

[54] SAFETY CLOSURE

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[52] U.S. Cl. 222/153, 222/402.11

[51] Int. Cl. B65d 83/14

[58] Field of Search. 222/153, 182, 402.11, 222/402.13

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Assistant Examiner—Thomas E. Kocovsky

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[57] ABSTRACT

An aerosol valve safety-lock device for an aerosol dispenser including a valve actuating means comprising a button actuator and valve stem having a plurality of locking legs formed thereon to operatively engage corresponding locking ledges formed within the dispenser to prevent vertical movement of the valve actuating means relative to the dispenser when in the "locked" position. The device further includes arming means to move the locking legs out of operative engagement with the locking ledges to permit vertical movement of the valve actuating means relative to the dispenser to actuate the dispenser.

7 Claims, 31 Drawing Figures

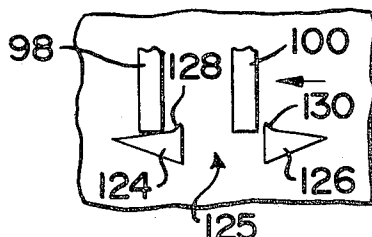


FIG. 1

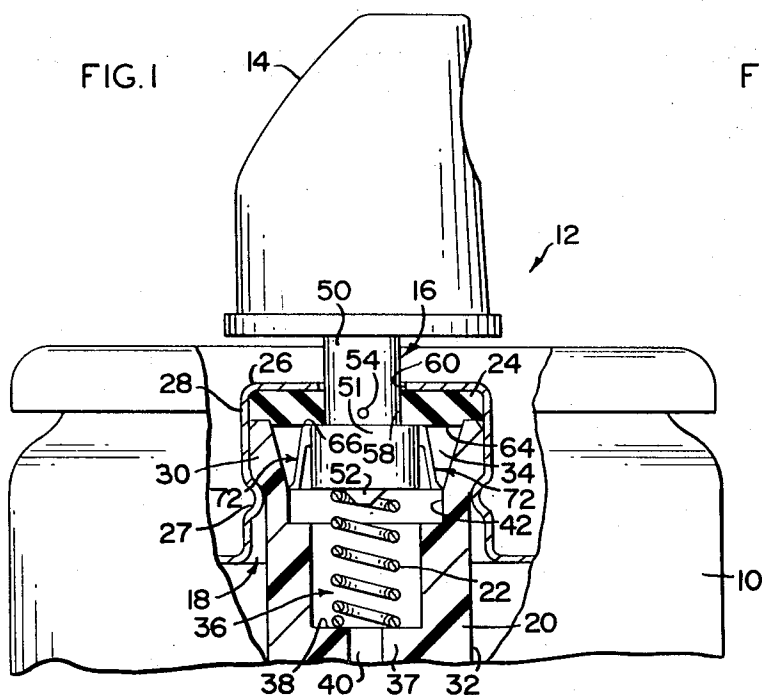


FIG. 2

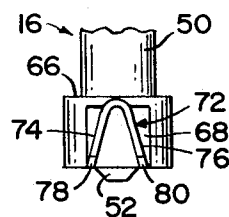
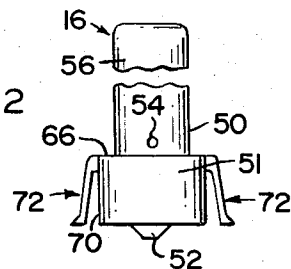


