edge, coin or other suitable instrument may be used in this manner to unlock the closure. Of importance is that the cap 32 cannot be unscrewed except by inserting a suitable tool in the continuous slot formation formed by selective manipulation of shell 34 so as manually to couple said shell and cap for simultaneous rotation in a direction opposite to that required for tightening cap 32.

It may be appreciated that the unidirectional coupling means may be reversed with pins 70 provided on cap 32 instead. Also, said means may comprise only one pin 70 and ramp portion 54.

It is contemplated that by virtue of the structure described, a tool, such as tool 73, can be employed positively to prevent opening of the closure. Referring to Fig. 5, shell 34 is in raised position relative the cap 32 and the pins 70 are disposed in groove 50. Keyways 72 and slot 46 are not aligned. Blocks 76 of tool 73 may be inserted in the keyways and transverse of the slot 46. Upon rotation of the shell 34 in a clockwise direction, the pins 70 will be prevented from riding down ramp portions 54 with accompanying dropping of shell 34 relative cap 32 by reason of the bottom surfaces of blocks 76 engaged on upper surface 48 of formation 44, and maintaining shell 34 elevated. As blocks 76 are brought into alignment with slot 46 upon continued rotation of the shell, pins 70 each will have been moved opposite an overhang 56. As a result, the blocks 76 are prevented from dropping into the slot 46 by the overhang projections 56 preventing pins 70 from dropping into position against stops 52. Accordingly, rotation of the shell in a clockwise direction will only freely rotate same relative cap 32 so long as the tool is thus in position. In order to open the closure, it is necessary to remove the tool first so that the shell 34 may be lowered relative cap 32 to engage pins 70 against stops 52 and telescope formation 44 within ring 64. It will be understood the slot 46, keyways 72 and overhangs 56 are so related in position one relative the other so that the above described advantages may be realized. Of course, the shell 34 may be rotated freely in a counter-clockwise direction when the tool 73 is thus positioned, albeit, the closure will remain locked.

Illustrated in Fig. 6 is another form of the invention designated generally 80 and shown installed on neck 22 of a container. The outer shell 81 of this closure is substantially identical to shell 34 of closure 30. The internal cap of closure 80 is substantially identical to cap 32 except that instead of a continuous slot 72 as provided on cap 32, a pair of slots 84 separated by a medial imperforate section 85 of the boss formation 86 visible in Fig. 6 is provided. Each of slots 84 open at one end thereof to a lateral surface of the boss formation on opposite sides thereof. Slots 84 are thus arranged so that only the blocks 76 of tool 73 will fit therein for unlocking the closure. In all other respects, closure 80 is identical to closure 30. This embodiment therefore, features the structure for boss 86 which requires a special tool for unlocking the closure and thereby further enhances the safety of the closure.

It will be appreciated that the tool 73 may be provided with the closure and the blocks 76 made so that same may be snapped into the slot formations provided in a semi-permanent installation. Thus, where the container is to be used only by an adult, the tool may be left installed on the closure. Otherwise, the tool may be removed and used as necessary.

Referring to Figs. 7 through 10, another form of the closure embodying the invention has been designated generally by the reference character 90. Closure 90 also includes a shell 92 and an internal cap 94 and can be formed in the same manner as either closures 30 or 80 except for the unidirectional coupling means employed. The external surface of depending skirt 96 of said cap 94 has a series of grooves or notches 98 formed thereon which are approximately quadrantly spaced around the circumference of said skirt. Said grooves function as detents or stops. The skirt 100 of the shell has a plurality of rectangular fingers 102 formed by cutting into said skirt around three sides of the finger with the finger connected to the skirt at its fourth side. Each finger is pressed inwardly toward inner cap 94. The grooves and

fingers are arranged so that the free extremities of said fingers will engage in the groove or notch coupling the shell and cap for unidirectional movement only in a direction locking the cap on neck 22. Conventionally, this would be clockwise movement of said cap and shell simultaneously. When shell 92 is rotated in the opposite direction, the fingers will ride surfaces 104 so that shell 92 will rotate freely relative cap 94.

The manual coupling means provided for simultaneously rotating said shell and cap in a direction unlocking closure 90 may be as illustrated in Fig. 10 which is suitable for insertion of a knife edge, coin or other instrument, including tool 73, or may be formed as described in connection with closure 80. No further description is deemed necessary.

It will thus be apparent that I have provided a safety closure comprised of a pair of components telescoped one within the other or concentrically arranged one relative the other. Said components are free to be rotated one relative the other in one direction and coupling means are provided for rotating the components simultaneously in only one direction which results in locking of the closure. In addition, manual coupling means are provided which require a predetermined alignment thereof in order to permit insertion of a tool or instrument by means of which said components may be rotated in an opposite direction for unlocking the closure. It is contemplated that minor variations may occur to the skilled artisan without circumvention of the fundamental arrangement of parts and the principles of the invention as set forth in the claims hereto appended.

