locking tabs that mate with locking openings or notches that are formed in the housing 200 so as to provide a secure snap-fit attachment. The illustrated casing 200 is a cylindrically shaped structure with a top end 202 and an opposing bottom end 204 that faces and mates with the base 150. Since the casing 200 is an at least partially hollow member, when the casing 200 is attached to the based 150, one or hollow interior spaces are formed and, as described herein, can contain and hold a number of components of the device 100 as described herein. The casing 200 is also defined by a side wall 206 that can be in the form of an upstanding circumferential wall.

The side wall 206 includes a recessed portion or track 220. In other words, the recessed portion 220 is set back relative to the other portions of the side wall 206 so as to define an arcuate shaped track that receives and limits the degree of lateral movement of another part as described below. Within the recessed portion 220 of the side wall 206, a medication (pill) dispensing opening (window) 215 (Fig. 3) is formed. The window 215 is open to the hollow interior of the casing 200.

The top end 202 is defined by a circumferential fastening feature 203, such as threads, that are formed along a circumferential band structure at the top end 202. At the top end 202, a top surface 230 is defined. The top surface 230 can be an at least substantially planar surface; however, it includes a number of features formed therein. More specifically, the top surface 230 includes a first opening or recess 235 that is generally centrally located. In the illustrated embodiment, the recess 235 is a hexagonal shaped recess; however, it will be appreciated that the recess 235 can have any number of other shapes that are designed to restrict movement of the object that is received therein (e.g., the recess 235 is a multi-sided recess that prevents free rotation of the object received therein). Proximate the recess 235, a shaped slot 231 is formed in the top surface 230. In the illustrated, the shaped slot 231 has a linear portion with a curved portion at one end. The curved end portion is closest to the recess 235. The recess 235 and slot -231 ~~237~~ are not through holes and therefore, have floors.

The recessed portion or track 220 is recessed a sufficient distance such that a slot is formed between the recessed track 220 and the threads 203 that extend across the top edge of the recessed track 220.

The top portion 310 is substantially hollow and in particular, the top portion 310 includes a main through opening or slot 311 and a first arcuate shaped opening or slot 313 and a second arcuate shaped opening or slot 315, both of which are located proximate and extending along a length of the peripheral edge of the top portion 310. The slots 313, 315 are through openings. The first arcuate shaped slot 313 is intended for placement over the first recessed track 240 and the second arcuate shaped slot 315 is for placement over the second recessed track 250 ~~240~~.

The disk-shaped top portion 310 has a complementary shape relative to the casing and therefore, can be a circular shaped disk that rests on the top surface 230 of the casing 200. The diameter of the disk-shaped top portion 310 is selected so as to not extend over the threads 203 at the top end 202. In addition, the door portion 320 is received within the opening (arcuate slot) formed between the recessed track 220 and the threads 203 that extend across the top edge of the recessed track 220. In this manner, the disk-shaped top portion 310 can seat against and be supported by the top surface 230 while the door portion 320 is disposed within the recessed track 220 in such a way that the disk-shaped top portion 310 can freely rotate on the top surface 230 and the door portion 320 can slidingly travel within the recessed track 220.

A thumb grip member 305 is attached to the door portion 320 to provide a rough surface that is configured to receive a thumb or finger of the patient or individual for laterally sliding the door portion 320 within the recessed track 220. The thumb grip member 305 attaches to the door portion 320 using traditional techniques, such as a mechanical attachment, e.g., a snap fit.

The recessed track 220 has a medication loading position at one end and medication release position at the opposite end with the center position being idle. The door portion 320 is sized and designed to cover the pill dispensing window 215 except for when the door member 300 is permitted to move into the medication release position as described herein. In the medication loading position, the door portion 320 is disposed over the medication dispensing window 215 and therefore, the medication is prevented from being dispensed. Conversely, when the door portion 320 is in the medication release position, the door portion 320 is offset from the medication dispensing window 215 and therefore, the medication is

At the second end 416, the central shaft 412 includes a coupling section 415. In particular, the coupling section 415 has a shape different than the rest of the length of the central shaft 412. The coupling section 415 is configured to seat within the recess 235 that is formed in the top surface 230. In the illustrated embodiment, the coupling section 415 has a hexagonal shape that is received within the complementary hexagonal shaped recess 235. A frictional fit is formed between the coupling section 415 and the top surface 230 resulting in the pill track member 410 standing upright.

