

[54] **AEROSOL SPRAY CONTAINER**
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[57] **ABSTRACT**
An aerosol spray container has a spray valve construction which will intermittently spray measured amounts of the container contents in an automatic sequence, but which can also be operated manually, when it is desired to override the automatic operation.

[56] **References Cited**
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4 Claims, 3 Drawing Figures

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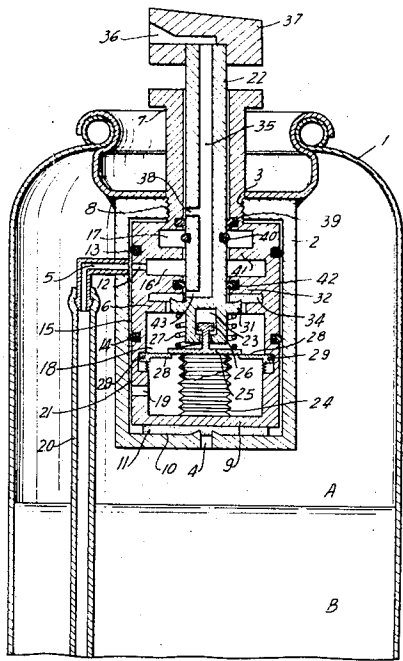


FIG. 1

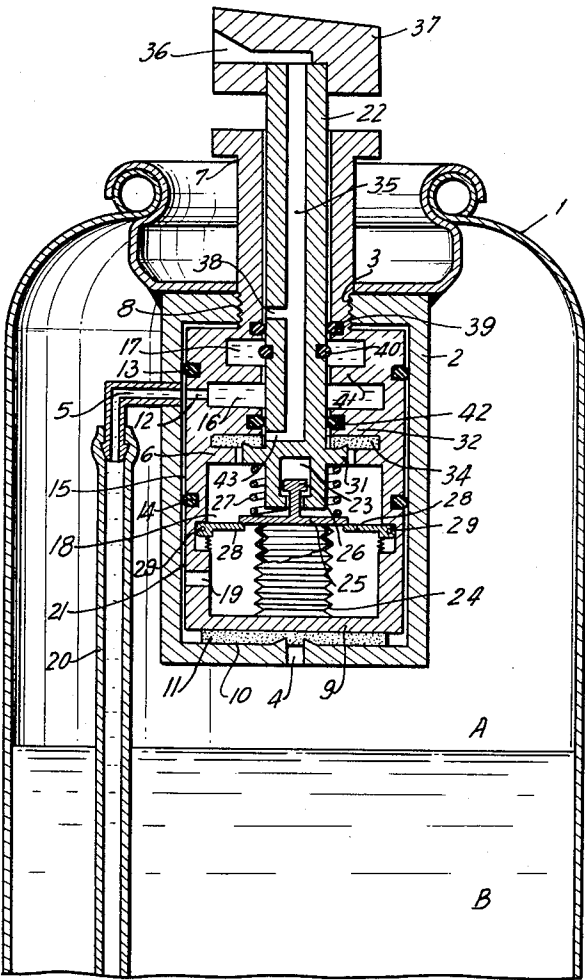


FIG. 2

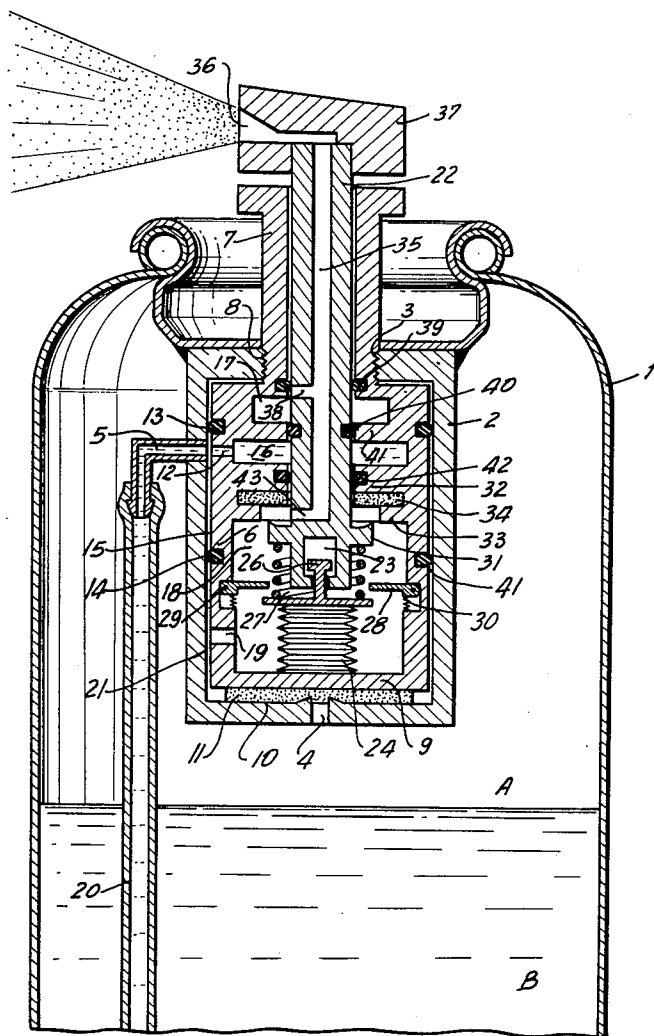
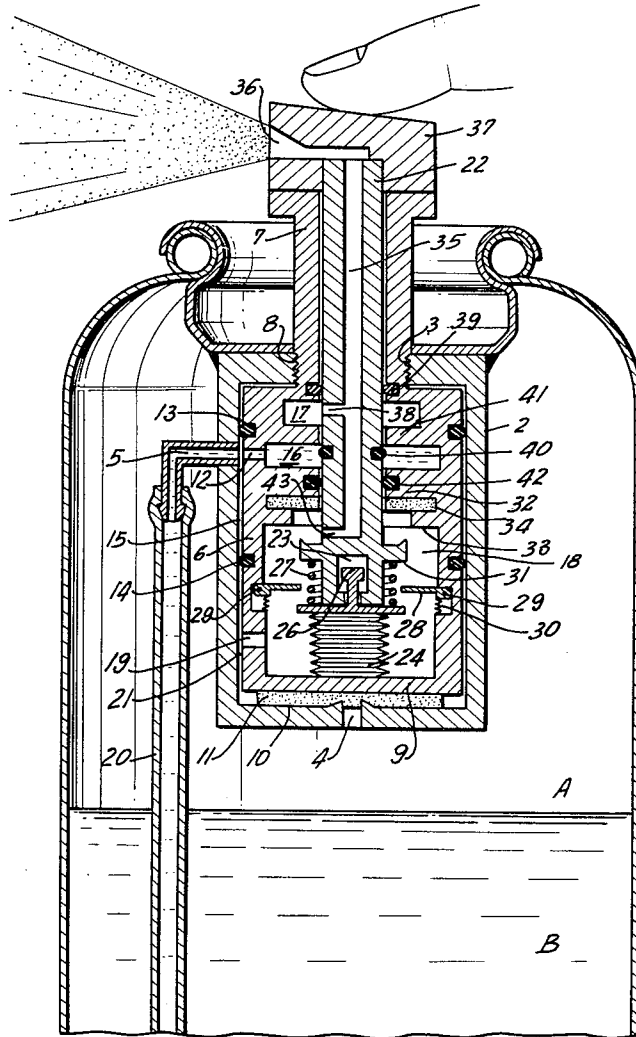


FIG - 3



AEROSOL SPRAY CONTAINER

BACKGROUND OF THE INVENTION

The present invention relates generally to an aerosol spray container, and more particularly to a novel aerosol spray container capable both of manual and automatic intermittent operation.

