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**Westfall**

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[54] CHILDPROOF CLOSURE

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[58] **Field of Search** ..... 215/9, 221, 224, 225

[ 56 ] References Cited

UNITED STATES PATENTS

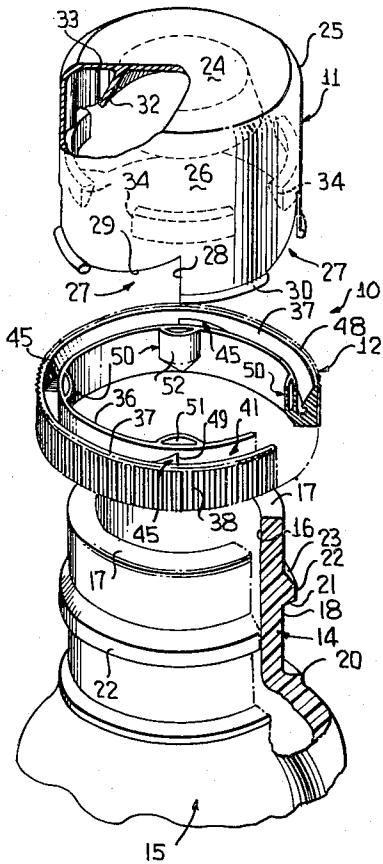
3,656,645	4/1972	Fontenelli .....	215/225
3,811,589	5/1974	Thornton et al. ....	215/9

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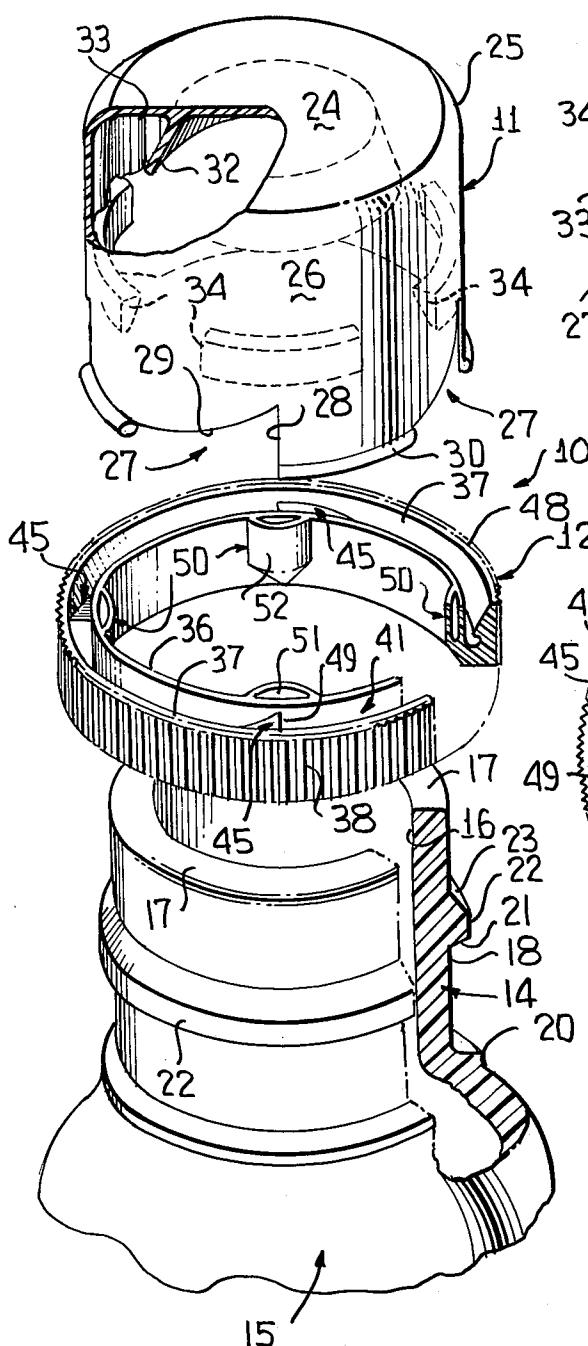
[57] ABSTRACT

This disclosure relates to a novel childproof closure combination in which a generally annular fitment is secured to a container finish and a closure is secured to the fitment by a cooperative bead and groove with means to achieve disengagement of the bead and groove upon relative rotation between the closure and fitment. In the absence of such relative rotation the application of opening force to the closure rotates the closure and fitment in unison thereby precluding inadvertent access to the container contents.

