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Ishida

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[54] SAFETY VALVE FOR AEROSOL CONTAINERS

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[58] **Field of Search** 222/402.1, 402.24, 82, 532, 222/541

[56] **References Cited**

UNITED STATES PATENTS

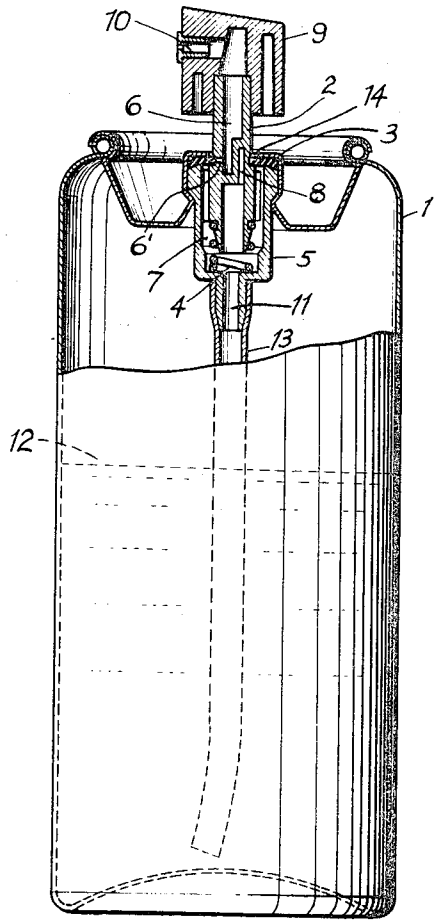
2,392,195	1/1946	Shonnard	222/541 X
2,773,722	12/1956	Abplanalp	222/82
3,088,680	5/1963	Fulton	222/541 X
3,441,177	4/1969	Treharne	222/82

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[57] **ABSTRACT**

A safety valve for an aerosol container which permits the discharge of the residual propellant gases in a used container when the valve stem is broken off. The container is thereby rendered safe from explosion caused by heat and also cannot be refilled.

9 Claims, 2 Drawing Figures



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FIG. 1

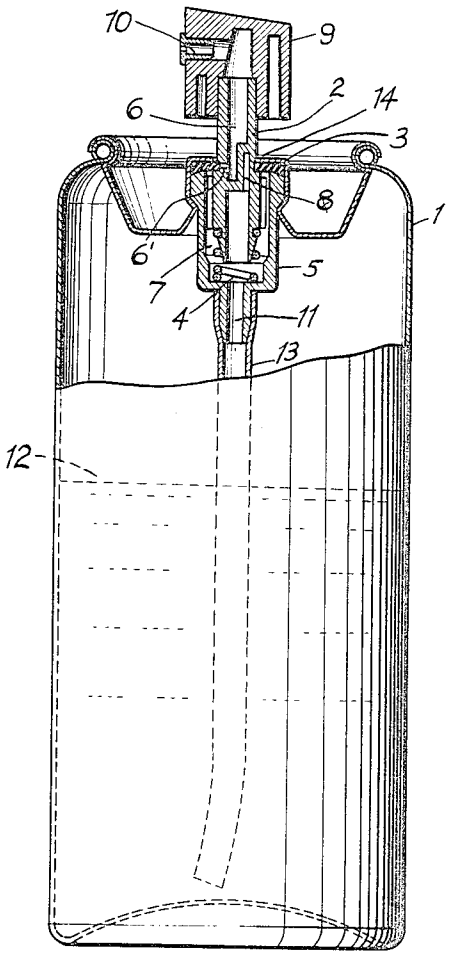
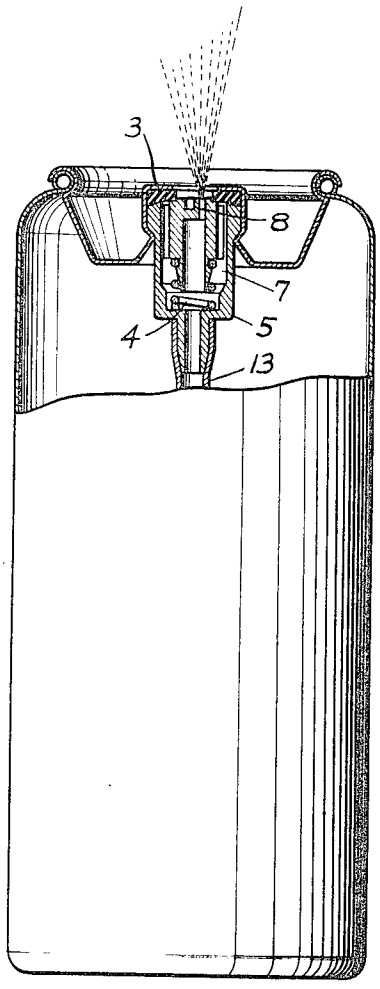


