The present invention relates to a child resistant cap assembly having an outer cap and an inner cap assembly that is difficult to be opened by children, and at the same time is simple and easy to use by adults. At the time of locking, the outer cap block and the inner cap block is stuck and after locking, are immovable. The cap is difficult to open by children. To open the cap, one must push the outer cap down and then turn the cap. The child resistant cap assembly has an outer cap, an inner cap assembly that is difficult to be opened by children and at the same time is simple and easy to use by a grownup. The child resistant cap assembly has an outer cap and an inner cap assembly that is difficult to be opened by children and at the same time is simple and easy to use by a grownup.
CHILD RESISTANT SCREW CAP

FIELD OF THE INVENTION

[0001] The invention relates to caps for vials and containers and, more particularly, to a child resistant plastic screw cap used for syrup, tablets, and other food products.

BACKGROUND OF THE INVENTION

[0002] Child resistant caps are used to reduce the risk of children ingesting dangerous items. This is often accomplished by the use of a special safety cap. It is required by regulation for prescription drugs, over-the-counter medications, pesticides, and household chemicals.

[0003] Designers and manufacturers of child resistant closures have long recognized the difficulty seniors have in accessing containers with child resistant closures. However, no designs which overcome the effects of “point contact” have been developed, and similarly, no other designs which adequately prevent children from opening the closures, yet which allow seniors to open them have been developed.

DISCUSSION OF RELATED ART

[0004] U.S. Pat. No. 4,078,687, entitled CHILD-PROOF SCREW-CAP CLOSURE and issued to Zapp on Mar. 14, 1978, discloses a child-proof screw cap closure, which can be screwed onto a bottle or container. The cap has an inner cap, an outer cap, a coupling member and a sealing member, which inner cap possesses an inner chamber and a cavity, connected with one another by a passage and a channel with a window between the cavity and the chamber. The outer cap possesses a projecting zone with at least one niche, which zone projects so far into the interior of the outer cap that, in the non-actuating position, it at least partially covers the window of the channel and prevents passage of the coupling member through the channel. When the outer cap is rotated so that the niche faces the window, the coupling member can pass from the cavity into the window and project into the niche, as a result of which a positive engagement is made between the inner cap and outer cap and both caps can be unscrewed from the mouth of the container.

[0005] U.S. Pat. No. 4,512,484, entitled LOCKING SCREW CAP and issued to Mar. Apr. 23, 1985, discloses a locking screw cap for sealing a wide variety of containers, such as medicine bottles, bottles containing hazardous liquids, and other containers where it is desired to prevent access by young children. A locking pin may be depressed to engage one or more lugs formed adjacent the opening in the container to prevent rotation of the cap. A flange formed on the top of the locking pin and a tang formed in the middle of the locking pin prevent removal of the pin from the bracket.

[0006] U.S. Pat. No. 5,433,329, entitled CHILD RESISTANT CAP WITH INDEPENDENT OPEN AND CLOSE RATCHET SETS and issued to Weinstein on Jul. 18, 1995, discloses a child resistant cap with independent open and close ratchet sets. It includes an inner cap having top and side walls and having inside surfaces and outside surfaces and an open bottom, and structure for attachment to a container. It also has a flanged base extending outwardly from its side walls, with the flanged base having one-way ratchet members thereon for engagement with an outer collar for locked rotation of an outer collar with the inner cap in a circular, first direction. It also has ratchets located on the outside surface of the top for engagement with an outer cap for rotation of an outer cap with the inner cap in a circular, second direction opposite from said first direction. There is an outer cap having a top and side walls and an open bottom and having inner surfaces and outer surfaces. It is rotatably attached to the inner cap and has ratchets on its inside surface of its top for engagement with the inner cap. There is also an outer collar rotatably mounted about the inner cap and the outer cap which has ratchets thereon for engagement with the ratchets located on the base flange of the inner cap.

[0007] U.S. Pat. No. 5,082,129, entitled SNAP-LOCK FOR SCREW-CAP CONTAINER and issued to Kramer on Jan. 21, 1992, discloses a screw-cap type container that comprises a container or bottle having a screw thread and an annular flange formed on a neck thereof. The flange is discontinuous to define a locking slot between its opposite ends. A closure cap has an internal screw thread for engaging the screw thread of the container to releasably secure the closure cap thereon. A lock tab, secured to the closure cap, normally engages within the locking slot to prevent relative rotation between the closure cap, when they are threadably secured together. When appropriate finger pressure is applied to the lock tab, it will disengage the locking slot for permitting the closure cap to be unscrewed and removed from the container. The closure cap may be of the “reminder” type for visually displaying information to a user relating to periodic use of the contents of the container.

