

AEROSOL CAN

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit under 35 U.S.C. § 119 of U.S. Provisional Application No. 63/551,700, filed February 9, 2024, the contents of the aforementioned application is hereby incorporated by reference herein in its/their entirety.

TECHNICAL FIELD

[0002] The present disclosure relates generally to aerosol cans.

BACKGROUND

[0003] Aerosol products, such as for example paint, are typically dispensed into a can and pressurized. Typically, the can is pressurized in one of two ways: under the cup and through the valve. Most current products are filled under the cup, not through the valve.

[0004] Used aerosol cans can be difficult to dispose. It can be difficult for the user to depressurize the can once all the contents, such as paint, has been sprayed. A second problem is once the user has sprayed all the dispensable product, some amount of the product remains in the can. Both of these conditions lead to problems when the user needs to dispose of the can. The can may explode if one tries to burn or crush it. The applied heat or the crushing action will increase the can's internal pressure and thus an explosion risk is presented. Also the content remaining in a paint can may represent a hazardous chemical or fire hazard and thus another disposal problem.

OVERVIEW OF EXAMPLE EMBODIMENTS

[0005] The following presents a simplified overview of the example embodiments in order to provide a basic understanding of some aspects of the example embodiments. This overview is not an extensive overview of the example embodiments. It is intended

to neither identify key or critical elements of the example embodiments nor delineate the scope of the appended claims. Its sole purpose is to present some concepts of the example embodiments in a simplified form as a prelude to the more detailed description that is presented later.

[0006] In accordance with an example embodiment, there is disclosed herein, an apparatus that comprises a container having an interior space configured to hold a pressurized fluid to dispense aerosolized. The container further comprises a first end and a second end. The first end of the container is configured to dispense the contents of the pressurized fluid. The second end of the container is shaped like an inverted dome and has an adapter that provides access to the interior space of the container.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] The accompanying drawings incorporated herein and forming a part of the specification illustrate the example embodiments.

[0008] FIG. 1 is a perspective view illustrating an example of a container upon which an example embodiment can be implemented.

[0009] FIG. 2 is a cutaway view of the container illustrated in FIG. 1 along the A-A. In the illustrated example, the second surface 14

[0010] FIG. 3 is a cutaway view of the container illustrated in FIG. 1 with a valve located inside the container.

[0011] FIG. 4 is a perspective view illustrating an example of a container with an external valve assembly mounted on the first end.

[0012] FIG. 5 is a detailed perspective view of the example illustrated in FIG. 4 without the external valve assembly mounted on the first end.

[0013] FIG. 6 is a perspective view illustrating an example of the second end of the container.

[0014] FIG. 7 is a perspective view illustrating an example of a valve body that can be coupled with the adapter at the second end of the container.

[0015] FIG. 8 is a block diagram illustrating an example cutaway view of a container with a valve assembly in the interior space coupled with the adapter at the second end of the container.

[0016] FIG 9 is a perspective view illustrating an example of a container with a first nozzle coupled with the first end of the container and a second nozzle coupled with the second end of the container.

DESCRIPTION OF EXAMPLE EMBODIMENTS

[0017] This description provides examples not intended to limit the scope of the appended claims. The figures generally indicate the features of the examples, where it is understood and appreciated that like reference numerals are used to refer to like elements. Reference in the specification to "one embodiment" or "an embodiment" or "an example embodiment" means that a particular feature, structure, or characteristic described is included in at least one embodiment described herein and does not imply that the feature, structure, or characteristic is present in all embodiments described herein.

[0018] FIG. 1 is a perspective view illustrating an example of a container 10 upon which an example embodiment can be implemented. In an example embodiment, the container 10 is hollow and comprises a first (e.g., top) end 12 and a second (e.g., bottom) end 14. The first end 12 comprises a collar 16 and an opening 18. As will be shown and described herein *infra*, the a first end of the container is configured to dispenses the contents, such as a pressurized fluid of the container 10.