FIG. 3

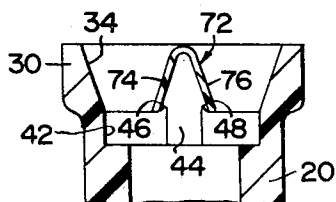


FIG. 4

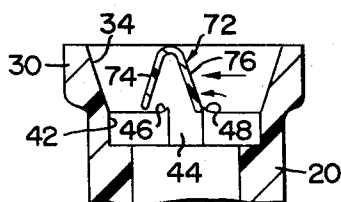


FIG. 5

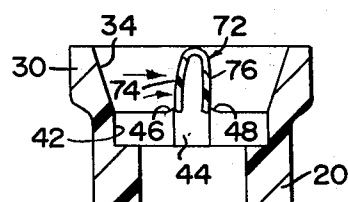


FIG. 6

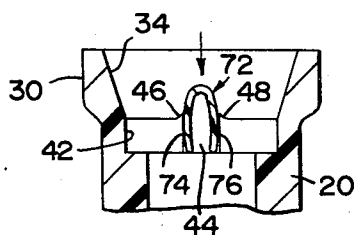


FIG. 7

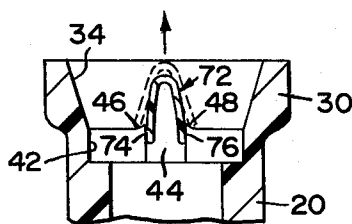
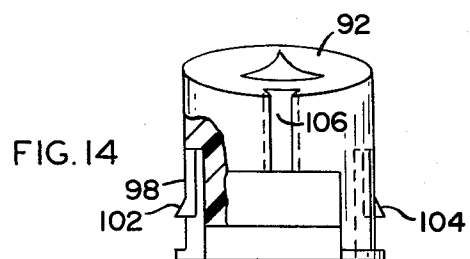
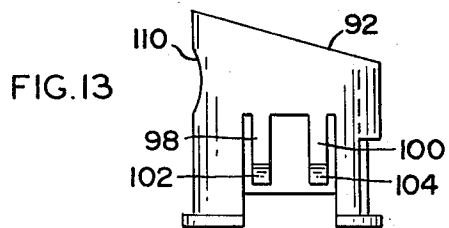
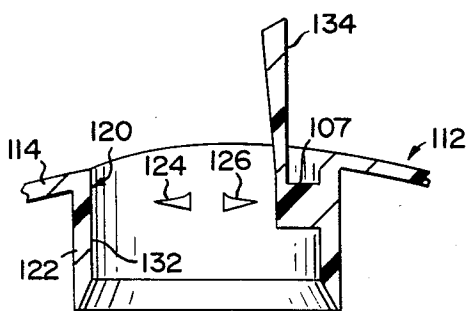
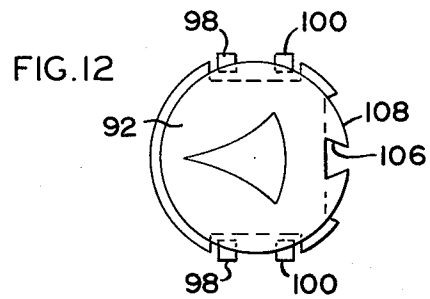
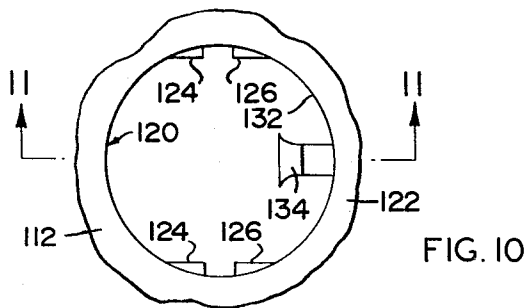
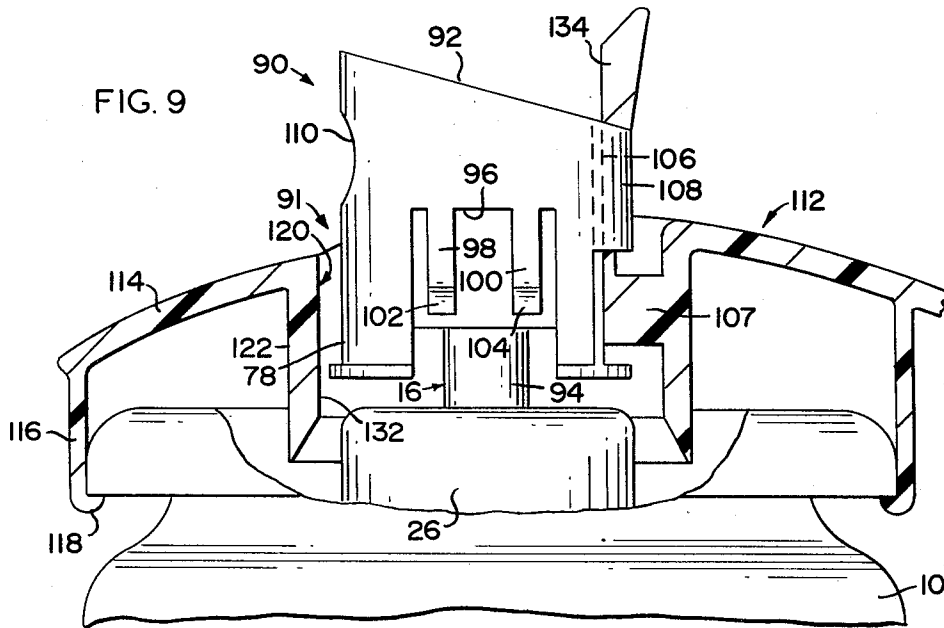


