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Caruso

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(54) **ACTUATOR FOR AEROSOL CONTAINER**

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B65D 83/16 (2006.01)

(52) **U.S. Cl.** **222/402.13**; 222/402.15

(58) **Field of Classification Search** 222/402.1, 222/402.13, 402.15
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,225,966	A	12/1965	Sagarin	
3,620,425	A	11/1971	Rait	
3,762,611	A	10/1973	Nigro	
3,764,044	A	10/1973	Pajak	
3,934,761	A	1/1976	Gentreau	
4,011,970	A	3/1977	Crowle et al.	
4,024,995	A	5/1977	Landen et al.	
4,065,036	A	12/1977	Kirk, Jr.	
4,095,725	A	6/1978	Goncalves	
4,582,228	A	4/1986	Diamond et al.	
4,620,646	A	11/1986	Crapser	
4,641,644	A	2/1987	Andersson et al.	
5,203,478	A	4/1993	de Laforcade et al.	
5,287,998	A	2/1994	Smrt	
5,411,184	A	5/1995	Smrt	
5,649,645	A *	7/1997	Demarest et al.	222/153.07
6,065,474	A	5/2000	Coe	
2003/0127468	A1	7/2003	Lohgman-Adham et al.	
2005/0133542	A1 *	6/2005	Kolanus	222/402.13
2005/0230437	A1 *	10/2005	Vlooswijk et al.	222/402.15

* cited by examiner

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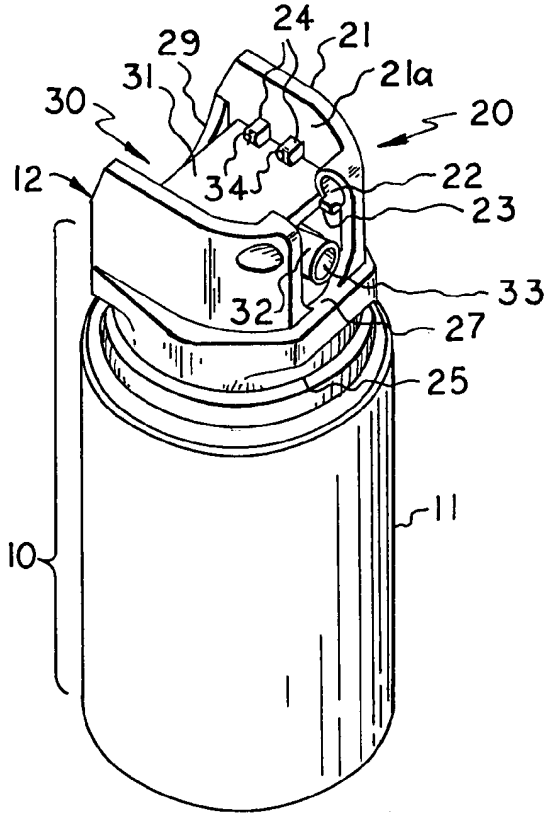
(57) **ABSTRACT**

The present invention broadly comprises an actuator assembly for an aerosol container in which a collar is attached to the aerosol container and substantially encloses an actuator. The actuator is functionally attached to an aerosol valve and includes slots that contact a plurality of guide rails attached to the inner surface of the collar as well as a passage from the valve to a nozzle shaped opening. When the actuator is pushed down, the downward movement is controlled by the interaction of the slots with the guide rails. Also provided is a cover that guards against accidental force being applied to the actuator.

