

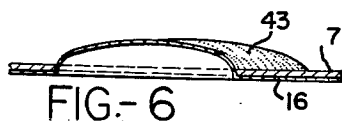
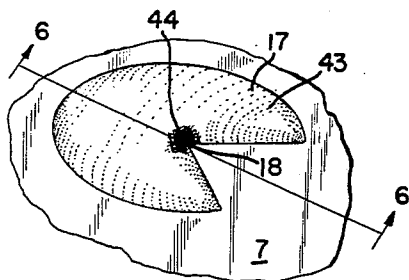
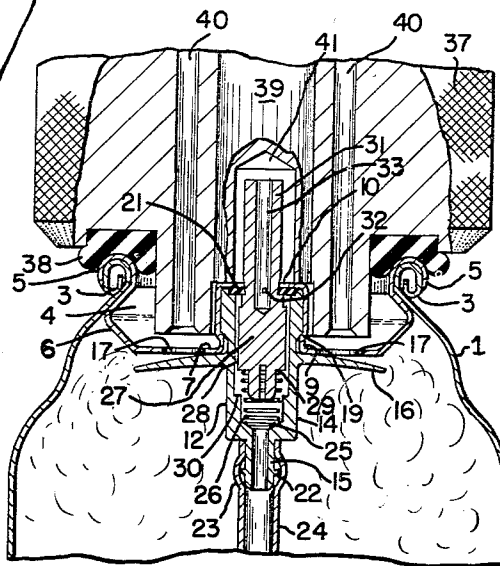
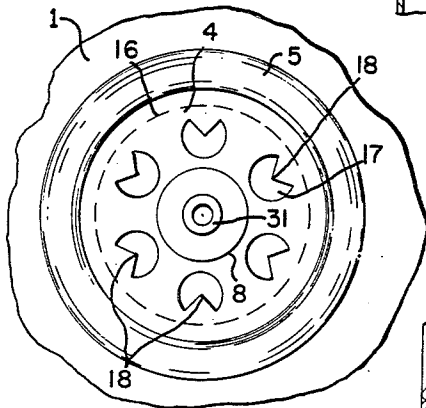
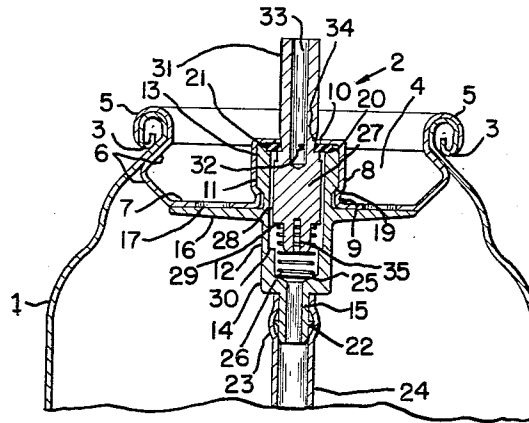
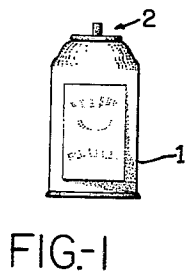
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AEROSOL BOMB DEVICE HAVING SAFETY MEANS

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AEROSOL BOMB DEVICE HAVING SAFETY MEANS

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This invention relates to aerosol bomb type containers and particularly to valve arrangements which facilitate the filling of the container with pressuring gas.

The conventional mode of filling containers with gas in the usual aerosol bomb manufacture involves injecting the material, which is to form the gaseous component, in the liquid state. For this purpose the gaseous material is customarily Freon. To effect the introduction of this liquid to the aerosol container requires extensive and expensive refrigerating and pressure equipment. Thus, in commercial practice, production line equipment and processing frequently includes a plurality of gas compression stages, most of which are accompanied by refrigeration, to reduce the gas to the liquid state, followed by pumping of the cold liquid to the aerosol container.

This invention contemplates the provision of a novel aerosol bomb container which is arranged to be directly filled with gas under pressure, the need for liquefaction being obviated by the container arrangement. For this purpose the container is provided with a cover which closes and seals the container. Suitably this cover has an outlet valve of the plunger operated type and which is normally closed; the cover, further, has filler-valve means leading to the interior of the container and so arranged that a suitable unbalanced pressure on the exterior of the cover causes opening of the filler valve structure.

The outlet valve means, which are openable independently of the filler valve means, remain closed when the gas is entering the container through the filler valve means. Thus the container arrangement provides for facile, economical filling with gaseous materials such as Freon, although other gases may be employed, for example, nitrous oxide, nitrogen and the inert gases.