[0008] U.S. Pat. No. 4,520,938, entitled SAFETY SCREW CAP and issued to Finke on Jun. 4, 1985, discloses a safety screw cap that is made up of an inner cap arranged to be screwed onto the neck of a bottle and an outer cap forming a cover over the inner cap. A cam is formed on one of the end closing walls of the inner cap or the outer cap spacing them apart in the assembled position. Perforations are formed in the end closure wall of the outer cap providing it with flexibility so that it can be forced axially toward the inner cap whereby the screw cap assembly can be removed from the closed or sealed condition. Because of the cam extending between the end closure walls, when axial force is exerted on the outer cap, the end closure wall of that cap assumes an arched configuration as the screw cap assembly is removed.

[0009] U.S. Pat. No. 4,298,129, entitled CHILDPROOF, SNAP-ON, TWIST-OFF SAFETY CAP AND CONTAINER and issued to Stull on Nov. 3, 1981, discloses a childproof safety screw cap having yieldable cap retainer means which are overcome, to effect cap removal, by a quarter-turn twist that produces a relatively large axial cap travel due to the provision of multiple screw thread elements thereon. The cap can be pushed straight on, accompanied by bypassing of the threads. The retainer means and the threads increase their interlock action if the cap is squeezed laterally, as by the act of a child applying its teeth to the cap. A sealing flange on the container defects efforts to bite the cap under its bottom rim, and a beveled top peripheral portion of the cap defeats its being gripped at the top by teeth.

[0010] U.S. Pat. No. 4,752,013, entitled TAMPER-EVIDENT CHILD RESISTANT CAP AND BOTTLE WITH AXIAL LOCKING MEANS and issued to Miller, et al. on Jun. 21, 1988, discloses a tamper-evident child resistant screw cap for a bottle that has an internally threaded closure portion and a depending cylindrical skirt portion having a pair of diametrically spaced arc segments, frangibly attached to the skirt and flexurally attached to the open end of the closure portion. The arc segments have downward-facing ratchet dogs engaged with upward-facing ratchet teeth on the bottle.
neck. Each arc segment has an upstanding rigid lever which may be inwardly depressed to disengage the ratchet dogs from the ratchet teeth of the bottle neck, permitting first removal of the cap only after breaking the frangible attachments and depressing the levers while unscrewing the cap; thereafter permitting removal only by depressing the levers while unscrewing the cap, or by breaking off the levers and arc segments at their flexural attachments, thereby converting the cap to a non-child resistant configuration.

[0011] U.S. Pat. No. 5,082,130, entitled TWIST TUBE LIFT CHILD PROOF CAP AND CONTAINER and issued to Weinstein on Jan. 21, 1992, discloses a child resistance container and lid which utilizes a semi-flexible ring. The snap lid which is utilized in the present invention container is substantially set into the top of the container and this lid has one component of either an extended lift member or an indented lift guide. The ring has the other component of either the extended lift member or the indented lift guide. When the ring is rotated, the snap lid cannot be opened. The snap lid can only be opened when the ring is simultaneously squeezed and rotated. In an alternative embodiment, the two component lift system is utilized wherein both components extend outwardly rather than one extending outwardly and one indented.

[0012] U.S. Pat. No. 5,205,424, entitled CHILD RESISTANT CAP AND CONTAINER ASSEMBLAGE and issued to Gaspar on Apr. 27, 1993, discloses a child resistant cap assembly comprising a container and a cap member that is secured to the container so that it cannot be removed without either breaking the cap member or damaging the seal that joins the cap member to the container. The cap member is provided with a nozzle having an internal locking means so that the contents of the container cannot be accessed when the container is in its normal upright position. To access the contents in the container, the assemblage is tilted to disengage the locking means enabling the nozzle to be opened and permitting a user to access the contents of the container using only one hand.

[0013] U.S. Pat. No. 4,069,935, entitled CHILD RESISTANT CLOSURE and issued to Hampel on Jan. 24, 1978, discloses a screw-on child resistant double cap closure in which the inner screw cap has printing and coloration on the exterior surface of its crown and the cover is transparent. The cover and the screw cap include two halves of a selectively engageable, normally disengaged, torque coupling.