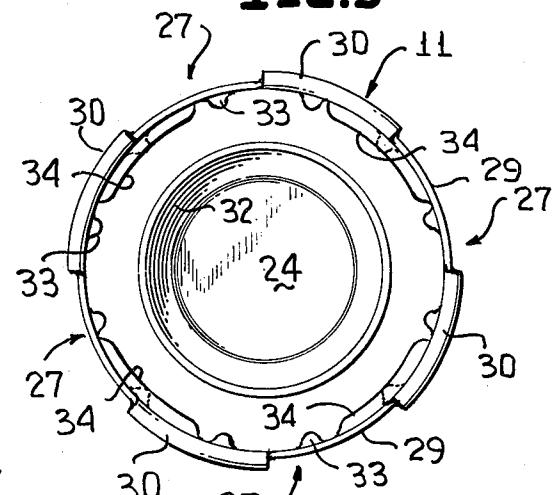
## 9 Claims, 8 Drawing Figures



## FIG.1



**FIG.3**



## FIG. 4

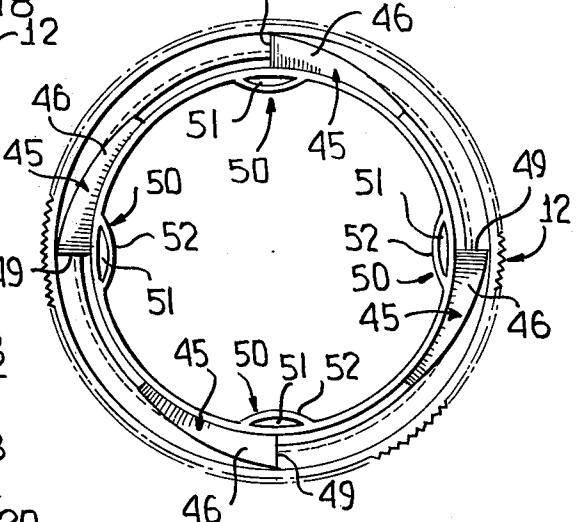
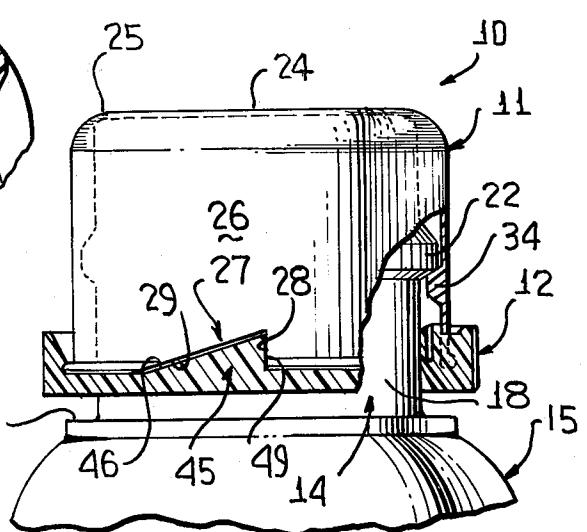
