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AEROSOL CAN

Abstract

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. The adapter at the second end of the container can be employed to depressurize the container and/or to refill the container.

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Background/Summary

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 Feb. 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.

Description

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. Pat. 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. Pat. 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. Pat. 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 firs 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 value/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 piercable 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 containe.

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.