[0014] U.S. Pat. No. 6,722,513, entitled INFANT AND TODDLER DRINKING CONTAINERS WITH CHILD RESISTANT CAPS and issued to Flood, et al. on Apr. 20, 2004, discloses a child resistant closure that prevents a toddler from unscrewing the top. The child resistant closure includes an inner screw cap which is threadably mountable on the beverage container, such as the milk bottle with a nipple or the sipping cup. An outer operating ring cap is mounted on the inner cap. The outer operating ring cap has a circumferential retaining rim on a lower end thereof to retain the inner cap within the outer cap.

[0015] U.S. Pat. No. 3,977,554, entitled CHILD-PROOF CLOSURE DEVICE FOR A CONTAINER HAVING A THREADED NECK PORTION and issued to Costa on Aug. 31, 1976, discloses a child-proof closure device for a container such as a bottle having a threaded neck portion. This closure device comprises a closure cap which has on the outside of its side wall a row of teeth and a drive cap which has on the inside of its drive wall a row of teeth and is fitted upon the closure cap. The two caps are dimensioned relative to each other so that the drive cap in a lowered or inactive position relative to the closure cap can be rotated and is axially displaceable relative to the screw cap so that it can be lifted into a raised or active position. In the latter position, the two rows of teeth are in rotation transmitting engagement whereby turning of the drive cap causes turning of the closure cap so as to screw the same off or on. The drive cap will drop into its inactive position by the force of gravity unless held in the active position. Hence, a person who wants to screw off or on the screw cap must perform several coordinated movements, namely, lift the drive cap, hold the same in the lifted position and turn the drive cap.

[0016] U.S. Pat. No. 3,685,676, entitled DOUBLE SHELL CHILD-PROOF BOTTLE CAP and issued to Gach, et al. on Aug. 22, 1972, discloses a child-proof screw on cap of the double shell type for a medicine bottle or the like. The cap has an inner threaded shell which fits the bottle neck and an outer shell which telescopingly overlies and encloses the inner shell when in safety position. The two shells are connected together by an axial pivot and are relatively rotatable. The outer shell has a top and a skirt and a deformable web connecting the top and skirt whereby the skirt can be moved axially to expose at least part of the outer wall of the inner shell for grasping by the fingers of a user in order to unscrew the inner shell off of the bottle. Cooperating one-way drive ratchet means are formed on mating portions of the two shells to provide for screwing the cap onto the bottle by rotating the outer shell.

[0017] U.S. Pat. No. 7,111,746, entitled SHELLABLE CHILD RESISTANT CLOSURE CONTAINER WITH POSITIVE LOCK MECHANISM and issued to Miciele, et al. on Sep. 26, 2006, discloses a shellable, positively lockable, child resistant closure and container that includes a pair of nested inner and outer caps designed to be purposefully shellable for use in its non-child resistant mode. The inner cap is coaxially positioned and nested within the outer cap such that a row of angular abutments of the inner cap engage a row of angular abutments of the outer cap upon rotation of the outer cap in a closing direction, and upon rotation of the outer cap in an opening direction, without a concomitant axial force, the respective angular abutments cam over and past each other to prevent rotation of the inner cap. Additionally, the inner cap contains a positive locking device for engagement with a complementary locking device on the neck of the container.

[0018] United States Patent Application Publication No. 2010/0102020, entitled SCREW CAP, CONTAINER BODY AND CONTAINER by Sebille, et al. on Apr. 29, 2010, discloses a screw cap capable of being screwed onto the neck of a container body, the screw cap comprising a substantially cylindrical screw section comprising a screw thread on its inner face, at least one tamper evidence member for indicating an initial opening of the screw cap, and a desiccant chamber located radially inwardly to the screw section, wherein the screw section is radially resilient.

[0019] U.S. Pat. No. 7,108,145, entitled REVERSIBLE CHILD RESISTANT CAP AND COMBINATION OF A CONTAINER AND A REVERSIBLE CHILD RESISTANT CAP and issued to Niceli, et al. on Sep. 19, 2006, discloses a reversible child resistant cap and a closure system having two positions, the first being a child resistant position and the other being a non-child resistant position. The cap has a...
closure plane, a circumferential outer skirt for engaging a container, and a circumferential resilient depending inner member.

