DEVICE FOR AUTOMATICALLY DISCHARGING AN EFFECTIVE SUBSTANCE INTO A NORMALLY CLOSED ROOM

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ABSTRACT
In automatically discharging an effective substance, such as a deodorizing agent, from an aerosol container into a normally closed room, such as a bathroom, closet and the like, the aerosol container is pivotally mounted in a rigid holder secured to the door of the room so that the container provides a flywheel mass which discharges the effective substance when the door is displaced from its normally closed position. Preferably, a tilting valve forms the discharge member from the container, the container can be supported by the holder in the upright or inverted position. In effecting a slow release of the effective substance, it can be sprayed into a porous sponge-like member secured in the holder from which it slowly evaporates. Further, for signalling that the container is empty, a whistle device can be arranged at its outlet opening for providing a whistle tone when the container is empty or a whistle tone can be provided at each discharge from the container so that the tone is no longer emitted when the container becomes empty.

20 Claims, 8 Drawing Figures
DEVICE FOR AUTOMATICALLY DISCHARGING AN EFFECTIVE SUBSTANCE INTO A NORMALLY CLOSED ROOM

SUMMARY OF THE INVENTION

The present invention is directed to a device for spraying an effective substance, such as a deodorizing agent, a perfuming agent, an insecticide and the like, into a normally closed room and, more particularly, it concerns an arrangement for pivotally mounting a container holding the effective substance so that the substance is automatically discharged into the room each time a closure member for an entry way into the room is opened.

In the past, it has been known to use deodorizing or perfuming sprays for lavatories, bathrooms, closets and similar rooms or chambers. Such sprays are normally supplied in a spray can and must be manually operated, that is the valve is hand actuated in spraying the substance. Further, it has been known to use a manually operated pump atomizer in spraying a deodorant, however, an embodiment has been known where the spray device is coupled with the movement of a toilet seat and cover. Auxiliary devices have also been known for mounting the spray container in a stationary position with the spray valves or pumping units being actuated manually in a more or less convenient manner.

These various devices are generally cumbersome and often they are not used for the intended purpose because it is inconvenient to do so or their use is overlooked.

Devices for discharging effective substances, such as deodorizing and perfuming agents, are also known which are used in lavatories, closets and the like and from which a constant discharge of the substance is made into the room in which it is located. However, a continuous discharge is undesirable because the concentration of the effective substance in the room can become too high due to inadequate ventilation or infrequent opening of the door or entryway into the room.

Therefore, the primary object of the present invention is to provide a device from which the discharge of an effective substance is performed automatically in proportion to the frequency with which the door to a room is opened and closed so that the problem of an undesirably high concentration of the effective substance is positively avoided. Further, in this arrangement the loss of the effective substance from the room at each opening of its door is taken into account by the amount of the substance which is discharged.

In accordance with the present invention, the discharge of the effective substance into a room is provided by pivotally mounting a container for the effective substance on the door or other closure member for the room so that the container forms a flywheel mass which opens and closes a discharge member from the container as the door opens and closes. Due to the inertia of the flywheel mass as the door is opened and closed, a practically constant amount of the substance is discharged from the container so that the concentration of the substance within the room does not increase with time, since the addition of the effective substance is proportional to the frequency of access to the room and thus of its ventilation whenever the door is opened. For example, in the case of a closet door which opens outwardly from the closet, the effective substance is discharged into the closet when its door is opened and, similarly the process is repeated when the door is closed, with the discharge occurring normally at the commencement of the closing movement and at the sudden stop when the closed position of the door is reached. In the case of a lavatory or bathroom door, the process is reversed, that is, the sudden acceleration which occurs when the door is opened effects a discharge of the effective substance and likewise the sudden stop when the door is closed also causes a discharge of the substance into the room.

