United States Patent [19]

Uhlig

[11] **3,917,097**

[45] **Nov. 4, 1975**

[54] **SAFETY CLOSURE CONTAINER**

[76] Inventor: **Gerhardt E. Uhlig,** 1900 Alexis Road, Apt. L-201, Toledo, Ohio 43613

[22] Filed: **July 24, 1974**

[21] Appl. No.: **491,534**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 475,593, June 3, 1974, and a continuation-in-part of Ser. No. 288,129, Sept. 11, 1972, Pat. No. 3,830,391, which is a continuation of Ser. No. 16,427, March 4, 1970, abandoned.

[52] **U.S. Cl.** **215/216;** 215/221

[51] **Int. Cl.**[2] **B65D 55/02;** B65D 85/56; A61J 1/00

[58] **Field of Search** 215/216, 9, 221, 218

[56] **References Cited**

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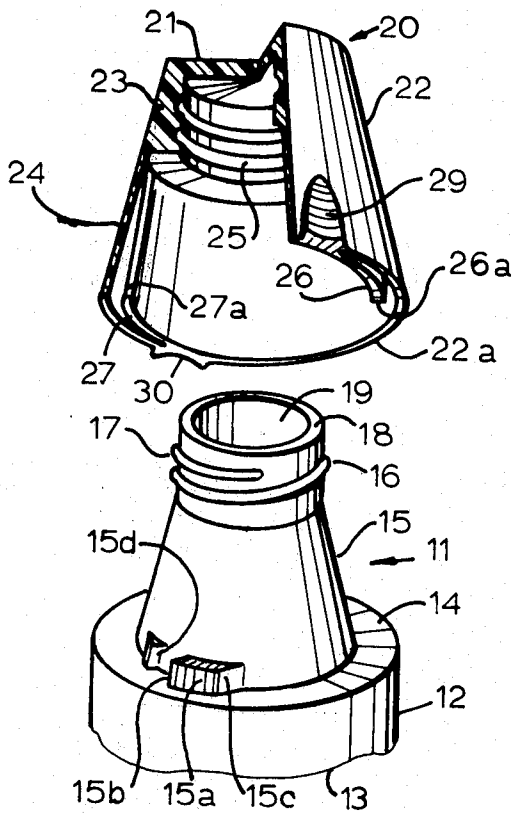
Primary Examiner—George T. Hall

Attorney, Agent, or Firm—Paul F. Stutz

[57] **ABSTRACT**

A novel container/closure construction including unique safety locking arrangements in the form of registering abutments and projections formed in and/or on said container and closure which do not substantially interfere with the application of the closure to the container but which can be disengaged only through purposeful mind-controlled dextrous manipulation. A threaded coupling of the container and closure is provided in preferred embodiments.