FIG. 8



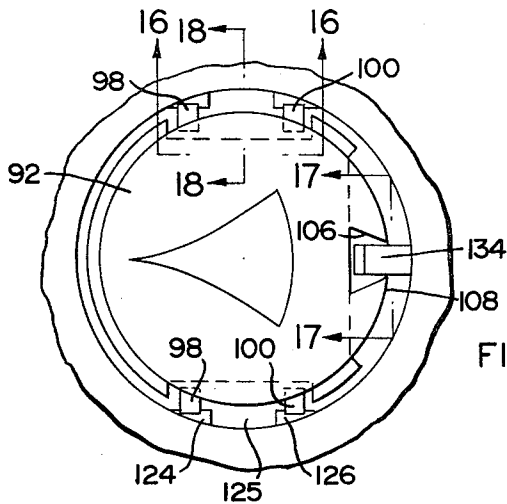


FIG. 15

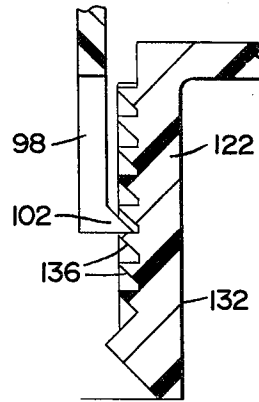


FIG. 19

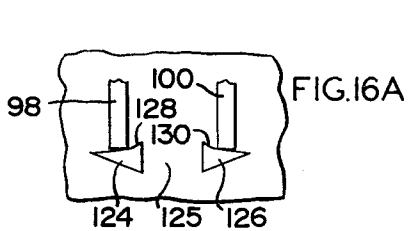


FIG. 16A

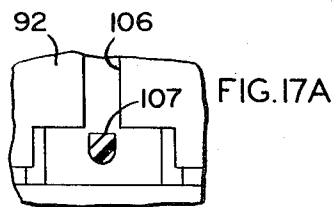


FIG. 17A

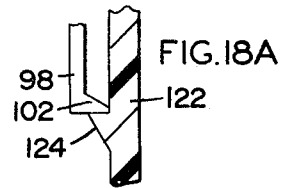


FIG. 18A

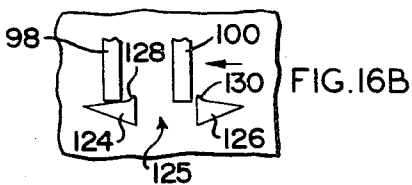


FIG. 16B

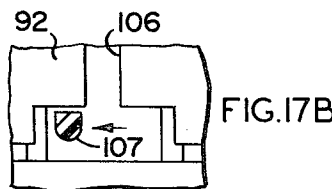


FIG. 17B

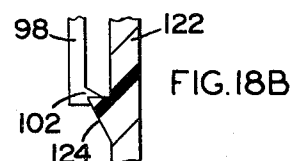


FIG. 18B

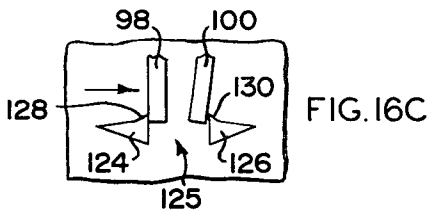


FIG. 16C

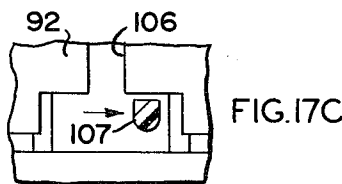


FIG. 17C

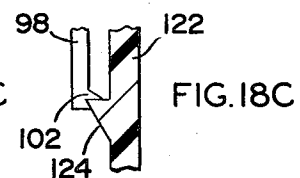


FIG. 18C

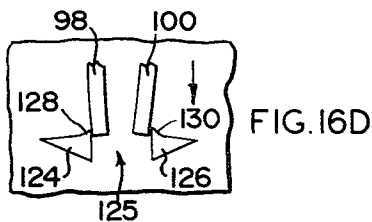


FIG. 16D

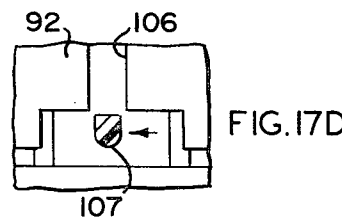


FIG. 17D

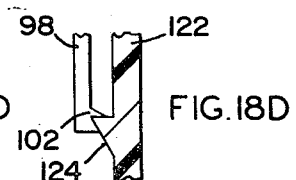


FIG. 18D

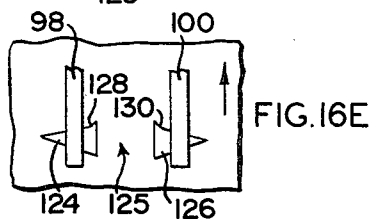


FIG. 16E

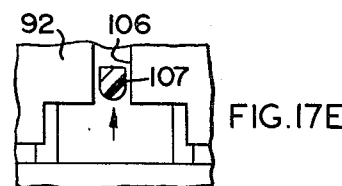


FIG. 17E

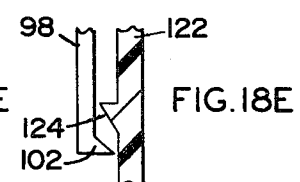


FIG. 18E

SAFETY CLOSURE

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to an aerosol valve safety-lock device for an aerosol dispenser including locking legs and corresponding locking ledges which operatively engage each other to prevent actuation of the dispenser when in the "locked" position.

2. Description of the Prior Art

Since the introduction of aerosol dispensers, there has been a continuing problem of inadvertent actuation of the dispensers. Unless some means to prevent accidental discharge of the aerosol during transportation and storage is provided, the consumer is not assured of purchasing a fully charged aerosol.

Another, more serious, problem is that of young children discharging the aerosol contents. This is particularly critical when the product is a cleaning agent, insecticide or other potentially hazardous matter commonly found in the home.

Numerous attempts have been made to provide tamperproof and childproof dispensers. The earliest and simplest of these is the cup-like overcap configured to detachably attach over the mounting cup and button actuator of the dispenser. Unfortunately, the simplicity of operation allows young children to remove the protective overcap from the dispenser with little effort. In addition the separate overcap may inadvertently be left off the dispenser thereby removing the safety feature.

One of the primary obstacles in developing an effective childproof dispenser has been to design a dispenser which is reasonable simple for an adult to use and still be beyond the capabilities of young children. Many existing tamperproof dispensers include elaborate locking mechanisms which are complex in structure and prohibitively expensive to manufacture. In addition, these mechanisms usually require changes or redesign of the basic dispenser and valve assembly structure thereby increasing production costs.

Thus while numerous attempts have been made to design and manufacture an inexpensive, effective tamperproof/childproof aerosol dispenser, substantial room for development and improvement remains.