16 Claims, 3 Drawing Sheets



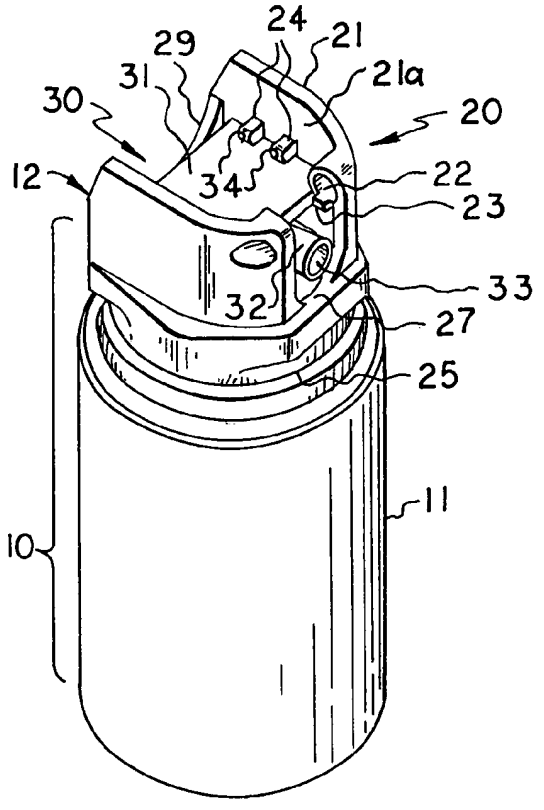


FIG. 1

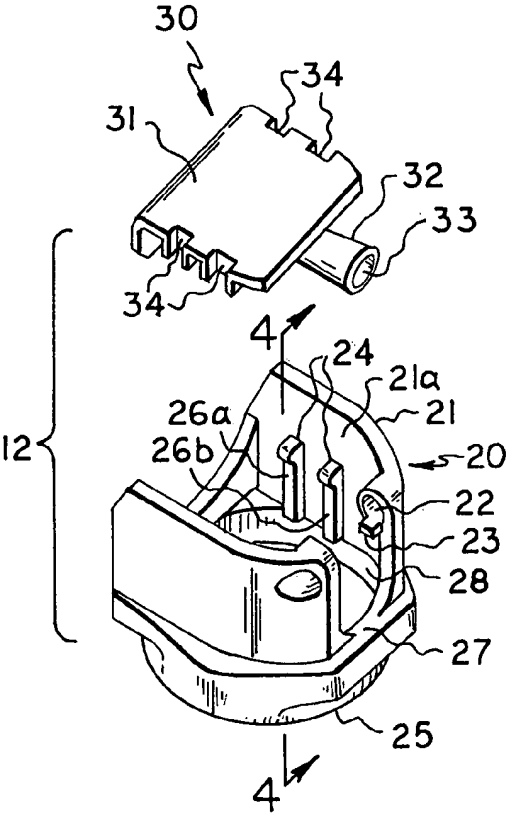


FIG. 2

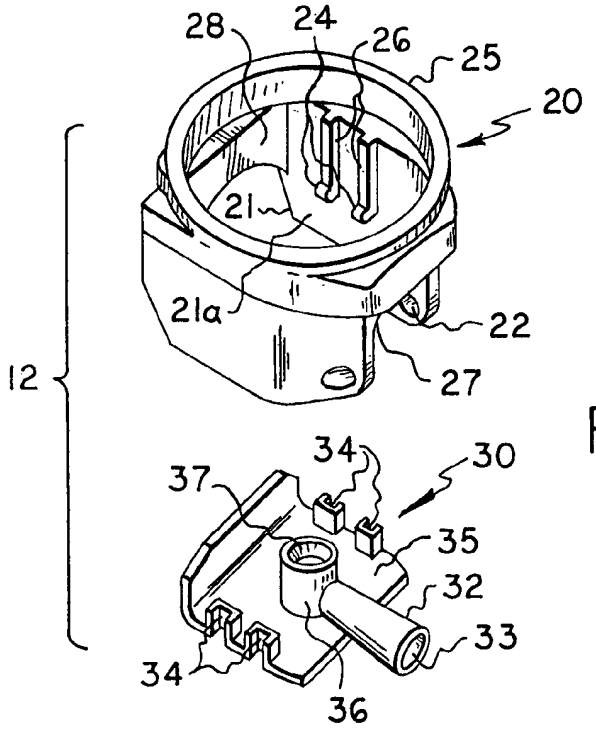


FIG. 3

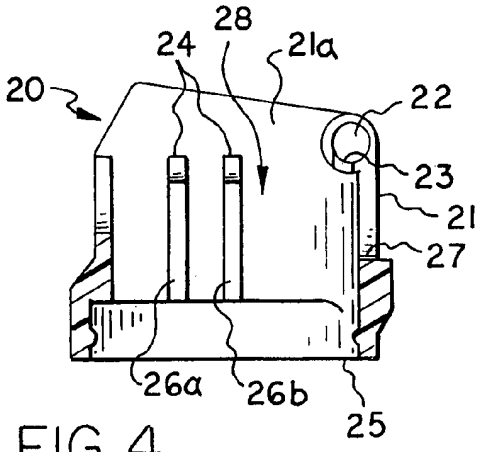


FIG. 4

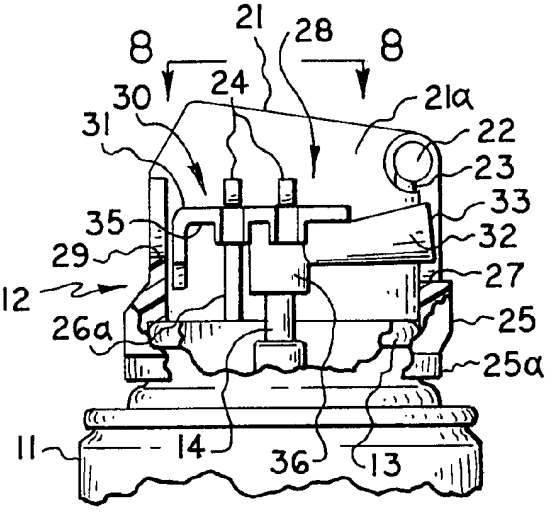
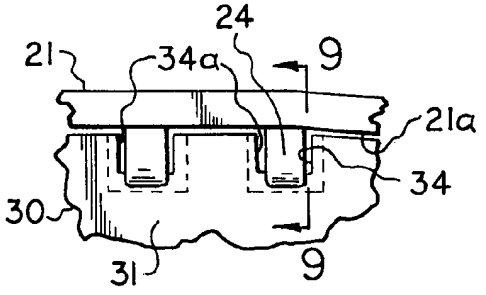


