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Risch

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(54) **SYSTEM AND METHOD FOR A REUSABLE DISPENSING CONTAINER**

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Related U.S. Application Data

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(60) Provisional application No. 62/950,906, filed on Dec. 19, 2019.

(51) **Int. Cl.**

B65D 83/42 (2006.01)
B65D 83/44 (2006.01)
B65D 83/64 (2006.01)

(52) **U.S. Cl.**

CPC ***B65D 83/425*** (2013.01); ***B65D 83/44*** (2013.01); ***B65D 83/64*** (2013.01)

(58) **Field of Classification Search**

CPC B65D 83/425; B65D 83/44; B65D 83/64; B65D 31/003; B65D 83/62; B65D 83/42; B05B 11/0056; B05B 11/0097; B05B 11/00446; B05B 11/039

See application file for complete search history.

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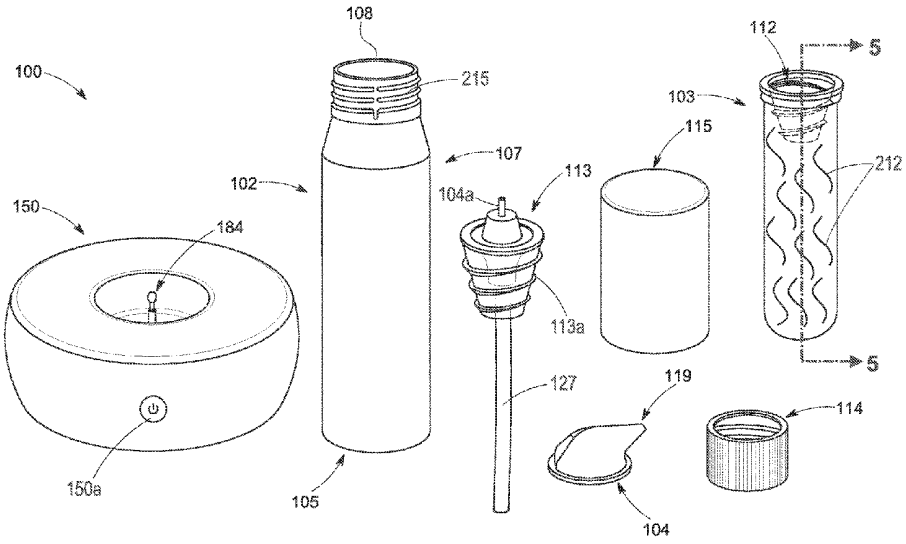
Primary Examiner — Vishal Pancholi

(74) *Attorney, Agent, or Firm* — Simpson & Simpson, PLLC

(57) **ABSTRACT**

A reusable dispensing container assembly including a canister having a first end and a second end, the canister having an upper chamber to hold dispensable substance, an actuator arranged proximate the first end of the canister, in communication with the chamber, the actuator having a nozzle arranged to eject the dispensable substance, and a deformable piston arranged within the canister below the upper chamber, the deformable piston having a reinforcement apparatus embedded therein, the piston further arranged to sealingly engage an inner surface of the canister, the piston arranged for upward movement within the canister when the actuator is actuated, the deformable piston forming a lower chamber arranged to hold pressurized gas.

20 Claims, 18 Drawing Sheets



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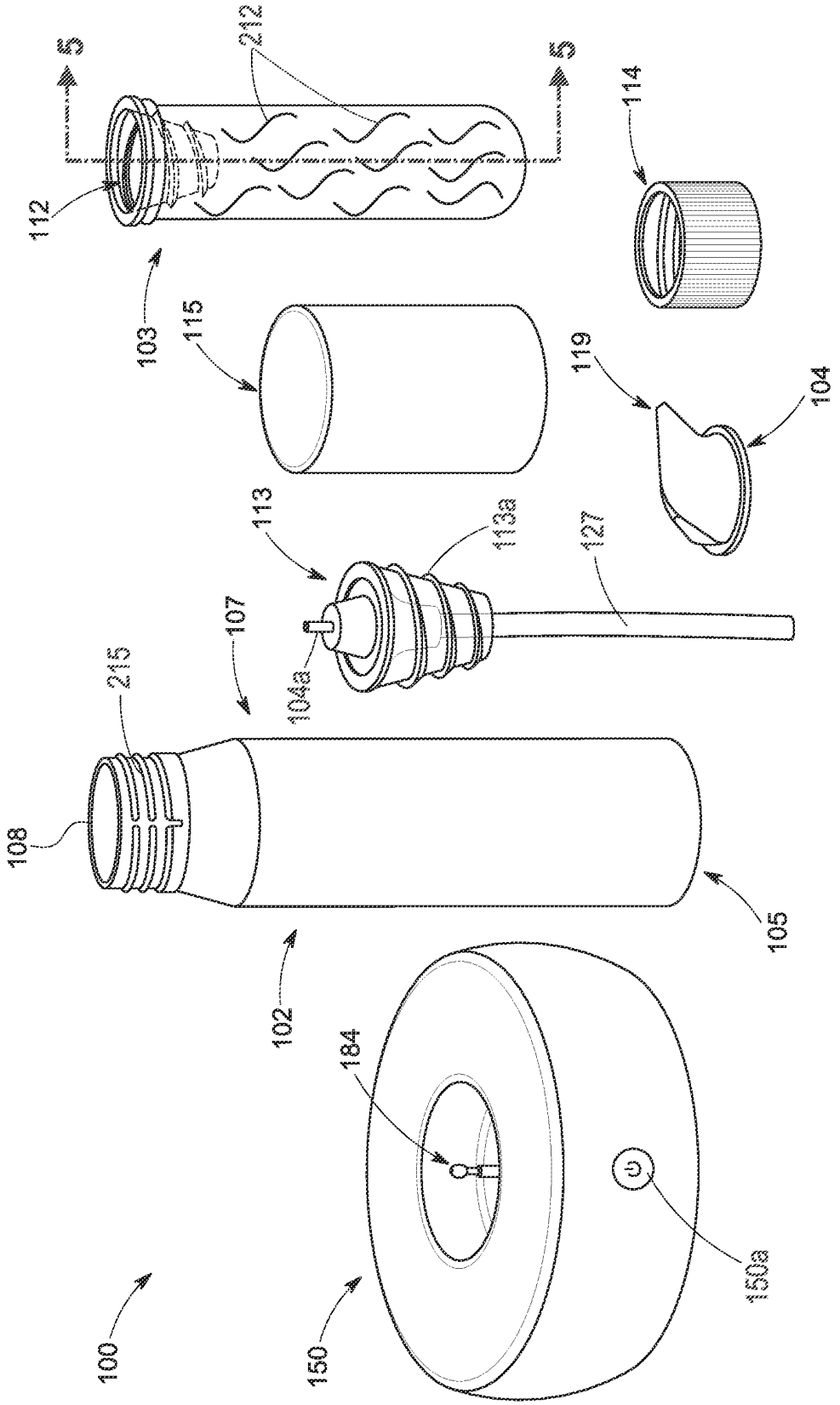
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Fig. 1A