SUMMARY OF THE INVENTION

This invention relates to a valve safety-lock structure for an aerosol dispenser. More specifically, the invention comprises a valve actuating means including a button actuator and valve stem having a pair of locking legs which are disposed to operatively engage a corresponding pair of locking ledges formed on the dispenser to prevent vertical movement of the valve actuating means relative to the dispenser when in the "locked" position.

In the preferred embodiment, each locking leg comprises a pair of locking feet extending downward from the lower portion of the valve stem in an inverted substantially V-shaped configuration. Extending outward from the bottom of each locking foot is an arming tip. The locking ledges comprise an annular interrupted ledge formed about the inner periphery of a cavity formed in the valve body. A vertical slot is formed by adjacent ends of the interrupted locking ledges adjacent to the slots.

In an alternative embodiment, each locking leg comprises a pair of locking feet extending downward from

the button actuator in an inverted substantially U-shaped configuration. Extending outward from the bottom of each locking foot is an arming tip. In this embodiment the interrupted locking ledge is formed on the inner periphery of the vertically disposed cylindrical wall of a dispenser overcap. The interrupted ledges include the upwardly projecting arming nubs. The alternative embodiment further includes a vertically disposed detachable tamperproof bar which cooperatively engages a slot formed in the side wall of the button actuator to prevent rotation of the valve actuating means.

In the preferred embodiment, the locking legs prevent vertical movement of the valve actuating means relative to the dispenser by engaging the upper surface of the locking ledges. To arm, the valve actuating means is rotated clockwise then counterclockwise such that the arming tips are rotated within the slot between the locking ledges and retained therein by means of the cooperative engagement of the arming tips and the arming nubs. Thus armed, the valve actuating means may be pressed vertically to actuate the dispenser.

In the alternative embodiment, the tamperproof bar must be detached from the overcap to permit rotation of the valve actuating means. Once the bar is removed, the valve actuating means is rotated clockwise then counterclockwise as previously discussed above to "arm" the dispenser. With the arming tips operatively engaging the arming nubs to retain the arming legs within the vertical slot, the valve actuating means is depressed to dispense product from the dispenser.

This invention accordingly comprises the features of construction, combination of elements, and arrangement of parts which will be exemplified in the construction hereinafter set forth and the scope of the invention will be indicated in the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

For a fuller understanding of the nature of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawings which:

FIG. 1 is a cross-sectional view of the device in combination with an aerosol dispenser.

FIG. 2 is a front view of the valve stem of the present invention with locking legs.

FIG. 3 is a side view of the valve stem of the present invention with locking legs.

FIG. 4 is a partial cross-sectional view of the device in the "locked" position.

FIGS. 5 and 6 are partial cross-sectional view of the "arming" sequence.

FIG. 7 is a partial cross-sectional view of the device in the "actuated" position.

FIG. 8 is a partial cross-sectional view of the device returning to the "locked" position.

FIG. 9 is a cross-sectional view of an alternate embodiment of the safety device in combination with an aerosol dispenser and overcap.

FIG. 10 is a partial top view of the overcap of the alternate embodiment.

FIG. 11 is a partial cross-sectional view of the overcap taken along line 11—11 of FIG. 10.

FIG. 12 is a top view of the button actuator of the alternate embodiment.

FIG. 13 is a side view of the button actuator of the alternate embodiment.

FIG. 14 is a rear view of the button actuator of the alternate embodiment.

FIG. 15 is a partial top view of the button actuator and overcap of the alternate embodiment.

FIG. 16 A through 16 E are cross-sectional views of the "arming" and "actuating" sequence taken along line 16—16 of FIG. 15.

FIG. 17 A through 17 E are cross-sectional view of the "arming" and "actuating" sequence taken along line 17—17 of FIG. 15.

FIG. 18 A through 18 E are cross-sectional views of the "arming" and "actuating" sequence taken along line 18—18 of FIG. 15.

FIG. 19 is a partial cross-sectional view of the locking leg and locking ledge of another alternate embodiment.