FIG. 5

FIG. 8



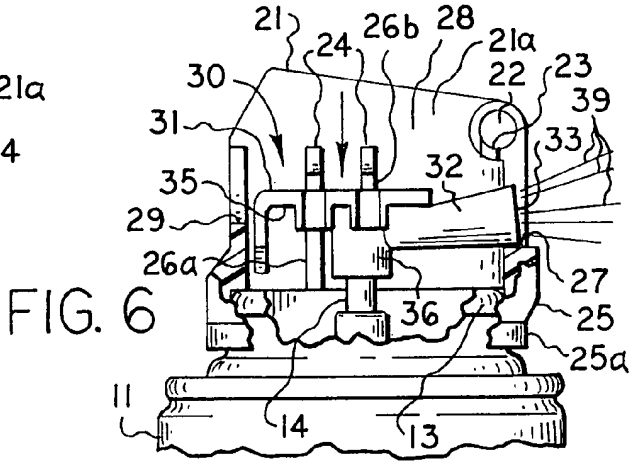


FIG. 6

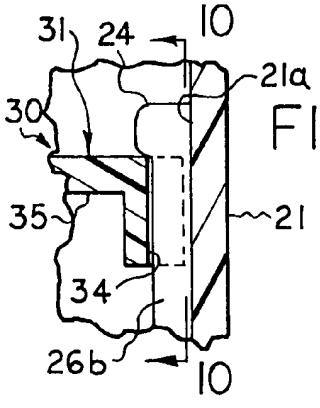


FIG. 9

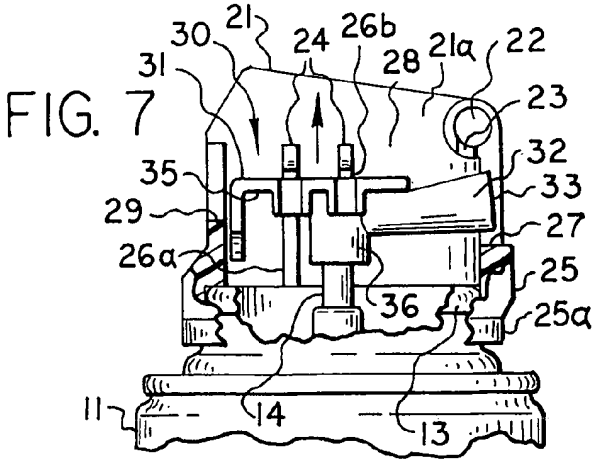


FIG. 7

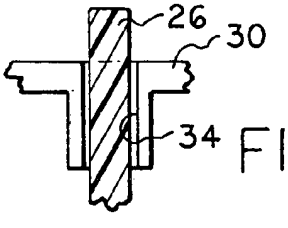


FIG. 10

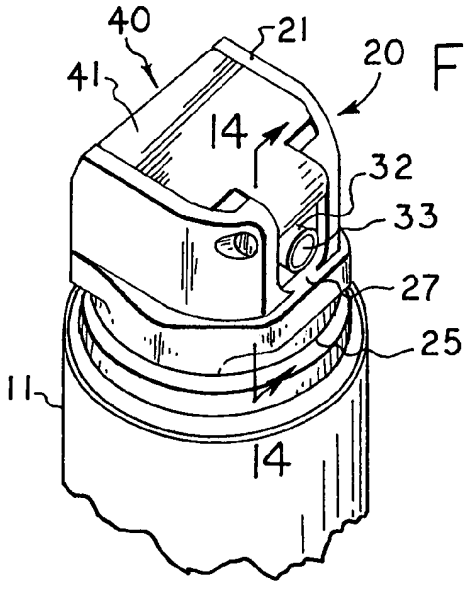


FIG. 11

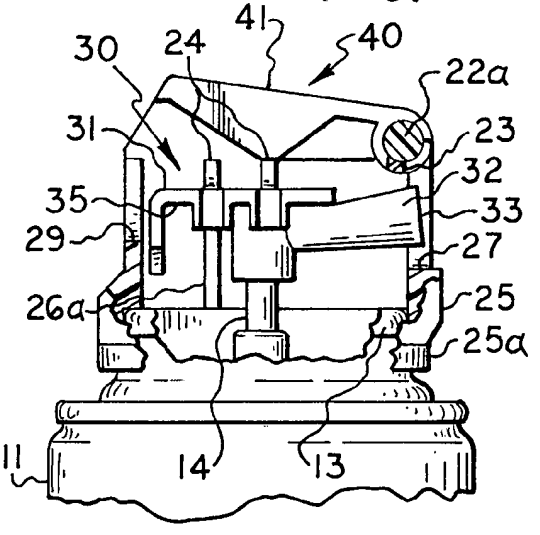


FIG. 12

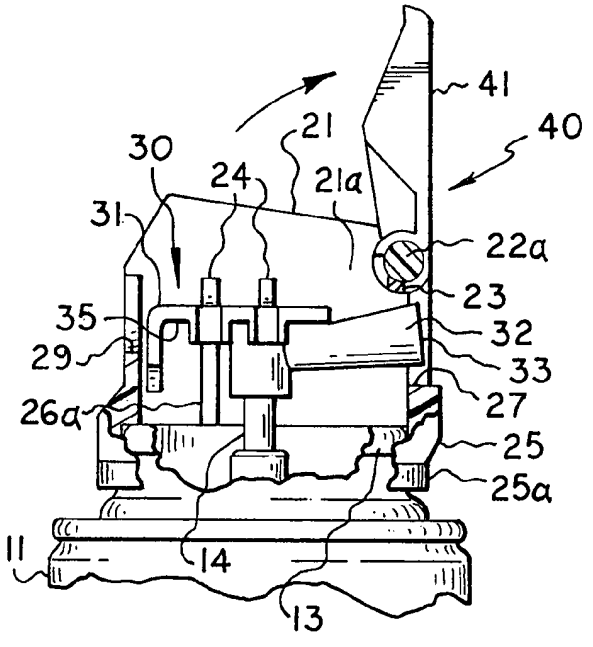


FIG. 13

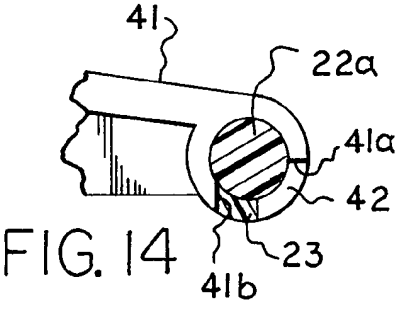


FIG. 14

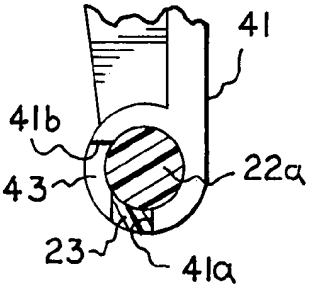


FIG. 15

ACTUATOR FOR AEROSOL CONTAINER

FIELD OF THE INVENTION

The present invention relates generally to aerosol containers, specifically to delivery systems for the content of aerosol containers, and more specifically to aerosol actuator systems.

BACKGROUND

The use of aerosol containers and delivery systems is widespread for both consumer and commercial products. Household products, such as furniture wax and oven cleaners, personal products such as hair sprays and topical burn medications, and commercial products such as insect repellants and paints use aerosol containers for storage and aerosol valves to deliver the contents to the desired target.

Several problems can arise during the use of aerosol container systems. One such problem is found in the aerosol valve itself. Aerosol valves are activated by depressing a valve along a stem that opens the valve and releases the contents that are stored under pressure. Very often, the pressure on the valve is not applied coaxially along the stem, but is applied at an angle. This angled pressure vector can cause bending or breaking of the stem or valve leading to leaks in the container and loss of contents.

