United States Patent

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[54] **AEROSOL VALVE WITH PRESSURE RELIEF**
5 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **137/522;** 251/354: 222/402.24
[51] **Int. Cl.** **F16k 15/18**
[50] **Field of Search** 251/349, 353, 354; 222/402.24, 402.22; 137/522, 348

[56] **References Cited**
UNITED STATES PATENTS

1,707,660	4/1929	Hammerstein	251/353X
2,008,574	7/1935	Bock	251/349X
2,551,688	5/1951	Metzler et al.	251/353X
3,454,198	7/1969	Flynn	222/402.22X

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Assistant Examiner—Michael O. Sturm
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ABSTRACT: An aerosol valve has a built-in pressure relief device, the valve being operable manually to spray through a nozzle in the usual manner, or automatically when the container pressure exceeds a safe limit. A valve head seats by downward pressure under the compressive force of a spring greater than the upward force of container pressure on the valve. For normal operation, the valve is unseated by a tilt action to overcome the spring force.

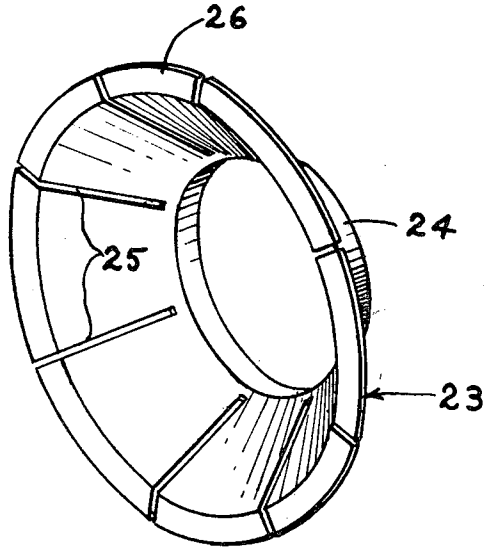


Fig. 1.

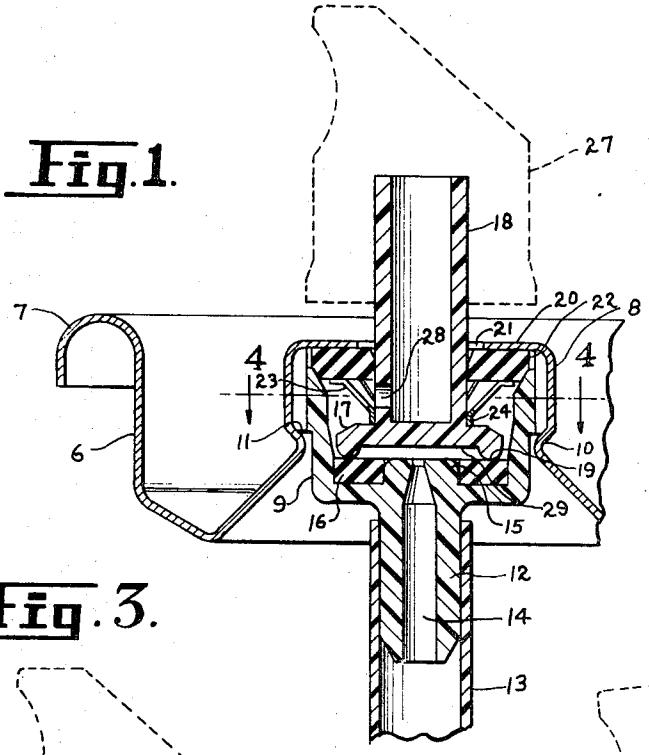


Fig. 4.

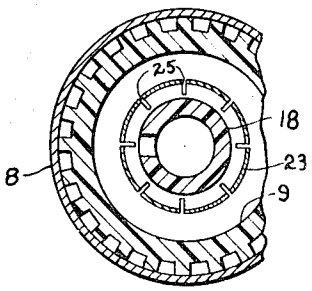


Fig. 3.