The member 450 includes a tab portion 451 that is received within the hollow interior of the central shaft 412 and extends through the vertical slot 421. By disposing the tab portion 451 within the interior of the central shaft 412 by passing through the vertical slot 421, the member 450 is limited to vertical movement along the height of the central shaft 412. The vertical slot 421 is formed along the central shaft 412 in a region between the helical ramp portions of the fixed ramp 420 so as not to interfere with the formation of the fixed ramp 420.

The member 450 is biased within the interior of the central shaft 412 and more specifically, a biasing member (not shown) is disposed within the hollow interior of the central shaft 412. The biasing member, such as a spring, has a first end that mates with an end cap 415 that is disposed at the first end 414 so as to close off the open end of the hollow central shaft 412 and a second end that mates with the tab portion 451. The biasing member ~~459~~ is constructed so that it applies a biasing force against the member 450 so as to position the member 450 in a down position. The down position is thus the rest position of the member 450. In the down position, the member 450 is disposed closest to the underlying portion of the fixed ramp 420. In other words, in the down position, the space between the ramp shaped body of the member 450 and the underlying ramp portion of the fixed ramp 420 is at a minimum (relative to the permitted degree of travel). This distance is set at a minimum for smaller sized pills.

As described herein, the construction of the insert 500 dictates the position of the movable member 450. In particular, since the member 450 is coupled directly to the insert 500, the insertion of the insert 500 into the casing 200 and the height of the insert 500 results in the movable member 450 being positioned along the central shaft 412. As described

feature at the first end 502 can be a male/female member and in the illustrated embodiment, the fastening feature is a male projection that is received into the U-shaped slot of the fastening feature 458, thereby forming a mechanical attachment (e.g., friction fit) between the parts. The movable member 450 is thus coupled to both the central shaft 412 and the insert 500 in such as way that vertical movement thereof is permitted.

The lower portion 510 that is defined between the first side wall 507 and the second side wall 509 includes a U-shaped slot 515 that is defined between the side walls 507, 509 and a rear wall 505 ~~511~~. The U-shaped slot 515 is thus open along the front of the insert 500 and as described herein is in registration with the window 215 formed in the side wall of the casing 200. The U-shaped slot 515 is thus part of the pill dispensing exit. The curvature of the movable member 450 and the fixed ramp 420 directs pills toward the U-shaped slot 515. As shown, pills travel down the helical shaped fixed ramp 420 and drop into the U-shaped slot 515. As described herein, while a plurality of pills can be disposed within the vertical U-shaped slot 515, only a single pill is dispensed at one time. The curved nature of the ramp 420 and the location and orientation of the U-shaped slot 515 cause the pills to slide down the ramp 420 while lying on their bottom (or top) surfaces, the pills assume a vertical orientation as they drop into the U-shaped slot 515 (i.e., they lie on their sides in stacked orientation). The U-shaped slot 515 is sized and shaped so that the pills cannot change their positions after entering the U-shaped slot 515 from the ramp 420. In other words, the pills cannot assume a more horizontal shape.

The second side wall 509 includes a notch or opening 511 that is open along the top edge thereof.

The insert 500 includes a base portion 525 at its bottom end that is intended to securely attach to the casing 200 and also to close off the notch 154 of the base 150. The base portion 525 includes a fastening element 527 that in the illustrated embodiment is in the form of a projection (male feature) that is received within the complementary opening 209 (Fig. 5) of the casing 200. For example, a mechanical attachment (i.e., friction fit) can be formed between the base portion 525 and the casing 200. The base portion 525 thus has an arcuate peripheral edge that generally completes the circumference of the base 150. The

attachment between the insert 500 and the base 150 can be of a type which prevents or makes it very difficult to remove the insert 500 from the device 100.