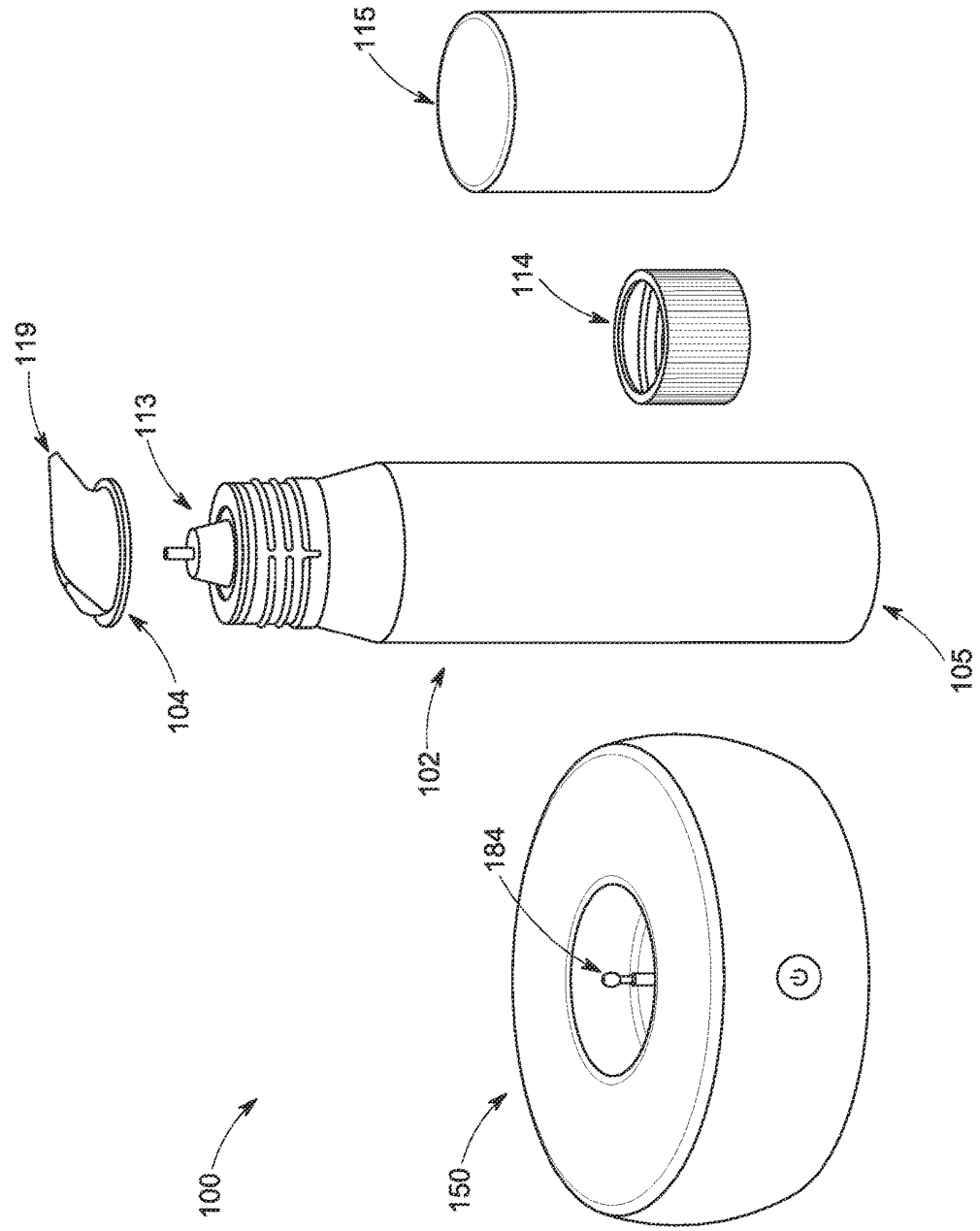

Fig. 1B

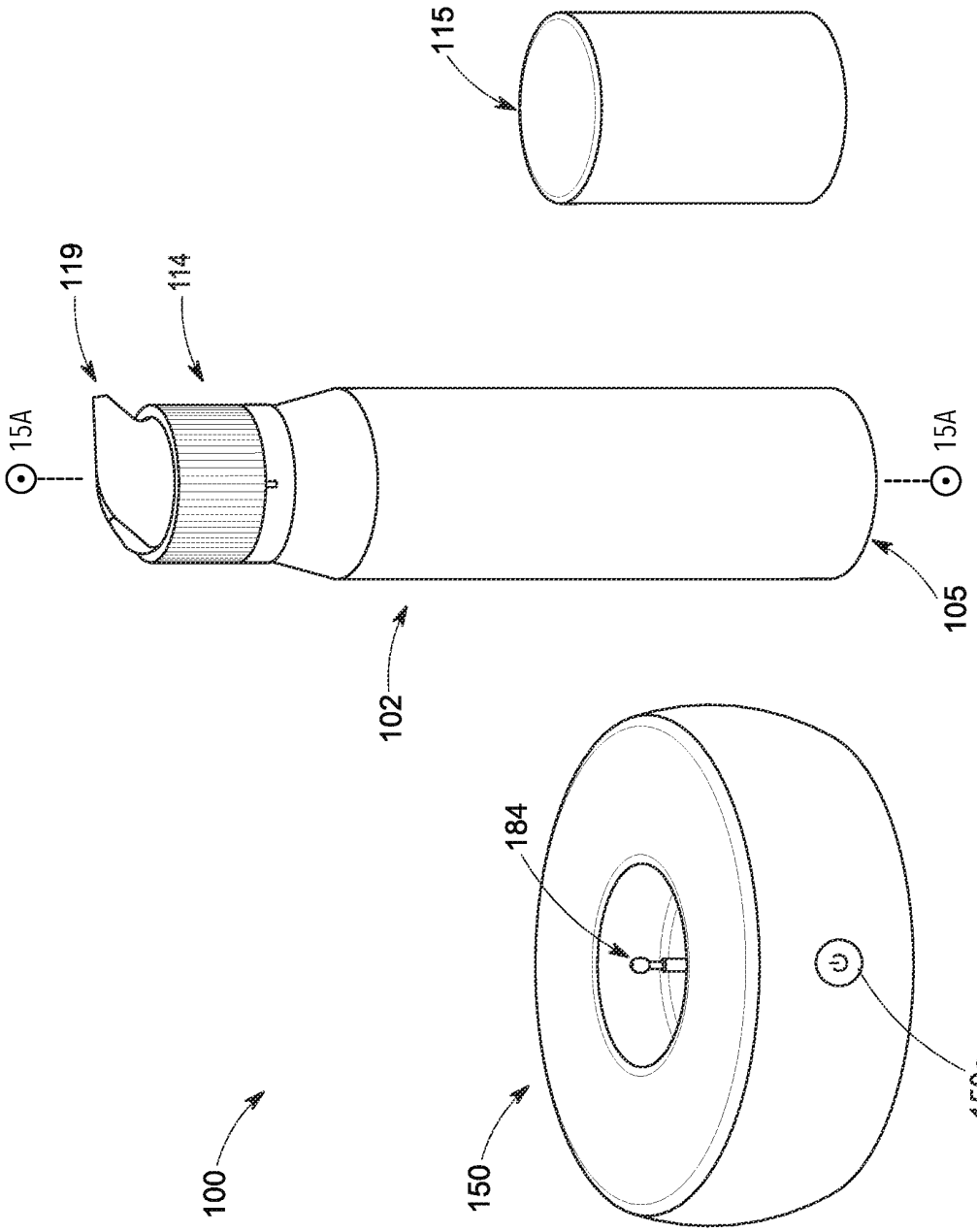

FIG. 1C

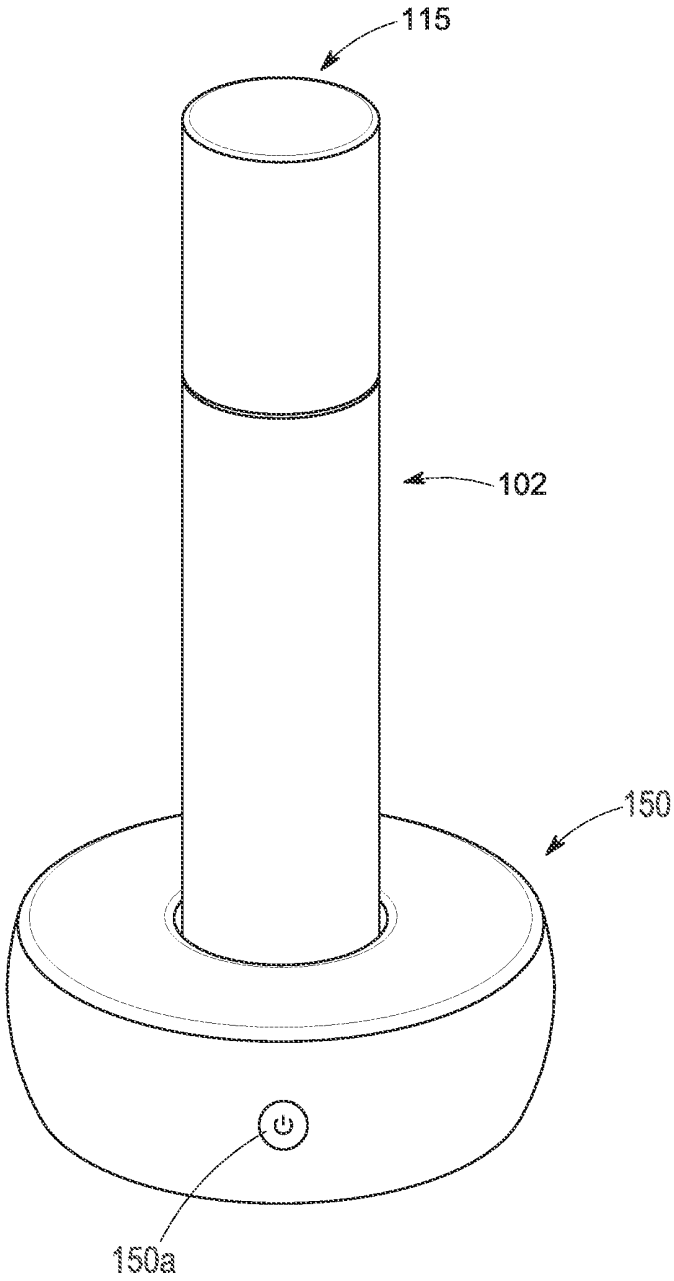

Fig. 1D

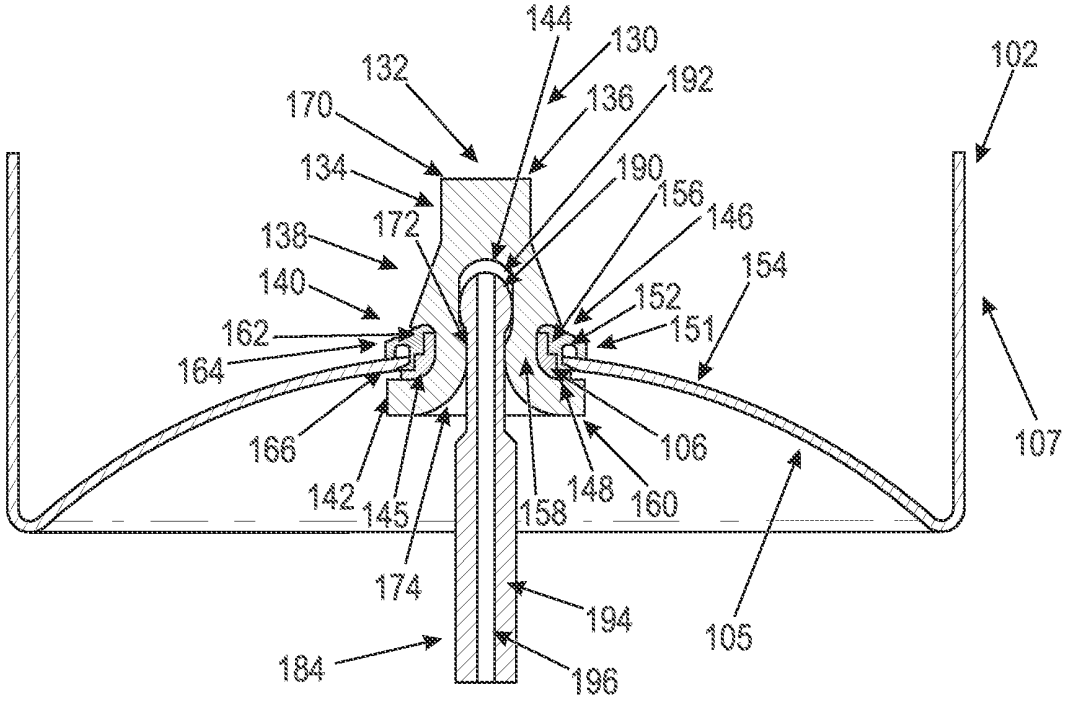
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Fig. 2

