

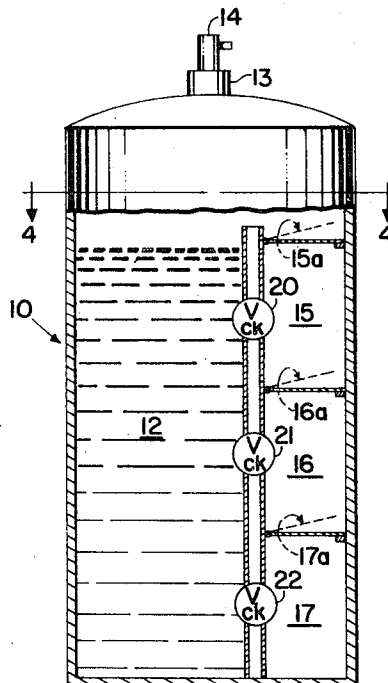
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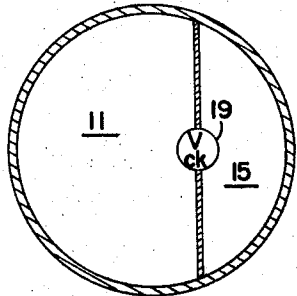
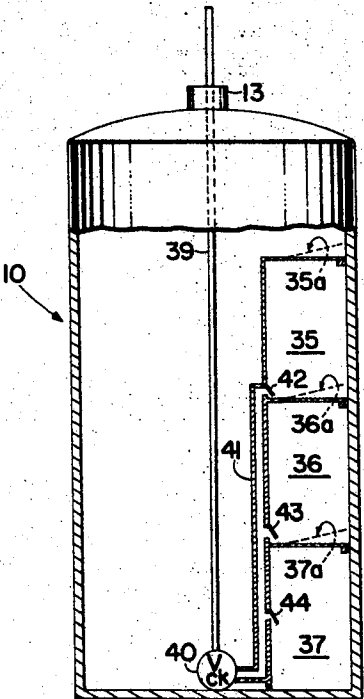
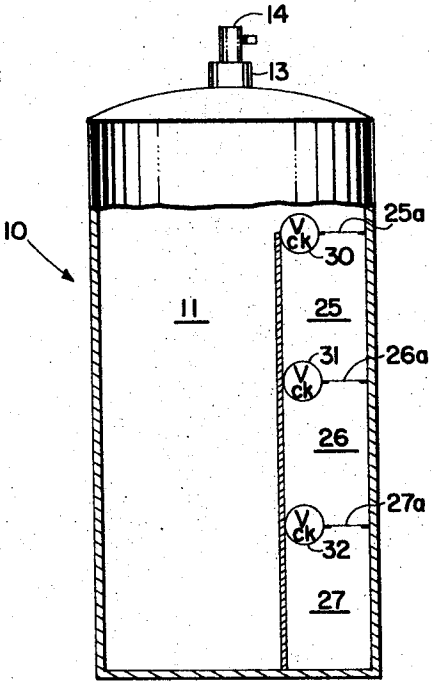
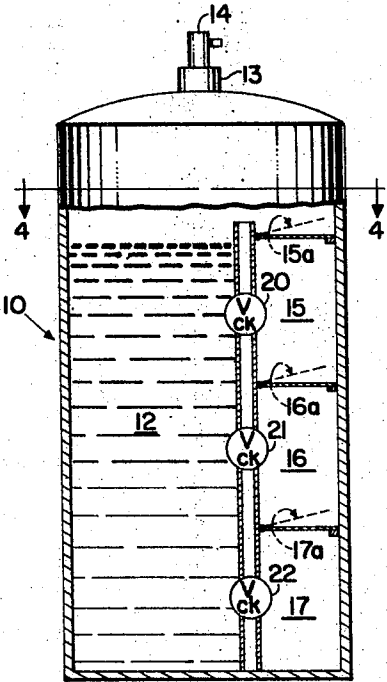
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[54] **AEROSOL DISPENSING CONTAINER WITH
 RESERVE PROPELLANT CHAMBERS**
 6 Claims, 4 Drawing Figs.