The invention further particularly contemplates a container having a novel arrangement of the filling valve means. Such is effected by providing a flexible, resiliently deformable apron to extend over orifice means of the valve and which apron is flexible inwardly of the valve under gas pressure to expose the interior of the container.

The apron, in the normal gas-filled condition of the container, is urged toward the cover and orifice means by the gas pressure within the container. Suitably the apron is arranged such that when deformed, that is bulged, it is opened slightly, thereby serving to relieve gas pressure within the container by escape of gas through the apron. A nylon apron serves this purpose well and returns to its usual gas impermeable state upon relief of the undue pressure.

In a preferred embodiment, the cover portion defining an orifice of the filling valve is provided with a piercing projection which tends to open the nylon, permitting of more rapid gas escape, and thus serving as a valuable safety factor when the container is exposed to excessively high temperature.

The invention also contemplates the provision of a

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novel structural arrangement of the cover-container combination to provide rigidity in the structure and to facilitate pressure equalization both during the filling operation and in storage of the sealed container.

The invention contemplates as a primary feature a novel filling method for an aerosol bomb.

These and other objects will become more apparent from the following detailed description and accompanying drawings wherein:

Figure 1 is an elevational view of an aerosol bomb; Figure 2 is a greatly enlarged fragmentary sectional view of the aerosol bomb of Figure 1;

Figure 3 is a plan view of the structure of Figure 2;

Figure 4 is a fragmentary elevational view of the structure of Figure 2 in the filling position of the container;

Figure 5 is a perspective view illustrating the function of the sealing apron in its cooperative relation with the filling orifice of the cover of the container; and

Figure 6 is a view taken on line 6—6 of Figure 5.

Referring to the drawings, and particularly first to Figures 1—3, inclusive, the numeral 1 designates a container proper of metal having an outlet valve generally indicated at 2.

As shown most clearly in Figure 2, the container has an interned reversely bent upper edge 3. Sealed on the upper edge of the container is a generally concave metal cover 4 having an annular flange 5 rolled on the edge 3 of the container in sealing relation with the edge 3.

The cover 4 has peripherally disposed angled sides 6 and a flat base 7. One angled side 6, as may be noted from Figure 2, is pressed into close sealing engagement with the interior of the container 1.

Upstanding from the base 7 is a housing 8 having a neck 9 adjacent the base 7. The housing is also provided upwardly with an aperture 10 which provides a passage to the interior of the container from the exterior. The housing 8 defines an interior cavity 11 in which the outlet valve 2 is socketed.

The outlet valve 2 comprises an axially bored body member 12 having an upper portion 13 which fits in the cavity 11 of the housing, a lower depending portion 14, a narrowed extension 15, and an apron 16, which extends laterally, circularly of the body member, below the base portion 7, and in contact with the base portion, as shown in Figure 2. The base portion is itself provided with a plurality of orifices 17 formed through the base portion in such manner as to provide in each orifice the piercing projection 18, as most clearly shown in Figure 3.

Referring now again to Figure 2, the upper portion 13 of the body member 12 is provided with a peripheral shoulder 19 which fixes against and is supported by the neck 9 inwardly of the neck. Upwardly the portion 13 has an inner peripheral recess 20 in which a gasket 21 is fitted to effect partial closure of the aperture 10.

The narrowed extension 15 of the body member 12 is provided with lugs 22 which engage in an enlarged 23 of an outlet tube 24. Thereby the outlet tube is retained upon the body member 12, and the tube itself extends only partially towards the bottom of the container 1, in accordance with known practice.

The lower portion 14 of the body member 12 is provided inwardly with a seat 25 for a compression spring 26. Compression spring 26 at its upper end engages the movable member 27 of the valve, which is in the general form of a cylindrical body disposed in spaced relation with the body member 12 within the cavity of the housing to provide a circumferential passage 28. The movable member 27 at its lower end is provided with a ridge 29 which abuts the upper end of the compression spring 26 and which is itself engageable against an interior ridge 30 of the portion 14 in downward movement

of the member 27. Thus the ridge 30 provides a limit stop for the movable member 27. At its upper extremity the member 27 has formed integral therewith a valve stem 31 which has a channel 32 therein. The channel 32 communicates the passage 28 with an outlet passageway 33 in the depressed condition of the valve stem.

Around the lower portion of the valve stem adjacent the channel 32, the stem has an outer downwardly tapering conical surface 34. This surface in the closed position of the valve engages the gasket 21 at the lower extremity of the surface. Thus, the gasket 21 seals against the surface 34 and the aperture 10 is completely closed by the combination of the surface 34 and the gasket 21. Depression of the valve stem 31 against the force of the spring 26 provides for exhaustion of material from the interior of the container, and at the same time, due to the conical surface 34, the sealing effect between the gasket and the stem is increased, this inhibiting leakage. Also gas pressure in container 1 normally tends to maintain outlet valve 2 closed.