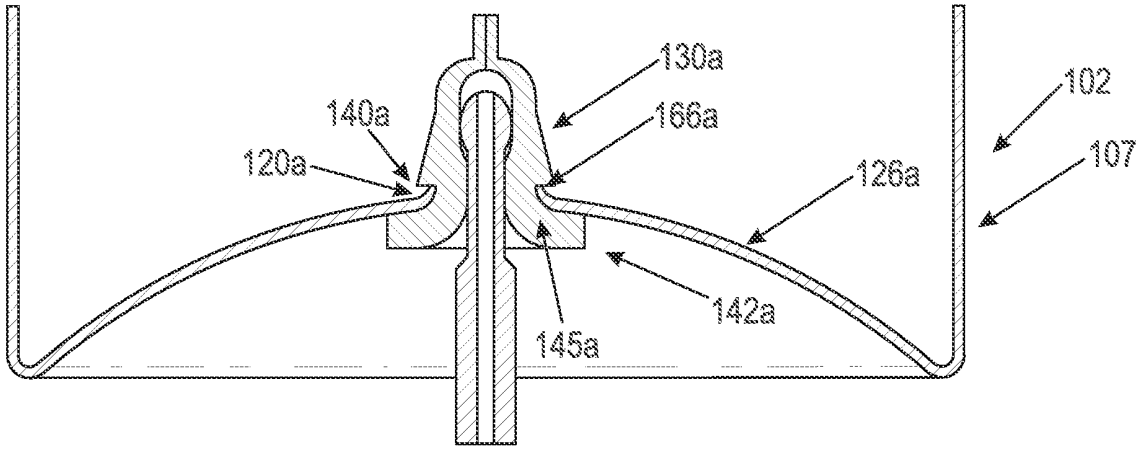
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Fig. 3

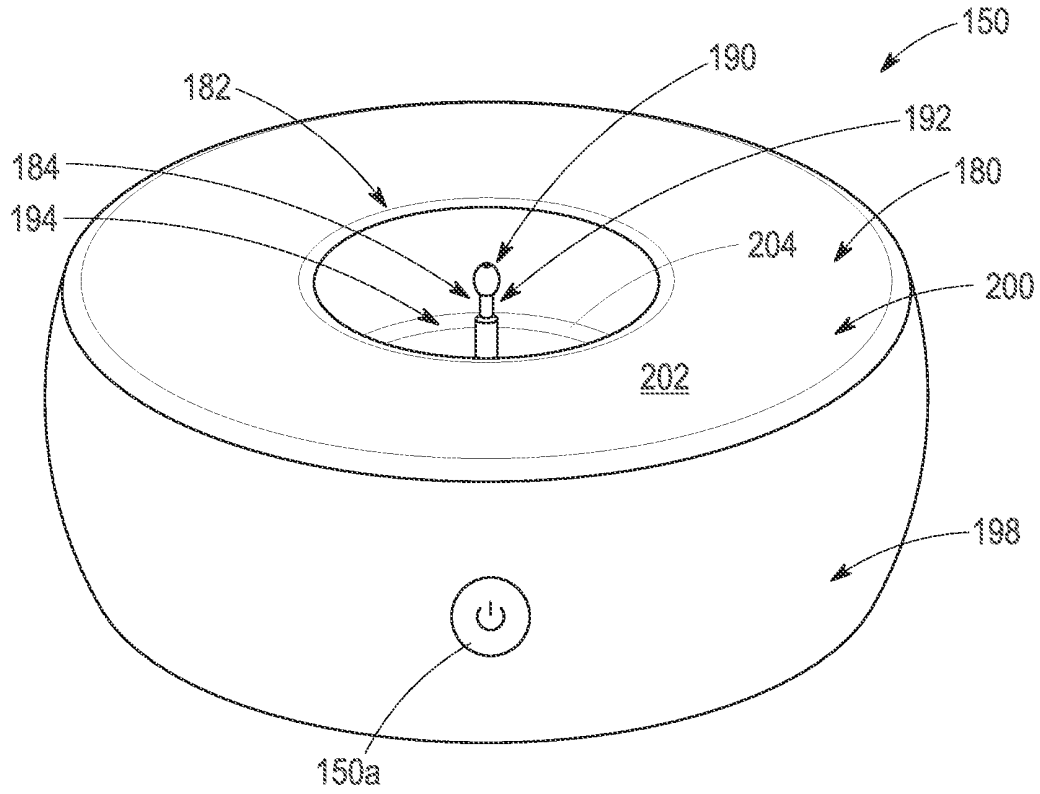

Fig. 4

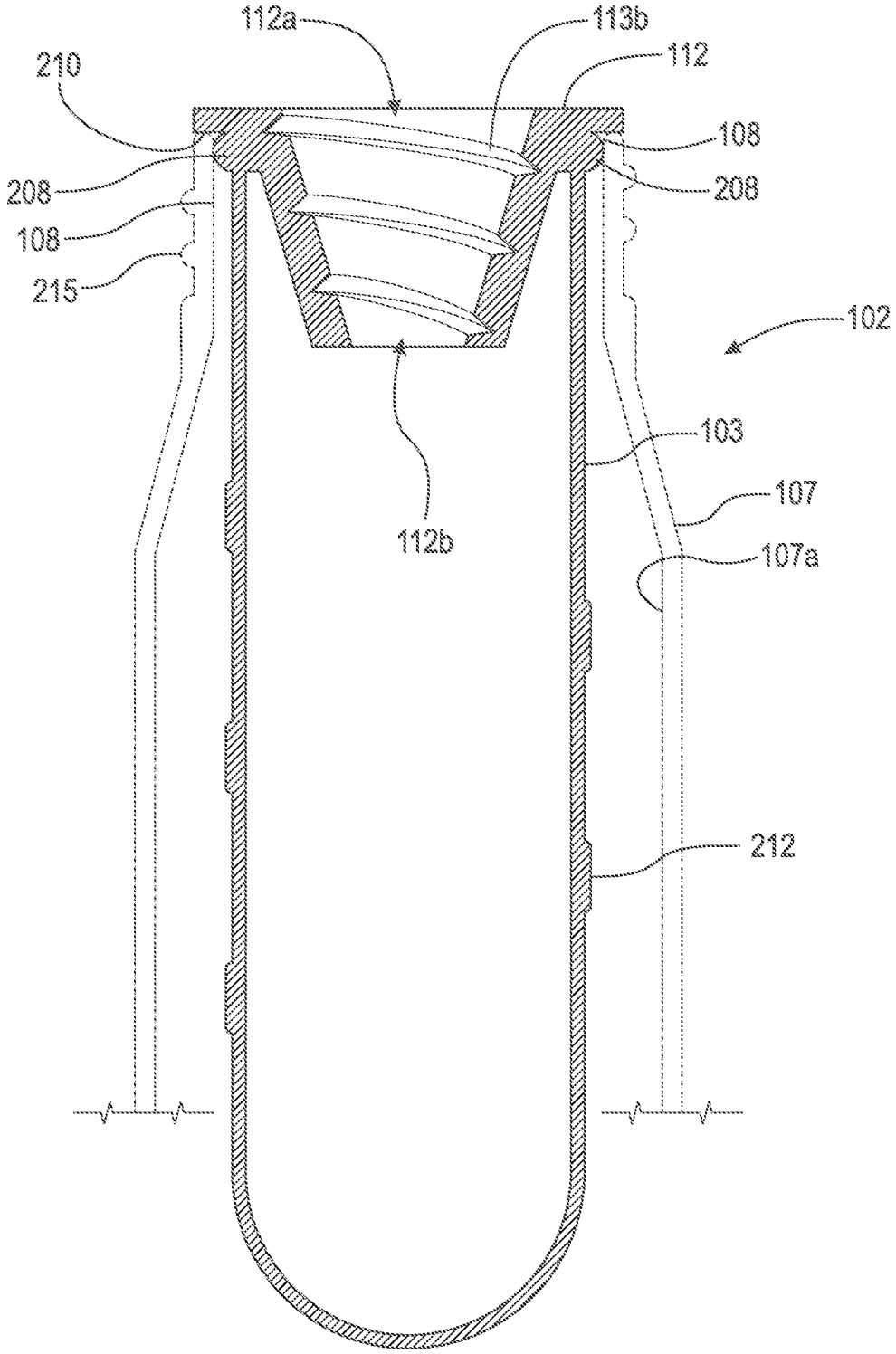

Fig. 5

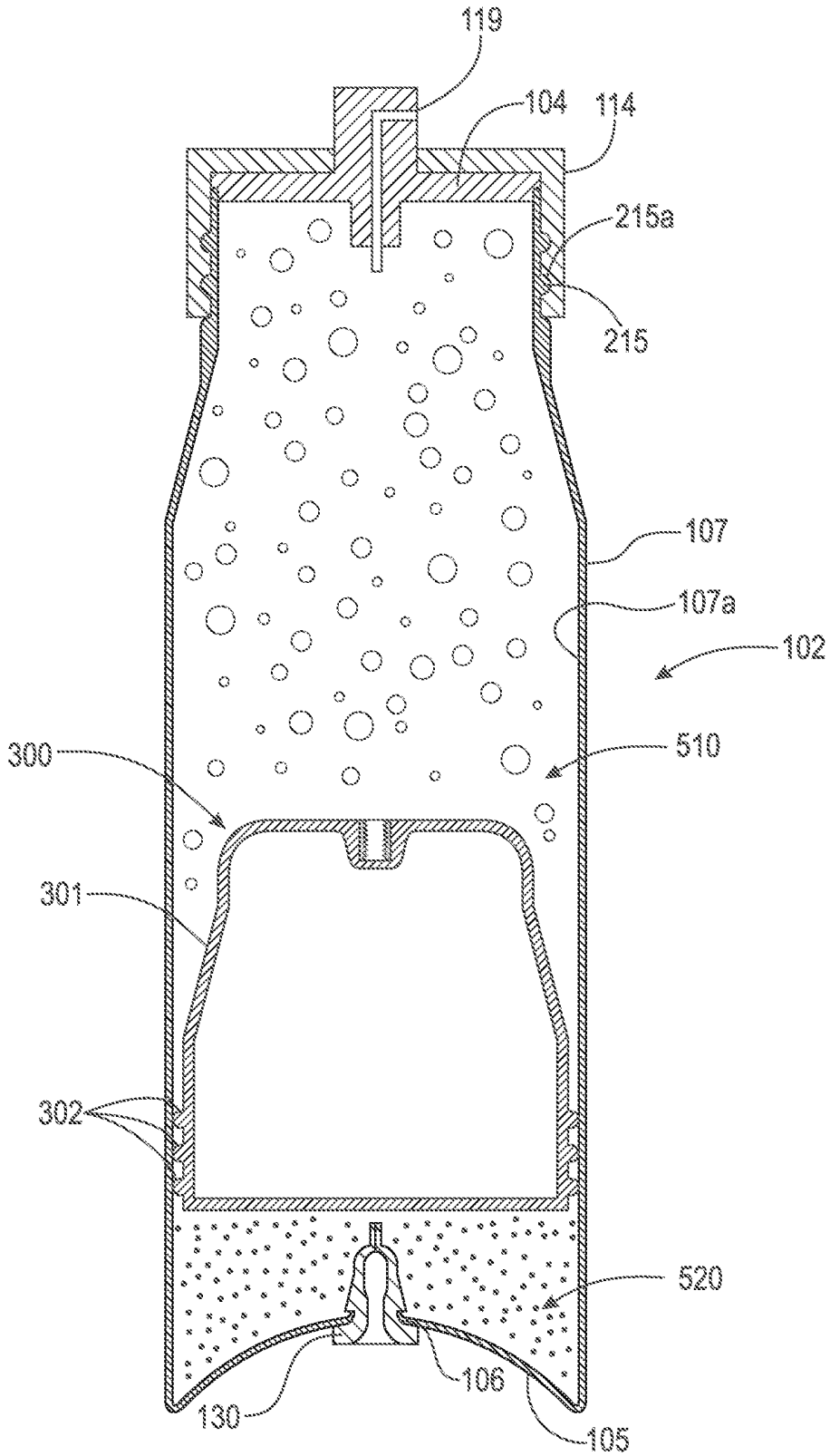
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Fig. 6