Preferably, aerosol spray cans are used as the containers for the effective substance with a tilting valve affording a particularly effective discharge control element. If a tilting valve is used, the discharge spray jet can be effected in two different directions corresponding to the pendulum movement of the container and to the tilting action of the valve. This arrangement has the special advantage that it affords a better distribution of the effective substance into the room. Further, various known pumping devices can be used for discharging the substance from the container. It is also possible to provide the container with a device which prevents any exchange between the atmosphere surrounding the container and the contents of the container when it is located in its normal position. The discharge or spray of the effective substance is provided only when the container is displaced from its normal at rest position. Accordingly, the effective substance is discharged into the room only when its container is displaced from its normal position. It is also possible to mount the containers on the door in such a way that the discharge is provided during the opening and/or closing of the door by the inertia of the contents of the container. For example, such a container can be designed in the manner of a bird bath.

In addition to pivotally mounting the container on the door, it can be combined with a pendulum and mounted in a holder on the door so that, as the pendulum is deflected from its rest position, it actuates the discharge member or valve of the container. If necessary, an intermediate lever can be provided between the pendulum and the valve.

In a particularly simple arrangement the container itself can be used as the flywheel mass. If the container should not provide sufficient weight for the mass, particularly as the container is emptied, and especially when it is arranged in an inverted position so that its center of gravity is displaced downwardly, the container can be provided at its base with a ring or disk-shaped weight. Preferably, the weight should be detachable so that it can be used with successive containers and only one such weight need be purchased.

In a particularly desirable embodiment of the invention the container for the effective substance is an aerosol can with a tilting valve having an outwardly projecting part of the valve cone arranged to be inserted into a bore in a rigid holder with the container arranged in an inverted position. A similar container and tilting valve arrangement is used with the container in the upright position and the outwardly projecting part of the cone valve fitted into the bore of a sleeve and secured within the sleeve by a binder, such as cement or other adhesive. In supporting the container on a door or similar closure member, the sleeve is inserted into a slot in a forked holder which is rigidly fixed to the door, with a shoulder on the sleeve bearing against a support surface in the holder.
When an aerosol can is used as the container for the effective substance with its discharge opening located at the bottom, in a preferable arrangement the spray jet can be aimed downward onto a porous, sponge-like member supported in the holder for the container. The effective substance sprayed into the sponge-like member is released into the room in a slow manner by evaporation. The advantage of such a design is found in the extended period over which the effective substance is released into the surrounding atmosphere. If such a release arrangement is located in a closet, a bathroom, a lavatory or the like, on the inner side of the door, the effective substance is discharged from the container whenever the door is opened and closed. If the effective substance is released from the container when the door is opened, a portion of the substance would be wasted since the full amount would not be retained in the room which is to be treated. However, if all or a very substantial proportion of the effective substance is absorbed by the sponge-like member, it will be released into the room after the door has been closed. Another advantage of such a device is that the effective substance sprayed into a closet containing garments and the like avoids an excessive concentration of the substance being sprayed directly onto the garments.

It is advisable to limit the amount of deflection of the flywheel mass from its rest position, particularly when the container itself is used as the flywheel mass, for avoiding any damage to the discharge element of the container. To afford the return of the container acting as the flywheel mass into its rest position, in which the discharge member is closed, at least one elastic return element can be provided in operative engagement with the container.

In practice it has been found that in certain cases, for example, when the device is mounted on a bathroom door used by a family of three, the contents of the container, generally an aerosol can, may be exhausted too rapidly, for example, in about a week. In such an instance too great an amount of the effective substance is discharged with the propellant gas each time the device is actuated. A reduction in the amount of effective substance used cannot be prevented or can be achieved only with great difficulty, by means of the container. To avoid the problem of the discharge of excessive amounts of the effective substance, it is possible to assure that only a gaseous mixture is sprayed from the aerosol container. When only a gaseous mixture is sprayed, the amount of substance discharged at each operation is reduced as compared to an arrangement where the effective substance is supplied in a liquid form even if it is in a very fine spray. The solution of the problem is provided by utilizing an azeotrope in the aerosol can, that is a mixture of the effective substance and propellant in a mixing ratio in the liquid phase which is exactly equal to the mixing ratio in the gas formed in the container with the removal of the container by the gas made not from the liquid chamber of the container, which is the normal procedure, but from the gas chamber, this special discharge arrangement can be effected, if a container with a downwardly directed discharge is used, by providing a tube extending into the gas chamber in the container. However, if a container is used with an upwardly directed discharge member, the member can be connected directly into the gas chamber located in the top of the container. Thus, the arrangement is reversed from that in known aerosol cans which have the discharge element located at the top and a tube connected to the discharge member extending to the bottom of the container, that is into the lower end of the liquid chamber.