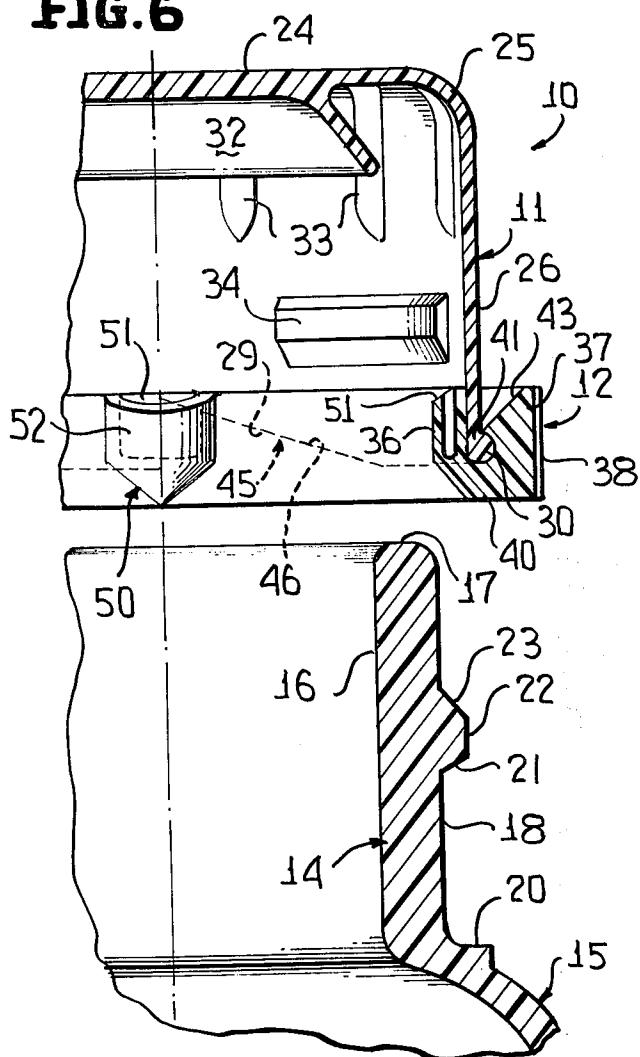
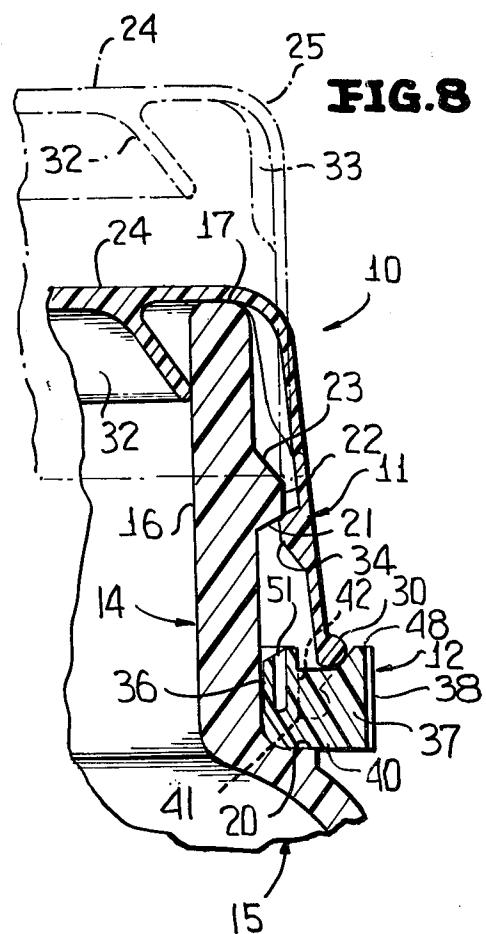
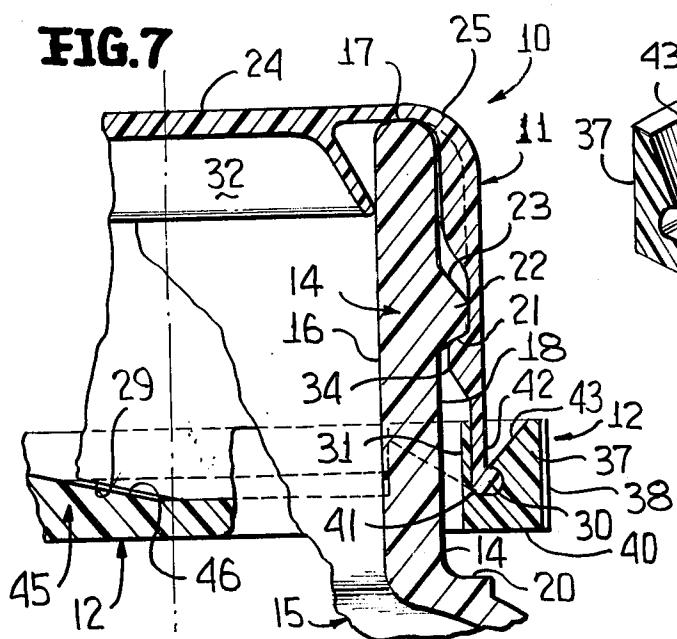
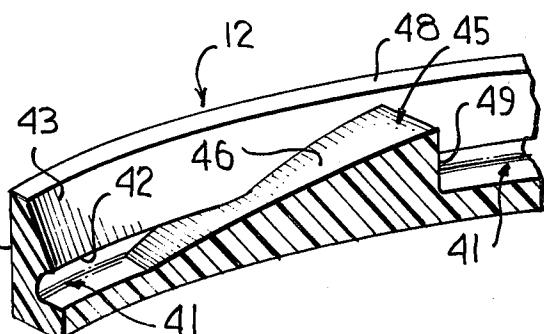