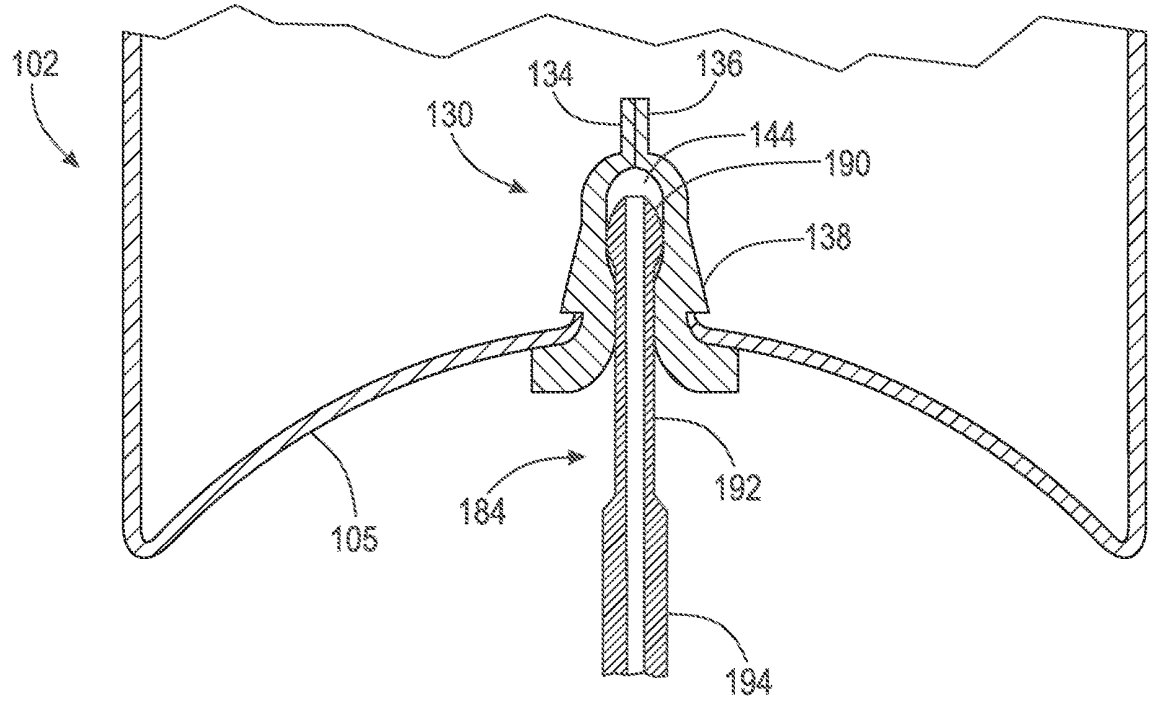
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Fig. 7

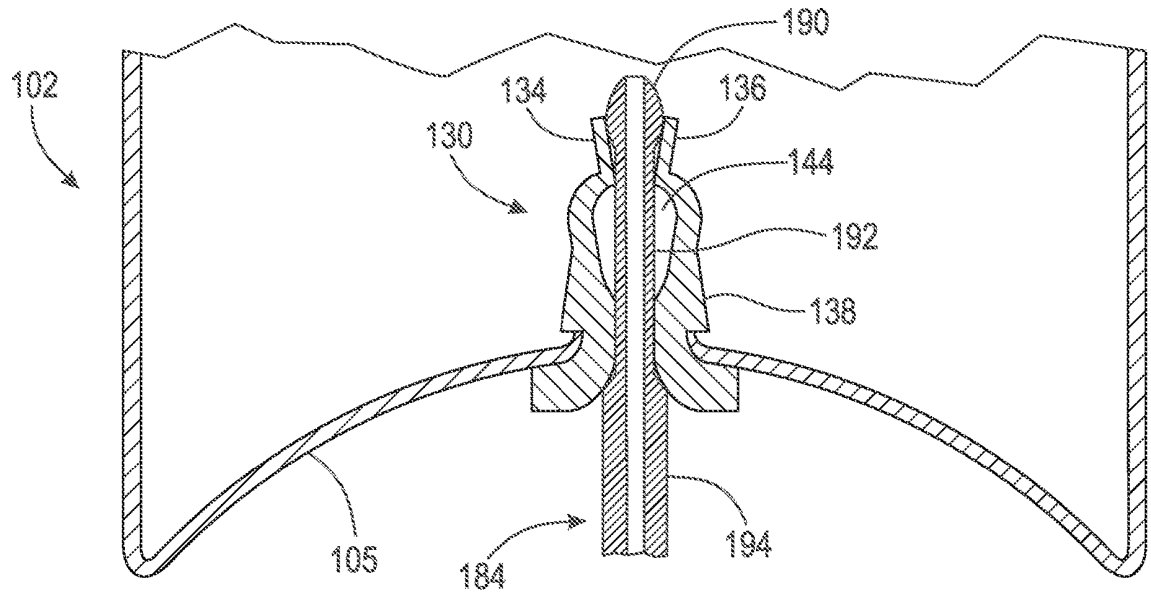
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Fig. 8