[0020] United States Patent Application Publication No. 2009/0255896, entitled ROTATE, SQUEEZE AND LIFT CHILD RESISTANT SAFETY CAP by DeJonge on Oct. 15, 2009, discloses a squeeze and lift child resistant safety closure for attachment to a container having a conventional container closure on its top that includes: an inner member for attachment to either the container or its closure, the inner member having an outer member interlocking component, being one of a circular track and a circular rail, the circular track having inside and outside ledges with a track space between the inside and outside ledges, the track space having a predetermined track space width, the circular rail has inside and outside protrusions adapted to ride inside the track space and under the ledges, the protrusions having widths less than the track space width and greater than one half the track space width. An outer member or closure has a circular bottom that is semi-flexible, and at its circular bottom, having the other of the one of a circular track and a circular rail. When the inner member is attached to a container under its conventional closure and the inner member and the outer member are interconnected, access to the convention closure is denied. However, if a user squeezes the outer member at the squeeze indicia to flex the outer member from circular to oval, the outer member can be removed to expose the conventional container closure for normal opening.

[0021] U.S. Pat. No. 5,462,182, entitled SCREWS-ON CHILD RESISTANT CONSUMER-FRIENDLY CLOSURE and issued to Opreasco on Oct. 31, 1995, discloses a child resistant closure or cap for use on a container having a threaded, shouldered neck. Complementary locking means on the cap shoulder and a resilient release tab are provided. In one embodiment the cap includes an internally threaded cylindrically-shaped skirt having a radially extending flange portion at a bottom edge. The container shoulder has a recess formed therein and is adapted to be adjacent the cap flange portion when the cap is fully threaded onto the container neck. A downwardly extending protrusion is formed on a bottom surface of the flange portion and cooperatively engages the recess when the cap is fully threaded onto the container neck to prevent rotational removal of the cap. The protrusion is located on the resilient release tab which is formed by a circumferential slit and a perpendicular slit, whereby the release tab is upwardly or axially deflectable to disengage the protrusion from the recess and permit rotational removal of the cap. In another embodiment, the cap has a lower edge in which a release tab is arranged to be operated radially for engagement and release.

[0022] U.S. Pat. No. 5,169,033, entitled CONTAINER-CLOSURE ASSEMBLY INCLUDING A SCREW-CAP HAVING ANTI-BACKOFF TEETH ON ITS THREADS and issued to Shay on Dec. 8, 1992, discloses a container-closure assembly that comprises a container molded of relatively soft plastic and a closure cap molded of relatively hard plastic and having a top wall and a continuous side wall. Threads are formed on both the finish of the container and inward on the side wall of the cap. The threads on the cap comprise three threaded segments spaced about the inner circumference of the side wall. The segments include an inward upwardly sloping rib, the upper surface of which is formed with a plurality of wedge-shaped teeth. In use, the closure is screwed on to the top of the container finish and the teeth dig onto the underside of the threads on the finish causing the instantaneous elastic deformation of the plastic of the finish to anchor the cap against removal.

[0023] U.S. Pat. No. 5,082,130, entitled TWIST TUBE LIFT CHILD PROOF CAP AND CONTAINER and issued to Weinstein on Jan. 21, 1992, discloses a child resistance container and lid which utilizes a semi-flexible ring. The snap lid is substantially set into the top of the container and this lid has one component of either an extended lift member or an indented lift guide. The ring has the other component of either the extended lift member or the indented lift guide. When the ring is rotated, the snap lid cannot be opened. The snap lid can be opened only when the ring is simultaneously squeezed and rotated. In an alternative embodiment, both components extend outwardly rather than one extending outwardly and one indented. They have geometric configurations so that one first slides past the other and then, in their reverse motion, one lifts the other so as to lift up a lid during operation.

[0024] U.S. Pat. No. 5,165,559, entitled CHILD RESISTANT CLOSURE AND PACKAGE and issued to Kusz on Nov. 24, 1992, discloses a child resistant closure that is adapted to be used with a container to provide a child resistant package comprising a closure having a base wall and a peripheral skirt with internal threads adapted to engage complementary threads on the container. The closure is provided with a plurality of circumferentially spaced flexible fins which frictionally engage the apex only of an annular bead on the container to provide resistance to closure back off in order to resist unthreading of the closure from the container. The closure is to be provided with a tab which is engageable with a projection on the container to prevent unthreading of the closure except when the tab is depressed. In another form, a cylindrical surface on the skirt frictionally engages solely the apex of the annular bead on the container. The cylindrical surface may be a continuous surface or a series of closely spaced annular serrations and alternating fine grooves. The closure may also be used without a tab to provide a secondary seal on a conventional threaded closure.