FIG. 2.



**FIG.6****FIG.8****FIG.7****FIG.5**

## CHILDPROOF CLOSURE

So-called safety closures have recently come into prominence because of the desirability of federal, state and local agencies to preclude or substantially reduce accidental illness and/or death resulting from the consumption of packaged products. A most notable example is that of infants or younger children opening aspirin bottles and consuming the contents thinking it to be candy.

It is because of such typical over-dosages that many conventional so-called "childproof" closures or simply "safety" closures have been developed. Unfortunately, such conventional safety closures generally include a variety of disadvantages, the most common of which is the relatively high manufacturing costs involved due to intricate container and/or closure design. This is particularly true in the production of small lots wherein the cost of the dies themselves, in the case of injection and/or compression molding techniques, is prohibitive from a cost standpoint.

Another disadvantage is the difficulty in intentionally opening many typical safety closures, the most common of which is the various varieties of "palm and twist" types. This has been found to be true when such closures are attempted to be opened by older or uneducated persons, particularly if they are handicapped or, for example, suffering from arthritis. It is for these and other reasons that the Food and Drug Administration lists among its requirements for safety closures not only criteria for precluding the accidental removal of a closure from an associated container, but criteria for the relatively easy removal of safety closures when such removal is intentionally desired. For example, under the Poison Prevention Packaging Act (PPPA) the Food and Drug Administration published as its protocol a minimum level of effectiveness at 85% for children receiving no opening instructions and 80% after instructions. Indications are that all products subject to the PPPA will have to conform to the same standard, coupled with a requirement that 90% of the adults tested must also be able to open and reclose childproof or child-resistant packages.

Another disadvantage of conventional safety closures is the inability thereof to close but not hermetically seal associated containers. This is not overly disadvantageous when solid products are packaged, such as aspirin, solid preparations harmful to health but not hydroscopic, etc. However, under the PPPA such liquid products as furniture polish, oil of wintergreen, sulphuric acid, harmful hydroscopic solid substances, etc., will necessarily have to be packaged in accordance with the provisions of this Act.

In the view of the foregoing disadvantages of conventional safety or childproof closures it is a primary object of this invention to provide a childproof closure which not only precludes inadvertent and/or accidental operation thereof, but also permits ease of removal when intentionally desired and can be used with liquid or solid products.

The latter object is achieved by providing a novel childproof closure combination which includes a closure and a cooperative annular fitment, the closure having an end panel and a depending peripheral skirt terminating in one or more enlarged beads, and the fitment having a groove for interlocking receiving the bead or beads whereby when united to a conventional

5 container and rotated simultaneously removal of the closure is precluded. However, cooperative means are provided between the fitment and closure such that upon relative rotation therebetween in a predetermined direction cam means are operative for imparting relative axial movement between the closure and fitment thereby disengaging the groove and bead to permit intentional removal of the closure from the associated container.