25 Claims, 26 Drawing Figures



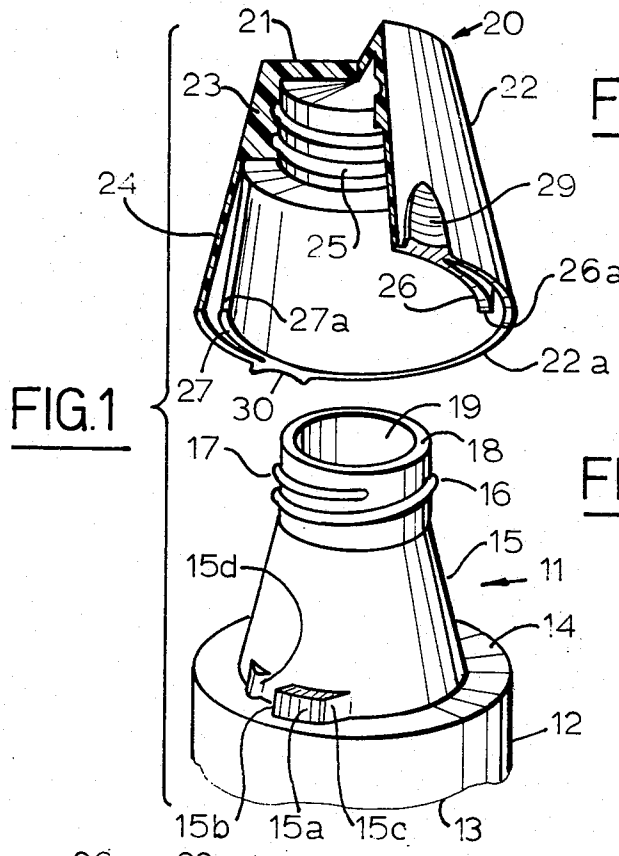


FIG. 1

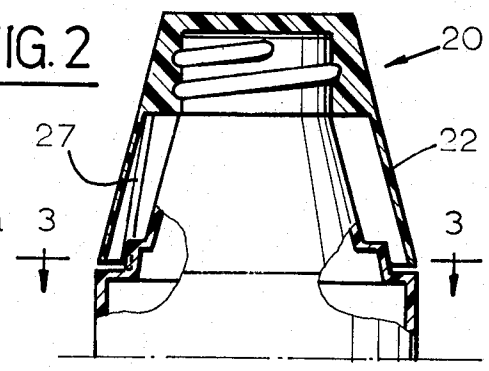


FIG. 2

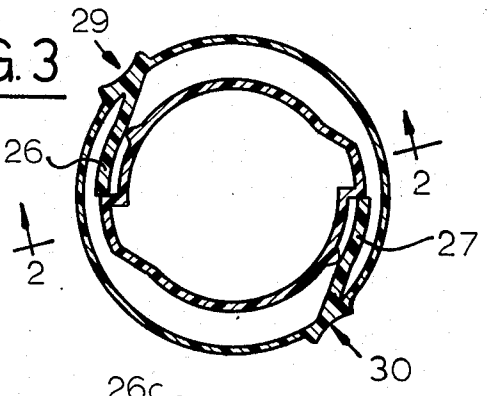


FIG. 3

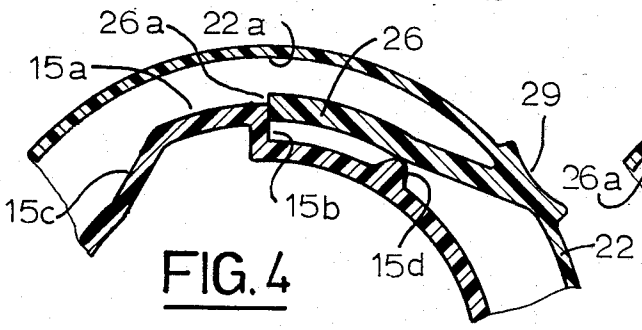


FIG. 4

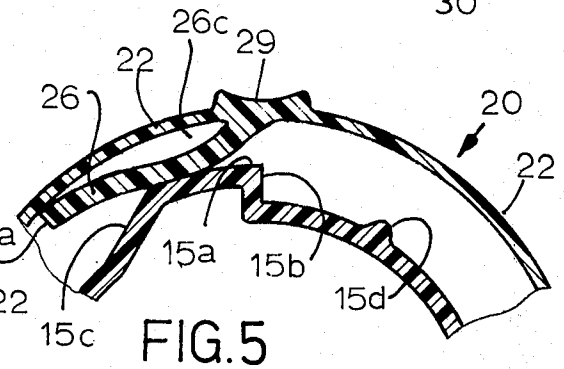


FIG. 5

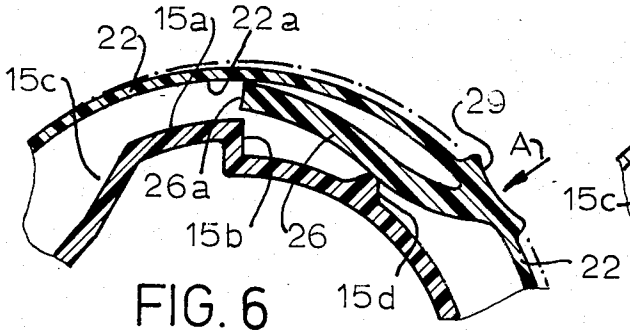


FIG. 6

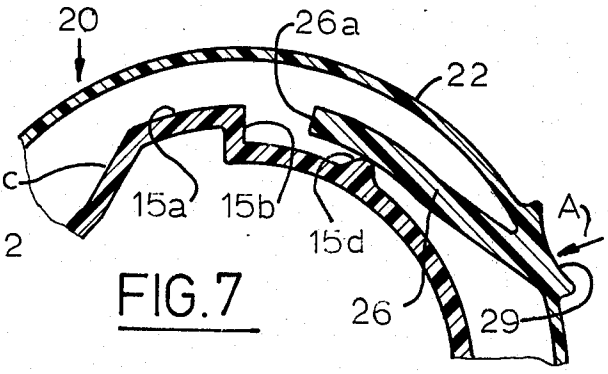


FIG. 7

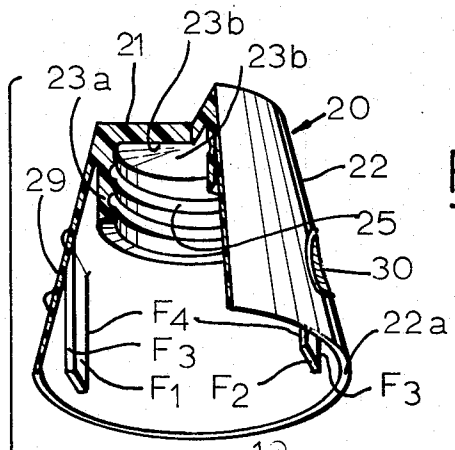


FIG. 8

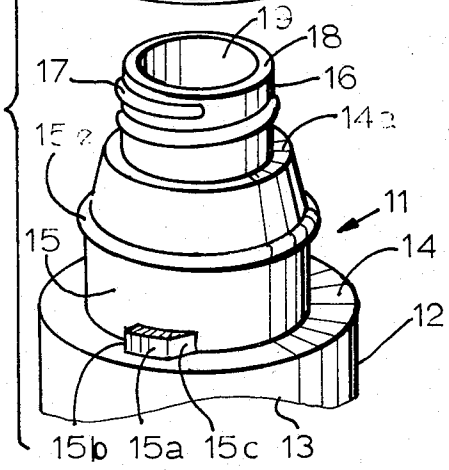


FIG. 9

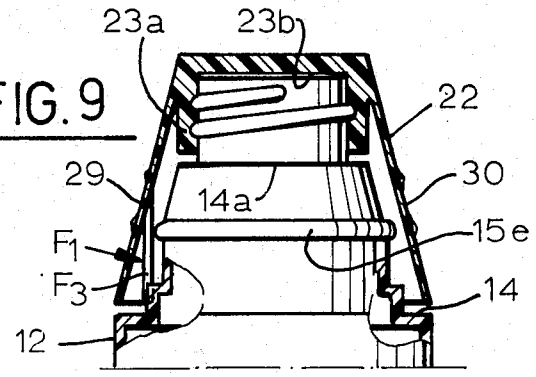
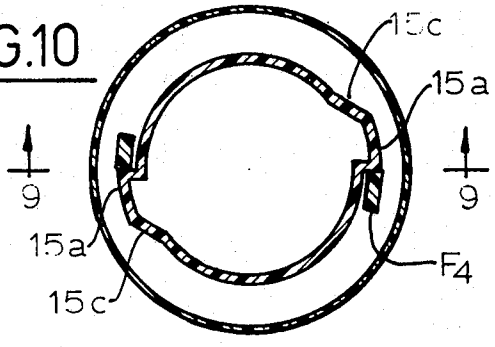