It will be appreciated that a nozzle of appropriate design may be suitably attached to the upper end of the valve stem 31 for cooperation with the passageway 33.

To provide for smooth flow of material through outlet tube 24 to passageway 33 in the depressed position of the valve member 27 is slotted at 35. Thus flow occurs even if ridge 29 abuts ridge 30.

The filling of the container is suitably effected as illustrated in Figure 4. In Figure 4 the container 1 has the upper edge thereof abutted by a header 37. A resilient rubber sealing ring 38 engages the upper edge in sealing relationship. The header 37 itself comprises a central cylindrical actuating rod 39, slidable vertically within the header independently of the header; disposed around the rod 39, within the header are channels 40, one for each of the orifices 17 of the base 7 of the container 1.

As illustrated in Figure 4 the header in its down position on the container 1 is so provided that the stem 31 of the valve 2 is received within a recess 41 of the actuating rod. The rod itself abuts on the upper end of the housing 8 and is restricted thereby from further movement. The rod, for example, might be spring-biased in the position of Figure 4.

The main portion of the header 37 projects downwardly (Figure 4) beyond the upper end of the housing 8 and the actuating rod 39 to provide the gas conduits 40 in close proximity to and directly above the orifice 17.

In actual practice control of the admission of gas to the channels 40 would normally be effected by utilizing the position of the actuating rod 39 to control an inlet valve to the channels 40, so that the gas flow would be automatically controlled. The control, however, may be effected in any suitable manner for the purposes of this invention.

As shown in Figure 4 gas is illustrated as entering the container 1 through the orifices 17, past the downwardly deflected apron 16.

It is to be noted that in the structure of this invention the container 1 could suitably be filled with material to be gasified in the first instance, that is, prior to the introduction of the gas; or, in many situations the material could, if desired, be introduced with the gas. The gas pressure exerted in either event is sufficient to effect filling of the container. The filling may be effected at normal temperatures.

It is to be particularly noted that the side wall structure, that is, the sides 6 of the cover 4, are formed to adequately resist the gas pressure which exists between the sealing ring 38 and the cover in the course of filling.

When filling has been completed, since valve 2 is automatically closed during the filling, the pressure of the gas tends to close the apron 16 against the base 7, to thereby seal the orifices of the cover.

A particular advantage of the structure is that under

normal conditions the apron 16 will lie against the base portion 7, in the manner illustrated in Figure 2. Should, however, the container be subjected to a temperature rise, which would cause an increase in the pressure of the gas within the container, the apron 16 tends to expand into the orifice 17 to form a bulge of the apron, as illustrated at 43 in Figure 5. Such bulge would occur to some extent with any shape of the orifice 17. However, the provision of the projection 18 tends to exert a concentrated stress at 44 on the apron. This occasions opening of the material of the apron, permitting escape of gas at this area. This reduces the pressure within the container 1, permitting the apron to retract to the position of Figure 2.

As illustrated in Figure 6 the apron, when bulged, is still firmly retained by the base portion 7, since it extends over a considerable area of the base.

Suitably the body member 12 together with the integral apron 16 and the movable member 27 is formed of nylon. Nylon in the thin form of the apron illustrated is sufficiently flexible, resilient and penetrable by the projection 18. Other materials may be used and this is dependent in some measure on the material with which the bomb is employed.

Substantially all materials customarily dispensed from aerosol containers may be utilized—dispersions such as creams, pastes and the like; and solutions such as medicaments, for example.

It is to be noted that the method of filling and the arrangement of the container provide for a very considerable economy with respect to production line equipment required for filling, since the gas need only be pressured into the container. Further, it is to be noted that the safety features of the container inhibit against disastrous explosions, such as might occur in a car-load shipment exposed to an unusual temperature condition through atmosphere or other effects.

The apron 16 is preferably integral with the body member 12 and supported thereby. However, it could be an attachment. Suitably the apron has the combined characteristics of impermeability to gas under the usual container conditions; permeability without tearing when stressed against the projection, thereby providing a safety feature (Figure 3); resistance to shattering; and resistance to normal conditions to which the aerosol bombs are usually subject. Nylon as noted is suitable, but other materials such as resin treated fibers and fabrics may form the apron.