10 In further keeping of this invention another object thereof is the provision of the cam means as one or more inclined cams, ramps or cam surfaces which taper axially outwardly of and circumferentially relative to the groove beginning at a bottom portion thereof whereby upon relative rotation between the fitment and closure the bead of the latter rides along the cam and is thereby forced outwardly of the groove toward an uncoupled or unlocked position.

15 Another object of this invention is to provide a novel childproof closure combination of the type heretofore described wherein the fitment includes means for securing the same to an associated container in the form of a plurality of radially inwardly directed generally hollow resilient lugs which prevent removal of the fitment from an associated container but also permit ease of assembly of the unified closure and fitment after the container has been filled with a desired product.

20 Still another object of this invention is to provide a novel childproof closure combination of the type heretofore set forth wherein the end panel of the closure includes a generally frusto-conical sealing rim for adapting the combination particularly in conjunction with the packaging of liquid products.

25 30 With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claimed subject matter, and the several views illustrated in the accompanying drawings.

35 40 In the drawings:

FIG. 1 is an exploded view with portions broken away and shown in section for clarity, and illustrates a closure, a fitment and a container finish constructed in accordance with this invention prior to the pre-assembly of the closure and fitment to each other and the subsequent assembly thereof upon the container finish.

45 50 FIG. 2 is a fragmentary side elevational view partially in cross section and broken away for clarity illustrating the assembled closure, fitment and container along with cooperative cam means for imparting axial relative movement to the closure and fitment.

55 FIG. 3 is a bottom plan view of the closure, and illustrates four beads carried by a peripheral skirt of the closure for interlocking with a groove of the fitment.

55 60 FIG. 4 is a top plan view of the fitment, and illustrates a groove for receiving the beads of the closure and four cams for imparting relative axial movement to the interlocked closure and fitment during an opening operation.

60 65 FIG. 5 is a fragmentary perspective sectional view of a portion of the fitment, and illustrates the groove thereof and one of the associated cams.

FIG. 6 is an enlarged fragmentary sectional view of the assembled closure and fitment prior to the application thereof to the container finish.

FIG. 7 is an enlarged fragmentary sectional view of the assembled closure, fitment and container finish.

and illustrates the manner in which a lug of the closure peripheral skirt interlockingly engages beneath a bead of the container finish.

FIG. 8 is an enlarged fragmentary sectional view similar to FIG. 7, and illustrates in solid outline the manner in which the cams uncouple the peripheral skirt beads from the groove resulting in the removal of the lugs of the closure from beneath the container finish bead incident to the complete removal of the closure, as shown in phantom outline.

A novel childproof or safety closure combination constructed in accordance with this invention is generally designated by the reference numeral 10 (FIG. 1) and includes a closure 11 and an annular fitment 12 which are adapted to be coupled to each other (FIGS. 2 and 6) for subsequent application to a finish 14 of a container 15 (FIGS. 1 and 7).

The container 15 is of a conventional construction and may be formed of polymeric or copolymeric material, such as polyethylene, polystyrene, or simply a standard glass container which includes an inner surface 16, an uppermost lip 17, and an outermost surface 18 defining a lowermost annular seat or shoulder 20 facing axially upwardly in opposed relationship to a similar annular seat or shoulder 21 of a circumferential bead 22 having an uppermost included surface 23 (FIG. 6). The annular fitment 12 is constructed for application to the container finish 14, and when once applied thereto is confined to the area generally between the shoulders 20, 21 as will be described more fully hereinafter.

The closure 11 of the childproof closure combination 10 includes an end panel 24 joined by a radius 25 to a peripheral skirt 26 having four cut out portions or notches 27 each defined by an axial wall 28 and a circumferentially inclined wall 29 with the latter serving as a cam, cam surface, ramp or incline for imparting axial relative movement between the closure 11 and the fitment 12 in a manner to be described more fully hereinafter.