That it is desired to secure by Letters Patent of the United States is:

1. A safety closure for a container having an externally threaded neck comprising, an inner cap member having a transverse wall and an annular depending skirt having internal threads enabling the cap to be threadedly engaged on the neck, an outer shell member having a depending annular skirt telescopically engaged with said cap, said members being normally freely rotatable one relative the other in the direction for loosening said cap from the neck, said members having cooperable locking means for positive unidirectional coupling therefor for simultaneous rotary movement in a reverse direction to tighten the cap on the neck, said transverse walls having manual cooperating coupling means for connecting said members to move simultaneously in the direction for loosening said cap, said coupling means being operative only when first disposed in a predetermined alignment one relative the other by selective rotary movement of the shell relative the cap and thereafter enabling continued movement of the shell and cap simultaneously in the direction loosening the cap.

2. A closure as described in claim 1 in which said manual coupling means comprise slots arranged to be aligned at the upper end of the closure.

3. A closure as described in claim 2 in which said slots are alignable to form a continuous slot across said upper end.

4. A closure as described in claim 2 in which said slots are alignable in an interrupted line across said upper end.

5. A closure as described in claim 1 in which said cap has an upstanding boss formation at one end thereof and said shell has a flanged formation at one end thereof, said manual coupling means comprising said formations having slots arranged to be aligned across the upper end of the closure through said selective manipulation of the shell.

6. A closure as described in claim 5 in which said boss formation is telescopically insertable substantially within said flanged formation in the aligned position of said slots.

7. A closure as described in claim 1 in which said

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unidirectional locking means comprises a pin and groove connection and said groove comprises an annular track adjacent the bottom of the cap member, said guideway including a ramp-like portion connected therewith and terminating in a closed end, and an overhang segment separating said closed end from the track considered in an axial direction of movement of the cap.

8. A safety closure for installation on a container having an externally threaded neck formation and comprising, a shell member and a cap member concentric with and on the interior of the shell member, said shell member being normally rotatable independently of said cap member, said cap member having an annular depending skirt open at one end thereof and being internally screw threaded for screwing said cap over said neck to seal the container, said cap having a central upstanding boss formation across the opposite end thereof, said shell having an annular wall surrounding said skirt and a hollow reduced dimension ring upstanding on one end thereof communicating with the interior of the shell of suitable cross-section to accommodate the boss formation therein, means on the interior of the closure coupling said cap and shell for unidirectional rotary movement simultaneously only in a direction tightening the cap on the neck, and means adapted to be coupled through selective rotation of the shell to permit manual rotating at the shell and cap simultaneously in the opposite direction for unscrewing the cap, said means being provided in said boss and ring and co-operable to achieve a predetermined alignment enabling such manual coupling only when the boss is substantially received in the ring.

9. A closure as described in claim 8 in which said last mentioned means comprise slots provided respectively in said boss and ring.

10. A closure as described in claim 8 in which said unidirectional coupling means are provided respectively on the exterior and interior surfaces of said skirt and annular wall.

11. A closure as described in claim 10 in which said unidirectional coupling means comprise depressed stop means in the exterior surface of said skirt and at least one protuberance on said shell engageable with said stop means.

12. A safety closure for a container having a dispensing neck for accommodating a rotatable capping

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device, said closure comprising, a cap member, a shell member having said cap member received on the interior thereof with the shell rotatable relative said cap, said cap member having internal threads for engagement on the neck for sealing the container, unidirectional coupling means between said cap and shell permitting rotation of the shell and cap simultaneously only in a direction tightening the cap on the neck, said cap and shell having co-operating coupling means required to be arranged in a predetermined alignment by selective alignment of the shell to permit simultaneous rotation of the shell and cap in a direction for unscrewing the cap, and means rendering said shell freely rotatable relative the cap in said first mentioned direction of rotation so as to prevent said unidirectional means from being coupled, said last mentioned means being selectively removable to permit opening of the closure.

13. A safety closure for a container having an externally threaded neck: an inner cap member having a transverse wall and an internally threaded depending skirt adapting said cap to be screwed on the neck in one direction and unscrewed in the reverse direction, an outer shell member having a transverse wall and a depending skirt having said cap telescopically and rotatably received therein with members being normally freely rotatable one relative the other only in said reverse direction, the shell and cap having cooperable unidirectional locking means for positively locking said members to move in unison when the shell is rotated in said one direction whereby to tighten the cap on the container, said transverse walls having cooperable coupling means for coupling the members for simultaneous rotary movement in the opposite direction whereby to unscrew the cap, said coupling means adapted to be brought into a registry position capable of accommodating a complementary locking tool therein for coupling said members only by independent rotation of said shell member.

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