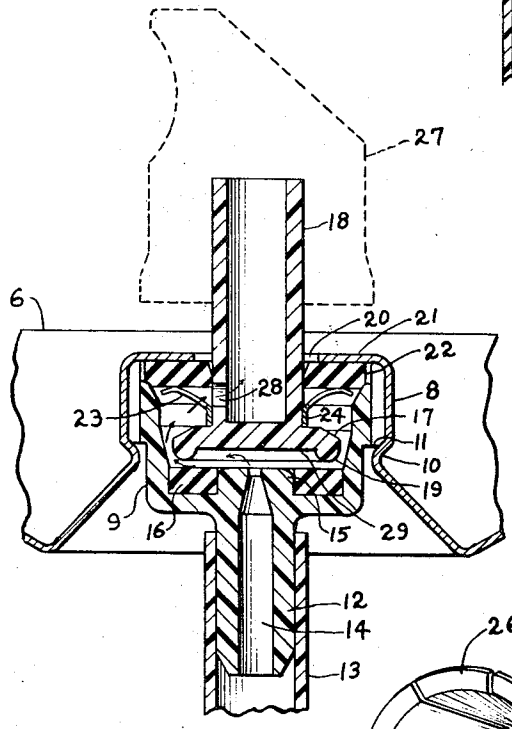


Fig. 2.

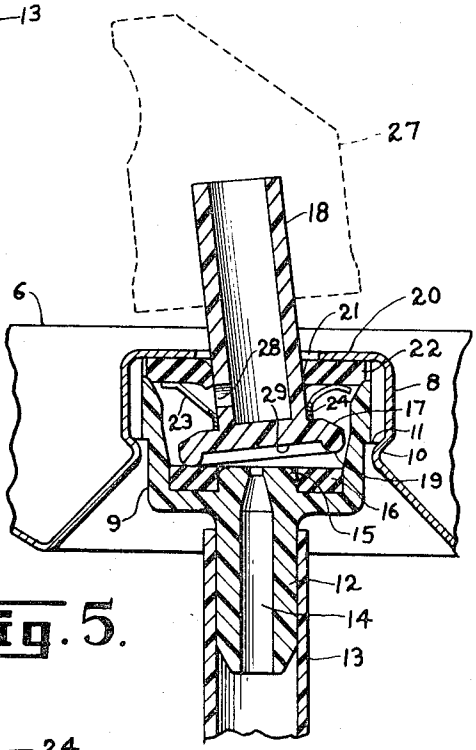
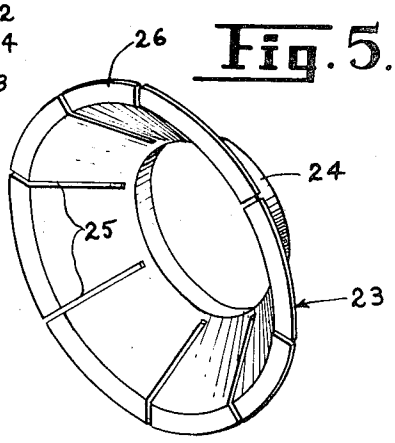


Fig. 5.



AEROSOL VALVE WITH PRESSURE RELIEF

The invention relates to aerosol valves and the main objective is to obtain an excess pressure relief function without materially adding to the cost of the valve assembly.

Instead of a valve head seating by upward pressure against the seat underside of a gasket, I utilize a valve closing downwardly against a seat around the inlet passage at the bottom of the valve body. A top gasket serves a sufficient seal during operation to prevent passage of material around the stem. The valve is actuated only by tilt action to overcome the downward compressive force of a spring which must be greater than the fluid pressure acting upwardly on the valve. It does not open by a vertical downward pressure and thus cannot be easily opened accidentally when an actuator button is being pushed by down in place after the container is filled. A hollow valve stem projects from the valve head to the outside of the container and the stem can be made to fit a socket in an actuator button or it may have itself a socket to receive the male portion of another type of actuator.

In the accompanying drawing, I have shown for purposes of illustration, one embodiment which the invention may serve in practice. In the drawing:

FIG. 1 is a central vertical section of my improved valve mounted in an aerosol container cap;

FIG. 2 is a central section showing how the valve is operated during manual use;

FIG. 3 is a similar section showing the valve opening under excess container pressure;

FIG. 4 is a partial cross section on line 4–4 of FIG. 1; and

FIG. 5 is a perspective view of the spring.