FIG. 10



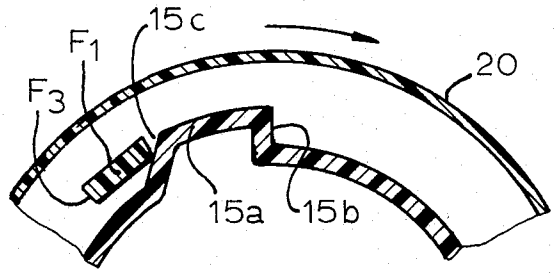


FIG. 11

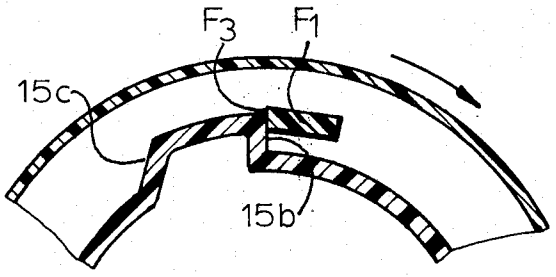


FIG. 12

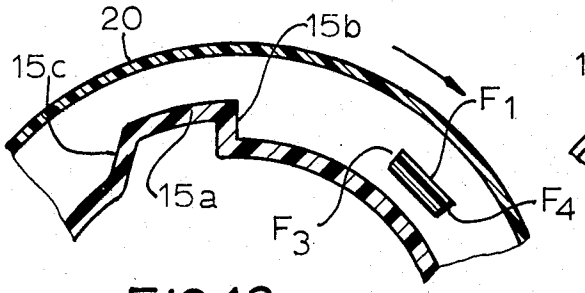


FIG. 13

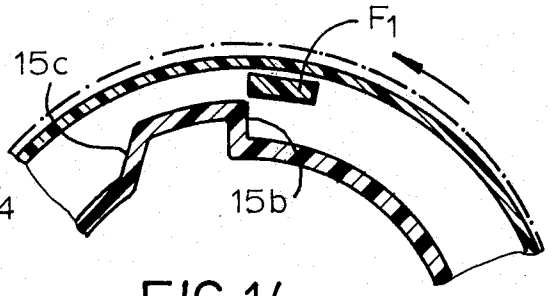


FIG. 14

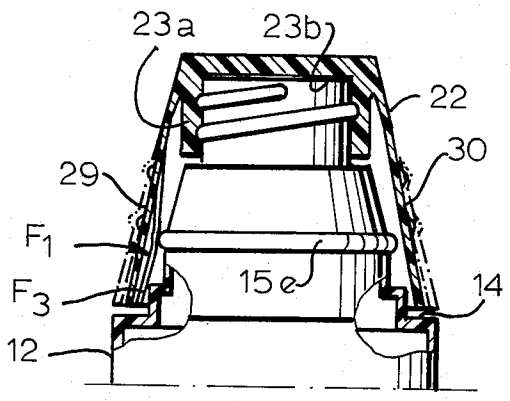


FIG.9a

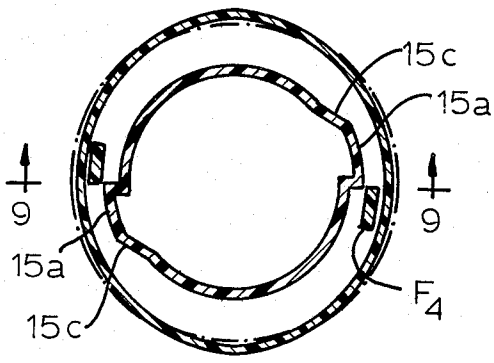


FIG.10a

FIG.15

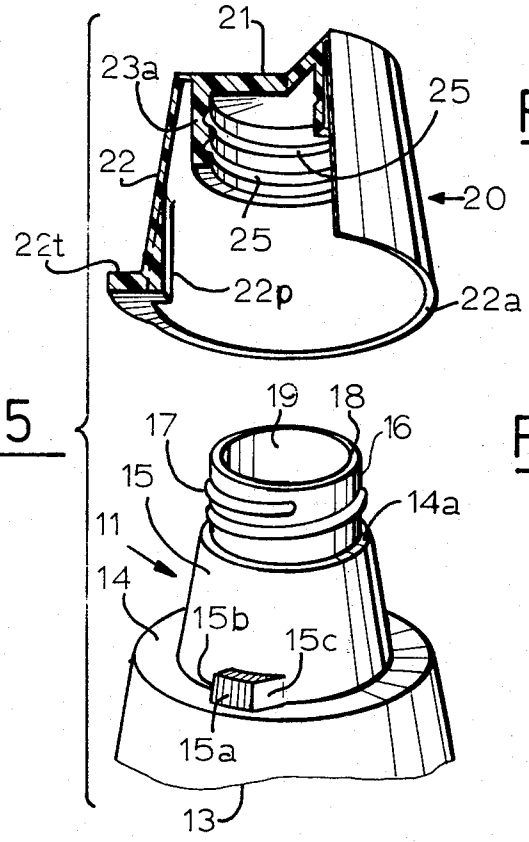


FIG.17

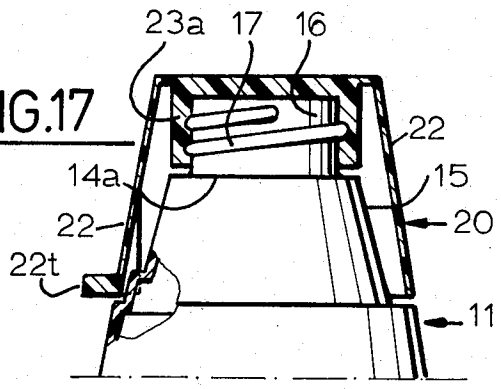


FIG.16

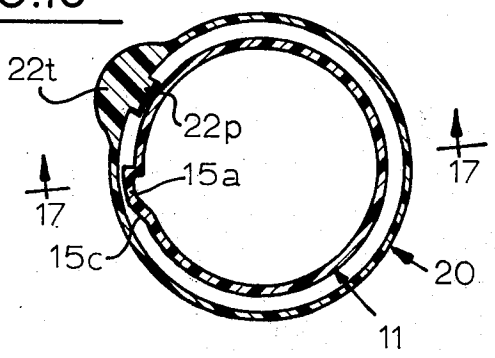


FIG.18

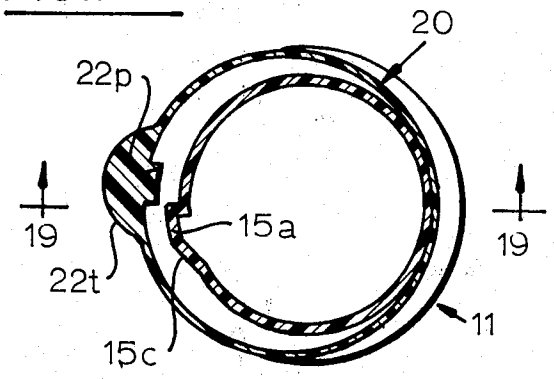


FIG.19

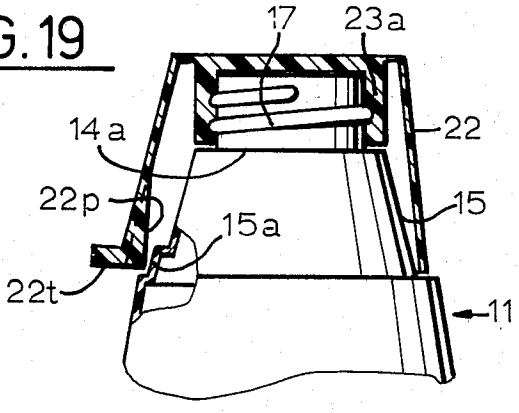


FIG. 20

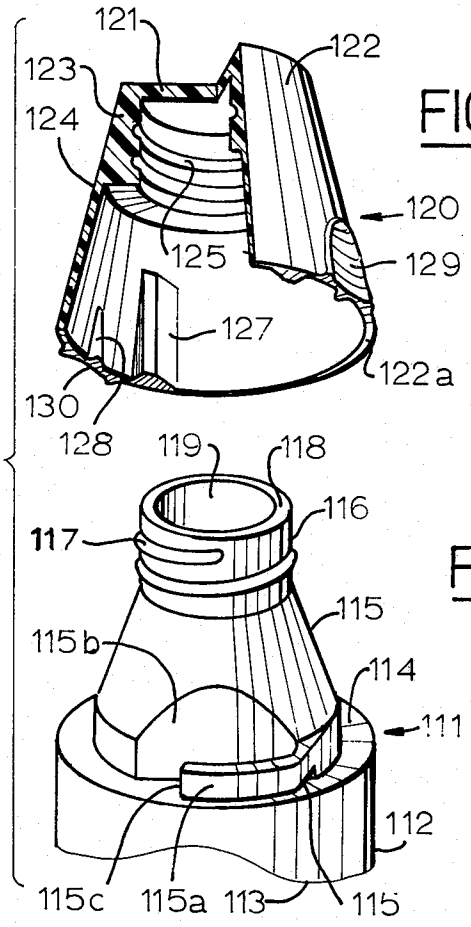


FIG. 21

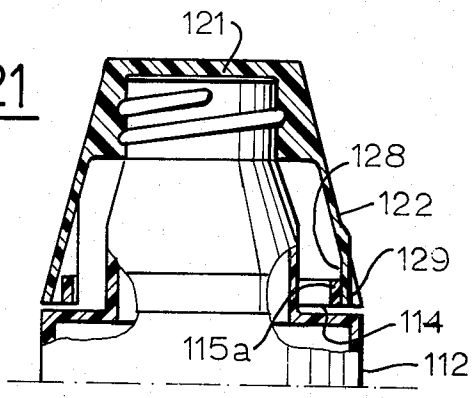


FIG. 22

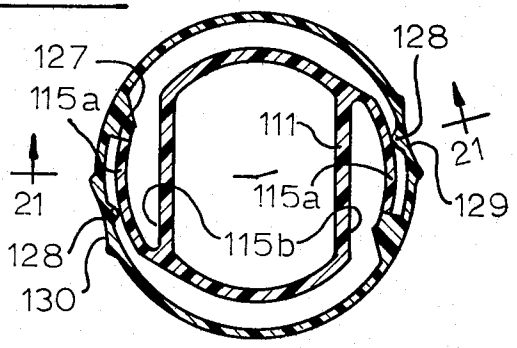


FIG. 24

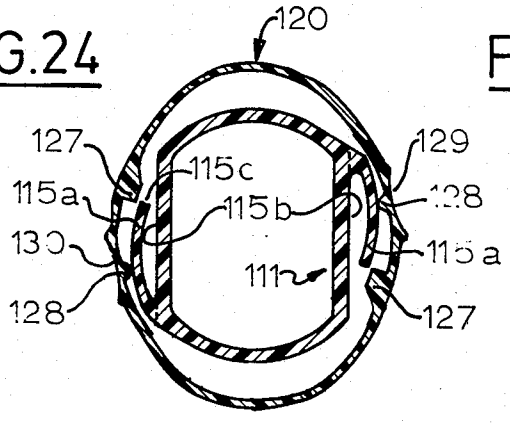
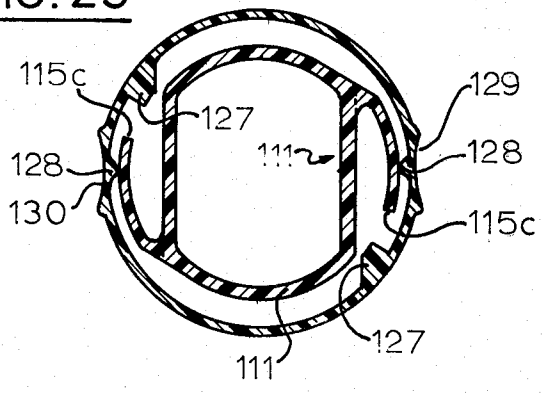


FIG. 23



SAFETY CLOSURE CONTAINER

This application discloses and claims subject matter previously disclosed, at least in part, in my copending application Ser. No. **475,593,** filed June **3, 1974,** and in my prior application Ser. No. **288,129,** filed Sept. **11, 1972,** now U.S. Pat. No. **3,830,391,** which application is a continuation of application Ser. No. **16,427,** filed Mar. **4, 1970;** now abandoned.

The present application contemplates a combination of a novel container and cooperating closure structure serving as a receptacle for any variety of what may be referred to as sensitive products desirably contained, but contained safely out of reach or in an inaccessible manner to children of tender years or others of impaired mental faculties or others of any variety of disabilities as might be harmed by the contents.

The sensitive products include, but are not limited to, liquid or solid medicines, pills, prescriptions, treatments and, as well, soaps, detergents, pesticides, poisons, solvents, industrial chemicals and the like; any one of which sensitive products could be harmful to the person of the unknowing user, either externally applied or taken internally.

The container industry, the closure industry and, as well, other industries engaged in the manufacture and sale of sensitive products of the type discussed above have been for some time engaged in a search for and the development of a package, such as a container and closure combination or variant thereof, which would embody constructional features which would preclude accidental or easy opening of the package containing the particular sensitive product. Considerable efforts have been expended, albeit without arriving at a package which is universally acceptable by the variety of manufacturers for the variety of sensitive products for which such a package has utility. While a number of packages have been developed and/or described in the patent literature, a principal objection to the presently existing ones resides in the excessive cost of manufacture, usually due to the multiple parts involved, the complexity of design, the unattractiveness and either too easily or overly difficult in opening.

Patented packages include those disclosed in the following list: Steiner U.S. Pat. No. **3,399,796;** Schaefer U.S. Pat. No. **3,360,147;** Quackenbush U.S. Pat. No. **3,422,978;** Deaver U.S. Pat. No. **3,376,991;** Weigand U.S. Pat. No. **3,435,974;** Cilluffo U.S. Pat. No. **3,445,022** and Whiteman, Jr. U.S. Pat. No. **3,101,856.**

A particularly notorious situation is involved in the packaging of sensitive products which are poisonous to a particular segment of the population such as children or to certain children or infirmed, handicapped or disabled adults who might be susceptible to a given drug and/or product. Aspirin is exemplary of the largest single culprit in child poisonings.

Another problem which exists with respect to present child-deterrent safety packages resides in the fact that they are not liquid-tight. Furthermore, some of the closure/package combinations, while frustrating to children an thus constituting a partial solution to the problem, are also difficult to open for adults. Still other closure arrangements require that the container be inverted before disengagement of the safety lock feature. This, of course, can be particularly and significantly messy with certain liquids. It can also be dangerous with certain liquids. It is also known, as previously indicated, that some of the present caps on

the market, allegedly designed to prevent child entry, are composed of two or more pieces with attendant disadvantages in manufacture and, of course, cost.