FIG. C



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SAFETY VALVE FOR AEROSOL CONTAINERS

BACKGROUND OF THE INVENTION

The present invention relates to aerosol containers, particularly those employed as a means of packaging, in which a propellant gas under pressure, or a liquefied gas which has a pressure greater than atmospheric at ordinary temperatures, is used to spray a liquid. The result of the spraying process produces a mist of small liquid droplets in the air surrounding the container. Such "spray" containers, as they are more commonly referred to, are widely used for the packaging of an extensive variety of consumer and industrial products. Some typical applications are: insecticides, disinfectants, cosmetics, deodorants, household waxes and cleaners, paints, fire extinguishers, cleaning agents, lubricants, drugs and pharmaceuticals and food products.

Because of the present construction of aerosol or spray containers, even after the supply of liquid has been exhausted, a residual amount of propellant gas, which sometimes may be as much as 3 percent of the original volume, may remain in the used container. Thus, the "empty" or used container is not really empty at all and presents a safety problem. If the container accidentally comes into contact with heat the residual gas in the container may expand and thereby increase the pressure in the container to a level which causes it to explode. It is very probable that such an explosion will cause serious harm or injury to anyone who happens to be nearby.

A second problem associated with aerosol containers is that not infrequently unscrupulous manufacturers have been known to refill used containers. This practice is not only illegal, but it also is dangerous, because the container might be refilled with a toxic or harmful substance.

SUMMARY OF THE INVENTION

It is an object of this invention to provide a novel safety valve for an aerosol container which will prevent the container from exploding after its contents have been exhausted.

Another object of this invention is to provide a novel safety valve for an aerosol container which will prevent the container from being refilled after its contents have been exhausted.

Another object of this invention is to provide a novel safety valve for an aerosol container which is of simple construction and can be easily adapted for use with any conventional aerosol container.

The improved safety valve for use in an aerosol container or any other hollow housing arranged to accommodate a supply of pressurized flowable material comprises a valve mounted in the housing and operative to normally seal the interior of the housing from the atmosphere. The valve has a weakened portion which defines a passage that is in permanent communication with the interior of the housing and is normally sealed from the atmosphere. The valve also has an external portion which is accessible for the application of stresses of a magnitude which will break the valve along the weakened portion to thus establish permanent communication between the interior of the housing and the atmosphere.

The novel features which are considered as characteristic of the invention are set forth in particular in the appended claims. The improved valve mechanism, however, both as to its construction and its method of operation, together with additional features and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a partly elevational and partly longitudinal sectional view of an aerosol container provided with a valve mechanism in accordance with the present invention; and

FIG. 2 depicts the container of FIG. 1 after the valve has been utilized in accordance with the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIG. 1, there is shown a preferred embodiment of the present invention wherein a housing or container 1 for the storage of a supply of a pressurized fluid mixture 12 or any other flowable material has an opening 14 at one end into which a valve means 5 mainly made from a sturdy yet breakable plastic or a similar material has been inserted. Valve means 5 includes a movable valve stem 2 which protrudes through opening 14 to extend into the atmosphere and is sealed by a flexible sealing means, gasket 3, which is located on the upper portion of the concealed part of valve means 5. The lower portion of valve stem 2 is received in cavity 7 of valve means 5 and is biased upwardly to a first position by spring 4. The upper portion of valve stem 2 is provided with a bore 6 which extends downward to the level of gasket 3. Bore 6 communicates with the spout bore 10 of button 9 and a second bore 6' is also located at or near the level of gasket 3 such that bore 6' is normally closed by gasket 3 when valve means 5 is not operative.

Valve means 5 also includes a nipple 11 at its lower end which is received by the upper end of conduit 13 to provide a passage for the flow of pressurized fluid mixture 12. Valve stem 2 also includes a gas outlet means, discharge bore 8 which communicates with the bore of nipple 11 at one end and is a blind bore at its other end at about the level of gasket 3. Bore 8 is located as close as possible to bore 6, as shown in FIG. 1.

As indicated in FIG. 1, at least part of bore 6', bore 6 and bore 8 are all located in a region which is approximately at the same level as gasket 3 when valve stem 2 is in the closed position. The exterior part of valve stem 2 surrounding this region is indented slightly to form a neck or groove as shown in FIG. 1.