Similar reference characters refer to similar parts throughout the several views of the drawings.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 shows, in detail, a complete aerosol dispenser 10 including the aerosol valve safety-lock device of the present invention. The invention includes a valve actuating means 12 comprising a button actuator 14 and a tubular valve stem 16 extending into an aerosol valve 18. In the preferred embodiment, FIG. 1, the invention includes a locking means comprising locking legs formed on the valve actuating means 12 and a locking ledge formed in the dispenser 10 which operatively engage each other as more fully described hereinafter.

The aerosol valve 18 disposed within the dispenser 10 includes a tubular body 20, valve stem biasing means 22 and a sealing ring gasket 24. The aerosol valve 18 is fixed within a valve turret 26 by crimping the side wall 28 about the valve body 20 at 27. The valve body 20 has an enlarged diameter head portion 30 and a reduced diameter tail portion 32 to which a dip tube (not shown) of the type that is generally used can be affixed. The valve body 20 includes a valve stem cavity 34 formed in the head portion 30 to receive a valve stem sealer 51, more fully described hereinafter, and a cavity 36 formed in the tail portion 32 to receive and retain the valve stem biasing means 22, preferably a spring as illustrated. The bottom surface 38 of the cavity 36 supports the valve stem biasing means 22. A passage 40 is formed in the bottom portion 37 through which the product can flow to the valve stem cavity 34.

FIGS. 2 and 3 show, in detail, the valve stem 16 including a tubular stem portion 50 and cylindrical valve stem sealer 51. The lower portion of sealer 51 comprises a cone shaped inner end 52 having a reduced diameter on its bottom to engage the valve stem biasing means 22, to retain the latter in aligned, operative relationship with the sealer 51. A discharge port 54 is formed in the side wall 56 of the tubular stem portion 50. The tubular stem portion 50 extends upward through an aperture 58 in the sealing ring gasket 24 and an aperture 60 in the top wall of the valve turret 26 a substantial length above the valve turret 26, so that it can be depressed by pushing it with a finger to operate the aerosol valve 18. The button actuator 14 is appropriately affixed to the upper end of the valve stem 16.

The top wall of the valve stem sealer 51 comprises an annular flat base 66, which engages the undersurface 64 of the sealing ring gasket 24. A cavity 68 is formed in valve stem sealer 51 whereby product may flow

through the cavity 68 and into cavity 34 when the dispenser 10 is actuated.

A pair of locking legs 72 are attached to opposite sides of side wall 70. As best shown in FIG. 3, each locking leg 72 comprises a pair of locking feet 74 and 76 extending downward from side wall 70 in an inverted substantially V-shaped configuration. Locking feet 74 and 76 terminate in outwardly projecting arming tips 78 and 80 respectively.

As shown in FIG. 4, the valve body 20 includes an annular interrupted locking ledge comprising ledges 42 formed about the inner periphery of stem cavity 34. An actuation slot 44 is formed by the adjacent edges of the ledges 42 on opposite sides of cavity 34. Formed on the upper surface of the ledges 42, on each side of slots 44 are arming nubs 46 and 48.

The sealing ring gasket 24 is an annular-shaped resilient ring having an aperture 58 slightly smaller in diameter than stem portion 50 to provide a tight seal about the stem portion 50 to prevent leakage.

FIG. 9 shows another aerosol dispenser 90 which is substantially like the aerosol dispenser 10, and the like parts thereof are correspondingly numbered. The primary difference between the aerosol dispensers 10 and 90 is in the structure of the locking means. In the aerosol dispenser 90, the valve actuating means 91 comprises a button actuator 92 and a valve stem 94. A substantially rectangular portion 96 is cut from opposite sides of side wall 78 of button actuator 92. A pair of locking feet 98 and 100 extend downward from the top of the rectangular portion 96. Projecting outwardly from the lower end of the locking feet 98 and 100 are arming tips 102 and 104 respectively. The button actuator 92 further includes a vertically disposed alignment slot 106 formed in the side wall 108 opposite a terminal orifice 110 which cooperates with alignment lug 107 formed on the overcap 112 to align the button actuator 92 with the overcap 112.