With the foregoing brief introduction, it is a general object of the present invention to provide a combination of closure and container which embodies features of construction which permit the manufacture of a child-deterrent package which is avoidative of the problems presently demonstrated by packages on the market or described in known patents and at the same time embodies a significant number of advantageous features which are believed nowhere to be found in any of the existing packages or patents in use or of record.

It is a particular object of the present invention to provide a combination of container and closure which embodies a safety lock feature which frustrates opening by a child but is relatively easily opened by a person exercisinig a purposeful, intelligent, cooperative, dextrous, mind-hand opening effort.

It is a significant object of the present invention to provide such a combination of container and closure which embodies a screw thread principal closure arrangement whereby the package is eminently suitable for fluid-tight closure, thus making the package eminently suitable for the containing of liquid products.

It is is still another of the present invention to provide such a container and closure combination which, upon operative engagement of the safety feature, provides an audible noise, thereby satisfying the one applying the closure to the container that the device is in the fully closed and safe position.

It is yet another object of the present invention to provide a container and closure combination which is capable of manufacture with conventional equipment used in the manufacture of containers, both glass and plastic, including the conventional plastic closure making machinery without any substantially burdensome modifications, whereby any cost factor, as compared to a conventional container and closure device not embodying a safety lock or a child-deterrent feature, is not excessive or even significant. Conventional plastic molding techniques are, of course, usable without difficulty.

It is still another object of the present invention to provide such a container and closure combination which, by reason of the design of the component parts, is capable of being easily assembled together by the user utilizing conventional capping machines normally employed following the product filling line.

It is a significant object of the present invention to provide a package which embodies the child-deterrent safety lock feature which is reliable and long lasting even after repeated cycles of opening and closing by successive users.

It is a particular object of the present invention to provide a combination of closure and container which embodies a resilient and consequently deformable segment of either the container or the closure to permit a purposeful disengagement of the locked-together engagement means as to permit opening of the container by one capable of performing the act of purposeful deflection to accomplish and disengagement while precluding accidental disengagement and opening of the container and/or closure. Hand in hand with the present object and desirably in combination therewith, it is most preferable that the principal securement of the

container and the closure be accomplished utilizing the screw thread type of engagement.

In accordance with a further embodiment of the present invention, it is possible and frequently desirable to design the location of the projections and the inner wall or web in such a manner that the engagment thereof is accomplished at precisely the same time that the underside of the descending cap, as provided by engagement of the screw threads, assumes sealing engagement with the upper rim of the neck of the container. The safety lock feature being thus engaged will preclude any accidental loosening of the closure from the container neck as might otherwise occur by reason of the space between the projection and the recess as present in the embodiments illustrated and by reason of the tendency of some plastics to experience the phenomena of "cap creeping". The latter is especially associated with polyethylene.

It is a significant object of the present invention to provide the closure component of the present invention as a one-piece relatively thin wall design susceptible to efficient and economical molding in large quantities without unduly expensive molds, albeit possessed of unique features of construction which, in conjunction with novel yet simple constructional features of the container, provide the functional package of the present invention.

The foreging, as well as other objects of the present invention, will become apparent to those skilled in the art from the following detailed description taken in conjunction with the annexed sheets of drawings on which there are presented, for purposes of illustrtion only, several embodiments of the present invention.

IN THE DRAWINGS

FIG. **1** is a partially sectional, vertically exploded, perspective view of the upper portion of a container, principally of the neck and mouth and, positioned thereabove, a closure member; the two pieces illustrated embodying features of construction in accordance with the present invention;

FIG. **2** is a side sectional view of the container neck region and the closure applied thereto and taken on the line **2—2** of FIG. **3**;

FIG. **3** is a horizontal sectional view taken on the line **3—3** of FIG. **2**;

FIG. **4** is an enlarged view of one portion of the closure/container as shown in FIG. **3**;

FIGS. **5, 6** and **7** are views all similar to FIG. **4** but with the closure in a different radial position with respect to the container in order to show the locking abutment features at various stages of the closure approaching sealing engagement;

FIG. **8** is a partially sectional, vertically exploded, perspective view of a container/closure representing a further embodiment of the present invention and with portions of the closure broken away to show the interior structure;

FIG. **9** is a right sectional view taken on the line **9—9** of FIG. **10**;

FIG. **9**(*a*) is a view like FIG. **9** but illustrating relative relationship of closure and container parts ready for opening;

FIG. **10** is a horizontal section through the container neck and closure, showing the closure locked onto the container;

FIG. **10***a* is a view like FIG. **10** but illustrating relative relationship of closure and container parts ready for opening;

FIG. **11** is a horizonal section somewhat like FIG. **10** but magnified to show the relative position of the closure and container in one position;

FIG. **12** is an enlarged horizontal section like FIG. **11** but with the closure in a different relative position with respect to the container;

FIG. **13** is a view similar to FIG. **12** but with the closure in a still different relative position with respect to the container;

FIG. **14** is a view similar to FIG. **13** but showing the relative parts of the closure and container in position for unlocking of the closure from its safety lock position;

FIG. **15** is a perspective view similar to that of FIGS. **1** and **8** but of a container and closure in accordance with a further embodiment of the present invention;

FIG. **16** is a horizontal section of the closure and container fully and completely sealingly engaged;

FIG. **17** is a right sectional view taken on the line **17—17** of FIG. **16**;

FIG. **18** is a horizontal section similar to FIG. **16** but showing the relative position of the container and closure in the releasing of the engagement of the locking abutment parts;

FIG. **19** is a right sectional view taken on the line **19—19** of FIG. **18**;

FIG. **20** is a partially sectional, vertically exploded, perspective view of a container/closure representing a further embodiment of the present invention and with portions of the closure broken away to show the interior structure, particularly the safety lock features;

FIG. **21** is a right sectional view taken on the line **21—21** of FIG. **22**;

FIG. **22** is a horizontal section through the container neck and closure with the safety lock locked;

FIG. **23** is a horizontal section through the container neck and closure with the closure fully rotationally applied; and

FIG. **24** is a similar horizontal section but with the opening or release of the safety lock being effected.

Considered most basically, a container/closure structure in accordance with the present invention includes a container having conveniently located thereon one or two projections or tongue-like stops or abutments engageable with abutments formed interiorly on a depending closure skirt, precluding accidental removal of the closure; the container/closure engagement being releasable by mind-controlled, purposeful and dextrous relative manipulation of the container and closure, permitting thereby disassemblement of the closure from the container whereby access can be had to the interior and thus the contents. Preferably, the container and closure include threads for cooperative sealing of the container by the closure; the thread location and design being in coincident registration with the abutment engagement to provide relatively simultaneous sealing of the container and engagment of the abutments.

It is an important feature of the present invention that one holding the package consisting of the container and the closure will not, with normal hand manipulation of a casual nature or using a conventional unscrewing motion, be able to open the container by removal of the closure. To the contrary, the one holding the package will, of necessity, be required to per-

ceive and comprehend instructions or visible indicia contained on or attached to the package before he can successfully and purposefully manipulate the package or some component thereof whereby the safety lock feature is disengaged, permitting further opening of the package to gain access to the interior of the container and, of course, whatever it contains. The instructions may be in the form of printed instructions on a label affixed to the container, the closure or the carton containing the package. The instructions may also be imprinted into the container or take the form of arrows or thumb and/or finger spots or indentations.

The package consisting of specially designed container and closure in accordance with the present invention may feature instructions in the form of color coding, a numeral indexing or any variety or combination of key-guided manipulation of the package. At the same time, it must be noted that once the key or code is known, appropriate dextrous manipulation of the package is easily accomplished, permitting purposeful intelligent access to the contents, but at the same time precluding access to the contents by one not capable of perceiving or appreciating the instructions, the key coding, the indicia or the like.

It is appreciated that even one of very tender years quickly learns how to unscrew a cap from, for example, an aspirin bottle. Experience and observation establish that a person faced with a package embodying the features of construction in accordance with the present invention will be unable to open the package. Furthermore, the initial failure quickly discourages any further attempts whereby the contents are not exposed or made available, particularly to the child of tender years.

It is a significant feature of the container/closure combination of the present invention that the combination is particularly useful in the packaging of liquid products providing a completely leak-proof closure, albeit embodying a safety lock, precluding accidental disengagement of the safety lock feature. A significant feature resides in the fact that the safety lock becomes operative while the closure is being applied; that is, screwed onto the neck of the container. Thus, at a given point of screw application of the cap or closure, the safety lock feature becomes operative and the cap can no longer be simply unscrewed. On the other hand, the cap can be continued to be tightened onto the neck portion whereby the top wall achieves sealing engagement with the upper circular rim of the container, thereby completely sealing the container. It will be appreciated that appropriate gaskets and plastic inner liners of various sorts may optionally be used on the underside of the closure cap or top wall thereof to increase the sealing efficiency due to the resilient or deformable character of the liner, gasket or plastic seal ring, etc.