In these devices, each time the valve of the container is opened, a spray jet issues for a brief period of time into the room and the spray is composed of liquid (effective substance and unevaporated propellant) and propellant gas. The discharge procedure is repeated until liquid no longer issues in the spray but only the propellant gas. However, if an azeotropic mixture is used, the spraying action continues until the container is completely empty.

When the aerosol container is finally emptied, it must be replaced with a full container. However, the need for replacement may be overlooked if the user does not observe whether a spray jet is issuing from the container. This is a particular problem in automatically controlled aerosol containers, such as used in the present invention, as contrasted to manually operated aerosol containers and especially when the spray jet is directed into a sponge-like member rather than directly into the room. Where the sponge-like member is used, a spray jet cannot usually be observed and a user even when carefully observing the operation, cannot determined if the container still holds some of the effective substance.

To provide a positive indication that the aerosol container is empty and one which a user can easily note, a whistle or flute-like device is provided which indicates when the effective substance in the container has been used up. To provide the whistle tone, a channel leading to a cavity or forming the cavity itself is positioned perpendicularly to the path of the spray jet from the container and its opening is arranged slightly obliquely to and in the path of the spray jet so that a whistle tone is emitted when the liquid contents are completely used up, or if an azeotropic mixture is used in the container, a whistle tone is produced until the container is empty after which the whistle tone ceases. In one case the user of the device notices that the container is empty when the whistle tone commences, and in the other case notices that the container is emptied when the whistle tone ceases. In either case, no whistle tone is produced as long as the spray jet contains liquid constituents. When the liquid contents, that is the effective substance, in the aerosol can is exhausted, only propellant gas issues from its discharge outlet and flows passed the whistle-like device producing the whistle tone. Consequently, a shrill whistle tone is produced when the propellant gas (without any liquid effective substance) is released. Thus, the fact that the can is emptied cannot go unnoticed. The user can be informed by a corresponding reference in the directions of use that the effective substance in the aerosol container is marked have been used up when the whistle tone appears and that the empty container should be replaced by a new full one. If an azeotropic mixture is utilized in the container, the signalling operation operates in a reverse manner. When the azeotropic mixture issues from the can, a whistle tone is produced, accordingly, when the whistle tone ceases, a user is notified that the container needs to be replaced.

The whistle can be provided in any desired manner, for example, as a recorder, a transverse flute and the like. The simplest solution to the problem is the use of the barrel key principle, consisting of a simple closed
channel with the closed channel extending transversely of the path of the spray jet issuing from the container and with the opening to the channel arranged slightly obliquely to and in the path of the jet.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a better understanding of the invention, its operating advantages and specific objects attained by its use, reference should be had to the accompanying drawings and descriptive matter in which there are illustrated and described preferred embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is a side elevational view, partly in section, of a device embodying the present invention with a container for the effective substance arranged in the inverted position;

FIG. 2 is a side elevational view, partly in section, of another device embodying the present invention with the container arranged in the upright position;

FIG. 3 is a side elevational view, partly in section, of still another device embodying the present invention which utilizes a pendulum for effecting the opening of the container;

FIG. 4 is a side elevational view of another arrangement of a device embodying the present invention, similar to that shown in FIG. 1, but arranged for directing discharge from the container in an indirect fashion;

FIG. 5 is a horizontal sectional view taken along the line V—V in FIG. 4;

FIG. 6 is a horizontal sectional view taken along the line VI—VI in FIG. 4;

FIG. 7 is a side elevational view, partly in section, of yet another embodiment of the present invention which includes a whistle device; and

FIG. 8 is an enlarged detailed view of a portion of the device shown in FIG. 7.

