An aerosol container is provided with a safety venting system whereby the product and propellant may be vented from the container when an increase in internal pressure threatens to blow an end off the container. The venting system comprises a plurality of vents formed in the body flange area which are buried in the double seam which joins the container body and end closure. When the internal pressure of the container increases sufficiently, the end closure will buckle outwardly exposing the vents and thereby permitting the contents of the container to safely escape.

11 Claims, 4 Drawing Figures
PRESSURE RELEASE MECHANISM

SUMMARY OF THE INVENTION

The present invention relates generally to a metal or plastic aerosol container having a pressure relief system whereby the internal contents of the container may be vented therefrom when the internal pressure rises to a level sufficient to threaten blowing an end off the container. More particularly, this invention relates to a two or three piece metal or plastic aerosol container having a simple venting system to prevent the explosion of a filled container when the internal pressure rises considerably, as may occur during excessive heating of the container.

For many years pressurized aerosol containers have been marketed to the general public. These containers usually comprise a three-piece metal container having therein a product to be dispensed; together with a propellant which provides the internal pressure necessary to dispense the product through a valve mounted on the container top.

However, due to the fact that the container is pressurized, problems have been encountered when the internal pressure of the container rises rapidly above the design pressure. In some instances this rapid increase in internal pressure, resulting from excessive heating, due to improper storage or use, has caused the container to explode.

It is, therefore, one of the important objects of the present invention to provide an improved pressure release mechanism for aerosol containers.

It is a further object to provide an improved pressure release mechanism which will function regardless of the container orientation.

It is another object to provide an improved pressure release mechanism which may be produced with a reasonably wide degree of manufacturing latitude.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary perspective view of an aerosol container constructed in accordance with this invention, illustrating a plurality of vents formed in portions of the end unit defining a part of the double seam structure.

FIG. 2 is a fragmentary perspective view of an aerosol container body prior to assembly, illustrating vents formed in the body flange.

FIG. 3 is an enlarged fragmentary sectional view taken generally along line 1—1 of FIG. 1, illustrating a vent formed in the body flange.

FIG. 4 is a fragmentary sectional view similar to FIG. 3 in which the end unit has buckled outward, illustrating the manner in which the vents are exposed by the rotation of the chuck wall, thereby allowing escape of the container contents.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In keeping with the present invention there is provided a conventional two or three-piece aerosol container 10 inside of which is housed a pressurized product (not shown). The container 10 includes a typical dispensing button and/or nozzle 11 which is united to a conventional dispensing valve (not shown) such that upon depression of the nozzle 11 or angulating the same in non-parallel relationship to the container axis the product within the container 10 is dispensed through the valve and nozzle 11 to atmosphere.

Most aerosol containers 10 include an end unit 12 having a domed portion 13 which is crimped at 14 to a conventional valved cup 15. Such conventional end units 12 further include a chuck wall radius 16 which joins the central domed portion 15 at a chuck wall 17. The chuck wall 17 in turn merges with a seaming panel 18 through a seaming wall radius 21 which in turn is joined to a seaming wall 22 merging with an end hook radius 23 which in turn merges with an end hook 24.

The container body 25 of the aerosol container 10 includes a body wall 26 merging with a body hook radius 27 which in turn merges with a body hook 28. The body hook 28 is sandwiched and crimped or clamped between the body wall 26, and the seaming wall 22. A sealing compound 29 may be employed to insure the integrity of this crimped seal.

In keeping with this invention, it has been found that the outer periphery of the seaming panel 18 of the end unit 12 experiences maximum expansion and eventually dome failure as the dome 13 is forced axially upwardly and outwardly under the influence of excessive internal pressure in the manner illustrated in FIG. 4.

Without some type of pressure relief mechanism, the container 10 would explode, fracture and/or otherwise disintegrate. However, in accordance with the present invention such undesired occurrence is precluded by the provision of a plurality of vents 30 in the body hook radius 27, said vents 30 being equally spaced about the periphery of said container body 25. Spacing of vents at 30° intervals is preferred although other spacing is also effective. Experience indicates that vents should not be placed within one-half inch of the body wall side seam and should not extend more than 0.09 inches inward from the flange periphery.

As internal pressure develops beyond a predetermined design maximum the end unit 12 begins to deflect axially upwardly and outwardly toward the eventual position shown in FIG. 4, thereby uncovering the vents 30. Any sealing compound 29 which may be blocking the vents 30 is forced out of the way allowing the high pressure gasses to exit between the body wall 26 and the end hook 24. In this manner undesired explosion is precluded and safe and unabrupt venting is achieved with the escaping gasses and other container contents being channeled in streams substantially parallel to the axis of the container.