The exact nature of the construction of the present invention will become more readily apparent by detailed examination of the drawings and the following description in which the component parts and segments of the closure and container will be identified by appropriate reference numerals and figure numbers to assist in an understanding of the cooperative relationship of the parts and the appropriate constructional features constituting preferred embodiments of the present invention.

For a further and more full understanding of the nature of the closure/container package of the present invention, reference may be had to FIGS. **1–7,** wherein there is disclosed a package consisting of a container and closure combination shown in various positions, one relative to the other, and, in which drawings, like numerals will be used to identify common parts. In these FIGS. **1–7,** the reference numeral **11** identifies a container composed of a principal hollow body **12** which defines the receptacle for contents; the body being broken away on the line **13** in the interest of clarity and simplicity of illustration. The upper extent of the body is defined by an annular horizontal collar **14** from which extends upwardly and inwardly an annular neck **15** bearing threads **17** and terminating in an annular rim **18** surrounding the opening **19** leading interiorly and axially through the neck **15** to the receptacle defined by the body **12.** Projecting radially from the neck **15** at the juncture thereof with the collar **14** is a projection **15***a* having a radial stop abutment edge **15***b* on one side and a cam slanted edge **15***c* on the other side. Slightly clockwise in spaced adjacency on the neck is a radially extending pivot projection **15***d*. Situated above the container, substantially in axial alignment, is pictured a closure **20** inclusive of a horizontal top wall **21** and a connected flaringly depending skirt **22** having an upper region **23** of somewhat thicker wall section than the lower region **24** of the relatively thin wall section. terminating in a lower edge **22***a*. In the upper thicker walled section **23,** thread grooves **25** matching threads **17** are formed. Reference numerals **26** and **27** identify a pair of essentially identical diametrically opposed interior partial wall or web sections which proceed from the skirt inner surface and extend in a counterclockwise direction to terminate in vertical edges **26***a* and **27***a*, respectively. The outer surface of skirt **22** contains, at the juncture of the partial walls **26** and **27** with the annular skirt, a pair of finger or thumb indentations **29** and **30** which are diametrically located. The closure is very easily applied to the container neck. The closure is thus simply telescoped down onto the neck, with the thread **17** on the neck **16** engaging the thread grooves **25.** Clockwise rotation engages the threads, with the top wall **21** gradually approaching contact and sealing relationship with the rim **18** of the container. As this occurs, the partial wall or web segments **26** and **27,** aided by the slanted cam edge **15***c* of projection **15***a*, slide easily over these projections as illustrated, for example, by comparing the relative position of the closure parts in the sequence of FIG. **5,** FIG. **6** and FIG. **4,** followed by FIG. **7.** Looking thus at FIG. **5,** the inner wall or web **26** is easily deflected against the inner surface of depending skirt **22,** as permitted by the void **26***c* between the outer skirt **22** and the inner wall **26.** Continued rotation of the closure clockwise causes the parts to assume the relationship illustrated in FIG. **6,** followed by that illustrated in FIG. **7**; at which point, the top wall is in secured liquid-sealed engagement with the rim **18.** All of the relative positions of the container and closure as shown in FIG. **7** or FIG. **4** or FIG. **3** represents locked safety positions in the sense that the casual person, particularly a child of tender years, is unlikely to be able to open the package or remove the closure from the container. In the position illustrated in FIGS. **2** and **3,** the closure is locked onto the container, albeit the threads have not fully engaged and the top wall has not achieved sealing rela-

tionship with the top or upwardly facing rim of the container. The slight space between the closure wall and the container rim is shown in the upper region of FIG. 2. Continued clockwise rotational engagement of the threads will move the closure to the relative position of FIG. 7, with the top wall in sealing engagement with the rim. Now starting at the fully closed position of FIG. 7, the natural reaction is to turn the closure counterclockwise. This will cause the closure to move to the position of FIG. 4, with the partial walls or webs 26 and 27 both poised adjacent the respective pivot projections 15*d* but with the vertical edge abutment 26*a* against the radial edge 15*b* of projection 15*a*. In this position, rotation ceases. It will be appreciated that diametrically opposed inner wall 27 will have simultaneously arrived at the same position with respect to an identical projection 15*a* on the opposite side of the container 11. At this juncture, relative rotation in either direction will accomplish nothing as to opening. The informed person will, however, be able to open the package by compressing the closure at the finger spots 29 and 30 (see FIG. 3). This action, schematically illustrated in FIGS. 6 and 7 via arrow A, will cause a flexing of the skirt 22 inwardly precisely at the juncture of the partial wall or web 26 with the wall 22. The inward movement of the one end of wall 22 causes the other end, namely, the vertical edge 26*a* of the partial wall or web, to move outwardly against the inner surface 22*a* (FIG. 6) of the wall. The partial wall 26 in effect acts as a lever or a "teeter totter". Counterclockwise movement of the closure can continue from the positions of FIG. 7 to FIG. 6 to FIG. 5 with the edges 26*a* and 15*b* not in rotation stopping abutment, whereupon continued rotation will accomplish disengagement of the threads and removal of the closure.

It is a significant and very important feature of the present invention that the thread design, location and pitch, both of the container finish and the closure, are preselectively located and designed with respect to the location of the inner wall edges 27*a* and 26*a* and the stop abutment projection 15*a* and its counterpart on the other side so that the closing relationship of the closure will find a relative position of the parts as shown in FIGS. 3 or 4 simultaneously as the top wall is approaching or achieving sealing relationship with the top rim 18 of the closure neck. It is similarly a significant feature of the present invention that the positioning of the parts, including the design and location of the thread with respect to the respective abutments on the closure and the container, allows the locking engagement to be achieved as represented by the position of the parts in FIG. 4 and yet allows continued rotational tightening to a position, for example, as illustrated of the relative parts of FIG. 7, to achieve secure fluid-sealed relationship of the closure top wall and the rim 18; all without any inducement of stress or strain in any other region or segment or part of either the closure or the container, contrary to prior art closures featuring a ratchet-type engagement of closure and container which induces the stress in the closure as securement is achieved and repeatedly so, coupled with localization of that stress in critical regions of the closure/container package. Ideally, in accordance with the present invention, the thickness of the partial walls or webs 26 and 27 should be slightly greater than the wall thickness of the skirt 22, in order that only pressure applied to the finger spot or spots 29 and 30, when the closure and container are in the relative position as shown in FIG. 7, will achieve bending or deflection of the partial wall of web 26, moving the edge 26*a* outwardly as the opposite extremity near the finger point 29 moves inwardly in lever or teeter-totter fashion as described so that the edge 26*a* and its counterpart 27*a* will have clearance to pass the abutment 15*b* as counterclockwise rotation is simultaneously applied to the closure 20. The thinner skirt wall 22 will collapse if pressed at a spot other than at the finger spot or spots and no disengagement will occur. Care is exercized that the outer skirt 22 has a circumference and thickness as insures a space between the inner suface 22*a* and the outer surface of the projection abutment 15*a* so as to accommodate the passage of the thickness of the partial wall of web 26. This clearance is shown most clearly in FIG. 6. Care is also taken that the skirt dimension allows at least a slight clearance between its lower edge 22*a* and the upper surface 14 of the collar formed at the juncture of the container body 12 and neck 15. This clearance is shown most clearly in FIG. 2.

A variant embodiment of the container/closure package as illustrated in FIGS. 1–7 is illustrated in FIGS. 8–14 and this embodiment will not be described. Inasmuch as many of the component parts and constructional features of the container and the closure in the present embodiment are similar or identical to those of the embodiment of FIGS. 1–7, the same reference numerals will be employed to identify the common parts. Thus, reference to FIG. 8 reveals the container 11 inclusive of a body portion 12 cut away on line 13. A horizontal collar 14 joins the body 12 with neck 15 terminating in an upper horizontal collar 14*a*, above which is a cylindrical neck region 16 bearing external threads 17 leading to a rim 18 surrounding mouth opening 19. In this embodiment, the projecting stop abutment 15*a* is located at the base of the neck proximate the collar 14 and includes the cam surface 15*c* on one side and the radial surface edge abutment 15*b* on the other side. In the present embodiment, no pivot projection 15*d* is formed on the neck; rather, an annular bead 15*e* is formed to encircle the neck 15. The bead projects radially outward from the normal surface of the neck 15. The projecting annular bead 15*e* cooperates with the projection 15*a* in a manner to be described hereinafter.