DETAILED DESCRIPTION OF THE INVENTION

In the various embodiments of the invention shown in the drawings, the container for the effective substance is an aerosol can and its discharge member is exclusively a tilting valve, however, the principles of the invention can be utilized, as indicated previously, in aerosol cans with normal spray valves, that is, valves which are actuated in the direction of the longitudinal axis of the cans. Further, a pump unit can be used as the discharge member for the container and the discharge member can incorporate a device which prevents any exchange between the contents of the container in its normal at-rest position and the surrounding atmosphere, such containers discharge the effective substance only if they are deflected from their normal position. Containers can also be used which are rigidly secured on a member which can be opened and closed in gaining access to the room or chamber into which the effective substance is sprayed and where the spraying action results from the inertia of the contents of the container which effect the opening of the discharge member. Such containers can be designed in the manner of a bird bath.

In the drawing, a closure member 1 provides a movable part through which access is gained into the room in which the effective substance is sprayed. Normally, the closure member 1 is a door or the like and a container 2 in the form of an aerosol can is mounted on the closure member. Discharge of the effective substance from the container 1 is provided through a tilting valve 3 having a valve cone 4 which projects outwardly from the container.

In the embodiment illustrated in FIG. 1, the container 2 is in an inverted position and the valve cone part 4 is inserted downwardly into a bore 5 in a holder 6 which is rigidly secured on the closure member 1. As indicated in FIG. 1, the spray jet from the container is directed downwardly and is produced by the movement of the closure member in the opening or closing direction due to the pivotal mounting of the container 2 relative to the holder 6. When the tilting valve 3 is opened the effective substance exits from the container in a spray jet 7 in the downward direction, as mentioned above.

In the embodiment shown in FIG. 2, the projecting part 4 of the tilting valve 3 is inserted into a sleeve 8 and is attached to the sleeve by means of a clamping action or by a binder, that is an adhesive material of some sort. In this arrangement, the container 2 is arranged in the upright position and its spray jet issues upwardly through the bore 9 in sleeve 8 when the container is pivotally displaced for opening the tilting valve 3. In the arrangement shown in FIG. 1, as the container is slowly emptied its center of gravity moves downwardly and, as a result, the flywheel moment of the container 2, acting as a flywheel mass, diminishes as the effective substance is used up. To avoid the decreasing effect of the flywheel moment, a weight 12 in the form of a ring or disk shape member is secured to the bottom of the container by a clamp 11. When the container 2 is replaced with a fresh container, the clamp 11 and the weight 12 can be removed from the used container and placed on the fresh one so that the weight and clamp can be reused.

In FIG. 3, the holder for the container 2 consists of two parts 13 and 14 spaced apart in the vertical direction, and the flywheel mass consists of a pendulum with a downwardly extending arm 15 having a weight 16 secured to its bottom end. The pendulum arm 15 is pivotally mounted on the upper holder part, or, if necessary, the top of the container 2 itself and it actuates the tilting valve 3 either directly or through the medium of an intermediate lever 17. In this arrangement the spray jet from the container is directed upwardly, in the same manner as in FIG. 2.

In the embodiment shown in FIGS. 4 to 6, the same parts of the device are designated by the same reference numerals as in the previous Figures. In this embodiment, the container is arranged in an inverted position and fits downwardly into a holder 18 which consists of a hub-shaped part 19 with a bore extending downwardly through the hub-shaped part and into which the outwardly projecting part 4 of the tilting valve is secured. Three plate-shaped spokes 21 extend radially outwardly from the hub-shaped part 19, note FIGS. 5 and 6. While the upper portion of the spokes 21 extend from the hub-shaped part outwardly to the periphery of the holder 18 in the lower part of the holder the hub is omitted and the inner ends of the spokes have an outwardly stepped arrangement. The stepped arrangement of the spokes provides a recess 22 into which a porous sponge-like member 23 is inserted, note FIG. 6. The sponge-like member can be provided in any form before it is inserted into the recess 22, for
example it may be supplied in a square form. Accordingly, when the effective substance is sprayed from the container 2, it is directed toward the sponge-like member and all or most of the substance is absorbed by the member. As a result, instead of being directly sprayed into the room, the substance evaporates slowly from the member 23 and is released into the room.