[0025] U.S. Pat. No. 6,814,259, entitled CHILD RESISTANT CLOSURE WITH SAFETY LOCK RING and issued to Foster, et al. on Nov. 9, 2004, discloses a child resistant closure apparatus between a container and a cap comprising a separate safety lock ring. The lock ring is mounted over the container neck and the cap is mounted on the container neck and engages with a pair of lock claps on opposite sides of the lock ring. Finger pads on opposite sides of the lock ring are squeezed and compressed by one hand of the user while the cap is rotated on the container neck by the other hand of the user to separate the cap from the container. The lock ring is designed to be employed with container and cap closure assemblies of at least two different sizes, reducing their manufacturing costs.

[0026] U.S. Pat. No. 5,687,863, entitled SQUEEZE AND TURN CHILD RESISTANT PACKAGE and issued to Kusz on Nov. 18, 1997, discloses a squeeze and turn child resistant package including a container having a finish and a closure having a base wall and an outer peripheral flexible wall depending from the base wall. The wall has an internal thread on the inner surface thereof, the finish has an external thread thereon. The closure has an internal surface with spaced flexible chordal lugs extending circumferentially in the direction of removal of the closure. The container finish has opposed radially extending abutments. Each abutment includes a radial abutting surface. The finish of the container includes an
integral radial projection adjacent the radial abutting surface of the abutment which has a lesser radial extent than the abutment. The radial projection has a chordal surface extending to the intersection of the radial abutting surface on the finish such that the chordal lug on the closure is forced toward the intersection when a closure is rotated in a retrograde direction to remove the closure without flexing the peripheral wall. The finish has stops below the threads engaging a blunt end leading end of the thread on the closure to limit the movement of the closure and orient the closure.

[0027] United States Patent Application Publication No. 2005/0199573, entitled THEREATED CAP PROVIDED WITH TAMPER-EVIDENT BAND by Last on Sep. 15, 2005, discloses a container having a neck, which surrounds an opening in the container, and a plastic collar, which can be screwed onto the neck and has a top side and an underside and an outer circumference. The neck is provided with a first screw thread and the collar is provided with a second screw thread. Beneath the first screw thread, the neck is provided with a blocking rib which projects outwards. On the underside, the collar is provided with a tamper-evident ring, which ring is provided on the inner circumference, with inwardly projecting flexible blocking members, which are distributed around the circumference, in such a manner that when the collar is being screwed onto the neck the flexible blocking members pass over the blocking rib, and when the collar is being unscrewed the blocking rib forms a step for the blocking members, resulting in one or more parts of the collar being broken.

[0028] U.S. Pat. No. 6,205,888, entitled ONE-HANDED CHILDPROOF MEDICINE BOTTLE OPENER and issued to Landani on Mar. 27, 2001, discloses a device which can be used with the palm of one hand to manually remove and replace threaded caps on bottles, particularly childproof caps on medicine bottles having a maximum diameter of approximately five inches. The device comprises a base plate, a top plate having a central opening and being positioned substantially parallel to the base plate, an upright open-ended cylinder connected between the base plate and the top plate, a plurality of flexible flap-like bottle gripping members extending across the upper opening of the cylinder and substantially covering the opening, as well as a gripping mat centrally positioned within the bottom of the cylinder and attached to the upper surface of the base plate. When a bottle is inserted into the cylinder, the flap-like bottle gripping members are forced downwardly and become biased against the outside surface of the bottle to hold it in an essentially upright orientation. The bottle is inserted until its bottom surface contacts the gripping mat. The gripping mat and the flap-like bottle gripping members in combination hold the bottle in a fixed position so that twisting forces applied to the bottle’s cap can remove or replace it. Feet attached to the base plate prevent it from rotating relative to a support surface.

[0029] U.S. Pat. No. 4,366,921, entitled CHILD RESISTANT CLOSURE DEVICE and issued to Kirk, Jr. on Jan. 4, 1983, discloses a child resistant closure for a container having a threaded cylindrical neck. The container neck is provided with a plurality of outwardly extending ratchet-teeth on its exterior surface below the thread. The cap portion of the closure has a central opening in its top surface that receives the base of the article to be attached to the container neck, e.g., a trigger pump. A collar member is received on the lower end of the closure member and is axially movable thereon. The collar member is provided with a plurality of ratchet-teeth adapted to engage the ratchet-teeth on the neck of the container when the collar is in its lower or down position. The cap has spaced apart splines on its skirt which define recesses that receive inwardly directed lugs provided at the top of the collar. The engagement of the lugs and splines permit the collar to move axially on the cap but prevents separate radial movement between the collar and cap.