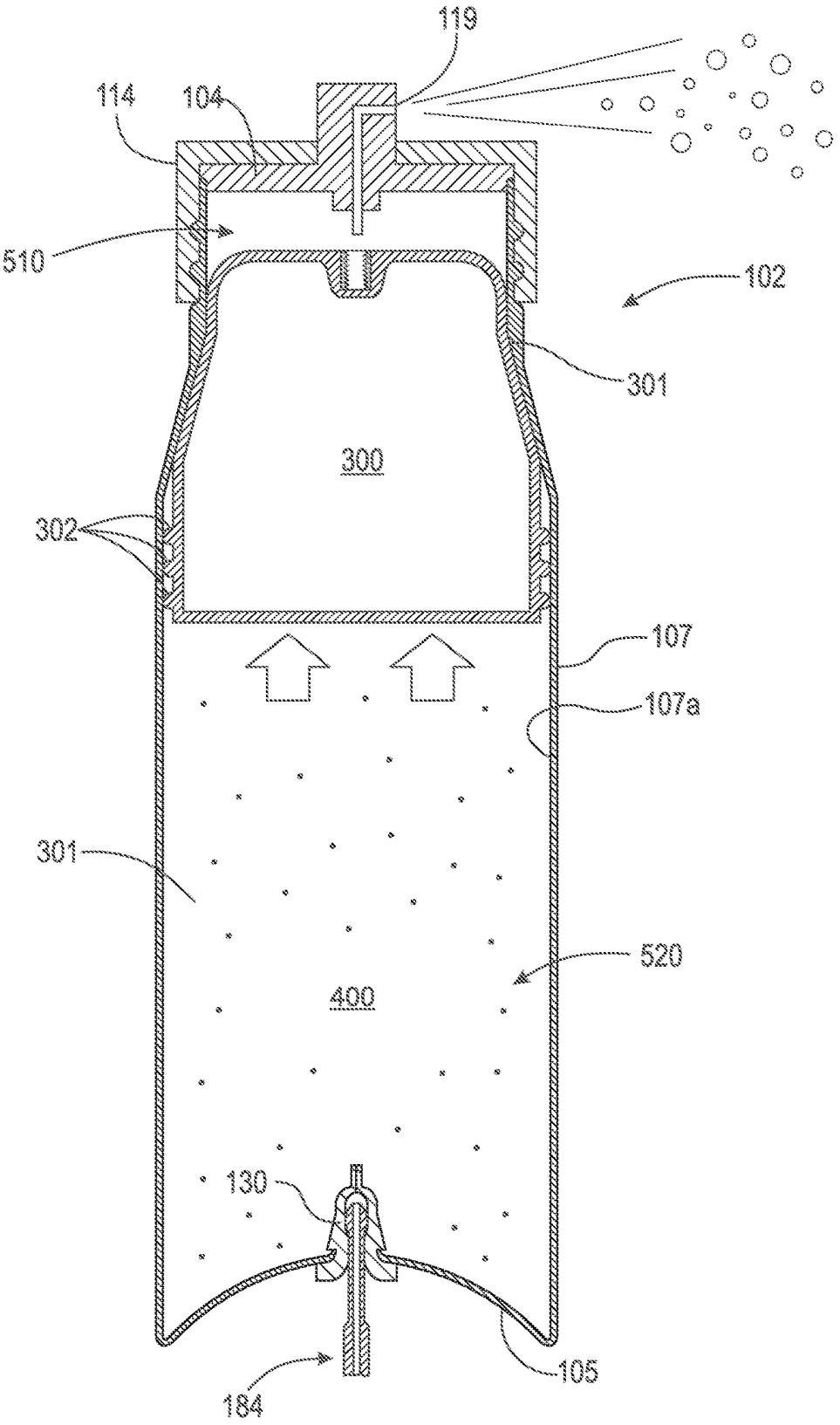

Fig. 9

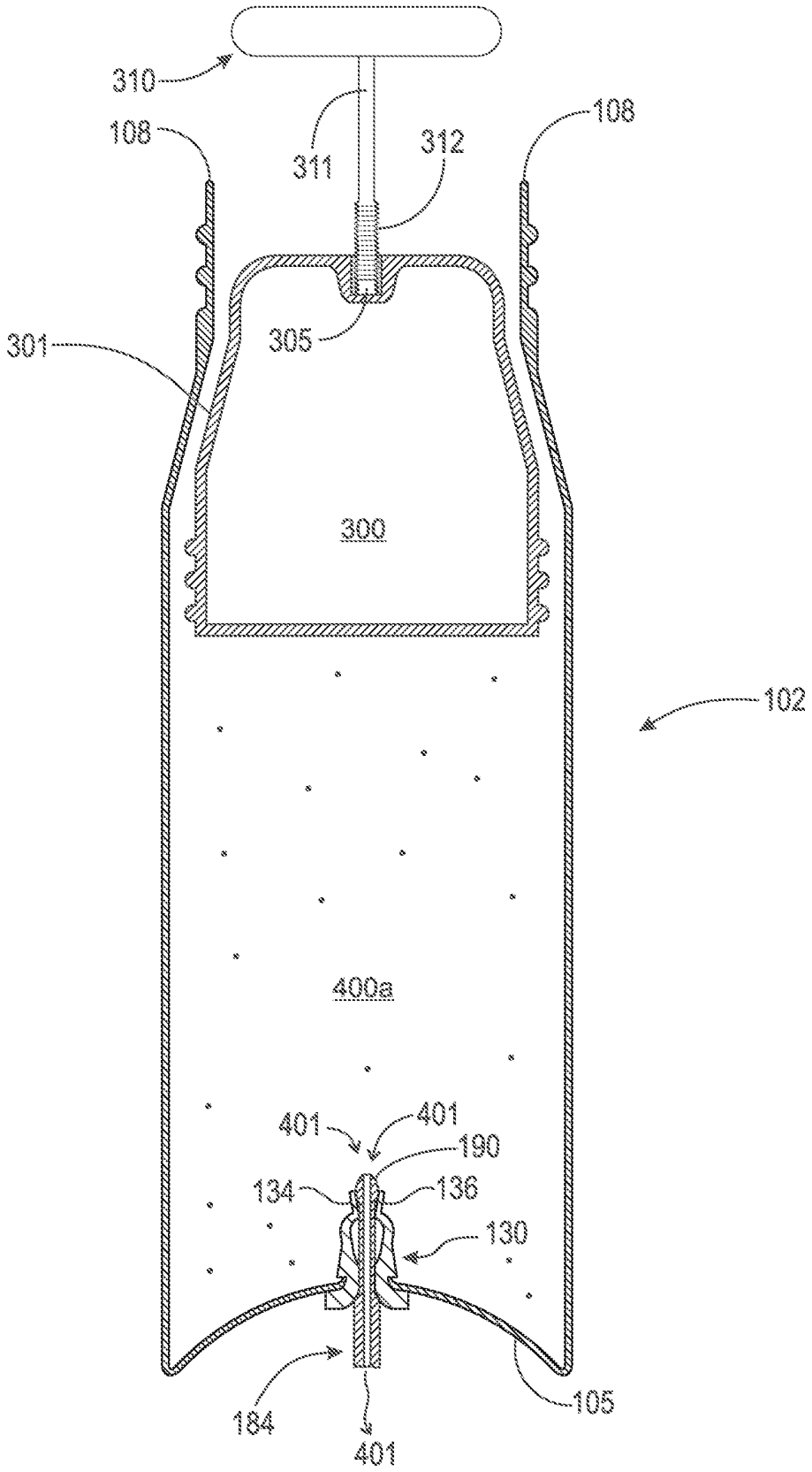
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Fig. 10