In the embodiment represented in FIGS. 7 and 8, an aerosol can serves as the container 2 for the effective substance and the discharge member is a tilting valve 3, however, the principle disclosed in this embodiment can be used in the same manner with spray cans having a normal spray valve, that is one which is actuated in the direction of the longitudinal axis of the aerosol can and also in containers which utilize a pump unit as the discharge member.

As mentioned previously, the closure member 1 provides access into the room in which the container 2 is positioned. In this arrangement the container 2 is in an inverted position and the projecting part 4 from its tilting valve 3 extends downwardly through a bore 5 in the holder 6 which is rigidly secured to the closure member 1. At the lower end of the projecting part 4, a device 24 is secured for providing a whistle signal and the device 24 can be formed integrally with the holder 6. The device 24 has a bore 25 into which the outlet end of the part 4 seats so that the spray jet from the container passes downwardly through the bore. A portion of the device 24 extends laterally from the projected axis of the part 4 and contains a closed bore 26. The bore 26 has its axis arranged substantially perpendicularly to the spray jet and the opening 27 to the bore is arranged slightly obliquely to and in alignment with the bore 25 in which the outlet opening from the part 4 is located. When the spray jet is activated from the container, it produces a whistle or flute-like tone when the effective substance is exhausted or it provides a whistle tone as an azeotropic mixture is discharged from the container and the tone is stopped when the azeotropic mixture is completely used up. Accordingly, a signal is provided by the device 24 for positively indicating to a user when the container is emptied and needs to be replaced.

While specific embodiments of the invention have been shown and described in detail to illustrate the application of the inventive principles, it will be understood that the invention may be embodied otherwise without departing from such principles.

What is claimed is:

1. Device for automatically discharging an effective substance, such as a deodorizing agent, a perfuming agent, an insecticide and the like, into a normally closed room or chamber, such as a lavatory, bathroom, closet and the like, which room has an access entry way closed by a closure member, such as a door, wherein the invention comprises a container for the effective substance, a discharge member mounted on said container for regulating the discharge of the effective substance from said container and said discharge member maintained in a normally closed position, and holder means for securing said discharge member and for pivotally mounting said container relative to said discharge member with said means arranged to be secured to a closure member so that in response to the movement imparted through said means to said container as the closure member is opened and closed, said container pivots relative to said discharge member held by said means and the pivoting action displaces said discharge member from its normally closed position into its open position and the effective substance is discharged from said container through said discharge member.

2. Device for discharging an effective substance, as set forth in claim 1, wherein said discharge member include means for preventing any contact between the outside air about said container and the contents including the effective substance within said container.

3. Device for discharging an effective substance, as set forth in claim 1, wherein said means for mounting said container includes a holder arranged to be secured to the closure member for supporting said container, and a pendulum mounted on one of said container and holder and arranged in operative engagement with said discharge member of said container for opening said discharge member when said pendulum is displaced from its rest position.

4. Device for automatically discharging an effective substance such as a deodorizing agent, a perfuming agent, an insecticide and the like, into a normally closed room or chamber, such as a lavatory, bathroom, closet and the like, which room has an access entry way closed by a closure member, such as a door, wherein the invention comprises a container for the effective substance, a discharge member mounted on said container and maintained in a normally closed position, and means for mounting said container on the closure member and for opening and closing said discharge member due to the flywheel mass mounted on the closure member and pivoting as the closure member is displaced from the access entry way so that the effective substance is discharged into the closed room or chamber when the closure member is displaced from its position closing the access entry way, said container for the effective substance is an aerosol can, and said discharge member is a spray valve fitted to the outlet of said aerosol can.