An enlarged bead 30 is carried by the peripheral skirt 26 between each adjacent pair of notches 27. Each bead 30 is cooperative with a groove to be described more fully hereinafter of the fitment 12 to maintain the closure 11 and the fitment 12 interlockingly coupled to each other until such time as the intentional uncoupling thereof is desired.

The closure 11 is provided interiorly thereof with a generally frusto-conical sealing rib 32 (FIGS. 1 and 3) which is adapted to sealingly engage against the interior surface 16 of the container finish 14, in the manner illustrated in solid outline in FIG. 8. A plurality of axially extending reinforcing ribs 33 are generally equally spaced about the periphery of the skirt 26 and serve to reinforce the upper portion thereof from the radius 25 to approximately a point adjacent four identical circumferentially spaced locking lugs 34. In the assembled position of the components (FIG. 7) the lugs 34 engage beneath the lug 22 of the container finish 14.

The annular fitment 12 is of a generally U-shaped configuration as viewed in cross section (FIG. 7), and is defined by an inner annular wall 36, an outer annular wall 37 having a plurality of axial ribs 38 therein, and a bight wall 40. The walls 36, 37 and 40 (FIG. 7) set off an axially upwardly opening circumferential groove 41 which is generally of a circular cross sectional configuration having a closed bottom portion (unnum-

bered) which narrows in an upward direction toward a narrower entrance portion 42 which in turn narrows with an upwardly and radially outwardly flared wall portion 43. At four equally circumferentially spaced positions about the annular fitment 12 there is disposed an identical cam 45 (FIG. 4 and 5) which has a cam surface 46 inclined axially upwardly and circumferentially from the bottommost portion (unnumbered) of the groove 41 toward, through and beyond the top entrance portion 41 and terminating slightly short of an uppermost lip 48 of the annular wall 37. Each cam 45 also has an axial wall 49 which serves as a stop or abutment to prevent rotation of the closure in a clockwise direction, in a manner to be described more fully hereinafter.

The interior of the annular fitment 12 is provided with identical means 50 spaced equally about the circumference thereof (FIG. 4) for securing the fitment to the container finish 14 between the shoulders 18, 20 (FIG. 7). Each means 50 is a radially inwardly directed lug or wall of a hollow construction, as is best illustrated in FIGS. 6 and 8 with the hollow construction being achieved by an axially upwardly opening slot or groove 51 in each lug 50. The latter construction forms a resilient wall 52 which may be deflected outwardly during the application of the fitment 12 when coupled to the closure 11 upon the container finish 14, as will be described more fully hereinafter.

It is to be noted that the notches 27 (FIG. 1) are formed to generally the same size and shape as the cams 45. In other words, the surfaces 29, 28 of the notches 27 correspond in contour and extent to the surface 46 and the wall 49 of each of the cams 45, as is most readily apparent in FIG. 2 of the drawings.

The closure 11 and fitment 12 are assembled by first aligning each notch 27 with an associated one of the cams 45 and moving the closure 11 and the fitment 12 axially relatively toward each other such that the beads 30 progressively enter the area between the walls 36, 37 of the fitment 12 passing through the entrance portion 42 and snap-seat within the groove 41. In this position (FIG. 2) each cam 45 is received in an associated notch 27 and the now assembled combination 10 may be applied to the finish 14 of the container 15 after the latter has been appropriately packaged with a desired product, be it solid or liquid. The packager simply telescopes the pre-assembled closure 11 and fitment 12 down upon the finish 14 whereupon the surface 23 of the lug 22 of the finish 14 depresses the wall 52 of each of the means 50 radially outwardly to permit the fitment 12 to pass beyond the lug 22 into the area between the shoulders 18, 20. During the same telescopic motion the lugs 34 on the interior of the peripheral skirt 26 of the closure 11 pass the same lug 22 and snap therebeneath in the locked position, in the manner clearly shown in FIG. 7. This same assembly of the closure and fitment to the container finish also positions the sealing lip 32 internally of the container finish in engagement with the inner surface 16 to form a seal therewith.