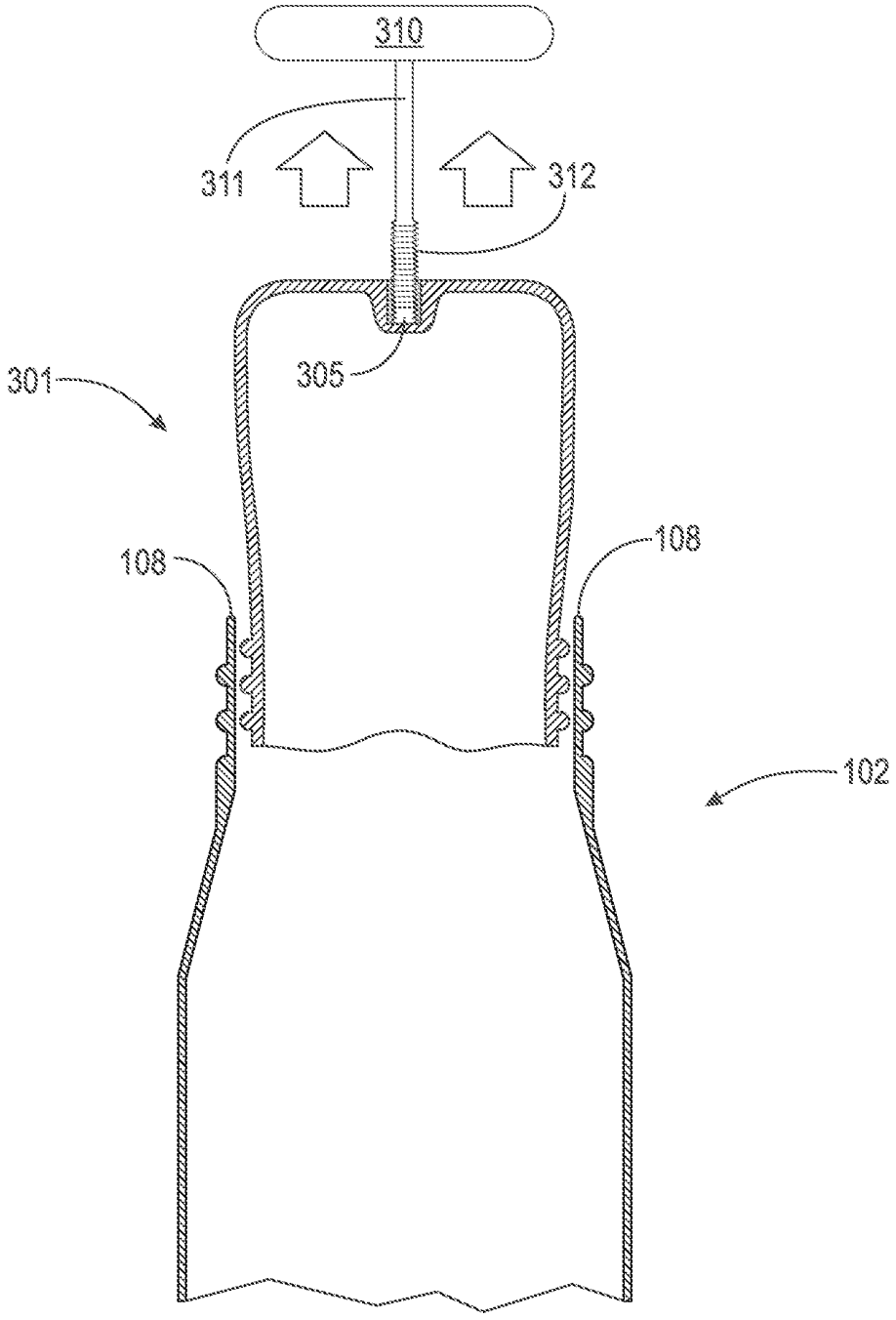

Fig. 11

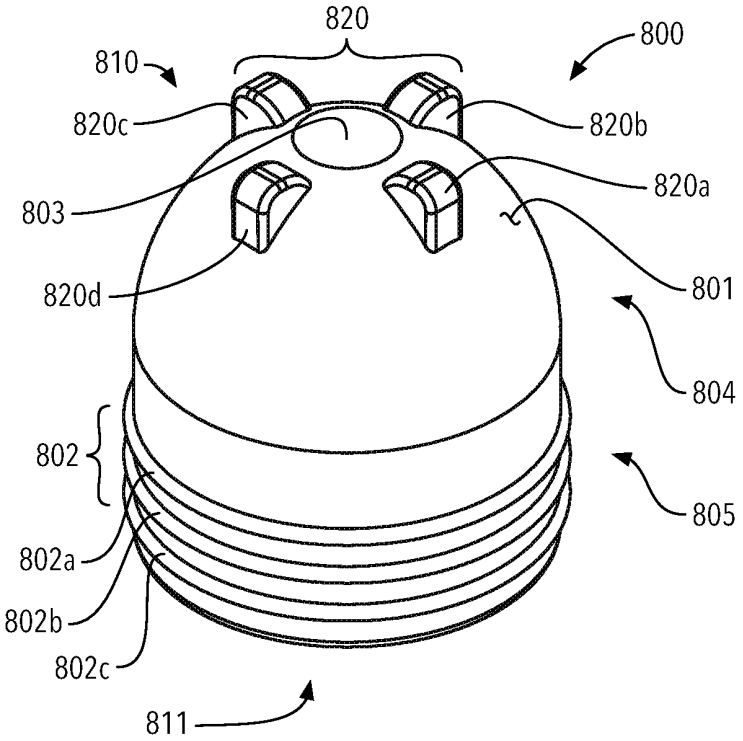

FIG. 12A

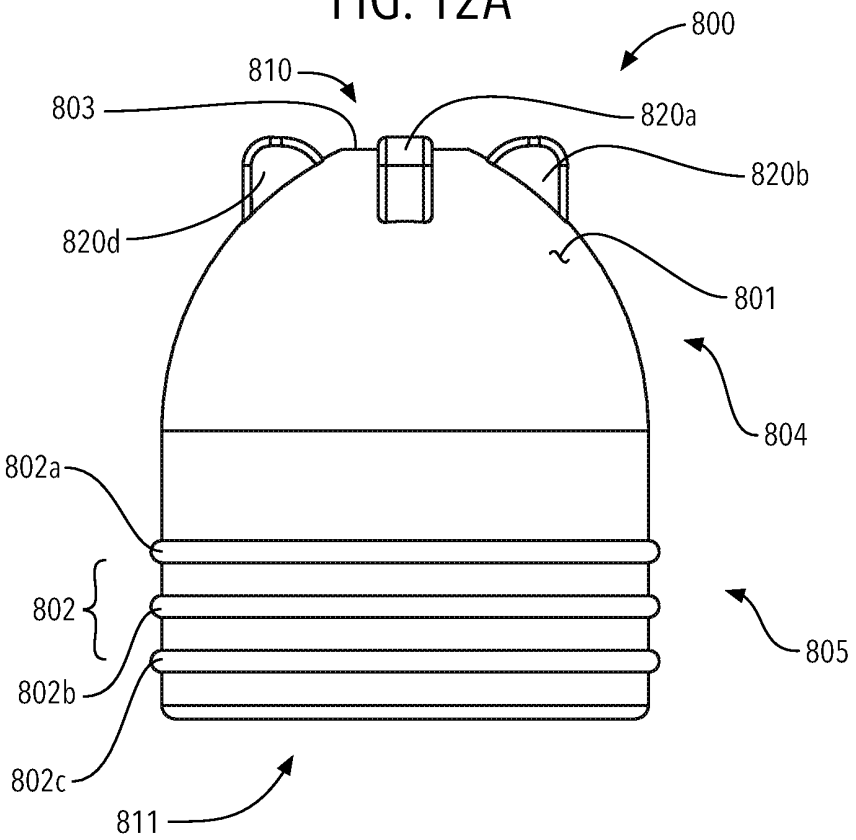

FIG. 12B

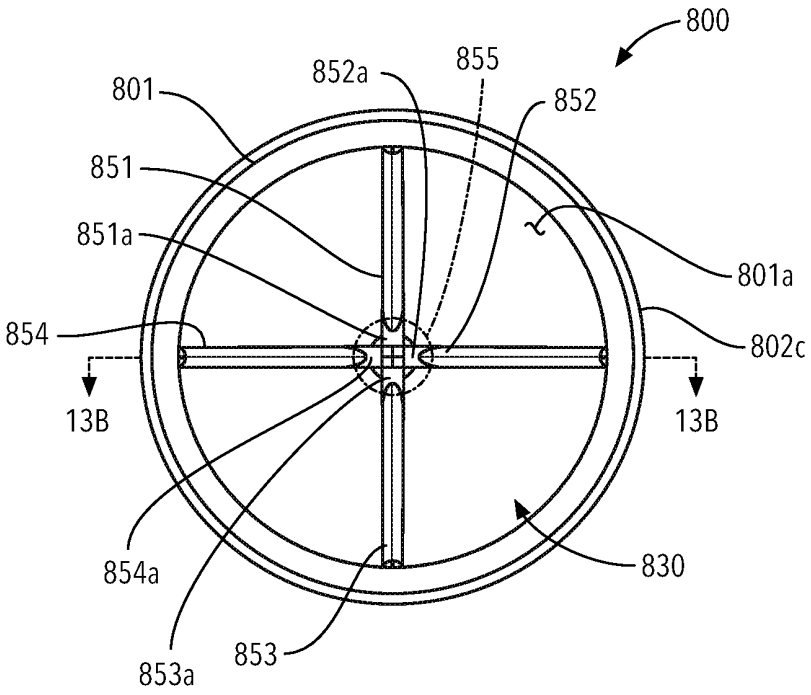

FIG. 13A

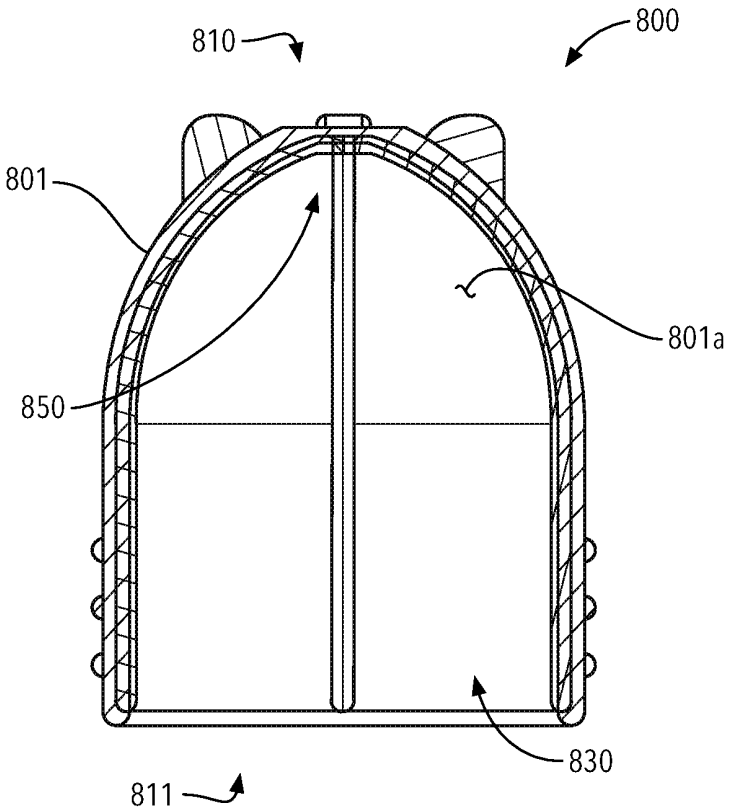

FIG. 13B

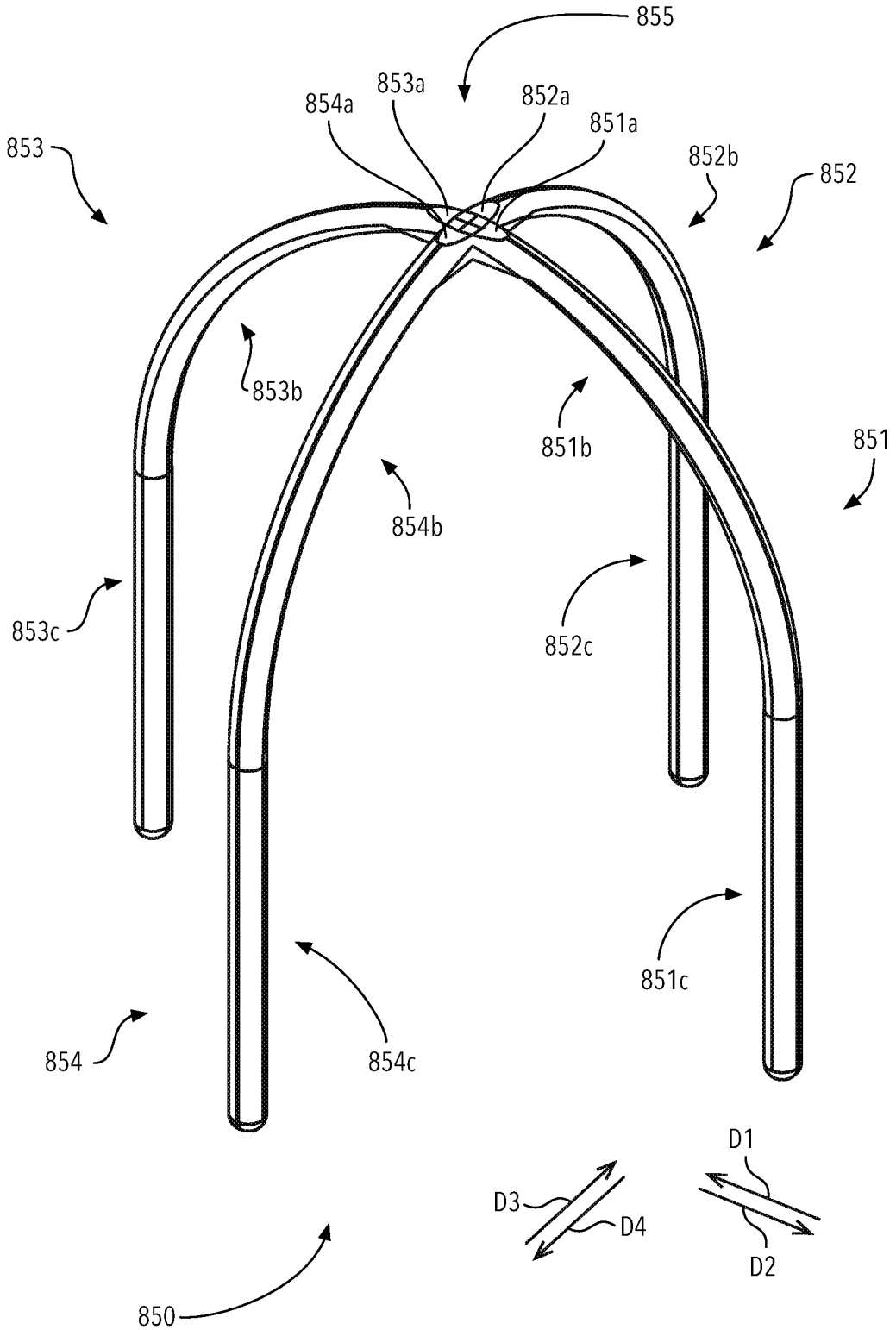
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FIG. 14

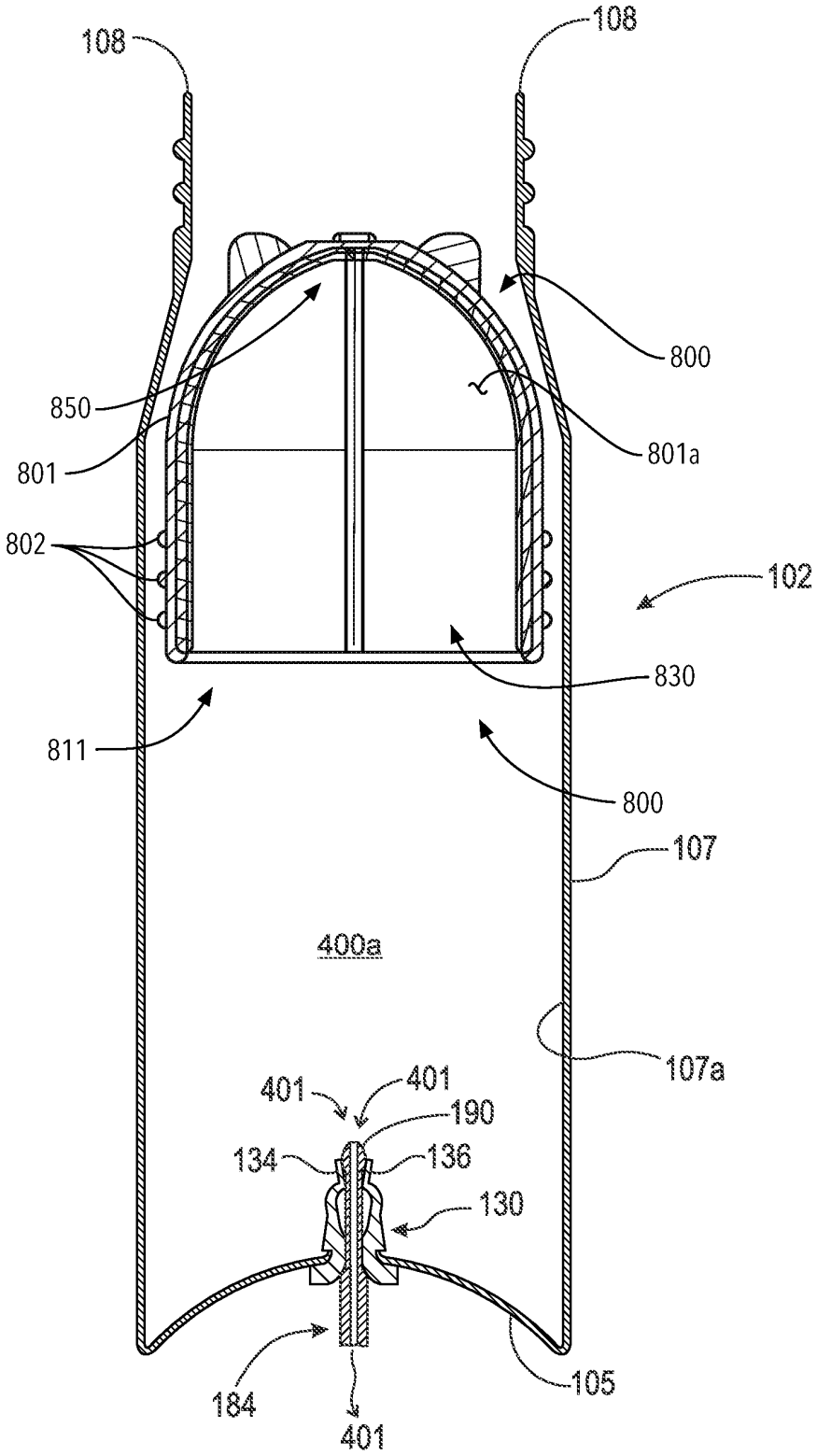
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FIG. 15A