The concave cover not only provides the support for the valve components but in addition, due to its dished and angled side configuration, it is well adapted to receive thereon elements which extend over the orifices and in addition bear advertising matter, trade-marks, operating instructions and the like.

Thus the cover itself performs a plurality of functions and in combination with the container provides for the economical filling system.

It will be understood that this invention is susceptible to modification in order to adapt it to different usages and conditions and accordingly, it is desired to comprehend such modifications within this invention as may fall within the scope of the appended claims.

What is claimed is:

1. The combination, in an aerosol bomb structure, of a container and a dished cover for the container closing and sealing the container, said dished cover having filling valve means and outlet valve means, said filler valve means comprising an orifice in the base portion of the cover and below the upper extremity of the outlet valve means, a closure for the orifice in the form of an apron which is flexible, gas-impervious and resilient but which is penetrable to pass gas therethrough, and said outlet valve means depending below the cover and supporting said closure beneath the orifice.

2. An aerosol bomb comprising a container, a cover

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closing and sealing the container, an outlet valve in the cover, and filling valve means comprising orifice means through the cover communicating the exterior of the container with the interior and flexible gas-impermeable apron means carried by the said outlet valve within the container closing the gas orifice inlet means and arranged to flex free of the gas inlet orifice means to expose the interior of the container to the exterior through the said orifice means, said outlet valve means and filler valve means being so arranged that gas pressure causing opening of said inlet valve means in the gaseous filling of the container tends to close said inlet valve means.

3. An aerosol bomb comprising a container, a dished cover closing and sealing the container and including an upstanding housing having an aperture providing a passage to the interior of the container from the exterior, an outlet valve in said housing extending through the housing and closing said aperture, said outlet valve including a fixed valve body member projecting below said cover, said cover having orifice means therethrough communicating the interior of the container with the exterior whereby a gas filling may be injected into said container, and flexible, gas-impervious apron means extending from the fixed valve body member beneath the cover closing the orifice means, and being flexible inwardly of the container thereby to expose the orifice means to the interior of the container.

4. An aerosol bomb comprising a container, a dished cover closing and sealing the container and including an upstanding housing having an aperture providing a passage to the interior of the container from the exterior, an outlet valve in said housing extending through the housing and closing said aperture, said outlet valve including a fixed valve body member projecting below said cover, said cover having orifice means therethrough communicating the interior of the container with the exterior whereby a gas filling may be injected into said container, and flexible, gas-impervious apron means extending from the fixed valve body member beneath the cover closing the orifice means, said orifice means including a piercing projection of the cover bounding at least a portion of the orifice means.

5. In a cover for an aerosol container, a base having a plurality of orifices therethrough, peripheral sides of the cover, a first one of which is angled upwardly, outwardly and extends from the base and a second of which extends from the first inwardly, upwardly, a housing projecting upwardly centrally of the base, an outlet valve socketed into the housing projecting above and below the base, and an apron closure for the orifices extending from the outlet valve over the orifices, said apron being gas-impervious,

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flexible and resilient, and penetrable upon flexure to provide for gas passage therethrough.

6. An aerosol bomb comprising a container, a dished cover closing and sealing the container and including an upstanding central housing having an aperture providing a passage to the interior of the container from the exterior, a neck of said housing adjacent a lower portion thereof, an outlet valve comprising a stationary body member having an axial bore and a movable member within the bore, said body member having a shoulder engaging against and retained by the neck of said housing, a gasket in the body member partially closing the aperture of the housing and abutted by said movable member, a plunger stem of the said movable member projecting through the said aperture in sealing contact with the said gasket, said cover having a base portion extending around the said housing and having a plurality of orifices in the base portion, an apron closure integral with the stationary body member extending from the body member over the orifices to close the orifices, said apron being gas-impervious, flexible, resilient and penetrable, and piercing projection means of the cover extending into each orifice in the plane of the base, whereby said flexible apron when urged into said orifice by gas pressure within the container is penetrated by the piercing projection.

7. In a cover for an aerosol container, a base having a plurality of orifices therethrough, peripheral sides of the cover, a first one of which is angled upwardly, outwardly and extends from the base and a second of which extends from the first inwardly, upwardly, a housing projecting upwardly centrally of the base, an outlet valve socketed into the housing projecting above and below the base, a plunger stem of the outlet valve, a stationary member of the valve around the plunger stem, a gasket supported by the stationary member, said stem having a conical surface against which said gasket seals and whereby the pressure on said gasket is varied with the position of the stem, and an apron closure for the orifices extending from the stationary member of the outlet valve over the orifices, said apron being gas-impervious, flexible, resilient and penetrable upon flexure to provide for gas passage therethrough.

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