[52] U.S. Cl. 222/52,
 222/399
 [51] Int. Cl. B67d 5/08
 [50] Field of Search 222/6, 52,
 61, 399

ABSTRACT: An aerosol dispensing container of the gas-propelled type which includes a plurality of reserve chambers for the propellant gas which are adapted to sequentially release their contained reserve gas supply as the pressure of the propellant gas in the main chamber drops below a predetermined level.





AEROSOL DISPENSING CONTAINER WITH RESERVE PROPELLANT CHAMBERS

BACKGROUND OF THE INVENTION

Disposable, manually operated dispensing devices are widely employed for emitting liquids in spray or foam form with a gas under pressure comprising the driving force. Such devices are commonly referred to as aerosol containers and contain the liquid product to be dispersed, e.g., hair treating liquids, deodorants, perfumes, food products and the like, and a gas propellant such as nitrogen, freon, carbon dioxide, and the like. The product and the propellant are introduced into the can separately, and the repeated opening of the nozzle on the can permits a portion of the product to be expelled with a portion of the escaping propellant.

However, aerosol cans often lose propellant in a disproportionate relationship to the emission of product, with the ultimate result that the can may have a significant quantity of product but insufficient propellant pressure to expel the remaining product.

The existence of the remaining product is readily apparent to the purchaser, who need only shake the can to discover that, although the can is not empty, no more product can be obtained therefrom. A significant marketing disadvantage results in that the customer feels that he has not received value.

A novel aerosol dispensing product has now been found which is not susceptible to the deficiencies of the prior art.

SUMMARY OF THE INVENTION

A novel aerosol container has now been found which provides for a self-contained reserve supply of propellant which is available to dispense the product from the can when the initial supply of propellant is depleted. The novel container comprises a main chamber, containing the product to be dispensed and an initial charge of propellant, and at least a first and second reserve chamber containing propellant adapted to be sequentially released when the propellant pressure in the main chamber drops below a predetermined level. Any number of reserve chambers may be employed, but, in a preferred embodiment, the container is constructed to include three reserve chambers.

The feature of the present invention also permits the employment of pressurized containers of a size heretofore unobtainable since the prior art design of cans which mixes all the propellant with the product would not permit the introduction of the quantity of propellant necessary to expel the relatively large quantity of product.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a vertical section through a container illustrating the novel features of the present invention;

FIGS. 2 and 3 show views similar to FIG. 1 and illustrate alternative embodiments of the present invention; and

FIG. 4 is a horizontal section taken along line 2-2.

DETAILED DESCRIPTION OF THE INVENTION

The novel pressure dispensing container of the present invention is composed of a main compartment for the product to be dispensed and a propellant gas and a plurality of chambers or compartments for holding a reserve quantity of propellant gas. Thus, in operation the main chamber is charged in the conventional manner with the product to be dispensed and the propellant gas to expel said product from the container. The quantity of propellant employed in the main chamber may be varied; the quantity conventionally employed may be charged to the main compartment or, preferably, a quantity less than that normally required for the expulsion of the total quantity of the product. In any event, sufficient propellant should be charged to the main compartment to provide for the emission from the container of at least a major portion of the product in the form desired, i.e., spray, foam or solid stream.

The container also contains a plurality of secondary or reserve chambers which are charged with propellant under pressure and which are adapted to deliver the contained propellant to the main compartment when the propellant pressure in the main compartment reaches a predetermined level. The reserve containers deliver the contained propellant in sequence; thus, the propellant level can be permitted to fall to the above-mentioned predetermined level several times, i.e., to a number corresponding to the number of reserve compartments in the container.