The insert 500 is introduced into the hollow interior of the casing 200 by being passed through the notch 154 and the through opening 237 and then into contact with the movable member 450. In other words, the fixed ramp structure 320 is oriented so as to not interfere with the reception of the insert 500 into the hollow interior of the device 100. The first end 502 of the insert 500 does come into contact with the fastening feature 458 so as to provide a secure attachment.

It will be appreciated that the height of the insert 500 directly controls the positioning of the pill adjusting track member 450 due to the coupling therebetween. Thus, if the insert 500 has a greater height, the member 450 is pushed further upward (against the force of the biasing force), thereby creating a larger space between the underside of the member 450 and the underlying ramp 420 to accommodate larger sized pills.

As shown in the figures, the insert 500 passes through the main slot 311 formed in the top portion 310 of the door member 300. The insert 500 is stationary; however, the shape of the main slot 311is configured to permit a degree of rotation of the top portion 310 above the casing 200 before interference between the door member 300 and the insert 500.

The device 100 also includes a controllable pill release mechanism ~~600~~. The pill release mechanism ~~600~~ includes both mechanical and electronic features and in particular, the pill release mechanism ~~600~~ includes an actuator 700 (Fig. 3) that permits controlled movement of the door member 300 relative to the casing 200 so as to open the drug dispensing window (opening) under select conditions to allow dispensing of a pill. The electronic components further include a power source 750 (Fig. 5) that can be in the form of a battery that is stored within the hollow interior of the casing 200 and a processor 760 (Fig. 5), such as a printed circuit board, that is electrically connected to the power source 750 and the actuator 700 for powering and controlling operation of the actuator 700.

The actuator 700 can be in the form of a solenoid that has a movable pin/projection 702 that is vertically oriented. The actuator 700 is arranged in an upstanding member with the pin 702 being located at the top of the actuator 700 such that the pin 702 moves vertically

between an extended position and a retracted position. The actuator 700 is disposed within the recessed section 260 of a casing 200.

The actuator 700 is positioned such that the top portion 310 of the door member 300 is disposed above the actuator 700. However, when the pin 702 is the extended position, the pin 702 assumes a position higher than the top surface of the top portion 310 when the pin 702 is received within the main opening 311 formed in the top portion 310. As described herein, when the pin 702 is received within the main opening 311 when the pin 702 is in the extended position. As described herein, this extended position of the pin 702 prevents free rotation of the door member 310 relative to the casing 200.

The device 100 also includes a switch 800 that is disposed within the second through opening 251 and therefore is open and in communication with the door member 300 is select positions of the top portion 310. The switch 800 can be in the form of a rocker switch that includes a pivotable portion 802 (Fig. 6. The pivotable portion faces the top portion 310 and movement of the top portion 310 over the casing 200 causes the switch 800 to move between open and closed positions. In particular, when the main opening 311 of the top portion 310 lies above the rocket switch 800, the pivotable portion thereof is free to assume the open position since the top portion 310 does not provide interference. As the door member 300 is operated, as described below for loading and dispensing the medication, the top portion 310 is rotated into contact with the pivotable portion 802 of the switch 800 and causes a closing thereof. When the pivotable portion 802 is compressed and the switch assumes a closed position, the switch 800 sends a control signal to the processor 760.

The controllable pill release mechanism ~~600~~ also includes a plunger member 900 that is designed to control the loading and dispensing of the pills through the pill dispensing window 215. The plunger member 900 is an arcuate shaped member that is disposed and has a degree of travel within the first recessed track 240. The plunger member 900 has a first end 902 and an opposing second end 904. The plunger member 900 also includes a top surface 905 that includes protrusion or tab 910 extending upwardly from the top surface 905. The plunger member 900 also includes a bottom portion that is received within the center portion 242, while the remaining portion is disposed on the landing 244. The arcuate shape of the

plunger member 900 is complementary to the arcuate shape of the first recessed track 240 and therefore can move therein. The second end 904 can be a flat end.