In some instances it is desirable that a spray container of the aerosol type be capable of dispensing its contents intermittently and automatically, that is without requiring the aid of a user. This may for instance be desired for dispensing room deodorants, insecticides or the like. The requirement having been recognized, the prior art has proposed an aerosol spray container having a valve for automatic intermittent spraying of the container contents, with the valve utilizing a disc-shaped bimetallic element which is alternately subjected to the cooling effect of the latent heat of vaporization generated during spray of aerosol liquid, and the heating effect of the ambient atmosphere. However, the operation of the bimetallic device used in this prior-art construction must be so delicately adjusted that high precision is required in producing the device, leading to considerable expense and also leading to many rejects. In addition, if the level of quality standards for the production of the device is even slightly relaxed, the aerosol container provided with a bimetallic device which deviates even slightly from the established norm will not operate properly.

An additional difficulty with this prior-art construction results in the fact that atmospheric temperature, that is the temperature in the ambient atmosphere surrounding the device, will of course depend on times and location where the container is to be used. This means that the container requires in addition to the bimetallic device a complicated adjusting mechanism to compensate for different ambient temperatures.

Because the heretofore described prior-art construction has thus been somewhat less than fully satisfactory, another construction has been proposed in the prior art utilizing a valve in which the expanding pressure of the aerosol liquid controls the intermittent operation, with the aerosol liquid being directly introduced into the operative valve chamber. Experience has shown that it is difficult in actual use to regulate the time interval at which successive sprays will take place, because the valve is abruptly actuated by momentary vaporization and expansion of the aerosol liquid which is introduced into the valve chamber, even if the liquid is a small quantity. It has also been difficult with this device to obtain a spray of the desired quantity because the valve is actuated by even a small quantity of the aerosol liquid so that the amounts dispensed during successive spraying incidents will vary widely.

SUMMARY OF THE INVENTION

It is, accordingly, an object of the present invention to provide a device of the type here under discussion which is not possessed of the disadvantages of the prior art.

More particularly, it is an object of the present invention to provide such a device which will provide for automatic intermittent spraying of measured quantities of the aerosol container contents at even intervals.

An additional object of the invention is to provide such a device in which the automatic operation may be

overridden by a user so that the device may also be used manually, for intermittent or continuous spraying if and when desired.

In pursuance of these and other objects which will still become apparent hereafter, one feature of the invention resides in an aerosol spray container which, briefly stated, comprises a receptacle having one region for a liquid to be sprayed and a communicating other region for a gaseous propellant under pressure. Valve chamber means is provided in the receptacle and hollow valve stem means has a nozzle portion outside the receptacle and an end portion in the valve chamber means. The valve stem means is slidable in a fixed path toward and away from the wall of the valve chamber means. Resiliently deflectable means is located between the wall and the valve stem means and subdivides the valve chamber means into two compartments which are located successively along the path. The end portion of the valve stem means is located in one of the compartments and bears upon the resilient means. Biasing means is located in the other compartment, bearing upon the wall and the end portion of the valve stem means. First passage means connects the one compartment with the other region. Second passage means connects the interior of the valve stem means with the one region and third passage means connects the one compartment with the interior of the valve stem means, and both the latter connections take place in response to movement of the valve stem means towards the wall.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects 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 DRAWING

FIG. 1 is an axial sectional elevational view of the device according to the present invention;

FIG. 2 is a view similar to FIG. 1 showing the device during an automatic intermittent spraying operation; and

FIG. 3 is a view similar to FIG. 2 but showing the device during manual spray operation.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Discussing the drawing now in detail, it will be seen that in FIGS. 1 - 3 I have illustrated a receptacle 1 in a lower region of which (the bottom of the receptacle is not shown) the liquid B to be dispensed will be accommodated and in an upper region of which the gaseous carrier A will be present. Located in the receptacle 1 is an outer casing 2 secured to an upper portion of the receptacle 1 and the casing 2 has a threaded opening 3 in its upper portion. An aperture 4 is provided in its bottom and in its side wall there is provided a passage 5 for introduction of the liquid to be dispensed. A valve casing 6 is accommodated in the outer casing 2 being slidable therein and provided with a head portion 7 having a thread 8 which is in mesh with the internal thread of the opening 3. An adjusting member, for in-

stance of coutchouc or rubber, but generally speaking of elastically compressible material, is accommodated between the bottom wall 9 and the bottom wall 10 of the outer casing 2, the adjusting member being identified with reference numeral 11 and being compressed between the walls 9 and 10 wherein the head portion 7 is screwed into the opening 3.