Another problem is the potential loose fit of the aerosol actuator, the component that directly contacts the aerosol valve. It is important that the actuator not only be in secure contact with the aerosol valve, but also that the actuator stays oriented in the same direction to ensure that the contents of the container are released in the same direction each time.

Still another problem with aerosol containers is the potential for accidentally pressing on the valve to unexpectedly release the contents. If aerosol containers are kept in a confined space with other objects, such as a purse, it is relatively easy for the valve to be activated by other objects if it is not covered. Detachable covers are often used to correct this problem. However, detachable covers are easily misplaced, add to the overall size of the container, and are inconvenient to use in that they must be completely removed from the container before use and then securely placed back on the container after use.

What is needed then is an aerosol actuator that is configured to always be depressed coaxially with the aerosol valve stem, that will remain in the correct orientation in relation to the release direction of the contents, and that provides a convenient way to prevent accidental opening of the valve.

SUMMARY OF THE INVENTION

The invention broadly comprises an actuator assembly for an aerosol container comprising a collar having an interior surface and having attachment means for attachment to the aerosol container, at least one pair of guide rails projecting from the interior surface of the collar and an actuator comprising one or more slots in which at least one of the slots is in operative contact with one of the guide rails. The aerosol container has an aerosol valve from which the contents exit the container. Each of the guide rails comprises an end proximate to the aerosol valve and an end distal from the aerosol valve. Each one of the at least one pair of guide rails is positioned on a different side of the interior surface of the collar. At least one knob projects from the interior surface of the collar. Finally, the invention also includes an actuator comprising a plurality of slots, each one of the plurality of slots are in operative contact with one of the guide rails and comprising a passage having a first opening and a second opening, the first opening in functional connection with an aerosol valve on the aerosol can.

The invention also broadly comprises an actuator assembly for an aerosol container comprising a collar having an interior surface and having attachment means for attachment to the aerosol container, at least one pair of guide rails projecting from the interior surface of the collar and an actuator comprising one or more slots in which at least one of the slots is in operative contact with one of the guide rails. In rotational attachment to the collar is a flip cover that substantially covers an actuator and restricts access to the actuator when in the covering position. The aerosol container has an aerosol valve from which the contents exit the container. Each of the guide rails comprises an end proximate to the aerosol valve and an end distal from the aerosol valve. Each one of the at least one pair of guide rails is positioned on a different side of the interior surface of the collar. At least one knob projects from the interior surface of the collar. Finally, the invention also includes an actuator comprising a plurality of slots, each one of the plurality of slots are in operative contact with one of the guide rails and comprising a passage having a first opening and a second opening, the first opening in functional connection with an aerosol valve on the aerosol can.

A general objective of the invention is to provide an aerosol actuator that reliably releases the contents of an aerosol container.

A second objective of the present invention is to make available an actuator guide system to enable consistent movement of an actuator when pressure is applied to the actuator from different directions

An additional objective of the invention is to disclose an aerosol actuator assembly that prevents wear on an aerosol valve caused by offset pressure applied to the valve.

A further objective of the invention is to provide a cover to reduce the potential for accidental release of the contents of an aerosol container.

A still further objective of the present invention is to present an aerosol actuator assembly configured to prevent the actuator from bursting off an aerosol valve.

An additional objective is to make available an aerosol actuator that applies pressure along the axis of an aerosol valve.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

The nature and mode of operation of the present invention will now be more fully described in the following detailed description of the invention taken with the accompanying drawing figures, in which:

FIG. **1** is a top perspective view of the actuator assembly of the present invention attached to an aerosol container;

FIG. **2** is an exploded top perspective view of the actuator assembly of the present invention;

FIG. **3** is an exploded bottom view of the actuator assembly of the present invention;

FIG. **4** is a cross-section of the collar of the actuator assembly taken along line **4**—**4** in FIG. **2**;

FIG. **5** is a cut-away side view of the aerosol actuator of the present invention in which the aerosol valve is in the closed position and the actuator is pressed against knobs projecting from a pair of guide rails;

FIG. **6** is a cut-away side view of the aerosol actuator assembly of the present invention in which the contents of the aerosol container are released as the actuator is moved down from the restraining knobs;

FIG. **7** is a cut-away side view of the aerosol actuator assembly of the present invention in which the actuator is depicted as moving up toward the restraining knobs to shut of the release of the container contents;