The plunger member 900 is thus coupled to the casing 200 by having a portion captured within the center portion 242 and within the first recessed channel 240 and to the top portion 310 of the door member 300 as a result of the tab 910 being received within the first arcuate shaped slot 313 of the top portion 310. The plunger member 900 is biased such that it normally assumes a closed position in which the second end 904 of the plunger member 900 extends into the U-shaped slot 515 into either contact with one pill or against the first side wall (whereby the plunger member 900 extends completely across the U-shaped slot 515) due to the first recessed channel 240 being freely open to the insert 500. The plunger member 900 is biased using a biasing member, such as a spring that can be captured within the center portion 242. The biasing member thus biases the plunger member 900 to the closed position in that the plunger member 900 is driven toward the insert 500 and into the U-shaped 515 for controlling movement of the pills.

Besides the tab 910, the plunger member 900 is disposed below the top portion 310 of the door member 300. The plunger member 900 is thus a passive member that is captured by the door member 300 by means of the tab 910 being contained in the slot 313 and therefore, rotation of the door member 300 causes movement of the plunger member 900 within the first recessed channel 240. When the door member 300 is moved counterclockwise, the movement of the door member 300 causes the tab 910 to move counterclockwise, thereby causing the biasing member (to store energy). When the user releases the door member 300, the biasing member releases its energy and the plunger member 900 is driven towards the insert 500.

The controllable pill release mechanism ~~600~~ also includes a door return member 1000. The door return member 1000 has an arcuate shape member that is disposed and has a degree of travel within the second recessed track 250. The door return member 1000 has a first end and an opposing second end. The door return member 1000 also includes a top surface ~~1005~~ that includes protrusion or tab 1010 extending upwardly from the top surface ~~1005~~. The door return member 1000 also includes a bottom portion that is received within the center portion 252, while the remaining portion is disposed on the landing 254. The arcuate shape of the

WHAT IS CLAIMED IS:

1. A medicine container cap (100) for use with a bottle (110) containing a plurality of pills comprising:

a casing (200) having a pill dispensing opening (215), the casing (200) being configured to securely attach to the bottle (110) and represent a cap structure that closes off the bottle (110);

a door member (300) coupled to the casing (200) and movable between at least an idle position and a dispensing position in which the pill dispensing opening (215) is open and one pill is released; and

a pill dispensing track assembly (400) that is removably coupled to the casing (200) and includes a pill ramp (410) for delivering pills to the pill dispensing opening (215) and an insert (500) that includes a pill dispenser slot (515) that receives pills from the pill ramp (410) and is open to the pill dispensing opening (215), the pill ramp (410) being coupled to the casing (200) and for insertion into the bottle (110) to contact pills therein, the insert (500) being detachably from the pill ramp (410) and insertable through an opening (237) in the casing (200) for being attached to the pill ramp (410);

wherein the pill ramp (410) includes a vertically adjustable member (450) that modifies a characteristic of the pill ramp (410) based on at least one characteristic of the insert (500) that is selected and inserted through the opening (237) in the casing (200) and coupled to the pill ramp (410).

2. The container cap of claim 1, further including a base to which the casing is coupled, the base including a notch formed along a periphery thereof for receiving the insert, the notch being axially aligned with the opening formed in the casing.

3. The container cap of claim 1, wherein the casing includes a top surface and a side wall with a recessed track formed therein and the door member includes a top wall that seats against the top surface of the casing and is rotatable thereon and a door portion that is received within the recessed track and can laterally move therein, wherein in the idle position, the door portion covers the pill dispensing opening and prevents pills from being dispensed.

4. The container cap of claim 3, wherein the pill ramp is coupled to the top surface of the casing.

15. The container cap of claim 1, further including an emergency tab along an interface between the bottle and the casing for preventing free access to the bottle for removal of the bottle from the casing, the emergency tab being configured such that in an emergency, the emergency tab can be removed to allow separation of the bottle from the casing.