The alternate embodiment differs further in that it includes a cup-like overcap 112 comprising a substantially circular base 14 with an annular skirt 116 depending therefrom. The overcap 112 is snap fitted to the mounting cup by means of an annular skirt 116. A vertically disposed hollow cylinder 122 is formed about the periphery of centrally disposed aperture 120. The overcap 112 may also be configured to attach to the dispenser 10 itself.

As best shown in FIG. 15 and 16A through 16E, a pair of locking ledges 124 and 126 positioned, relative to each other to form actuation slot 125 are formed on opposite sides of inner wall 132 of cylinder 122. Locking ledges 124 and 126 include arming nubs 128 and 130 respectively. The overcap 112 further includes a substantially L-shaped detachable tamperproof bar 134 disposed within vertical alignment slot 106 to prevent rotation of the valve actuating means until the bar 134 is detached. Alternately the bar 134 may be configured to remain attached to overcap 112 and be moved into and out of the alignment slot 106 to provide a permanent tamperproof device.

FIG. 19 shows another alternate embodiment including a plurality of horizontally disposed locking ledges 136 arranged in a series of vertical steps on wall 132 of cylinder 122.

As shown in FIG. 1, when assembled, the aerosol valve safety-lock device is mounted inside the valve turret 26. In the "locked" position discharge port 54 is

isolated from cavity 34 by sealing ring gasket 24 whereby product is not dispensed.

FIGS. 4 through 8 show the "arming" sequence of the present invention. To operate, the valve actuating means 12 is rotated clockwise, until locking foot 76 snaps over nub 48 (FIG. 5). The valve actuating means 12 is then rotated counter-clockwise until the locking foot 74 snaps over nub 46 (FIG. 6). As shown in FIG. 7 tips 78 and 80 engage nubs 46 and 48 respectively to retain feet 74 and 76 within slots 44. The device is now "armed" as locking legs 72 are clear to pass vertically inside slots 44.

To actuate, the valve actuating means 12 is depressed downward actuating the valve assembly thereby dispensing product (FIG. 7).

As shown in FIG. 8, the biasing spring 22 within the dispenser 10 forces the valve actuator means 12 upward when the valve actuating means 12 is released. When the valve actuating means 12 reaches its upward extent of travel, the locking legs 72 again engage the locking ledges 42 to "lock" the dispenser 10 to prevent actuation.

The valve safety-locking device operates in a similar manner in aerosol dispenser 90.

As shown in FIG. 9, when assembled, the aerosol valve safety lock device is mounted inside the valve turret 26 within aperture 120. In the "locked" position, (FIGS. 16A, 17A and 18A) the valve actuating means 91 is prevented from moving vertically relative to the dispenser 10 by locking feed 98 and 108 in cooperative engagement with the locking ledges 124 and 126 respectively.

FIGS. 16A through 16E, (detailed view of the operative relation of locking feet 98 and 100, locking ledges 124 and 126 and slot 125), 17A through 17E (detailed view of the operative relation of alignment slot 106 and alignment lug 107), and 18A through 18E (detailed view of operative relation of arming tip 102 and arming nub 128), show the "arming" sequence of the invention. Before the valve actuating means 91 can be rotated to arm the dispenser, bar 134 must be detached by simply tearing it from the side of side wall 122. To arm, the valve actuating means 91 is rotated clockwise, until the locking foot 100 snaps over nub 130, (FIGS. 16B through 18B). The valve actuating means 91 is rotated counter-clockwise until the locking foot 98 snaps over nub 128 (FIG. 16C through 18C). When "armed", tips 102 and 104 engage nubs 128 and 138 respectively to retain feet 98 and 100 within slots 125. The device is now "armed" as locking legs 98 and 100 are clear to pass vertically inside slots 125.

To actuate, the valve actuating means 10 is depressed downward actuating the valve assembly thereby dispensing product (FIGS. 16D through 18D). It should be noted that alignment slot 106 must be in vertical alignment with alignment lug 107 before the dispenser 90 can be actuated.