FIG. **8** is a top view of the actuator pressed against the restraining knobs on the guide rails taken along line **8**—**8** in FIG. **5**;

FIG. **9** is a cross-section view taken along line **9**—**9** of FIG. **8** depicting the actuator pressed against the restraining knobs in which the knobs are shown projecting from the interior surface of the collar;

FIG. **10** is a sectional view taken along line **10**—**10** in FIG. **9** demonstrating a slot of the actuator positioned around the guide rail situated on an interior surface of the collar;

FIG. **11** is a top perspective view of an alternate embodiment of the present invention depicting the flip cover in closed position over the actuator;

FIG. **12** is a cut-away side view of the actuator assembly of the present invention showing the flip cover in the closed position over the actuator;

FIG. **13** is the same view as that of FIG. **12** depicting the flip cover in the open position;

FIG. **14** is a close-up view of the rotary attachment of the flip cover to the collar of the actuator assembly in the closed position; and

FIG. **15** is a close-up view of the rotary attachment of the flip cover to the collar of the actuator assembly in the open position.

DETAILED DESCRIPTION OF THE INVENTION

At the outset, it should be appreciated that like drawing numbers on different drawing views identify identical structural elements of the invention. While the present invention is described with respect to what is presently considered to be the preferred embodiments, it is understood that the invention is not limited to the disclosed embodiments.

The present invention broadly comprises an aerosol container actuator assembly having a collar attached to the aerosol container that provides a surrounding wall for an aerosol actuator. FIG. **1** is a top perspective view of the combination actuator assembly-container **10**. Actuator assembly **12** is shown attached to container **11**. Wall **21** of collar **20** partially surrounds actuator **30** on three sides. Persons skilled in the art will recognize that collar **20** may have several different shapes as long as access to actuator **30** by an operator is retained. Knobs **24** are seen projecting from interior surface **21***a* of wall **21**. Receiver **22** is defined by wall **21**. Shoulder stop **23** is in close proximity with receiver **22**. In the preferred embodiment shown, shoulder stop **23** is integral with receiver **22** and wall **21**. Not shown is a second receiver on the opposite wall transverse from visible receiver **22**. Also not shown in FIG. **1**, a second shoulder stop **23** is also present in close proximity to the second receiver. At least one knob **24** projects from inner surface **21***a*. As will be explained below, knob **24** acts to restrict the upward movement of actuator **30** to maintain the integrity of actuator assembly **12** by preventing the pressure of the aerosol contents from propelling actuator **30** off actuator assembly **12**. Opening **27** through wall **21** is provided to enable the contents of aerosol container **11** to be released to the immediate environment. Although opening **27** is depicted as U-shaped in FIG. **1** and subsequent figures, persons skilled in the art will recognize that opening **27** may possess any convenient shape. Collar **20** is configured with attachment means **25** to attach collar **20** to container **11**. In one preferred embodiment, attachment means **25** comprises a bead that forms a crimp-type grip to attach collar **20** to container **11**. Orifice **28** seen in FIG. **2** is defined by attachment **25** and wall **21** which either together or separately bound the bottom perimeter of collar **20**.

The sides of actuator **30** are shown as comprising slots **34**. Nozzle **32** of actuator **30** is shown extending from opening **27** and defines nozzle orifice **33**.

FIG. **2** is an exploded top perspective view of actuator assembly **12**. Slots **34** of actuator **30** are clearly shown on opposite sides of actuator **30**. In the preferred embodiment shown, slots **34** are configured as channels to contact and traverse guide rails **26** on collar **20**, as described below. A plurality of guide rails **26** extend along inner surface **21***a* of collar wall **21** with at least one of guide rails **26** on a different side of inner surface **21***a*. In a preferred embodiment, at least one pair of guide rails **26** is provided with each of the pair of guide rails placed on different areas of inner surface **21***a* so as to face different directions. In a more preferred embodiment, each of the pair of guide rails are positioned on opposite areas of inner surface **21***a* so as to face each other. Thus, one of guide rail pair **26***a* is shown on one area of inner surface **21***a*. The other of guide rail pair **26***a* (not shown) is preferably positioned across from guide rail **26***a*. Similarly, one of guide rail pair **26***b* is shown in approximately the same area or region of inner surface **21***a* as visible guide rail **26***a*. Again, a second guide rail **26***b* is preferably positioned across from guide rail **26***b* on inner surface **21***a*. Although it is preferred that the individual guide rails in each pair be positioned on opposite sides of inner surface **21***a*, the separate guide rails **26** in each pair may be positioned differently as warranted by the particular configuration of actuator assembly **12**.