The closure 20, like that of the embodiment of FIGS. 1–7, includes the top wall 21, the flaringly depending skirt 22 terminating in a bottom edge 22*a*. The closure includes an inner cylinder 23*a* in which are formed the threads 25. In accordance with the embodiment, the inner skirt has integrally joined thereto a pair of depending fingers F-1 and F-2 in diametric opposed relationship. The fingers are vertical and thus normal to top wall 21. The fingers include side edges F-3 and F-4. The outer surface of the skirt includes finger spots 29 and 30 which identify the location or region of joinder of the fingers F-1 and F-2, respectively, with the inner surface of the skirt. See in FIG. 9 that finger F-1 joins the skirt at the location of finger spot indentation 29. Other than just described, the container and closure is essentially identical to that of the embodiment of FIGS. 1–7.

The closure of FIG. 8 is applied by simply telescoping it onto the neck to engage the threads 17 on the container with the interior threads 25 in the closure. Clockwise rotation engages the threads, brings the top wall 21 down onto the rim 18 while the lower edge 22*a*

of the skirt **22** approaches collar **14.** Simultaneously, the fingers F-1 and F-2 pass easily over the slanted cam edges **15***c* of projection **15***a;* only one of which is shown in FIG. **8** but two of which are shown in FIG. **10.** The fingers are deflected in passing over the cam surface **15***c* outwardly into the space between the finger and the inner surface of the skirt. Once the rotation brings the finer past the projection **15***a*, the finger snaps back into its normal vertical position proximate the abutment edge **15***b*, as shown in FIGS. **9, 10** and **12.** Reference to FIGS. **11–13** reveals the sequential movement of one of the fingers past the abutment **15***a* . FIG. **13** represents the fully tightened liquid-sealed relationship of the closure rim **23***b* with container rim **18.** In opening the container, a counterclockwise rotational movement is applied to the closure which will, within a very few degrees of turns, bring the finger F-1 so that its surface F-3 abuts edge **15***b* of stop projection **15***a* (see FIG. **12**). In this position, the closure cannot be further unscrewed or rotated. The closure/container is locked and the unknowing child or infirmed person cannot further release it. The knowing and forearmed individual, however, can release the locking engagement by simultaneously applying pressure, usually by a thumb and forefinger to the finger points **29** and **30** at the juncture of the fingers with the skirt and counterclockwise rotation. Due to the presence of annular bead **15***e*, the pressure will convert the fingers into levers, deflecting the lower extremities outwardly while the upper extremities are being compressed inwardly into the clearance between the skirt inner surface and the neck outer surface as shown in FIG. **9***a*. The teeter-totter action will cause, as indicated, the lower extremity of the fingers to pivot outwardly. For example, see the location of the finger F-1 in FIG. **14** and FIG. **10***a*. In the position as shown in FIG. **14,** and assuming that similar pressure and outward deflection of the lower terminus of the finger F-2 is occurring, counterclockwise rotation of the closure can proceed to move the finger past the abutment to the position as shown in FIG. **11,** whereupon compression may be relaxed. Continued rotation will unscrew the closure from the container. As indicated earlier herein, the present invention contemplates a package having only one finger F-1 and one abutment **15***a* although the optimum in achievement of the objectives of the invention is realized where two fingers and two abutments are featured.

A still further variant embodiment of the container/-closure package embodying safety locking features is illustrated in FIGS. **15–19** of the drawings; in which drawings and the following detailed description, the same numerals will be employed to identify the same featues features construction.

The container **11** (FIG. **15**) thusly features a principal body broken away on the line **13** in the interest of simplicity; the body being definitive of a receptacle for a variety of products and including an annular collar **14,** above which extends a neck **15** which converges to a collar **14***a* connecting with cylindrical neck region **16** bearing exteriorly formed threads **17.** The cylindrical neck terminates in an upperly facing annular rim **18** surrounding a mouth **19** leading to the body interior. The neck **15** bears a radially extending projection **15***a* having a stop abutment radial edge **15***b* and, on the other side, a curved cam edge **15***c*. The projection is contiguous to collar **14.** The closure **20** includes a top wall **21,** a connecting annular depending skirt **22** terminating in a lower edge **22***a* having a circumference larger than the circumference of the top wall **21.** The closure includes an interior annular cylinder **23***a* depending from top wall **21** and including on its inner surface female threads **25** matching the threads **17** on neck **16.** The skirt **22** includes on its inner surface an inward projection **22***p* which is wedge shaped in the vertical dimension and merges smoothly into the sidewall at its upper extent. Coincident with the projecting wedge-sahped projection **22***p* is an outwardly extending finger tab **22***t* priximate the lower edge **22***a* of skirt **22.** Closure dimensions are selected to match the neck of the container **11** with skirt **22** and the projection **22***p* with the projection **15***a* on neck region **15** in order that the closure may be properly locked onto the container. To close the package, the closure is telescoped onto the neck; the threads engaged to bring the top wall down and into sealing engagement with the rim **18** as the skirt lower edge **22***a* approaches collar **14.** Simultaneously as the closure is rotated, the internal projection **22***p* on the skirt, and aided by the flexible nature of the skirt, passes smoothly over the cam surface **15***c* of projection **15***a* to the abutment edge **15***b* wherein the projection snaps the skirt back to its normal undeflected condition. The relative location of abutments and the pitch and the design of the threads are selected for coincident registration such that final sealing closure is effected just after the projection **22***p* passes clockwise past projection **15***a*, as viewed in FIG. **16.** The closure in this position and, as well, as illustrated in FIG. **17** is securely fastened in liquid-sealed relationship to the container To open the package, the closure is turned counterclockwise until the internal projection **22***p* abuts edge **15***b* of projection **15***a* on the neck. At this juncture, as viewed in FIG. **19,** pressure is applied upward against the outer tab **22***t*, flexing the container skirt outwardly so that the abutments **15***a* and **22***p* are not in abutment (see FIG. **18**), allowing the closure to be rotated counterclockwise in an opening direction. It will be seen that intelligent, purposeful and dextrous manipulation on the part of the person will be necessary in order to impart both rotation of the closure, steadiness to the container and upward movement on the tab. Experience has established that a child of tender years is unable to coordinate this mind-controlled movement to effect initiation and maintaining of opening conditions.

The embodiment of FIGS. **15–19** of featuring the lift tab **22***t* and the container neck abutment **15***a* and closure abutment **22***p* is similar in many respects to the embodiment of FIGS. **1–7** in my prior application Ser. No. **288,129.** The embodiment of FIGS. **15–19,** however, represents a distinct advantage in several respects. Most importantly, the embodiment of FIGS. **15–19** features a construction which allows considerably more variability in the vertical dimension of the closure/container package. This is referred to as the H dimension and is defined in The Society of the Plastic Industry, Inc. as the height of the bottle finish, measured from the sealing surface, in a line parallel to the axis of the finish and tangent to the threads on the finish, down to a point where the line intersects the body (shoulder) of the container. The H dimension is also defined as the inside height of the closure, measured from the bottom of the closure, in a line tangent to the threads of the closure and terminating at the inside, top of the closure. Thus, the engagement of the threads on

the neck with corresponding threads on the inner cylinder **23***a* on the closure need not be as precise, either with respect to sealing engagment of the top wall with the container rim **18** or the engagment of the relative abutments. In keeping with the foregoing, it is a desirable characteristic of the embodiment of FIGS. **15–19** that fitments, sealing rings and the like may be employed on either the container or the closure to improve the sealing efficiency, contact or other similar reasons without destroying or adversely affecting, in any event, the engagment of the abutments. This is due to the fact that the abutment **15***a* on the neck and the abutment **22***p* on the closure have a large dimension along the longitudinal axis of the container and the closure than in the case of the embodiment of FIGS. **1–7** in the referred-to prior application. In that embodiment, vertical variability was limited by the horizontal nature of the collars on each of the container neck and closure which required a fairly precise dimensioning of the neck, threads and closure design. Furthermore, the skirted closure of the present application, while as difficult to open as it were, is more easily manipulated once the opening is purposefully initiated due to the deeper draw design of the closure, particularly the skirt thereof.