The valve casing 6 is provided with an opening 12 located in the upper portion of its side wall and communicating with a gap 15 which is sealingly delimited by O-rings 13. Thus, liquid having passed through a conduit 20 at the passage 5 will pass through the opening 12 and enter into reservoir chambers 16 and 17 provided in the interior of the construction. A valve chamber 18 is provided in a lower portion of the casing 6, communicating via an opening 19 with a gap 21 which is separated from the gap 15 by the presence of the O-ring 14.

A hollow valve stem 22 is provided extending through the head portion 7 into the valve chamber 18 and having an opening 23 in its lower end portion. Loosely received in this opening 23 is an engaging portion 26 of an operative plate 25 which is provided on a bellows 24. A spring 27 between the portion 26 and the plate 25 urges the two apart. The lower portion of the bellows 24 is fixedly secured to the bottom wall 9 and the bellows is sealed, accommodating air or gas under atmospheric pressure.

The plate 25 is supported on resilient support members 28 which are located on at least three circumferentially spaced portions of the wall bounding the chamber 18, each of the members 28 being pivotable about an axis 29 in such a manner that it may flex from the illustrated horizontal position upwardly or downwardly in response to pressure exerted axially of the chamber 18. The members 28 are therefore capable of flexing under a predetermined force, and when the force acts in the direction towards the bellows, they will permit the plate 25 to move downwardly immediately as soon as this force level is reached. Biasing members, here illustrated as compression springs 30, are provided for tending to maintain each of the members 28 normally in horizontal position, reference numeral 31 identifies a flange supporting the springs 27 and defining a valve body which is urged against a resilient valve seat 34 supported between a partition 32 and a flange 33 and surrounding a passage 35 which extends through the valve stem from the valve chamber 18.

The upper portion of the passage 35 communicates with a spray nozzle 36 formed in conventional manner in a push-button 37 which is provided, as in all known aerosol spray containers, for manual operation upon engagement and depressing with the fingers of a user. An opening 38 permits communication of the passage 35 with the chambers 16 or 17 as will be discussed later, and an O-ring 39 is normally positioned below the opening 38 and serves to seal the reservoir chamber 17 relative to the atmosphere. Another O-ring 40 is fitted about the valve stem 22 opposite a partition 41 which separates the reservoir chamber 16 from the chamber 17 so that descent of the valve stem 22 inwardly of the receptacle 1 will result in sealing of the reservoir chamber 17 with respect to the reservoir chamber 16. A further O-ring 42 is mounted on the partition 32

above the lower opening 43 communicating with the passage 35 to seal the gap which communicates with the chamber 16.

The automatic intermittent spray operation of the device thus far described will now be discussed with reference to FIG. 2. It will be understood that part of the gaseous propellant A will progressively enter through the opening 4, the adjusting member 11, the gap 21 and the hole 19 into the chamber 18 when the adjusting member 11 is depressed. The rate at which the propellant A enters into the chamber 18 can be adjusted by adjusting the degree of depression of the adjusting member 11 with a slight rotation of the head 7 in the direction in which it would be unscrewed from the opening 3. As the propellant A enters the chamber 18, the pressure within the latter progressively increases, leading to a simultaneous compression of the bellows 24. The bellows must be so constructed that it is fully extended and subject to a downward force so that it can be readily compressed only in axial direction so that the operative plate 25 will initially tend to move downwardly in FIG. 2, being however prevented from so doing by the presence of the members 28 until the pressure of propellant A in the chamber 18 exceeds a predetermined level at which it is capable of flexing the members 28. When this level is reached the plate 25 will move downwardly at once and as a result the portion 26 will rapidly descend and draw the valve stem 22 downwardly. Now, the propellant A in the chamber 18 can discharge through the opening 43 which has been moved downwardly to the level of the chamber 18, and via the passage 35 to the atmosphere. Before this takes place, the chambers 16 and 17 will be filled — they are filled constantly — with the liquid B which enters through the conduit 20. As the valve stem 22 thus moves downwardly, the quantity of liquid accommodated in the chamber 17 is discharged via the nozzle 36 when the opening 38 of the stem 22 moves beyond the O-ring 39 as the stem 22 descends.