FIG. **2** depicts a preferred embodiment in which knobs **24** are integral with guide rails **26**. In an alternate embodiment, knobs **24** may be detached from guide rails **26** provided knobs **24** extend from inner surface **21***a* sufficiently to restrict the upward movement of actuator **30**. (See below.) Preferably, actuator **30** is configured so that the shape and size of its perimeter is only slightly smaller that the shape and size of inner surface **21***a* so as to create a close fit between actuator **30** and inner surface **21***a* that still allows smooth movement of actuator along guide rails **26**.

FIG. **3** depicts an exploded bottom perspective view of actuator assembly **12**. Fitting **36** is shown attached to bottom surface **35** and surrounds aperture **37**. Aperture **37** and nozzle orifice **33** are connected to form a continuous passage.

FIG. **4** is a cross-section through U-shaped opening **27** of collar **20** taken along line **4**—**4** in FIG. **2**. One member each of guide rail pairs **26***a* and **26***b* are seen extending substantially parallel to each other in a vertical direction. By vertical is meant approximately perpendicular to the plane of the perimeter of attachment **25** of collar **20**.

FIG. **5** is a cut-away side view with parts of wall **21** and actuator **30** removed to depict the attachment of actuator assembly **12** to container **11**. Fitting **36** is mounted over aerosol valve **14**. In one embodiment, fitting **36** is sized to provide a snug friction fit over valve **14**. In an alternate embodiment, fitting **36** may be attached to valve **14** using adhesives, glue, welding or other methods well known to those skilled in the art. Aerosol valve **14** is constructed to release the contents of container **11** when depressed toward

container **11** in a coaxial direction along valve **14**. In the embodiment shown in FIG. **5**, nozzle **32** is pitched at an angle between approximately 7–10° relative to bead **13** of container **11**. At such an angle, self-defense aerosols such as MACE® and pepper spray discharge at an upward angle such that contents **39** are more likely to contact an attacker's face rather than his/hers chest or waist. In an alternate embodiment, nozzle **32** may be at substantially a zero angle, meaning parallel to the plane of bead **13** of container **11** or at a downward angle. Top surface **31** of actuator **30** is seen contacting knobs **24** which again are seen integral with guide rails **26**. Attachment **25**, including lower portion **25***a*, is shown contacting bead **13** of container **11** to form a friction fit to hold actuator assembly **12** onto container **11**. Nozzle **32** may be bell shaped as shown in FIG. **2**, tapered, or other suitable shape

Using the same view as FIG. **5**, FIG. **6** demonstrates the result of the movement of actuator **30** toward container **11**. Fitting **36** moves down over valve **14** until bottom surface **35** contacts valve **14** and pushes it toward container **11**, thereby opening valve **14** and releasing contents **39**. Contents **39** are forced under pressure out open valve **14** through aperture **37** then out through nozzle orifice **33**

FIG. **7** demonstrates the closing of valve **14**. When pressure on actuator **30** is released, upward pressure of contents **39** forces actuator **30** away from container **11** along guide rails **26** until actuator **30** contacts knobs **24** where its upward movement is stopped. Thus, actuator **30** is held in place by the upward pressure of pressurized contents **39** and the downward restraints of knobs **24**. In the preferred embodiment discussed above, a close fitting of actuator **30** within inner wall **21** further stabilizes actuator **30**.

FIG. **8** is a top view of actuator **30** and knobs **24** taken along line **8**—**8** of FIG. **5**. Knobs **24** can be seen attached to inner surface **21***a* of wall **21**. In one embodiment, knob **24** may be integral with inner surface **21***a* such as may be made with an injecting molding or blow molding process. FIG. **9** is a side section taken along line **9**—**9** of FIG. **8** through guide rail **26**. Guide rail **26** is seen extending from knob **24** along inner surface **21***a*. The shaded portion depicts one side of slot **34** of actuator **30** extending toward inner surface **21***a* along guide rail **26**. Gaps **34***a* seen in FIG. **8** demonstrate that slots **34** are close to but, preferably, not in continuous contact with guide rails **26** to enable smooth movement of actuator **30**. FIG. **10** is a length-wise section taken along line **10**—**10** in FIG. **9** clearly showing slot **34** in close proximity to guide rail **26**.