[0030] U.S. Pat. No. 3,670,685, entitled CHILD-PROOF CAP FOR MEDICINE BOTTLES and issued to Gach on Jul. 25, 1972, discloses a child-proof cap for medicine bottles having an inner threaded closure member and an outer overcap or driver. The closure and driver have co-operating one-way driving means for screwing the closure onto the bottle which are engaged by pushing the driver down, and second co-operating driving means for unscrewing the closure which are engaged by pulling the driver upwardly and squeezing its walls inwardly.

[0031] U.S. Pat. No. 5,638,970, entitled CHILD RESISTANT INDICATOR CAP and issued to Garby, et al. on Jun. 17, 1997, discloses a closure for a container including an indicator mechanism to record the removal of the closure from the container and a child resistant mechanism to resist the removal of the closure from the container by a child. A spring in the indicator mechanism urges the indicator mechanism toward the child resistant mechanism to provide sufficient force to engage the child resistant mechanism for the attachment of the closure to the container, but not sufficient force to engage the child resistant mechanism for the removal of the closure from the container, so that an additional external force must be applied to engage the child resistant mechanism for the removal of the closure from the cap. The additional, external force is also necessary to engage the indicator mechanism, so that the mechanism cannot be inadvertently advanced.

[0032] U.S. Pat. No. 3,817,416, entitled SAFETY CLOSURE CAP FOR CONTAINERS and issued to Costa on Jun. 18, 1974, discloses a safety closure container closure attachable to the neck of a container or to a tubular base secured to the container. The safety closure comprises a screw cap which can be screwed off or on and constitutes the closure proper and a cover cap rotatably fitted upon the screw cap completely overlying the screw cap to prevent direct access to the same. The cover cap is normally biased into a position spaced apart from the screw cap so that rotation of the cover cap has no effect on the screw cap but can be axially depressed into a position in which it is coupled to the screw cap. With the cover cap in this coupling position, rotation of the cover cap causes rotation of the screw cap also thereby permitting opening or closing of the container.

[0033] U.S. Pat. No. 7,000,789, entitled TWO PIECE REVERSIBLE CHILD RESISTANT CLOSURE and issued to Miceli, et al. on Feb. 21, 2006, discloses a reversible child resistant closure system including a closure and container. The closure has a child resistant mode when applied to the container in a first child resistant position and has a non-child resistant mode when applied to the container in a second non-child resistant position. The closure includes an outer cap and an inner cap. The inner cap is coaxially positioned and nested within the outer cap such that a plurality of angular abutment surfaces of the inner cap engage a series of angular abutments of the outer cap upon rotation of the outer cap to rotate the inner cap in a closing direction. However, upon rotation of the outer cap member in an opening direction in the absence of an axial force, the angular abutment surfaces of
the inner cap cam over and past the series of angular abutments of the outer cap, preventing rotation of the inner cap.

[0034] U.S. Pat. No. 3,850,326, entitled SAFETY CLOSURE and issued to Ryles on Nov. 26, 1974, discloses a child proof safety closure for a container, having a portion on the cylindrical surface of the closure which is depressable to allow opening of the closure and yet which is not readily distinguishable from the remainder of the cylindrical surface of the closure member.

[0035] U.S. Pat. No. 7,222,741, entitled TAMPER EVIDENT CAP and issued to Chmela, et al. on May 29, 2007, discloses a tamper evident cover for engaging a container cap or drum bung, which cover has a plurality of locking teeth that snap under and engage a lip of the container cap. A frangible strip permits severing the cover to facilitate removal of the cover, and a series of tabs extend from the locking teeth and bear against the outer edge of the lip of the container cap to prevent any forcible removal of the cover without substantial damage to or destruction of the cover.

[0036] U.S. Pat. No. 3,578,192, entitled TAMPERPROOF CAP FOR RECEPTACLE and issued to Sonne on May 11, 1971, discloses tamperproof receptacles provided with a rotatable cap, the latter having an annular recess for reception of a flexible band that includes a latch and a manual control thereon, said latch cooperating with a triples on the neck of the receptacle to permit either free relative movement of the cap on the receptacle for complete removal or prevent movement thereof depending upon the position of the manual control.