It is important to note that only a specifically measured predetermined quantity of liquid from the chamber 17 is to be sprayed, and that the provision of the O-ring 40 which is urged against the periphery of the partition 41 seals the chamber 16 and prevents spraying of its contents.

As the gaseous carrier A is discharged from the chamber 18, the pressure in the chamber 18 drops and the plate 25 is then returned to its initial position — flexing the members 28 upwardly — as the gas sealed in the bellows 24 restores the latter to its normal configuration. The before-discussed operation is repeated when additional gaseous carrier A progressively enters into the valve chamber 18 and eventually attains again the predetermined pressure, at which time the chamber 17 will again be filled with liquid and the stem 22 will again be moved downwardly in the manner described above.

As already pointed out, however, the device according to the present invention can also be operated manually. This is shown in FIG. 3. It will be seen that if the push-button 37 is depressed to the extent that the O-ring 40 moves downwardly beyond the partition 41, releasing sealing contact between the O-ring 40 and the partition 41, communication will be established between the chamber 16 and the chamber 17. As a

result of this, the liquid B which is under the pressure of the gaseous carrier A which is located in the upper part of the receptacle 1, is expelled through the conduit 20, the passage 5, the aperture 12, the chambers 16 and 17, and the opening 38 in a continuous spray. When pressure on the button 37 is released after a desired quantity of the liquid has been dispensed, the stem 22 automatically returns to its initial position and spraying will terminate.

It is clear from the disclosure herein that a device according to the present invention can operate both manually and also can spray automatically at intervals which are controllable as to their lengths, and that furthermore the quantity of liquid dispensed during each automatic intermittent spraying incident will be accurately measured. Thus, the device according to the present invention provides full freedom for the user over the control of its operation. The device may be readily operated and adjusted, depending upon the requirements of a given location, without being affected by the ambient atmospheric temperature and the time or place of use. A spray of predetermined quantity during each automatic spraying incident is assured and the device according to the present invention thus overcomes all of the disadvantages which have been outlined in the introductory portion of the specification with reference to the prior art.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of constructions differing from the types described above.

While the invention has been illustrated and described as embodied in an aerosol spray 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 and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

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

1. In an aerosol spray container, in combination, a receptacle having one region for a liquid to be sprayed and a communicating other region for a gaseous propellant under pressure; valve chamber means in said receptacle; hollow valve stem means having a nozzle portion outside said receptacle and an end portion in said valve chamber means, said valve stem means being slidable in a fixed path toward and away from a base wall of said valve chamber means; resiliently deflectable means between said wall and valve stem means and subdividing said valve chamber means into a lower and an upper compartment located successively along said path, said end portion located in one of said compartments and bearing upon said resiliently means; biasing means in the other compartment bearing upon said wall and said end portion; first passage means connecting said lower compartment with said gas region; and second passage means connecting the interior of said valve stem means with said liquid region, and third passage means for connecting said compartments with the interior of said valve stem means, in response to movement of the latter towards said wall.

2. In an aerosol spray container as defined in claim 1, said resiliently deflectable means being deflectable towards said wall under a predetermined pressure which is greater than the force required for compressing said biasing means.

3. In an aerosol spray container as defined in claim 2, wherein said biasing means is a sealed bellows whose interior is at atmospheric pressure.

4. In an aerosol spray container as defined in claim 2, wherein said valve stem means is movable towards said wall to a first operative position in which said third passage means connects said one compartment with said valve stem means, and a second operative position closer to said wall and in which the interior of said valve is connected with both of said regions.

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