16. The container cap of claim 1, wherein the characteristics of the pill ramp comprise a height of at least a tunnel portion defined between the adjustable member and the pill ramp proximate the pill dispensing slot, a height of the tunnel controlling an orientation in which the pills can slide along pill ramp into the pill dispensing slot and the characteristics of the insert comprise a height thereof.

17. The container cap of claim 1, further including a pill sensor that is disposed at least partially within the pill dispensing slot for determining a presence of one pill within the pill dispensing slot.

18. The container cap of claim 1, wherein the processor is configured such that the door member can only move into the dispensing position if the following criteria are satisfied: (1) it is time for a pill to be dispensed and (2) a pill is sensed within the pill dispensing slot.

19. The container cap of claim 9, wherein the top wall of the door member includes a main through opening through which the insert and pill ramp extend through, the main through opening having a shaped end portion into which the projection of the actuator extends in the extended position, thereby limiting rotation of the door member relative to the casing and preventing movement of the door member to the dispensing position, the shaped end portion being constructed such that the door member can move to the load position while the projection remains in the extended position.

20. A medicine container cap (100) for use with a bottle (110) containing a plurality of pills comprising:

a casing (200) having a pill dispensing opening (215), the casing (200) being configured to securely attach to the bottle (110) and represents a cap structure that closes off the bottle (110);

a door member (300) coupled to the casing (200) and movable between an idle position and a dispensing position in which the pill dispensing opening (215) is open and one pill is released; and

a pill dispensing track assembly (400) that is removably coupled to the casing (200) and includes:

a pill ramp (410) for delivering pills to the pill dispensing opening (215), the pill ramp(410) including a central shaft and a ramp extending about the central shaft;

an insert (500) that includes a pill dispenser slot (515) that receives pills from the pill ramp (410) and is open to the pill dispensing opening (237), the pill ramp (410) being coupled to the casing (200) and for insertion into the bottle (110) to contact pills therein, the insert (500) being detachably from the pill ramp (410) and insertable through an opening (237) in the casing (200) for being attached to the pill ramp (410) resulting in the pill ramp (410) being in registration with the pill dispensing slot (515); and

a vertically adjustable member (450) that has a first portion attached to the central shaft (412) and a second portion that is attached to the insert (500), the vertically adjustable member (450) being disposed between ramp portions (420) of the pill ramp (410), the vertically adjustable member (450) including an underside surface that faces an underlying ramp portion (420) with a pill space being defined between the adjustable member (450) and the underlying ramp portion (420), wherein the vertically adjustable member (450) is adjustable along a vertical axis so as to alter dimensions of the pill space;

wherein there is a direct correspondence between a height of the insert (500) and the position of the vertically adjustable member (450) along the central shaft (412).

21. A medicine container cap (100) for use with a bottle (110) containing a plurality of pills comprising:

a casing (200) having a pill dispensing opening (215), the casing (200) being configured to securely attach to the bottle (110) and represents a cap structure that closes off the bottle (100);

a door member (300) coupled to the casing (200) and movable between an idle position and a dispensing position in which the pill dispensing opening (215) is open and one pill is released; and

a pill dispensing track assembly (400) that is removably coupled to the casing (200) and includes:

a pill ramp (410) for delivering pills to the pill dispensing opening (215), the pill ramp (410) including a central shaft (412) with the pill ramp extending about the central shaft (412);

an insert (500) that includes a pill dispenser slot (515) that receives pills from the pill ramp (410) and is open to the pill dispensing opening (215), the pill ramp (410) being coupled to the casing and for insertion into the bottle (110) to contact pills therein, the insert (500) being detachable ~~detachably~~ from the pill ramp (410) and insertable through an opening (237) in the casing (200) for being attached to the pill ramp (410) resulting in the pill ramp (410) being in registration with the pill dispensing slot (515); and

a vertically adjustable member (450) that has a first portion coupled to the central shaft (412) in such a way that the vertically adjustable member (450) can travel vertically along the central shaft (412) and a second portion that is attached to the insert (500), the vertically adjustable member (450) being disposed between ramp sections (420) of the pill ramp (410), the vertically adjustable member (450) including an underside surface that faces an underlying ramp portion (420) with a pill space being defined between the adjustable member (450) and the underlying ramp portion (420), wherein the vertically adjustable member (450) is adjustable along a vertical axis so as to alter dimensions of the pill space and only permit pills having a predetermined size to travel to the pill dispensing slot (515);

wherein there is a direct correspondence between a height of the insert (500) and the position of the vertically adjustable member (450) along the central shaft (412).