[0019] As will described herein *infra*, the second end 14 is shaped like an inverted dome (or concave). The second end comprises an adapter that can be employed for depressurizing the container 10 and/or for filling the container 10.

[0020] FIG. 2 is a cutaway view of the container 10 illustrated in FIG. 1 along the A-A. The second end 14 is shaped like an inverted dome 20. The bottom surface 14 comprises an adapter 22 coupled with the inverted dome. The adapter 22 can be employed for depressurizing the container 10 and/or for filling interior space 24 of the container 10. In an example embodiment, the adapter 22 is threaded.

[0021] FIG. 3 is a cutaway view of the container 10 illustrated in FIG. 1 with a valve 32 located inside the container. A hollow stem 34 provides a fluid passageway to nozzle 34. Operating the nozzle 34 in a predefined manner dispenses the contents from within container 10. For example, pressing down on nozzle 34 will cause the valve 32 to open and dispense the contents from within container 32.

[0022] In an example embodiment, the valve 32 can also be employed to fill the container 10. In particular embodiments, the valve 32 is a Schrader valve.

[0023] FIG. 4 shows a perspective view of the first end 12 of a container 10 equipped with a fluid dispensing apparatus 50 equipped with an external valve body 30 according to some example embodiments. Examples of a fluid dispensing apparatus 50 equipped with an external valve body 30 can be found in U.S. Patent No. 11,180,308, the contents of which are hereby incorporated by reference herein.

[0024] In an example embodiment, the container 10 is a can made from one or more metals and/or metal alloys that is devoid of an internal valve within an interior space 24 defined by the container 10. In an example embodiment, the external valve body 30 is screwed onto a threaded section 59 of an adaptor 26 as described below, or otherwise installed, to control and regulate the expulsion of the contents under the pressure generated within the interior space of the container 10 by the propellant, instead of valve within the interior space of the container 10 itself. Puncturing the membrane 15 as described below without the external valve body 30 would result in the uncontrolled release and depletion of the propellant from the container 10 to the ambient environment. The fluid dispensing apparatus 50 described herein will work with any type, size and shape of pressurized container with 10. In an example embodiment, the contents dispensed by the fluid dispensing apparatus 50 may be a pressurized paint fluid that is a liquid, gas, vapor, or a mixture thereof.

[0025] The fluid dispensing apparatus 50 may, in some embodiments, include a nozzle 36, a valve body 30, and an adaptor 26. The valve body 30 may have a valve cap 35 on its top, as shown. The valve cap 35 may have any design suitable to properly receive the nozzle 36 as chosen by a person of skill in the art. The valve body 30 may be substantially cylindrical in shape and may have a height 61. In an example

embodiment, the height 61 ranges between 1.0 to 4.0 inches. In an example embodiment, the valve body 30 comprises a fluid passageway (not shown; see *e.g.*, fluid passage bore 34 in FIG. 10 of U.S. Patent No. 11,180,308). The passageway may extend from bottom to the top of the valve body 30, as shown. In one embodiment, the bore 34 may be centered along the valve body's longitudinal axis.