Reference may now be had to FIGS. **20–24** for an illustration of a variant embodiment of the present invention in the form of a container or closured package consisting of a container **111** and a closure **120.** Briefly stated, this embodiment of FIGS. **20–24** is, in a manner of speaking, a reversal of the embodiment of FIGS. **1–7.** In this embodiment, the abutment **15***a* and pivot **15***d* (FIG. **1**), rather than being on the neck of the closure as in the embodiment of FIGS. **1–7,** are embodied in the closure as will be described. Conversely, the inner wall **27** of closure **20** in the embodiment of FIG. **1** finds its counterpart on the container **111** of the embodiment of FIG. **20** in a hook or bridge member **115***a*. The container additionally includes a body portion **112** adjoining via horizontal shoulder **114** with an upwardly tapered neck **115** joining a cylindrical finish **116** which is threaded as at **117,** terminating in an upper rim **118** surrounding a mouth opening **119** which communicates with the interior. The body is broken off on line **113** in the interest of simplicity of illustration. The tapered neck **115** includes a vertically chamfered region **115***b* behind the aforesaid circumferentially elongage hook or bridge **115***a* which is joined at the one extremity but having a free edge, as it were, identified by the reference numeral **115***c*. There is additionally provided a slight space **115***d* between the bridge **115***a* and the shouder surface **114.** The closure **120** includes a principal top wall **121** having at its outer edge a dependingly flaring skirt **122,** terminating in a lower edge **122***a*. The upper region of the skirt includes a thicker wall section **123** having grooved threads **125** on its inner surface. The lower region **124** of the skirt is relatively thin but includes on its inner surface a wedge abutment **127** which is thicker at the edge **122***a* and flows smoothly into the inner surface at its upper extremity. Additionally and displaced a few degrees therefrom, there is a rod-like projection **128** which is vertically elongage and serves as a pivot or transmitter of finger opening force in a manner to be described. Reference numerals **129** and **130** identify finger pressure spots. There are two wedges **127** and two elongate pivot projections **128** in **180°** disposed relationship. The closure is applied simply by telescoping the skirt over the neck **115** and allowing the threads **117** of the neck region **116** to engage grooved threads **125** on the interior of the closure, gradually rotating the closure threadingly in a clockwise direction. As the top wall **121** approaches sealing engagement with the rim **118,** the wedge **127** will move in a clockwise path past the edge **115***c* of bridge **115***a*, assuming thusly the position illustrated in FIG. **22.** The movement of the wedge **127** is not encumbered or inhibited in any way since the surface of the neck and bridge **115***a* offers no obstacle. Actually, the wedge **127** bends or deflects the bridge **114***a* inwardly very easily and, as the closure top wall assumes proximate sealing relationship with the container rim, the final stage of rotation allows the wedge to pass the bridge **115***a* which returns to its normal position as shown in FIG. **22** whereby counterclockwise rotation is impossible since the edge of the wedge **127** will abut sharply the terminal edge **115***c* of bridge **115***a*. The design of the threads and the placement of the abutments, wedges, bridge, etc., contemplate coincident registration as explained hereinabove such that some additional continued clockwise rotation of the closure can occur to allow fluid-sealed relationship or contact between the inner surface of the top wall **121** and the rim **118.** In the embodiment as illustrated, this will bring the wedge **127** to a position past the edge **115***c* as shown in FIG. **23** but without any serious or significant stresses being induced in other parts of the container or closure as is frequently encountered with container/-closure packages described in the patent art which feature ratchet types of engagement as between closure and container.

Returning again to FIG. **23,** the closure **120** and container **111** and their associated parts are shown in fully clockwise rotational securement. Disengagement or removal of the closure is initiated by first grasping the container body **112** with the fingers of either hand and the closure with the fingers of the opposite hand, imparting a counterclockwise relative rotation which continues for only a very few degrees of rotation until the position illustrated in FIG. **22** is reached, with the wedge abutment **122** of closure **120** against the extremity **115***c* of bridge **115***a* of container **111.** Next, finger pressure is applied to the finger spots **129** and **130,** causing the pivot projections **128** to exert pressure against each of the bridges **115***a*, deflecting the edges **115***c* inwardly towards the container wall in the manner shown in FIG. **24** and as allowed by reason of the clearance provided by the chamfered region **115***b* behind each of the bridge segments **115***a*. With the parts, and specifically the bridge edges **115***c*, in the position as shown in FIG. **24,** counterclockwise rotation of the closure **120** can continue to effect disengagement of the threaded regions of the closure and container, allowing access to the container. It should be emphasized that the deflection of the bridge via pressure can be accomplished only by finger pressure on the zones or spots **129** and **130** which will, via the pivot projection **128,** accomplish the desired deflection of bridges **115***a*. Pressure exerted anywhere else on the outer surface of the skirt will result only in deflection of the skirt itself, without any corresponding deflection of the bridge, which consequently will remain in the position illustrated in FIG. **22,** whereby opening of the closure is prohibited.

Reference to FIGS. 9*a* and 10*a* will assist in understanding the nature of the movement of the closure finger spots **29** and **30** from their dotted line position inwardly, resulting in a deflection of the finger F-1 as assisted and influenced by the bead **15***e;* the end result being a movement of the lower extremity of the finger radially outwardly to a position where it will allow the closure to move past the stop projection **15***a*. The closure as shown in FIG. **10***a* assumes a somewhat oval configuration; in effect, aiding and abetting the relative movement of the closure and finger as just hereinabove described. The degree of oval configuration is a factor determined by the amount of finger pressure and the thickness of the skirt and, as well, of course, the basic property of the particular plastic employed in molding the closure.

In the interest of complying with the patent statutes requirement of setting forth the best mode contemplated for carrying out this invention, the drawings and the specification have illustrated and described in the embodiment of FIG. **1** the presence of two inner wall or web segments and two stop projections on the container and, as well, two finger spots located near the juncture or joinder of the partial wall or web. It is to be understood that two locking abutments and release features represent an optimum construction, both in terms of the efficiency of the locking and in terms of the complexity or difficulty in releasing the safety lock. On the other hand, it is possible, within the broader framework of the present invention, to employ one partial wall or web on the inner side of the closure as in the embodiment of FIG. **1** and one stop projection and pivot projection rather than two. In such case, the design of the thread, pitch, placement and the origin point of the thread would be designed with the location of the partial wall or web and stop projection being determining design factors in order that the principle of coincident registration would be carried out, whereby sealing and locking would be proximately coincidently achieved. Similarly, in the embodiment of FIGS. **8–14,** it is possible, within the broader framework of the present invention, to employ a single finger on the closure and a single stop projection on the neck of the container rather than pairs of each of these items as in the preferred embodiment as illustrated. Again, similarly, the employment of a single wedge and pivot projection on the closure in an embodiment similar to that of FIG. **20** may be employed, coupled with the use of a single bridge rather than several or two of these associated items as illustrated in FIGS. **20–24.** The foregoing is also possible with the other embodiments illustrated in the various drawings.

It is to be understood that the constructional features of the embodiment of FIGS. **15–19** which cooperate to define a safety lock feature may be reversed. Thus, rather than a projecting wedge on the inside of the closure, the closure may feature a recess adapted to receive a projection **15***a*. In this reversal situation, the cam edge **15***c* would be eliminated in favor of a radial edge like **15***b;* the overall configuration of the projection **15***a* being such as to fit in a correspondingly and similarly sized recess on the inner surface of the wall of the skirt. Similar reversal of the constructional features were described and illustrated as possible in my prior application Ser. No. **288,129.**

It will be appreciated that quite a wide variety of materials may be employed in fabricating the closure and, as well, the container. The container may be formed of metal, glass or any suitable rigid or semi-rigid plastic materials, having in mind the properties and characteristics of the product. The closure should be formed of a relatively flexible material, whereby the depending skirt portions can flex repeatedly as occasioned by repeated openings and closings of the package. It will be appreciated that the particular dimensions in terms of wall thickness, etc., particularly as to the wall members and skirts and the connecting parts, may be varied to meet the properties of the specific plastic material. The latter, of course, may be selected, having in mind perhaps the nature of the contents or the specific environmental conditions to be encountered by the package.

As indicated herein, the screw thread type of engagement of closure and container is preferred in accordance with the present invention. It will be understood, however, that in connection with the broader aspects of the present invention, one may employ other types of engagement arrangements such as the lug type of cap which may be manufactured for engagement with corresponding contours of the container.

Modifications may be resorted to without departing from the spirit and scope of the appended claims and all such modificatons including equivalents are intended to be covered unless such would do violence to the appended claims.

I claim:

1. In combination,

a container including (**1**) a principal hollow body serving as a receptacle and (**2**) a connected upstanding neck terminating in a rim-defined opening and having threads formed on the exterior annular surface of said neck for threaded engagement by cooperating thread means formed on a suitable closure,

a closure member including (**1**) a top wall spanning said rim-defined opening, said top wall being adapted to sealingly contact said rim, (**2**) a connected depending skirt having threads formed on the inner surface of said skirt adapted to threadingly engage said threads on said neck of said container,

said skirt and container each including, in coincident registration with said threads, cooperatively engageable and disengageable lock abutments, and

means associated with said closure adapted for purposeful dextrous manipulation to effect disengagement of said abutments, said combination being constructed such that said lock abutments are arranged as to allow rotational tightening beyond the stage of locking engagement of said abutments without any contact of said component parts of said closure or container as would induce distortion or stress in either said closure or container.

2. The combination as claimed in claim **1,** wherein said abutments are preselectively radially located in relationship to that thread design which effects sealing contact between said container rim and said closure top wall, whereby abutment of said cooperatively engageable and disengageable lock abutments precludes rotational removal of said closure.

3. The combination as claimed in claim **2,** wherein said skirt an container each include not more than two spaced abutments.