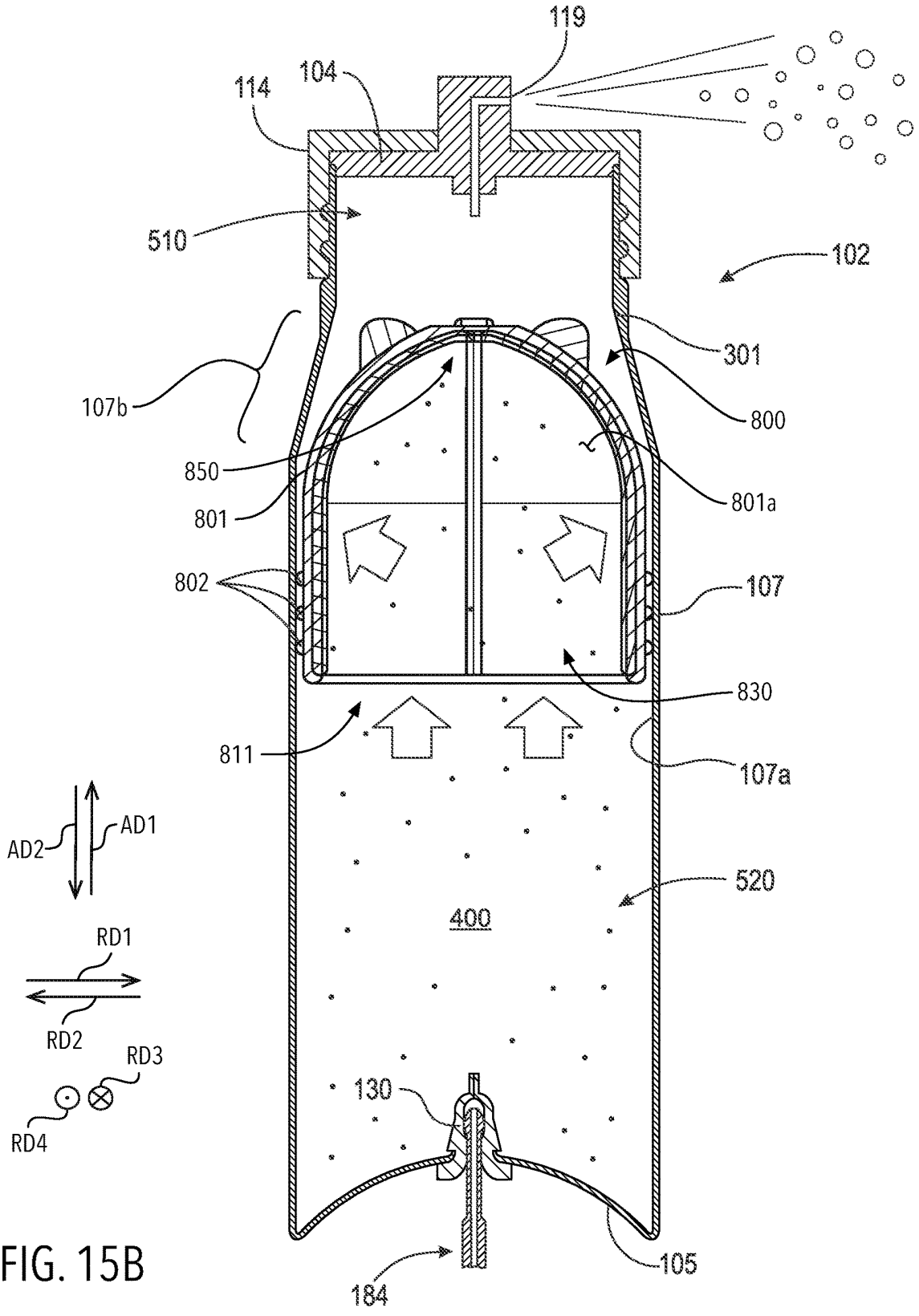
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FIG. 15B

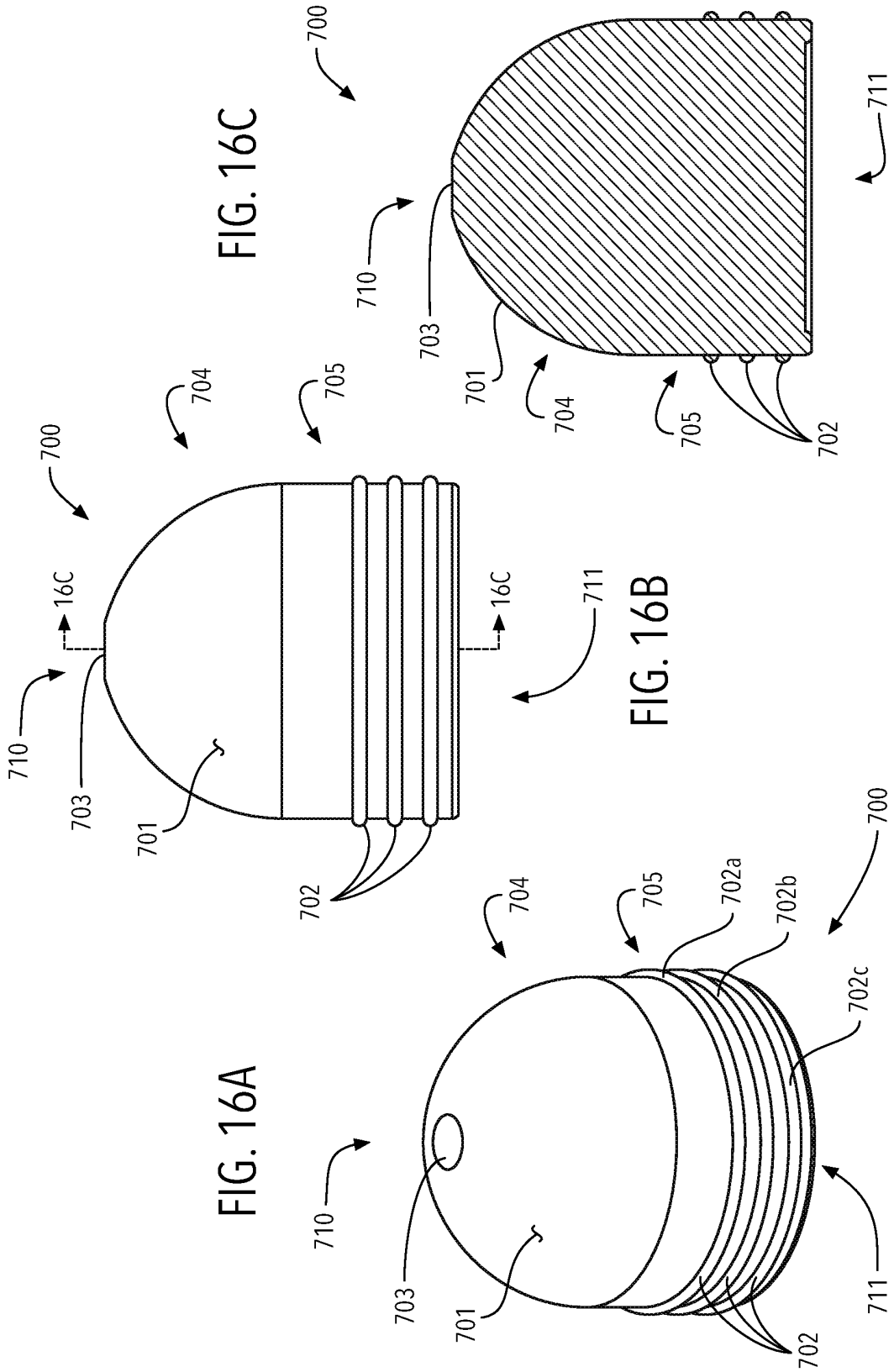

FIG. 16A

FIG. 16B

FIG. 16C

SYSTEM AND METHOD FOR A REUSABLE DISPENSING CONTAINER

CROSS-REFERENCE TO RELATED APPLICATION

This application claims the benefit under 35 U.S.C. § 119 of U.S. patent application Ser. No. 17/127,275, filed on Dec. 18, 2020, which application is incorporated herein by reference in its entirety. Provisional Application No. 62/950,906, filed on Dec. 19, 2019, also is incorporated herein by reference in its entirety.

FIELD OF THE INVENTION

The present invention relates generally to a system and method for pressurizing pressurized dispensers. More particularly, this invention relates to refillable dispensers having a piston, where the piston is solid or collapsible.

BACKGROUND

Pressurized aerosol containers are used to dispense cooking oils, grooming products such as hairspray and deodorant, window cleaners, etc. In most cases, regardless of what the containers dispense, they are pressurized at the point of filling by the addition of some sort of propellant gas. The containers are single-use items that need to be completely emptied and cut apart to be properly recycled and, even then, the containers may be improperly disposed of, resulting in polluting the environment and adding to the carbon footprint.