[0026] FIG. 5 is a detailed perspective view of the example illustrated in FIG. 4 without the external valve assembly 30 mounted on the first end 12. In an example embodiment, A container cap 11 is fixedly joined to the top of the container 10 such as being crimped in a known manner. The container cap 11 may be, in one embodiment, positioned substantially concentrically with the container's longitudinal axis. The container cap 11 may have a well 13, a coupling element 28, and a fluid passage bore (not shown, see *e.g.*, FIG. 6 of U.S. Patent No. 11,180,308) that is sealed by the membrane 15. The membrane 15 may be pierceable and located with respect to fluid passage bore in such a manner as to seal bore and prevent fluid from exiting container 10 until it is pierced. The embodiment of the membrane 15 shown in FIG. 3 includes a planar metal surface integrally formed as part of a monolithic structure along with the other portions of the container cap 11, such as the coupling element 28, well 13 and threaded section 19, for example. Such structures can be integrally formed together by stamping a flat sheet of suitable metal stock into the desired shape of the container cap 11. FIG. 6 shows membrane 15 in a pierced or punctured condition which exposes fluid passage bore 14 to outside of the pressurized container 10, and establishes fluid communication with the fluid dispensing apparatus 50 described in FIG. 4. In the illustrated embodiments, the membrane 15 is fixedly connected to the coupling element 28 to close an uppermost region of that coupling element 28. In an example embodiment, the coupling element 28 is generally cylindrical, protruding upward from a base of the container cap 11 at the bottom of the well 13, but may be of any desired size, shape and relative position to the other portions of the container cap 11 to releasably couple the fluid dispensing apparatus 50 to the container cap 11. To be releasably coupled, the fluid dispensing apparatus 50 can be installed on, and subsequently removed from a plurality of containers 10, such as for example paint containers, without being damaged to an extent that would prevent reuse of the fluid

dispensing apparatus 50. In one embodiment coupling element 28 may have an externally threaded (male threading) section 19, as shown. For the embodiment shown, the coupling element 28 is cylindrical in shape and the threaded section 19 is on the exterior surface of the coupling element 28.

[0027] FIG. 6 is a perspective view illustrating an example of the second end 14 of the container 10. The adapter 22 comprises a fluid passageway that is sealed by membrane 60. Upon puncturing the membrane 60, the interior space 24 (FIG. 2) is depressurized.

[0028] FIG. 7 is a perspective view illustrating an example of a bottom of a valve body 71 that can be coupled with the adapter 22 at the second end of the container. The bottom side of the valve body 71 comprises an external adapter 72 configured to releasably couple with the adapter 22 at the second end 14 of the container 10. The external adapter 72 comprise a piercing member 73 that punctures the membrane 60 when the bottom of the valve body 71 is engaged with the adapter 22 at the second end of the container 10. In an example embodiment, the bottom of the valve body 71 further comprises a gasket 74 that aids in forming a seal between the external adapter 72 and the bottom of the valve body 71. In an example embodiment, the bottom of the valve body 71 comprises one or more locking structures 76 located between gussets 77. The locking structures 76 can prevent rotation of the external adapter 72 with respect to the bottom of the valve body 71.

[0029] FIG. 8 FIG. 8 is a block diagram illustrating an example cutaway view of a container with a valve assembly in the interior space coupled with the adapter 22 at the second end of the container. In an example embodiment, a valve 82 is coupled with the second adapter 22 at the second end of the container 10. A stem 84 provides a fluid passageway from the valve 82 to the exterior of the container 10. The combination of the valve 82 and stem 84 can allow for refilling of the container 10 independent of the configuration at the first end 12 of the container 10 and/or depressurization of the container. In an example embodiment, valve 82 is a Schrader valve.

[0030] FIG. 9 is a perspective view illustrating an example of a container 10 with a

first nozzle 91 coupled with the first end 12 of the container 10 and a second nozzle 94 coupled with the second end 14 of the container 10. In the illustrated example, the container 10 is in a first orientation where the first end 12 is above the second end 14. In this orientation, the first nozzle will dispense the pressurized fluid, aerosolized, and the second nozzle 94 will dispense the propellant. However, in a second orientation (not shown) where positions of the first and second ends 12, 14 are reversed such that the second end 14 is above the first end 12, then both nozzles 92, 94 will dispense the pressurized fluid, aerosolized. Thus, the second nozzle can be used to either depressurize the container 10 (while in the first position) or dispense the pressurized liquid from the container 10 (while in the second position) which can be useful if the first nozzle 92 is malfunctioning (e.g., blocked).