Should the filled and capped container 15 come into the hands of a youngster the most natural inclination is to either pull the childproof closure combination 10 axially relative to the container 15, rotate the combination 10 relative to the container 15, or both. A straight line axial pull exerted on the closure 11 and/or the fitment 12 results in no motion whatever since the closure

lugs 34 are engaged beneath the lug 22 of the container finish 14.

Rotation imparted to the closure 11 per se in either a counterclockwise or clockwise direction will result in like simultaneous rotation of the fitment 12 because the latter loosely surrounds the finish 14 and actually contacts the exterior surface 18 at four minor points established by the peaks (unnumbered) of the walls 52 of the four lugs 50. For the same reasons, rotation imparted in either direction to the fitment 12 per se or rotation imparted in either direction by simultaneously rotating both the fitment 12 and the closure 11 results in simultaneous rotation without in any way achieving the removal of the closure 11 from the container 15. Thus a youngster when uninitiated will find it virtually impossible to remove the combined closure and fitment 10 from the container 15.

Thus in order to remove the closure 11 from the container 15 one must be sufficiently aware of the manner in which this is to be performed or have sufficient mentality to determine the precise operation necessary through trial or error, or the like. In order to remove the closure 11 one must grasp the annular fitment 12 which is knurled or provided with the axial ribs 38 for this purpose. Thereafter the closure 11 is rotated in a counterclockwise direction as viewed in FIGS. 1, 2, and 6 through 8, it being noted that clockwise rotation is precluded by the abutment between the surfaces 49 of each cam 45 and the wall 28 of each notch 27. Upon maintaining the fitment 12 stationary and imparting counterclockwise rotation to the closure 11 the cam surfaces 29, 46 cooperate to progressively axially move the closure 11 relative to the fitment 12 resulting in the eventual withdrawal of the beads 30 from the groove 41, in the manner illustrated in solid outline in FIG. 8. The dimensioning between the shoulders 18, 20 is such that the annular fitment 12 will seat upon the shoulder 20 with the latter precluding further downward axial movement of the fitment relative to the container 15 whereupon continued rotation of the closure results in the progressive riding of each bead 30 axially upwardly along the camming surface 46 of each cam 45 whereupon the lugs 34 are progressively withdrawn from beneath the lug 22 of the container finish 14 as the lower portion of the peripheral skirt 26 deflects in the manner illustrated in FIG. 8. At approximately the position shown in solid outline in FIG. 8 the lugs 34 pass radially outwardly beyond the lug 22 and an upward lifting force applied to the closure 11 will permit the removal thereof toward and beyond the phantom outline position in order that access may be had to the contents of the container 15.

In order to reclose or recouple the closure 11 and the fitment 12 after having been once opened it is merely necessary to repeat the operation heretofore described, namely, that of aligning the beads 30 with the groove 41 and the notches 27 with the cams 45 and applying axial pressure to assemble these components. The annular fitment 12 is, however, not removed from the container 15 after having been once applied thereto.

Through specific materials have not been described relative to the childproof closure combination 10 in the description set forth herein, preferably through not necessarily the closure 11 as well as the fitment 12 are constructed from polymeric or copolymeric material, such as polyethylene.

While preferred forms and arrangements of parts have been shown in illustrating the invention, it is to be clearly understood that various changes in detail and arrangement of parts may be made without departing from the spirit and scope of this disclosure.

I claim:

1. A childproof closure combination comprising a closure and a cooperative annular fitment, said annular fitment being adapted for encircling engagement about an associated container, said closure having an end panel and a depending peripheral skirt, means carried by said peripheral skirt, for securing said closure to an associated container, first cooperative means between and formed as portions of said peripheral skirt and said annular fitment for releasably interlockingly coupling the same to each other, second cooperative means between and formed as portions of said peripheral skirt and said annular fitment for uncoupling said first cooperative coupling means upon relative rotation between said closure and fitment, said second cooperative coupling means being defined by cam and cam follower means of said peripheral skirt and fitment, said cam and cam follower means being defined by a cam surface of said fitment opposing a cam follower surface of said peripheral skirt, and said cam and cam follower surfaces being disposed along a portion of the periphery of said fitment and peripheral skirt, respectively, and being circumferentially inclined whereby upon relative rotation between said fitment and closure said cam and cam follower surfaces create axial forces between said closure and fitment causing axial motion therebetween resulting in the uncoupling of said first cooperative coupling means.
2. The childproof closure combination as defined in claim 1 wherein said first cooperative coupling means is a bead of said peripheral skirt interlocked in a groove of said fitment.
3. The childproof closure combination as defined in claim 1 including means carried by said fitment for securing said fitment to an associated container, and said fitment securing means are a plurality of radially inwardly directed hollow resilient lugs carried by said fitment for preventing axial removal of said fitment from an associated container.
4. The childproof closure combination as defined in claim 2 wherein said groove in radial cross-section has a closed bottom portion of a size greater than a top entrance portion thereof.
5. The childproof closure combination as defined in claim 2 including means carried by said fitment for securing said fitment to an associated container, and said fitment securing means are a plurality of radially inwardly directed hollow resilient lugs carried by said fitment for preventing axial removal of said fitment from an associated container.
6. The childproof closure combination as defined in claim 4 including means carried by said fitment for securing said fitment to an associated container, and said fitment securing means are a plurality of radially inwardly directed hollow resilient lugs carried by said fitment for preventing axial removal of said fitment from an associated container.
7. A childproof closure combination comprising a closure and a cooperative annular fitment, said closure having an end panel and a peripheral skirt, means carried by said peripheral skirt for securing said closure to an associated container, first cooperative means be-

tween and formed as portions of said peripheral skirt and said annular fitment for interlockingly coupling the same to each other, second cooperative means between and formed as portions of said peripheral skirt and said annular fitment for uncoupling said cooperative coupling means upon relative rotation between said closure and said fitment, said cooperative coupling means being defined by a bead carried by said peripheral skirt interlocked with a groove in said fitment opening axially in a direction toward said end panel, said cooperative uncoupling means being defined by a cam of one of said peripheral skirt and fitment in cooperative circumferential sliding relationship with a portion of the other of said peripheral skirt and fitment, said cam being inclined circumferentially relative to said peripheral skirt and fitment, said portion also being a cam, one of said cams being defined by a notch in said peripheral skirt defining an axially inclined circumferentially extending cam surface of said closure, the other of said cams being defined by an axially inclined circumferentially extending cam surface of said fitment, and said cam surfaces are in mating like contoured relationship in the coupled condition of said closure and fitment whereby upon relative rotation therebetween in a predetermined direction said cam surfaces impart axial relative movement between said closure and fitment to cause uncoupling of said cooperative coupling means.

8. The childproof closure combination as defined in claim 7 including means carried by said fitment for securing said fitment to an associated container, and said fitment securing means are a plurality of radially inwardly directed resilient lugs carried by said fitment for

preventing axial removal of said fitment from an associated container.

9. A childproof closure combination comprising a closure and a cooperative annular fitment, said closure having an end panel and a peripheral skirt, means carried by said peripheral skirt for securing said closure to an associated container, first cooperative means between and formed as portions of said peripheral skirt and said annular fitment for interlockingly coupling the same to each other, second cooperative means between and formed as portions of said peripheral skirt and said annular fitment for uncoupling said cooperative means upon relative rotation between said closure and said fitment, said cooperative uncoupling means being defined by a cam of one of said peripheral skirt and fitment in cooperative circumferential sliding relationship with a portion of the other of said peripheral skirt and fitment, said cam being inclined circumferentially relative to said peripheral skirt and fitment, said portion also being a cam, one of said cams being defined by a notch in said peripheral skirt defining an axially inclined circumferentially extending cam surface of said closure, the other of said cams being defined by an axially inclined circumferentially extending cam surface of said fitment, and said cam surfaces are in mating like contoured relationship in the coupled condition of said closure and fitment whereby upon relative rotation therebetween in a predetermined direction said cam surfaces impart axial relative movement between said closure and fitment to cause uncoupling of said cooperative coupling means.

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