As shown in FIGS. 16E through 18E, the biasing spring 22 within the dispenser 10 forces the valve actuating means 91 upward upon release of the valve actuating means 91. When the valve actuating means 91 reaches its upward extent of travel, the locking legs 98 and 100 again engage the locking ledges 124 and 126 to "lock" the dispenser 10 to prevent actuation.

Of course, a single locking ledge may be used in either embodiment. This would permit arming by merely rotating the valve actuating means either clockwise or

counter clockwise depending upon the location of the ledge relation to the locking feet.

The plurality of vertically stepped ledges 136 shown in FIG. 19 permits the use of the overcap 112 with valve actuating means of various sizes.

As previously described upon release of the valve actuation means 91, it will travel upward deactivating the dispenser 10. The locking legs 98 and 100 will rest on the appropriate ledge 136 as determined by the height of stem 94 and length of feet 98 and 100.

It will thus be seen that the objects set forth above, among those made apparent from the preceding description, are efficiently attained, and, since certain changes may be made in the above construction without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall there-between.

Now that the invention has been described,

What is claimed is:

1. A valve safety lock device for an aerosol dispenser comprising a valve actuating means including a button actuator and a valve stem, said valve actuating means further including a first locking means comprising at least one locking foot formed on said valve stem, said aerosol dispenser including a second locking means comprising a locking ledge formed on the valve body of said dispenser, said first and second locking means cooperatively engaging each other to prevent vertical movement of said valve actuation means relative to said dispenser, said safety lock device further including arming means comprising an arming tip formed on said locking foot and an arming nub formed on said locking ledge to disengage said second locking means from cooperative engagement with said first locking means to permit vertical movement of said valve actuating means relative to said dispenser to actuate said dispenser.

2. The valve safety lock device of claim 1 wherein said arming tip projects outwardly from the lower end of said locking foot and said locking nub projects upwardly from the said locking ledge such that when said valve actuating means is rotated relative to said aerosol dispenser said arming tip engages the side of said nub to disengage said locking foot from said locking ledge to permit vertical movement of said valve actuating means relative to said dispenser to actuate said dispenser.

3. The valve safety lock device of claim 1 wherein said first locking means comprises a plurality of locking feet formed in a substantially inverted V-shaped configuration and said second locking means comprises a locking ledge formed on a cavity formed in said valve body, said locking ledge comprising an interrupted annular rim forming at least two slots by adjacent locking ledges each end of said locking ledges including said arming nub such that when said valve actuating means is rotated counter clockwise and clockwise relative to said dispenser said feet are retained within said vertical slots by the cooperative engagement of said arming tips and arming nubs to permit vertical actuation of said valve actuating means.

4. A valve safety lock device for an aerosol dispenser comprising a valve actuating means including a button actuator and a valve stem, said valve actuating means further including a first locking means comprising a pair of vertically disposed locking feet formed on opposite sides of said valve actuator, said aerosol dispenser including a second locking means comprising an interrupted annular rim forming at least two slots by adjacent locking ledges, said first and second locking means cooperatively engaging each other to prevent vertical movement of said valve actuating means relative to said dispenser, said safety lock device further including arming means comprising an arming tip formed on each of said locking feet and an arming nub formed on each of said locking ledges, said arming tip projecting outwardly from the lower end of each of said locking feet and said locking nub projecting upwardly from each of said locking ledges such that when said valve actuating means is rotated counter-clockwise and clockwise relative to said dispenser said feet are re-

tained within said vertical slots by the cooperative engagement of said arming tips and arming nubs to permit vertical actuation of said valve actuating means.

5. The valve safety lock device of claim 1 wherein said second locking means comprises a plurality of annular interrupted locking ledges arranged in vertical configuration relative to one another to permit use with various size valves.

6. The valve safety locking device of claim 4 further including an outwardly projecting alignment lug formed on the side wall of said dispenser and said button actuator includes a vertically disposed alignment slot.

7. The valve safety locking device of claim 6 further including a tamper proof detachable bar formed on said overcap disposed within said vertical alignment slot to prevent rotation of said valve actuating means relative to said dispenser.

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