[0037] U.S. Pat. No. 3,944,102, entitled SAFETY SCREW CLOSURE and issued to Grun on Mar. 16, 1976, discloses a safety screw closure for use with a container having an inner screw cap on to the bottom edge of which an elastically expandable securing ring is attached by at least one rupturable bridge member. An outer cap is mounted on the inner cap and slidable axially between a first position remote from the inner cap and second position. A spring is located between the caps to normally urge the outer cap into the first position. The caps are provided with at least one set of cooperating coupling means which are in cooperation in any axial position of the outer cap when the closure is screwed onto the container whereas they are ineffective when rotating the outer cap in the opposite direction and when the outer cap is its first position in which it is not depressed against the spring. The outer cap is dimensioned so that, when in the first position, it extends above the securing ring. The container has a threaded neck for receiving said inner cap and a shoulder having an inclined slide surface adapted to expand the securing ring when said closure is threaded thereon.

[0038] U.S. Pat. No. 4,250,232, entitled BOTTLE WITH CLOSURE CAP and issued to Atkins on Oct. 28, 1980, discloses a bottle with closure cap. In a screw canted bottle, a protuberance cooperates with a notch in a notch-bearing member so that as the cap is screwed on, the protuberance bears on the notch-bearing member and one or both deforms to accommodate the threading movement until the protuberance snaps into the notch to terminate the movement. When screwing the cap off, there is an initial resistance to movement whiles the protuberance and/or notch-bearing member deforms. The protuberance then snaps out of the notch and the cap may be removed.

[0039] U.S. Pat. No. 6,296,130, entitled ANTI BACK OFF SCREW ON CLOSURE and issued to Forsyth, et al. on Oct. 2, 2001, discloses a screw on caps for bottles that have an anti back off feature formed on a hinged tab of the cap engaging dent teeth below the threads on the bottle. The hinge enables the tab to snap into and hold a gripping position while avoiding temporary distortion or creep. The dent teeth are particularly suited for use with blow molded bottles and are capable of restraining a cap within a small angle of a fully tightened position to avoid any significant back off and potential leakage. In one embodiment, the anti back off feature is provided in a child resistant cap while in another embodiment this feature is provided in a simpler continuous thread cap.

[0040] U.S. Pat. No. 7,600,648, entitled BOTTLE CAP WITH COMBINATION LOCK and issued to Hamer on Oct. 13, 2009, discloses a locking cap for a container that has a combination lock built into the top. Two or more thumbwheels with numbers or letters are mounted beneath the top surface of the cap or gung plugs. The thumb wheels have through holes corresponding to the numbers or letters. One or more pins are slidable mounted in the cap. The pins are locked by the thumb wheels unless the through holes are in alignment. The pins either project through holes in the container or abut inwardly, projecting portions with the top of the container to prevent turning of the cap unless the pins are retracted. Combinations of numbers or letters can be preset at manufacture, or selected at or after sale, using plugs to fill selected through holes.

[0041] U.S. Pat. No. 5,320,232, entitled POSITIVE-SEALING BOTTLE CAP and issued to Maguire, et al. on Jun. 14, 1994, discloses a bottle cap device that has a positive sealing arrangement for use with bottles that store gaseous fluid such as soda water, wherein the bottle cap device includes a threaded cap body and a hinged cover or lid that is formed having a sealing semi-spherical structure defined by a depending convex wall that engages a gasket mounted within the cap body when the cover is locked in a close sealed position.

[0042] U.S. Pat. No. 5,183,171, entitled CLOSURE WITH DISPENSING FITMENT AND SCREW-ON CAP and issued to Pherigo on Feb. 2, 1993, discloses a plastic dispensing fitment and a plastic screw-on cap connected in nested relation by an ultrasonic weld. When the cap is initially screwed onto the neck of a jar, the fitment is forced over the neck with a snap fit. When the cap is first unscrewed, the weld breaks to separate the cap from the fitment and enable removal of the cap from the jar while leaving the fitment attached to the jar.

[0043] U.S. Pat. No. 4,103,797, entitled TIGHTLY CLOSED SAFETY CAP AND VIAL and issued to Morris on Aug. 1, 1978, discloses a container or vial for medicines. A reversible internally and externally screw-threaded closure is provided for selective engagement with internal and external screw-threads on the mouth of the container. Wedge sealing rings on the reversible closure force the coating screw-threads of the closure and container into tight compressive engagement in either position of use of the closure so that the container is tightly closed. A group of locking teeth on the skirt of the closure cooperate with a single laterally movable tooth adjacent to the container side wall to lock the closure on the container so that it cannot be separated from the container without complex manipulation, thereby rendering the device child-proof. The movable tooth of the container is supported in spaced relation from the container side wall by a yielding bar carried by two radial support arms joined to the container.