An aerosol can cap 6 has the usual rim 7 for securing it to the container and a central pedestal constituting a housing 8. A valve body 9 of cup-shape is secured in the housing 8 by indentations 10 engaging under a shoulder 11 on the valve body. A nipple 12 extends downwardly from the valve body 9 to accommodate a dip tube 13 and an inlet passage 14 through this nipple continues through a boss 15 extending into the hollow portion of the valve body. A rubber like washer 16 is fitted around this central boss 15 to provide a valve seat.

The valve itself has a head 17, a hollow stem 18 and a sealing lip or rim 19 adapted to seat against the washer 16 by downward pressure.

The top wall 20 of the housing 8 has an opening 21 which is substantially larger than the cross-sectional area of stem 18 so that the stem is free to move a substantial amount in a lateral direction to allow tilting action around the lip 19 to unseat the valve, as shown in FIG. 2.

A top sealing gasket 22, also of flexible rubber like material, seals against the inner surface of the top housing wall 20 and also around the valve stem 18. The gasket 22 thus prevents leakage between the housing 8 and the valve body 9 and also around the stem 18.

A spring which exerts the compressive force on the valve is mounted in the valve body between the gasket 22 and valve head 17. It may be possible to use a coil spring, but in view of the limited space, I have shown a Belleville type spring generally indicated by the numeral 23. It has a collar 24 surrounding the valve stem 18 and bearing against the valve head 17. Slots 25 extend from the collar through a rim section 26 bearing against the gasket 22.

It will thus be seen that although the valve will not operate by vertical downward movement, it can be operated with a tilt action by pushing against the actuating button 27, as seen in FIG. 2. The container contents will then flow through the passage 14, around the lip 19, through a flow aperture 28 in the wall of the valve stem 18 and out through the valve stem and the usual discharge orifice in the button 27. The flow aperture 28 must, of course, be located between the gasket 22 and the head 17.

Within the sealing lip 19, a substantial area of the valve head, herein indicated by the numeral 29, is continuously subjected to the pressure of the container contents to exert an upward pressure on the valve which tends to unseat it.

The spring 23 is so designed that its compressive force is sufficiently greater than the fluid pressure against the area 29 as to hold the valve seated under normal conditions. However, by properly proportioning the spring force and the area 29, this seal may be broken by internal pressure which exceeds any predetermined safe level so that the aerosol solution is released before the can explodes.

My improved valve with its safety release feature utilizes a valve body and gasket combination which is generally like that of a well known valve as shown, for instance, in U.S. Pat. No. 3,158, 298 assigned to my assignee, having means to allow rapid pressure filling. Such means includes the passages 31 around the valve body.

I claim:

1. An aerosol valve assembly comprising:
   a. a housing having an opening;
   b. a valve body of cup-shaped secured in said housing and having a fluid inlet passage adapted to communicate with the interior of an aerosol container;
   c. a valve seat around said inlet passage;
   d. a valve having a head adapted to close against said seat and having a substantial area subjected to fluid pressure from said inlet passage tending to unseat the valve;
   e. a hollow valve stem joined to said head and extending through said opening in the housing, said stem being substantially smaller in cross section than said opening so that it can move laterally; and
   f. a sealing gasket bearing up against the inner surface of said housing around said opening and also sealing around said stem, the wall of the stem having a flow aperture therethrough between said head and said gasket;
   g. a spring urging a said valve down against said seat with a predetermined force greater than that normally exerted by the fluid pressure acting up on said valve head; and
   whereby said valve may be opened to permit flow through said stem either by a tilting force applied to the stem or by an unusually high fluid pressure in the container.

2. An aerosol valve assembly as defined in claim 1 wherein said spring bears downwardly against said head and upwardly against said sealing gasket.

3. An aerosol valve assembly as defined in claim 2 wherein said spring is of conical shape having a collar surrounding the stem adjacent said head and a flat rim bearing against said sealing gasket.

4. An aerosol valve assembly as defined in claim 1 further characterized by a boss surrounding said inlet passage and extending into said valve body, said valve seat consisting of a rubber like boss and said head having a sealing lip bearing against said washer, and wherein the area of the head within said lip is exposed to internal pressure of the container through said inlet passage.

5. An aerosol valve assembly as defined in claim 1 wherein passage-way means are provided around the outer wall of said valve body to permit quick filling of the container by flow over the top of said gasket and around said valve body.