5. Device for discharging an effective substance, as set forth in claim 4, wherein said spray valve is a tilting valve.

6. Device for discharging an effective substance, as set forth in claim 4, wherein said discharge member is a pump unit connected to said container.

7. Device for discharging an effective substance, as set forth in claim 4, wherein said container is pivotally mounted on the closure member and acts as the flywheel mass in effecting the discharge of the effective substance from said container.

8. Device for discharging an effective substance, as set forth in claim 4, wherein said mounting means pivotally mount said container, and a weight is secured to said container spaced in the axial direction of said container from the position at which said container is supported on said mounting means.

9. Device for discharging an effective substance, as set forth in claim 8, wherein said weight comprises a member conforming to the shape of and detachably secured to the bottom of said container.

10. Device for discharging an effective substance, as set forth in claim 4, wherein said discharge member is a tilting valve, an outlet member forming a discharge passageway secured to and extending outwardly from said valve, a sleeve having a bore therethrough, said member being secured within the bore in said sleeve, said mounting means pivotally mounts said container and is a rigid forked holder secured to said closure
member and has a slot formed therethrough with a support surface therein, and said sleeve having a shoulder intermediate its ends so that said shoulder bears against the support surface in said slot.

11. Device for discharging an effective substance, as set forth in claim 4, wherein said mounting means pivotally mounts said container and is attached to the closure member and includes holding means, a porous sponge-like member fitted within said holding means in the path of the outlet from said discharge member whereby the effective substance is sprayed onto said sponge-like member and is released at a slow rate to the surrounding atmosphere.

12. Device for discharging an effective substance, as set forth in claim 11, wherein said holding means comprises a hub containing a bore therethrough, a plurality of spoke-like members extending radially outwardly from said hub, and said spoke-like members extending below said hub and forming a recess into which said sponge-like member is fitted, and said container is mounted in an inverted position in said mounting means.

13. Device for discharging an effective substance, as set forth in claim 4, wherein said mounting means pivotally mount said container, and other means are arranged so that the deflection of the flywheel mass provided by said container is limited for preventing damage to said container.

14. Device for discharging an effective substance, as set forth in claim 13, wherein at least one elastic return element is arranged in operative engagement with said container for ensuring the return of said container when it acts as the flywheel mass into its rest position in which said discharge member is closed.

15. Device for discharging an effective substance, as set forth in claim 4, wherein said container contains an azeotrope which is a mixture of the effective substance and a propellant where the mixing ratio between the effective substance and the propellant in the liquid phase is exactly equal to the mixing ratio in the gas forming in the container.

16. Device for discharging an effective substance, as set forth in claim 15, wherein said container is arranged in an inverted position with the outlet from said discharged member directed downwardly, and said container including a gas chamber located in its upwardly arranged end, and a tubular passageway extending between said discharge member and said gas chamber.

17. Device for discharging an effective substance, as set forth in claim 15, wherein said container is arranged in the upright position and includes a gas chamber located in its upper end, and said gas chamber being connected directly to said discharge member.

18. Device for discharging an effective substance, as set forth in claim 4, wherein means for forming a whistle tone is arranged at the outlet from said discharge member of said container for indicating acoustically when the effective substance is exhausted from said container and said container requires replacement.

19. Device for discharging an effective substance, as set forth in claim 18, wherein said means for forming a whistle tone includes a tubular channel arranged substantially perpendicularly to the path of the outlet from said discharge member, said channel having an opening which is in alignment with the outlet path from said discharge member and is slightly obliquely disposed relative to the outlet path for emitting a whistle tone when the effective substance in said container is used up or for emitting a whistle tone while an azeotropic mixture is being dispensed from said container and discontinuing the whistle tone when the azeotropic mixture is exhausted.

20. Device for discharging an effective substance, as set forth in claim 4, wherein said discharge member is a tilting valve, said mounting means comprises a rigid holder for pivotally mounting said container with said rigid holder arranged to be secured to the closure member and said holder having a bore therethrough, said tilting valve having an outlet member for the effective substance projecting outwardly from said container and said outlet member extending downwardly into the bore in said holder with said container arranged in the inverted position.