[0031] Although the example embodiments described herein show separate configurations for the first end and second end (e.g., external valve/internal valve), those skilled in the art should readily appreciate that any combination of the first end and second end can be employed. For example, the first end (top) may have an external valve or internal valve while the second end (bottom) may have either an internal, external, or even no valve (e.g., just a pierceable membrane which can be pierced to depressurize the can). Thus, this disclosure should not be construed as limited to any single configuration.

[0032] Described above are example embodiments. It is, of course, not possible to describe every conceivable combination of components or methodologies, but one of ordinary skill in the art will recognize that many further combinations and permutations of the example embodiments are possible. Accordingly, this application is intended to embrace all such alterations, modifications and variations that fall within the spirit and scope of the appended claims interpreted in accordance with the breadth to which they are fairly, legally and equitably entitled.

CLAIMS

1. An apparatus, comprising:
a container having an interior space configured to hold a pressurized fluid to dispense aerosolized, the container comprises a first end and a second end;
the first end of the container configured to dispense the contents of the pressurized fluid; and
an adapter coupled with the second end of the container, the second end shaped as an inverted dome.
2. The apparatus set forth in claim 1, further comprising:
a valve located inside the container;
a stem coupled with the container; and
a nozzle is coupled with the stem, the stem providing a fluid passageway between the valve and the nozzle.
3. The apparatus set forth in claim 2, wherein the valve is a Schrader valve.
4. The apparatus set forth in claim 1, the first end further comprising a container cap comprising a membrane that seals the pressurized fluid within an interior space of the container, the pressurized fluid in the interior space is at an elevated pressure relative to an ambient pressure outside of the container.
5. The apparatus set forth in claim 4, further comprising a reusable dispensing apparatus that comprises a piercing member that pierces the membrane when the reusable dispensing apparatus is installed on the container cap to establish fluid communication between the interior space and the reusable dispensing apparatus, the

container cap being installed on the container to enclose the interior space containing the pressurized, and wherein the interior space enclosed by the container cap is devoid of a valve that controls emission of the fluid from the interior space.

6. The apparatus set forth in claim 4, further comprising a threaded fastener comprising threading that engages a compatible fastener provided to the reusable dispensing apparatus to releasably couple the reusable dispensing apparatus to the container cap and establish a seal that interferes with an escape of the propellant between the container cap and the reusable dispensing apparatus after the membrane has been pierced.

7. The apparatus set forth in claim 1, the adapter further comprises a pierceable membrane.

8. The apparatus set forth in claim 7, the adapter further comprises threads for releasably coupling with a valve body.

9. The apparatus set forth in claim 8, a bottom side of the valve body further comprises:

an external adapter configured to be releasably coupled with the adapter at the second end of the container;

a piercing member configured to pierce the pierceable membrane when the valve body is coupled with the adapter at the second end of the container;

a gasket for sealing a connection between the external adapter and the adapter at the adapter at the second end of the container;

a locking structure; and

a reinforcing gusset.

10. The apparatus set forth in claim 9, the adapter at the second end of the container further comprises threads for threadably engaging the bottom side of the valve body.

11. The apparatus set forth in claim 1, further comprising:
a valve located in the interior space of the container and coupled with the adapter at the second end of the container; and
a stem coupled with the valve.

12. The apparatus set forth in claim 1, further comprising:
a first nozzle coupled with one of a group consisting of a first internal valve and a first external valve coupled with the first end of the container; and
a second nozzle coupled with one of a group consisting of a second internal valve and a second external valve coupled with the adapter at the second end of the container.

13. The apparatus set forth in claim 12, wherein the first nozzle dispenses the pressurized fluid, aerosolized, when the container is in a first and a second orientation;
and
wherein the second nozzle dispenses the pressurized fluid, aerosolized, when the container is in a second orientation and dispenses propellant from the interior space when the container is in a first orientation.

14. The apparatus set forth in claim 1, wherein the container is cylindrical.