4. The combination as claimed in claim **3,** wherein said abutments are generally diametrically opposed.

5. A multi-component package for safely storing contents to be reached only by prescribed dextrous manipulation of the package components, said package comprising:

a container including (1) a principal body defining a receptacle for contents, (2) a connected upstanding neck terminating in a rim-defined opening and (3) closure attachment means formed on the exterior surface of said neck, said neck including a radially outwardly extending stop projection, and

a closure including (1) a top wall spanning said rim-defined opening and (2) a connected depending skirt having attachment means formed on the interior surface thereof for rotational releasable engagement with said attachment means on the exterior surface of said neck and a resilient or flexible inner partial wall or web connecting along one region of the inner surface of said skirt, said partial wall or web including stop means spaced inwardly from said inner surface of said skirt, said stop means spaced inwardly from said inner surface projection when said closure is proximately rotationally secured to said closure neck but being deflectable out of opposing contact with said stop projection, whereby said closure can be rotationally removed.

6. A package as claimed in claim 5 which includes means for deflecting or bending said partial wall or web to teminate abutting contact of said stop means and said stop projection.

7. A package as claimed in claim 6, wherein said deflection means comprises a pivot projection adjacent said stop projection, said pivot projection aiding deflection of said partial wall or web responsive to compression applied at the connecting region of said wall or web to said skirt.

8. A multi-component package for safely storing contents to be reached only by prescribed dextrous manipulation of the package components, said package comprising:

a container including (1) a principal body defining a receptacle for contents, (2) a connected upstanding neck terminating in a rim-defined opening and (3) closure attachment means formed on the exterior surface of said neck, said neck including a radially outwardly extending stop projection and a pivot projection in radial spaced proximity to said stop projection,

a closure including (1) a top wall spanning said rim-defined opening and (2) a connected depending skirt having attachment means formed on the interior surface thereof for rotational releasable engagement with said attachment means on the exterior surface of said neck and a resilient or flexible inner partial wall or web connecting along one region of the inner surface of said skirt, said partial wall or web including stop means spaced inwardly from said inner surface of said skirt, said edge opposingly contacting said stop projection when said closure is almost rotationally secured to said closure neck, and

means for deflecting or bending said partial wall or web about said pivot projection to displace said stop means out of stop-contact with said stop projection, allowing rotational removal of said closure from said container.

9. A package as claimed in claim 8, wherein said stop projection includes an abutment surface on one side for contact with said stop means of said partial wall or web and a cam surface on the opposite side which, together with the flexible nature of said partial wall or web, permits rotational tightening of said closure and sliding contact passage of said partial wall or web in slightly deflected condition.

10. A package as claimed in claim 9, wherein said partial wall or web is resiliently elastic in that it returns to its original undeflected position.

11. A package as claimed in claim 10, wherein said last-mentioned means comprises a skirt circumference which is larger than the circumference of said neck proximate said stop and pivot projections as permits compression of said skirt proximate said partial wall or web connection region, thereby bending said partial wall or web.

12. A package as claimed in claim 11, wherein said skirt outer surface includes visible indicia marking the spot for application of compression to bend said partial wall or web to disengage said stop means of said partial wall or web from said stop projection.

13. A package as claimed in claim 8, wherein said neck includes two sets of stop projections and pivot projections in diametric positions and said closure skirt inner surface includes two inner partial walls or webs in diametric positions.

14. A package as claimed in claim 13, wherein said skirt outer surface includes visible indicia marking the spot for application of compression to bend said partial wall or web to disengage said stop means of said partial wall or web from said stop projection.

15. A multi-component package for safely storing contents to be reached only by prescribed dextrous manipulation of the package components, said package comprising;

a container including (1) a principal body defining a receptacle for contents, (2) a connected upstanding neck terminating in a rim-defined opening, said neck including an annular bead encircling said neck between said body and said opening, and (3) closure attachment means formed on the upper exterior surface of said neck, said neck further including a radially outwardly extending stop projection, and

a closure including (1) a top wall spanning said rim-defined opening, (2) a connected depending skirt having attachment means formed on the interior surface thereof for rotational releasable engagement with said attachment means on the exterior surface of said neck and (3) a depending finger member attached to the inner surface of said skirt at its upper end and depending generally vertically downwardly to a lower extremity normally opposingly contacting said stop projection when said closure is almost rotationally secured to said closure neck, said finger being deflectable and pivotable about said bead responsive to pressure on the outer surface of said closure skirt at the upper end of said finger, causing the lower end to move outwardly out of contact with said stop projection, allowing rotational opening or removal of said closure.

16. A package as claimed in claim 15, wherein there are two fingers and two stop projections located respectively generally 180° apart.

17.A multi-component package for safely storing contents to be reached only by prescribed dextrous manipulation of the package components, said package comprising:

a container including (1) a principal body defining a receptacle for contents, (2) a connected upstanding neck terminating in a rim-defined opening and (3) closure attachment means formed on the exterior surface of said neck, said neck including a circumferentially elongage cantilever bridge connected to said neck at one extremity of said bridge and having stop means at the other extremity, and

a closure including (1) a top wall spanning said rim-defined opening and (2) a connected depending skirt having attachment means formed on the interior surface thereof for rotational releasable engagement with said attachment means on the exterior surface of said neck, said skirt including a radially inwardly extending stop projection normally opposingly contacting said stop means of said bridge when said closure is proximately rotationally secured to said closure neck, said circumferentially elongate cantilever bridge being deflectable out of opposing contact with said stop projection on said closure, whereby said closure can be rotationally removed.

18. A package as claimed in claim 17 which includes means for deflecting or bending said cantilever bridge out of abutting contact of said inwardly projecting stop member formed on the inner surface of said skirt.

19. A package as claimed in claim 18, wherein said means comprises a second generally vertically elongate projection formed on said inner skirt wall adjacent said stop projection, said projection assisting deflection of said cantilever bridge on said container responsive to compression applied on said skirt on the other side of said second projection means.

20. A multi-component package for safely storing contents to be reached only by prescribed dextrous manipulation of the package components, said package comprising:

a container including (1) a principal body defining a receptacle for contents, (2) a connected upstanding neck terminating in a rim-defined opening and (3) closure attachment means formed on the upper exterior surface of said neck, said neck further including a radially outwardly extending stop projection, and

a closure including (1) a top wall spanning said rim-defined opening, (2) a connected depending skirt having attachment means formed on the interior surface thereof for rotaional releasable engagement with said attachment means on the exterior surface of said neck, (3) a vertically elongate wedge projecting radially inwardly from the inner surface of said skirt, said wedge tapering smoothly into said skirt at its upper juncture, said wedge normally opposingly contacting said stop projection on said container neck when said closure is proximately rotationally secured to said closure neck, and (4) means for deflecting said skirt outwardly proximate said wedge to thereby disengage said wedge from said stop projection, permitting thereby rotational removal of said closure.

21. The package as claimed in claim 20, wherein said wedge on said inner skirt, said projection on said container neck and said thread design are constructed and arranged to mutually cooperate in providing tolerance in a vertical dimension, allowing thereby employment of auxiliary liners or the like in the region of said rim and/or closure without interfering or adversely affecting the safety lock features provided by the said closure wedge and said stop projection on said container neck.

22. The package as claimed in claim 20, wherein said means (4) includes a radially extending tab means on the outer surface of said skirt opposite said wedge for finger contact and lifting movement of said skirt to thereby disengage said wedge from said stop projection.

23. The package as claimed in claim 15, wherein said bead is not continuous and is present only vertically above said radially outwardly extending stop projection.

24. A multi-component package for safely storing contents to be reached only by prescribed dextrous manipulation of the package components, said package comprising:

a container including (1) a principal body defining a receptacle for contents, (2) a connected upstanding neck terminating in a rim-defined opening and (3) closure attachment means formed on the upper exterior surface of said neck, said neck further including a radially outwardly extending stop projection, and

a closure including (1) a top wall spanning said rim-defined opening, (2) attachment means formed on said closure adapted for rotational releasable engagement with said attachment means on the exterior surface of said neck (3) a connected depending skirt having a vertically elongate wedge projecting radially inwardly from the inner surface of said skirt, said wedge tapering generally smoothly into said skirt at its upper juncture, said wedge normally opposingly contacting said stop projection on said container neck when said closure is proximately rotationally secured to said closure neck and (4) means for deflecting said skirt outwardly proximate said wedge to thereby disengage said skirt outwardly proximate said wedge to thereby disengage said wedge from said stop projection, permitting thereby rotational removal of said closure.

25. The package as claimed in claim 24, wherein said closure includes (5) a connected depending inner skirt having the attachment means (2) formed thereon.

* * * * *

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,917,097 Dated November -4, 1975

Inventor(s) Gerhardt E. Uhlig

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

Column 15, line 21, cancel "spaced inwardly from said inner surface" and substitute therefor -- normally opposingly contacting said stop --.

Signed and Sealed this

third Day of *February 1976*

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents and Trademarks

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