22. The container cap of claim 21, further including an actuator to control movement of the door member relative to the casing and to permit the door member to selectively move into the pill dispensing position.

23. The container cap of claim 22, wherein the actuator comprises a cam assembly that is disposed within the casing and includes a biased pin that extends and is biased upwardly from a main body of the cam assembly and is received within a slot formed in an upper wall of the door member, the pin being movable within a vertical bore formed in the main body, the main body including a notch that is formed in the main body, the notch forming an opening into the vertical bore, wherein the cam assembly further includes a driven cam member that is sized to

be received within the notch for locking the pin in an extended position so as to create interference between the pin and the door member and prevent rotation of the door member relative to the casing, thereby preventing the door member from moving to the pill dispensing position.

24. The container cap of claim 23, wherein the cam member is controllably driven by a motor that is supported by the main body and is operatively connected to a controller that only permits the cam member to be disposed outside of the notch when prescribed conditions exist that indicate it is an appropriate time to dispense one pill.

25. The container cap of claim 23, wherein the pin is normally spring biased to the extended position and an edge of the upper wall of the door member that defines the slot has a bevel that engages the pin and drives the pin downwardly within the vertical bore to a retracted position when the cam member is displaced from the notch.

26. The container cap of claim 23, wherein the center shaft of the pill ramp is frictionally coupled to the casing by being frictionally held within a non-circular shaped opening formed in the casing.

27. The container cap of claim 23, further including a pill sensor for detecting whether one pill is within the pill dispenser slot of the insert.

28. A cap (100) for use with a bottle (110) containing a plurality of pills comprising:
a casing (200) having a pill dispensing opening (215) and configured to securely attach to the bottle (110) and represent a cap structure that closes off the bottle (110);
a pill dispensing track assembly (400) that is removably coupled to the casing (200) and includes an adjustable pill ramp (410) for delivering pills to a pill dispenser slot (515) from which the pills are dispensed to a user through the pill dispensing opening (215), wherein in a pill dispensing position, the pill ramp (410) is configured such

that the pills are ordered and slide along the pill ramp (410) to the pill dispenser slot (515) and the pills enter and are held within the pill dispensing slot (515); and a pill dispenser mechanism (900) that is arranged relative to the pill dispenser slot (515) and configured such that only one pill is dispensed at a time from the pill dispenser slot (515).

29. The cap of claim 28, wherein the pill dispensing mechanism comprises a biased element that has a free end that is selectively received within the pill dispenser slot to prevent a next-to-be dispensed pill from moving within the pill dispenser slot until a select event occurs.

30. The cap of claim 29, wherein the biased element comprises a spring biased plunger that has an arcuate shape and travels within a track and the free end comprises an end of the plunger that is biased such that the free end is selectively received within the pill dispenser slot when the one pill is being dispensed.

31. The cap of claim 29, further includes a door member movably coupled to the casing and movable between an open position and a closed position, wherein the select event comprises dispensing of the one pill that is disposed in a bottom location of the pill dispenser slot, whereby dispensing of the one pill creates a space for the next-to-be dispensed pill which is permitted to move into the space only once the door member moves to the closed position.

32. The cap of claim 28, further comprising a pill sensor that is configured to detect a presence of the one pill that is within a pill dispensing location of the pill dispenser slot and detect the dispensing of the one pill.

33. The cap of claim 28, wherein the adjustable pill ramp includes a fixed ramp part whose position does not change and a movable ramp part that is coupled to a biasing member so as to permit the movable ramp part to move between the plurality of different pill dispensing positions.