The aerosol container is made operative by depressing spout button 9 downward thereby displacing valve stem 2 from its first position to a second position against the bias of spring 4. In this second position, gasket 3 bends so that bore 6 can communicate with cavity 7 through bore 6'. Consequently, the pressurized fluid mixture 12 passes from conduit 13 through the bore of nipple 11 into cavity 7 and thence into bore 6 where it passes into the atmosphere as a spray through spout bore 10.

When the supply of the pressurized fluid mixture 12 has been exhausted, depression of button 9 will be longer produce a fluid spray, however, a residual quantity of propellant gas which can be as much as 3 percent of the filled volume still remains in the container.

In order to prevent the container from exploding, in the event that its temperature is increased after mixture 12 has apparently been exhausted, button 9 is moved by the user to cause stem 2 to be bent, twisted or stressed until it finally breaks off at its weakest portion, namely at the neck of the valve stem. The closed end of discharge bore 8, located substantially in the region of the neck, is thereby permanently opened to the atmosphere when stem 2 is broken, and the residual propellant gas in the container gradually discharges into the atmosphere. The evacuation of the residual fluid thus renders the container free from the possibility of explosion when its temperature is increased. FIG. 2 illustrates a container in which stem 2 has been broken and the residual propellant gas is evacuating into the atmosphere.

A significant feature of the present invention is that once stem 2 has been broken off, it is no longer possible to refill the container.

It can also be appreciated from the above description that valve means 5 serves as a safety valve when utilized in the above-described manner.

The valve means is of relatively simple and inexpensive construction and can be adapted for use with most presently manufactured aerosol containers.

It is to be understood that each of the above-described elements, or two or more together, may also find a useful application in other types of valves for aerosol containers which differ from the type described above.

While the invention has been illustrated and described as embodied in this valve for an aerosol container, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge, readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended claims:

1. In an aerosol container, a combination comprising a hollow housing arranged to accommodate a supply of pressurized flowable material; and a valve mounted in said housing and operative to normally seal the interior of said housing from the atmosphere, said valve including a valve stem movable between a first position in which said valve seals the interior of said housing from the atmosphere and a second position in which said valve stem establishes a path for communication between the interior of said container and the atmosphere, said valve also having a weakened portion defining a passage which is in permanent communication with the interior of said housing and which is normally sealed from the atmosphere, and an external portion accessible to the application of stresses of a magnitude which will break the valve along said weakened portion to thus establish permanent communication between the interior of said housing and the atmosphere.

2. A combination as defined in claim 1, wherein said weakened portion is provided in said stem.

3. A combination as defined in claim 1, further comprising a flexible sealing means surrounding said weakened portion in the first position of said stem and cooperating with said stem to seal the interior of the housing from the atmosphere.

4. A combination as defined in claim 1, further comprising a conduit communicating with the interior of said housing and defining a portion of said path.

5. A combination as defined in claim 1, further comprising spring means for biasing said stem to said first position.

6. A combination as defined in claim 1, wherein said weakened portion is provided with an external groove.

7. A combination as defined in claim 1, wherein said passage is a blind bore.

8. In an aerosol container, a combination comprising a hollow housing arranged to accommodate a supply of pressurized flowable material; and a valve mounted in said housing and operative to normally seal the interior of said housing from the atmosphere, said valve having a weakened portion defining a first passage which is in permanent communication with the interior of said housing and which is normally sealed from the atmosphere, a normally sealed second passage having a portion extending through said weakened portion, and an external portion accessible for the application of stresses of a magnitude which will break the valve along said weakened portion to thus establish permanent communication between the interior of the housing and the atmosphere.

9. In an aerosol container, a combination comprising a hollow housing arranged to accommodate a supply of pressurized flowable material; and a valve mounted in said housing and operative to normally seal the interior of the housing from the atmosphere, said valve having a weakened portion defining a passage which is in permanent communication with the interior of the housing and which is normally sealed from the atmosphere, and an external portion accessible to the application of stresses of a magnitude which will break the valve along said weakened portion to thus establish permanent communication between the interior of the housing and the atmosphere, said valve further comprising a stem which includes said weakened portion and which is reciprocable between sealing and open positions, said stem including a second passage having a first end communicating with the atmosphere and a second end communicating with the interior of said housing in the open position of said stem, and elastic sealing means sealing said second end in the sealing position of said stem, said second passage including an intermediate portion extending through said weakened portion.

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