It is understood that the venting ports 30 are made in the body flange area 28a such that they will be buried in the double seam. Actually, they are covered by the seaming panel 18 of the end unit 12. During an overpressure condition, the end unit will buckle outward with the seaming panel 18 rotating about 90°. This highly reliable mechanical phenomenon then becomes the opening action—essentially it is a popper valve.

With a large enough hole, the compound 29 remaining is forced out of the way, allowing the high pressure gasses or product to exit between the body wall 26 and the end hook 24.

The implication here in that a "loose" double seam is essential. Actually the double seam tightness should be normal. Then during the buckling the double seam tends to loosen. This is a result of the outward forces developed kinematically as the deep counter-sink is lifted, thus forcing the seaming wall radius 21, and the remainder of the end hook 24 outward.
This "developed" double seam looseness is usually adequate for venting, yet is such that a heavy jetting and subsequent rocking effect is prevented. The discharge is actually a series of fine streams or sprays and rather well dispersed.

Should a situation develop such that the rate of pressure depletion thru venting is less than the rate of pressure buildup, then the venting rate will actually be increased. As the pressure on the end unit 12 increases, there is a pronounced tendency of the double seam to unfold. As this tendency develops, the effect is to move the end hook 24 out away from the body 25 thus further opening the vents 30 as an outer poppet valve.

Experience thus far indicates that double seam integrity is maintained so that a burst does not occur.

For 3-piece cans this application is possible on either end, preferably the top end. It can also function for 2-piece.

While preferred forms and arrangement of parts have been shown in illustrating the invention, it is to be clearly understood that various changes in details in arrangement of parts may be made departing from the scope and spirit of this disclosure.

1. Safety venting means for a double seam structure of the type securing an end unit to a flanged container body, said venting means comprising openings buried in said double seam, said openings being uncoverable upon the deflection of said end unit consequent to internal overpressurization of the container.

2. Safety venting means for a double seam structure of the type securing an end unit to a flanged container body, said venting means comprising a plurality of openings in the body of the container, said openings being buried in said double seam and being uncoverable upon the deflection of said end unit consequent to internal overpressurization of the container.

3. The invention according to claim 1 wherein said body comprises a radially outwardly directed flange and said openings disposed at the juncture of said flange and said body and being folded over into said seam.

4. Safety venting means for a double seam structure of the type securing an end unit to a flanged container body, wherein said body has a flange at said seam and said venting means comprises at least one opening in said flange: said opening being buried in said double seam and being uncoverable upon the deflection of said end unit consequent to internal overpressurization of the container.

5. The invention according to claim 1 wherein said end unit comprises a central domed portion and a peripheral relatively rigid portion including a seaming panel extending alongside said container body to said seam, said peripheral portion and said domed portion being deformable under greater stress loads than said seam wall whereby upon overpressurization said seam wall is caused to deform thereby opening said vent means.

6. A method of making a safety vent in a pressurized container comprising the steps of providing a container having an outwardly directed flange at one end, forming opening means in the flange, providing a distortable end closure, connecting the end closure to the body by double seaming the flange to said end closure an extent to bury the opening means in the seam in a location whereon upon said end closure becoming distended said seam will open and expose said opening means to evacuate the container.

7. In a container having an end member and a body member and a seam interconnecting said members, openings, formed in one of said members enclosed within said seam and openable attendant to the deflection of said end member consequent to internal overpressurization of said container to provide means to evacuate the container.

8. A container as defined in claim 7 and a sealing compound in the seam, said compound being extruded through said openings and upon the deflection of said end unit being blown out from said venting means to effect subsequent release of the gases pressurizing said container.

9. The invention defined in claim 7 wherein said double seam is disposed in shielding relation to the venting means to direct the pressured material venting from the container in a predetermined pattern.

10. A safety venting system for a double seam structure of the type securing an end unit to a flanged container body, said container body including a body wall terminating at an outwardly directed body hook radius followed by a body hook, said end unit including a chuck wall merging with a securing panel which in turn merges with a seaming wall which in turn merges with an end hook, said body hook being sandwiched between said seaming wall and said end hook, said venting system comprising a plurality of openings in said body hook radius, said openings normally being covered by said securing panel, said openings being uncoverable upon the deflection of said end unit consequent to internal overpressurization thereby controllably venting the interior of said container to the atmosphere.

11. In a safety venting system, a double seam structure of the type securing an end unit to a flanged container body, said container body including a body wall terminating at an outwardly directed body hook radius followed by a body hook, said end unit including a chuck wall merging with a securing panel which in turn merges with a seaming wall which in turn merges with an end hook, said body hook being sandwiched between said seaming wall and said end hook, said venting system comprising a plurality of openings in said securing panel, said openings normally being covered by said body hook radius, said openings being uncoverable upon the deflection of said end unit consequent to internal overpressurization thereby controllably venting the interior of said container to the atmosphere.