As the product is dispersed from the container, the propellant pressure in the main chamber will fall; when a predetermined pressure level is reached, suitable valving means will open, discharging the contents of one of the reserve chambers into the main compartment thus providing sufficient propellant to insure the continued proper emission of the product from the can. With repeated use, the pressure in the can again falls to a predetermined level, which may be the same or different from the first-mentioned predetermined pressure; a second reserve chamber releases its stored propellant into the main chamber, again raising the propellant level in the main chamber to a satisfactory level for efficient operation. As the product is continued to be expelled from the can, the pressure may again drop to a predetermined level, which may be the same as either or both of the above predetermined levels, or a still different pressure level. The contents of a third reserve chamber will discharge its contained propellant into the main compartment.

By employing the novel container of the present invention, various combinations of pressurized levels of propellant may be employed. For example, it may be desirable to employ the same quantity of propellant that would be required to eject the propellant equally among the main and reserve chambers. Thus, the variation in product expulsion force would vary only slightly throughout the use life of the container. A uniform "average" pressure would always be available to expel the contents of the cans.

It is preferred, however, that a relatively large percentage of the total propellant be employed in the main compartment, e.g., approximately 75 percent of the total propellant with the reserve compartments functioning as true reserve compartments to provide for a more efficient level of propellant in the main chamber of the container upon extended use of the container and to ensure that the last residual quantity of product is effectively discharged from the container in the form, i.e., spray, foam, etc., originally intended by the designer of the product and container.

Deficiencies in manufacture of the container or valve, corrosion, or valve malfunction resulting from accumulation of product therein may cause leakages resulting in a slow loss of propellant upon storage. As a result, the level of propellant may drop to a level inadequate to discharge the product, leaving a container with a relatively large quantity of product but no method of removing it from the container. With the container of the present invention, however, leakages would not require discarding the container because loss of the propellant would only be from the main compartment, and when the loss has reached a point where the first reserve chamber would be activated, a new supply of propellant would be provided to the main chamber. It would not be likely that all the propellant would be discharged to the main chamber from the reserve chambers, since such a situation would probably result from a serious leak, which would be obvious from visual inspection of the can and require discarding the can as a safety measure. By virtue of the present invention, however, most containers which would ordinarily be discarded as a result of leakage of propellant, would remain useable.

Still a further advantage obtained with the container of the present invention resides in the ability to employ containers of a size heretofore not useable. In the past, an effective limit has been placed on the size of the container that can be used; the amount of propellant necessary to expel a relatively large quantity of product from a container would be excessive. The

relatively high pressure would drive the contents out at an unacceptable velocity during initial use, while repeated use would result in great variations in discharge pressures. The high pressures produced by large quantities of propellant would also render the valves highly susceptible to leakage.

Employing a container of the present invention, however, pressurized containers of a size heretofore not obtainable can be achieved. By pressurizing the main chamber with only sufficient propellant to expel the product at the desired velocity and form, a series of reserve chambers can be employed to maintain a predetermined uniform propellant range over the entire use period of the container sufficient to provide product at the desired pressure, but not with an excessive quantity of pressure which may produce the above-mentioned detrimental results.

Turning now to the drawings, FIG. 1 shows container 10 with valve 13 and spout 14 through which the product passes. Valve 13 and spout 14 are not of any specifically required construction; their selection is determined by the type of product to be used in the container and suitable valves and spouts are known to the art. Container 10 is composed of main compartment 11, wherein propellant and product 12 to be expelled are contained. The container also includes a plurality of reserve chambers 15, 16 and 17. While three are shown, it should be understood that any number can be employed depending upon the particular set of conditions desired in the container. As shown in FIG. 1, the reserve chambers 15, 16 and 17 are charged with propellant at the same time as compartment 11. As the propellant reaches a preselected level in compartment 11, check valve 18 will open admitting propellant into tube 19 from which it passes into the reserve chambers through apertures 20, 21 and 22, respectively. As the propellant in compartment 11 is depleted through use, the pressure will drop. Reserve chamber 15 has valve 15a communicating with compartment 11 and which is adapted to open responsive to the aforementioned pressure differential between compartment 11 and chamber 15 discharging the propellant from chamber 15 into compartment 11, thus making additional propellant available for the efficient emission of product 12 from the container.