FIG. **11** is a top perspective view of a preferred embodiment of the instant invention. Flip cover **40** is shown covering actuator **30** (not shown). Upper surface **41** of flip cover **40** is also seen.

FIG. **12** is cut-away side view of actuator assembly **12** to include flip cover **40**. FIG. **12** shows flip cover **40** in the closed position covering actuator **30**. Flip cover **40** is attached to collar **20** by insertion of rod **22***a* extending from collar **20** into holes on either side of flip cover **40** to form a hinged attachment. In an alternate embodiment, stems extending from cover **40** may be inserted into receiver **22** to form a hinged attachment. In a preferred embodiment, shoulder stop **23** is shown as an extension of receiver **22**. As discussed below, shoulder **23** is configured to restrict the range of motion of flip cover **40** to prevent flip cover **40** from rotating open so far as to hang down in front of nozzle opening **33**. FIG. **13** shows flip cover **40** in the open position allowing easy access to actuator **30** by an operator. Persons skilled in the art will recognize that other methods may be used to movably attach flip cover **40** to collar **20** to allow access to actuator **30** when desired by an operator.

FIGS. **14** and **15** illustrate a preferred embodiment in which shoulder **23** prevents flip cover **40** from opening so far as to hang in front of nozzle opening **33**. Flip cover **40** includes shoulders **41***a* and **41***b*. As seen in FIG. **14**, flip cover **40** is in the closed position with gap **42** between shoulder stop **23** and shoulder **41***a*. Shoulder **41***b* is seen in contact with or in close proximity to shoulder stop **23**. When flip cover **40** is opened, as seen in FIG. **15**, shoulder **41***a* is rotated until it is stopped by contacting shoulder stop **23**. At the same time, shoulder **41***b* rotates away from shoulder **23** to form gap **43**. Person skilled in the art will recognize that other designs methods may be used to restrict the movement of flip cover **40**.

Thus it is seen that the objects of the invention are efficiently obtained, although changes and modifications to the invention should be readily apparent to those having ordinary skill in the art, which changes would not depart from the spirit and scope of the invention as claimed.

The invention claimed is:

1. An actuator assembly for an aerosol container comprising:

a collar having attachment means for attachment of said collar to said aerosol container, said aerosol container having an aerosol valve and said collar having an inner surface;

a plurality of guide rails projecting from said interior surface of said collar, each of said guide rails having an end proximate to said aerosol container and an end distal to said aerosol container, wherein at least one of said plurality of guide rails is positioned on a different side of said interior surface than the other of said plurality of guide rails;

one or more knobs projecting from said interior surface of said collar;

an actuator positioned below said one or more knobs and comprising at least one slot, said at least one slot in operative contact with one of said guide rails, and including a passage having a first opening and a second opening, said first opening in functional connection with an aerosol valve on said aerosol can; and,

a flip cover operatively connected to said collar.

2. The actuator assembly as recited in claim **1** wherein said actuator assembly further comprises at least one stop device configured to stop the rotational movement of said flip cover.

3. The actuator assembly as recited in claim **2** wherein said at least one stop device is a shoulder stop.

4. The actuator as recited in claim **3** wherein said flip cover comprises two shoulders.

5. The actuator assembly as recited in claim **1** wherein one of said at least one knob is positioned on the distal end of at least one of said plurality of guide rails.

6. The actuator assembly as recited in claim **1** wherein one of said at least one knob is positioned on the distal end of each guide rail.

7. The actuator assembly as recited in claim **1** wherein said second end of said passage is a nozzle from which the contents of said aerosol container are released.

8. The actuator assembly as recited in claim **1** wherein said second end is positioned at an angle in the range of about 7–10 degrees from horizontal.

9. The actuator assembly as recited in claim **7** wherein said contents are released up at an angle in the range of about 7–10 degrees from horizontal.

10. The actuator assembly as recited in claim 7 wherein said second end is bell-shaped.

11. The actuator assembly as recited in claim 7 wherein said second end is tapered.

12. The actuator assembly as recited in claim 7 comprising two or more pairs of guide rails.

13. The actuator assembly as recited in claim 1 wherein said functional connection comprises the movement of said actuator and said aerosol valve on substantially coincident axis.

14. The actuator assembly as recited in claim 13 wherein said substantially coincident axes are in a vertical direction.

15. The actuator assembly as recited in claim 1 wherein said functional connection comprises a friction fit between said first end of said passage and said aerosol valve.

16. The actuator assembly as recited in claim 1 wherein said functional connection comprises an attachment between said first end of said passage and said aerosol valve.

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