**SUMMARY OF THE INVENTION**

In accordance with the present invention, there is provided a child resistant cap assembly which enables a user
to access the contents of the container using only one hand with minimum manipulation and exertion. While simple and easy to use, the cap assembly presents a formidable challenge to children who may attempt to remove the cap from the container or otherwise access the contents in the container.

The child resistant cap assembly comprises: an outer cap, an inner cap assembly that is difficult to be opened by children and at the same time is simple and easy to use by grownups.

It is an object of the present invention to provide an improved child resistant cap.

It is yet another object of the present invention to create such a cap which would not create difficulties in opening for people who are slightly handicapped or lack total manual dexterity.

It is also an object of the present invention to create an improved child resistant cap unique snap-on cap which is both child proof and easy to use.

BRIEF DESCRIPTION OF THE DRAWINGS

A complete understanding of the present invention may be obtained by reference to the accompanying drawings, when considered in conjunction with the subsequent detailed description, in which:

FIG. 1 is an isometric view of an exemplary embodiment of outer cap according to the present invention;

FIG. 2 is an inner view of an exemplary embodiment of outer cap according to the present invention;

FIG. 3 is a side top view of an exemplary embodiment of inner cap according to the present invention; and

FIG. 4 is an inner view of an exemplary embodiment of inner cap according to the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Accordingly, in one aspect, this invention relates to a child resistant cap assembly which enables a user to access the contents of the container using only one hand with minimum manipulation and exertion. While simple and easy to use, the cap assembly presents a formidable challenge to children who may attempt to remove the cap from the container or otherwise access the contents in the container.

These caps are difficult to open by children. To open the cap one must push the outer cap down and turn. Inner cap has outside extensions designed in relation with outer cap. Outer cap has inside lines. During opening these lines operate with the help of outside extensions of the inner cap. Also the inner cap has provision for fixing a piller proof ring (tamper evident ring), that makes the cap tamper evident.

Clear opening instructions are written on the top of outer cap. This is a simple mechanism to make the cap child resistant (child secure) piller proof caps.

The outer cap has vertical blocks in the inner surface at some distance. The inner cap has the same block on its outer surface.

At the time of locking, the outer cap block and the inner cap block are stuck and, after its locking, are immovable.

The following descriptions are of preferred exemplary embodiments only, and are not intended to limit the scope, applicability, or configuration of the invention in any way. Rather, the following description merely provides a convenient illustration for implementing a preferred embodiment of the invention. For example, various changes may be made to the function and arrangement of elements described in the preferred embodiments without departing from the spirit and scope of the invention as set forth in the appended claims. The present invention is not limited to such designs and is similarly applicable to closures utilizing other means of "child resistance," and cap configurations such as those including more than two caps or those which employ "interlocking" child resistant structures.

FIG. 1 is an isometric view of outer cap 10 according to the present invention. The outer cap 10 has inside lines 12. During opening, these lines 12 operate with the help of outside extensions 16 of an inner cap 14 (FIG. 3).

FIG. 2 is an inner view of an exemplary embodiment of outer cap 10 according to the present invention. The outer cap 10 has vertical blocks 18 in the inner surface at some distance.

FIG. 3 is a side top view of an exemplary embodiment of inner cap 14 according to the present invention. The inner cap 14 has the same block 16 on its outer surface as that of outer cap 10.

FIG. 4 is an inner view of an exemplary embodiment of inner cap 14 according to the present invention. The thread 22 of the inner cap 14 is designed such as to get fixed with the container assembly.

Since other modifications and changes varied to fit particular operating requirements and environments will be apparent to those skilled in the art, the invention is not considered limited to the examples chosen for purposes of disclosure, and covers all changes and modifications which do not constitute departures from the true spirit and scope of this invention.

Having thus described the invention, what is desired to be protected by Letters Patent is presented in the subsequently appended claims.

What is claimed is:

1. A child resistant cap assembly comprising: an outer cap and an inner cap assembly.

2. The child resistant cap assembly in accordance with claim 1, wherein the inner cap is with outside extensions designed in relation with outer cap.

3. The child resistant cap assembly in accordance with claim 1, wherein the outer cap has inside lines.

4. The child resistant cap assembly in accordance with claim 1, wherein the outer cap has provision for fixing of piller proof ring (tamper evident ring).

5. The child resistant cap assembly in accordance with claim 1, wherein the outer cap has vertical blocks in the inner surface at some distance.

6. The child resistant cap assembly in accordance with claim 1, wherein the outer cap has the same block on its outer surface as does outer cap.

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