Upon repeated use of the container the propellant level will again drop to a predetermined level which will activate valve 16a releasing the propellant in chamber 16 into compartment 11. As mentioned above, the pressure level which will activate valve 16a may be the same or different from that which will activate valve 15a or any of the other valves.

As the propellant level in the main compartment is depleted, a predetermined pressure level is again reached which activates valve 17a discharging the propellant from chamber 17 into compartment 11.

As shown in FIG. 1, the contents from the reserve chambers pass through each of the preceding chambers and into compartment 11. It should be understood that the reserve chambers may also discharge directly into the main compartment without passing through any other chambers.

The valves employed in the reserve chamber may comprise any type of valve actuated by a pressure differential; for example, a hinged, spring-loaded valve, shown in an open position in dotted lines in FIG. 1. In an alternative embodiment, a membrane or diaphragm of a synthetic polymeric material or metal adapted to rupture at a given pressure differential may be employed.

FIG. 2 illustrates an alternative embodiment wherein container 10 is composed of main compartment 11, valve 13, spout 14, reserve chambers 25, 26 and 27. The pressure responsive valves 25a, 26a and 27a are polymeric membranes which rupture when a predetermined pressure differential is attained between the reserve chamber and the next adjacent chamber communicating with compartment 11. In the embodiment shown in FIG. 2 charging the reserve chamber is accomplished by introducing the propellant to compartment 11, a portion of which passes through check valves 30, 31 and 32 which are selected to open at a given pressure so that the pressure in compartment 11 will be above that in the reserve chambers during filling to avoid premature rupture of the membranes.

FIG. 4 illustrates still another embodiment of the present invention wherein container 10, composed of main compartment 11, valve 13, and reserve chambers 35, 36 and 37 are charged with propellants in two operations. Compartment 11 is first charged with product and propellant in a conventional fashion. A dip stick 39 is then inserted through valve 13 in a gastight manner and inserted into check valve 40 in the bottom of compartment 11. Check valve 40 is connected to tube 41 which communicates with chambers 35, 36 and 37 through apertures 42, 43 and 44. A pressurized source of propellant is connected to the opposite end of tube 39 and propellant is passed through said tubes and check valves into the reserve chambers. To avoid leakage from one reserve chamber to another, suitable valve means should be inserted in line 41. In still another alternative, check valves are located at apertures 42, 43 and 44 without any valve on the bottom of compartment 11.

For simplicity of illustration, the drawings are shown without any dip tube. It should be understood, however, that as the product requires, dip tubes may be employed.

The novel containers of the present invention are suitable for use with substantially any product employed in pressurized containers. Similarly, any suitable propellant known to the art may be employed, such as nitrogen, freon, carbon dioxide, and the like.

I claim:

1. An expendable dispensing container comprising a main compartment for the substance to be dispensed and a gas propellant for ejecting said substance from said container, and at least a first and second reserve chamber containing gas propellant, said reserve chambers adapted to sequentially release substantially the entire contents thereof into said main compartment.

2. A product as defined in claim 1 wherein said reserve chambers include a spring-loaded valve adapted to open and to release substantially the entire contents thereof when the pressure in the next adjacent compartment drops to a predetermined level.

3. A product as defined in claim 1 wherein said reserve chambers include a diaphragm adapted to rupture at a predetermined pressure differential.

4. A product as defined in claim 1 wherein said container includes three reserve chambers.

5. A product as defined in claim 1 wherein said propellant comprises freon.

6. A product as defined in claim 1 wherein said reserve chambers include check valves whereby said reserve chambers are charged with propellant through said check valves.