Traditional aerosol cans are also designed to mix the propellant with the product. Therefore, a product that may take extended periods of time to develop, manufacture and approve, must then be mixed with propellent. Some pressurized aerosol containers utilize a bag-on-valve system (B.O.V.) developed to improve the quality of cosmetic, medical or food products.

The B.O.V.s keep the product separate from the propellant, typically housing it in a film laminate bag, which is welded to an aerosol valve. This configuration maintains the integrity of the product whereby the product remains separate from propellants at all times. Typically B.O.V.s are used in metal cans with a one inch opening for crimping the valve which is welded to a foil based packaging bag with multilayer film laminate. Once compressed air or nitrogen is filled into the area between the bag and can, the valve is then crimped. This process is called "under the cup gassing" and keeps the product and propellant separate at all times. However, though safer on the environment, the B.O.V.s are still disposed after a single use. Thus, there exists a need for a pressurized dispenser that has a bag capable of being refilled and replaced that is easy to operate and accessible to various users. Further, B.O.V.s still have a reusability issue. In order to prevent cross-contamination the B.O.V.s need to be cleaned in between uses of different substances. After multiple cleanings, a B.O.V. may begin to wear out or lose structural integrity.

Existing reusable pressurized canisters also present safety hazards and reliability issues. In most existing reusable pressurized canisters, actuators are threadably secured thereon. Existing pistons within the canister, when pressurized, can be expelled from the pressurized canisters and harm users when the actuators are removed from a pressurized canister. Also, pressurization on a piston within a pressurized canister can dislodge the piston from its proper and functioning position within—allowing sprayable contents to leak into the pressurized chamber of the canister that is created by the bifurcation of the piston within the canister, or creating leak points between the piston and the inner canister walls which prevents the canister from being repressurized in the pressurized chamber which is normally created by a properly positioned piston therein.

Thus, there is also a long-felt need for an internal piston within a pressurized canister that moves vertically as the canister is pressurized to push a substance out of the canister when actuated for dispensing, where the piston is arranged to increase its seal-ability against the canister's internal wall by expanding under pressurization. There is a further need for a piston that can be removed from a canister in order to facilitate cleaning by configuring a piston that will collapse in overall size when depressurized. Additionally, there is a further need to provide for a pressurized canister station that has a needle that may also depressurize the canister. Still further, there is a need for a piston that is collapsible and has a reinforcing apparatus. Even further there is a need for a piston that is solid and arranged to permanently remain within the refillable canister. Lastly, there is a need to reduce the number of components in a reusable pressurized canister.

SUMMARY

The present invention broadly comprises a reusable dispensing container assembly including a canister having a first end and a second end, the canister having an upper chamber to hold dispensable substance, an actuator arranged proximate the first end of the canister, in communication with the chamber, the actuator having a nozzle arranged to eject the dispensable substance, and a deformable piston arranged within the canister below the upper chamber, the deformable piston having a reinforcement apparatus embedded therein, the piston further arranged to sealingly engage an inner surface of the canister, the piston arranged for upward movement within the canister when the actuator is actuated, the deformable piston forming a lower chamber arranged to hold pressurized gas. Wherein the piston may alternative be solid. Wherein the reinforcement apparatus may include a cross member fixedly secured within a cavity of the deformable piston arranged proximate an apex of the deformable piston, a plurality of arm members extending from the cross member, each of the plurality of arm members fixedly secured to and extending the entirety of the cavity, and a flexion point connecting each of the plurality of arm members to the cross member.

The present invention also broadly comprises a reusable dispensing container assembly including a canister having a first end and a second end, the canister having an upper chamber to hold dispensable substance, an actuator arranged proximate the first end of the canister, in communication with the chamber, the actuator having a nozzle arranged to eject the dispensable substance, and a solid piston arranged within the canister below the upper chamber, the piston further arranged to sealingly engage an inner surface of the canister, the piston arranged for upward movement within the canister when the actuator is actuated, the deformable piston forming a lower chamber arranged to hold pressurized gas. Wherein the solid piston includes at least one integral external O-ring about its circumference arranged to sealingly engage the inner surface of the canister and maintain separation of the dispensable substance and the pressurized gas. Where the container assembly is arranged to engage a pressurization station having a pressurizing and de-pressurizing needle, said needle having a rounded tip,

said pressurization station operatively arranged to pressurize the canister to permit upward movement of the deformable piston when the actuator is actuated to dispense the dispensable substance through the nozzle.

A primary object of the present invention is to provide a pressurized canister arranged to dispense a substance that may be reusable such that the canister may be re-pressurized to dispense another substance, where the pressurized canister includes a deformable piston that is arranged to pressurize the canister, expand under pressurization, collapse when depressurized, and removed from the canister do to its deformable configuration.

A secondary object of the present invention is to provide a pressurized canister having a valve arranged to accept a needle from a pressurizing base that may pressurize or depressurize the canister.

Another object of the present invention is to provide for a canister having a piston that is deformable in configuration and includes a reinforcement apparatus arranged to expand the piston when the canister is pressurized and arranged to collapse when the canister is depressurized.

Still, another object of the present invention is to provide a piston for a canister that includes at least one structural component that prevents the piston from being expelled or dislodged from a preferable position when the canister is pressurized and/or when an actuator is removed from the pressurized canister.

These and other objects, features, and advantages of the present disclosure will become readily apparent upon a review of the following detailed description of the disclosure, in view of the drawings and appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the present invention are described in detail below with reference to the following drawings. These and other features, aspects, and advantages of the present invention will become better understood with regard to the following description, appended claims, and accompanying drawings. The drawings described herein are for illustrative purposes only of selected embodiments and not all possible implementations and are not intended to limit the scope of the claims, in which:

FIG. **1**A illustrates a perspective view of the separate components of a first embodiment of the reusable dispensing container system;

FIG. **1**B illustrates a perspective view of a reusable dispensing container system shown in FIG. **1**A with the valve cup placed in position on the bag;

FIG. **1**C illustrates a perspective view of a reusable dispensing container system shown in FIG. **1**A with the actuator placed in position on the valve cup and the cover piece fitted over the canister to mechanically lock actuator with the canister and bag;

FIG. **1**D illustrates a perspective view of a reusable dispensing container docked to a pressurizing system of either the first or second embodiments of the present invention;

FIG. **2** is a longitudinal section of a lower end of the container positioned atop and engaging a needle of the pressurizing system of either the first or second embodiments of the present invention, wherein the container is provided with a preferred embodiment of a valve;

FIG. **3** is a longitudinal section of a lower end of the container positioned atop and engaging a needle of the pressurizing system of either the first or second embodiment of the present invention, wherein the container is provided with a second embodiment of the valve shown rotated 90° relative to the valve in FIG. **2**;

FIG. **4** is a perspective view of the pressurizing system of either the first or second embodiment of the present invention;

FIG. **5** is a sectional view of the bag within the canister taken generally along lines **5**-**5** in FIG. **1**A of the present invention;

FIG. **6** is a cross-sectional view of the second embodiment of the canister shown in FIG. **5** engaging the needle of the pressurization station;

FIG. **7** is a partial view of the canister and valve engaging the needle of the pressurization station of the first and second embodiments of the present invention in a first engagement position;

FIG. **8** is a partial view of the canister and valve engaging the needle of the pressurization station of the first and second embodiments of the present invention in a second engagement position;

FIG. **9** is a cross-sectional view of the second embodiment of the canister shown in FIG. **5** engaging the needle of the pressurization station in the first engagement position shown in FIG. **7**;

FIG. **10** is a cross-sectional view of the second embodiment of the canister shown in FIG. **5** engaging the needle of the pressurization station in the second engagement position shown in FIG. **8**;

FIG. **11** is a partial cross-sectional view of the second embodiment of the canister shown in FIG. **5** illustrating the procedure for removal of the internal deformable piston;

FIG. **12**A illustrates a perspective view of reinforced piston **800**;

FIG. **12**B illustrates a right-side view of reinforced piston **800**;

FIG. **13**A illustrates a bottom plan view of reinforced piston **800**;

FIG. **13**B generally illustrates a cross-sectional view taken generally along line **13**B-**13**B in FIG. **13**A;

FIG. **14** illustrates a perspective view of reinforcement apparatus **850**;

FIG. **15**A illustrates a cross-sectional view of canister **102** taken generally along line **15**A-**15**A in FIG. **1**C, having piston **800** therein, where canister **102** is depressurized;

FIG. **15**B illustrates a cross-sectional view of canister **102** taken generally along line **15**A-**15**A in FIG. **1**C, having piston **800** therein, where canister **102** is pressurized;

FIG. **16**A illustrates a perspective view of solid piston **700**;

FIG. **16**B illustrates a ride side view of solid piston **700**; and,

FIG. **16**C illustrates a cross-sectional view of solid piston **700** take generally along line **16**C-**16**C in FIG. **16**B.

DETAILED DESCRIPTION

At the outset, it should be appreciated that like drawing numbers on different drawing views identify identical, or functionally similar, structural elements. It is to be understood that the claims are not limited to the disclosed aspects.

Furthermore, it is understood that this disclosure is not limited to the particular methodology, materials and modifications described and as such may, of course, vary. It is also understood that the terminology used herein is for the purpose of describing particular aspects only and is not intended to limit the scope of the claims.

Unless defined otherwise, all technical and scientific terms used herein have the same meaning as commonly

understood to one of ordinary skill in the art to which this disclosure pertains. It should be understood that any methods, devices or materials similar or equivalent to those described herein can be used in the practice or testing of the example embodiments.

It should be appreciated that the term "substantially" is synonymous with terms such as "nearly," "very nearly," "about," "approximately," "around," "bordering on," "close to," "essentially," "in the neighborhood of," "in the vicinity of," etc., and such terms may be used interchangeably as appearing in the specification and claims. It should be appreciated that the term "proximate" is synonymous with terms such as "nearby," "close," "adjacent," "neighboring," "immediate," "adjoining," etc., and such terms may be used interchangeably as appearing in the specification and claims. For example, the terms "canister," "canister," and "container" are specific interchangeable terms that appear in the following description.

The present disclosure is generally drawn to a system and method, according to one or more exemplary embodiment for a dispensing container having an internal bag, the bag having an external surface with raised portions, such as external ribs on the perimeter of the bag, to allow air to surround bag and to prevent the bag from sticking to the internal walls of the canister, the dispensing container connected to a small battery powered air compressor having a fill needle with a rounded and substantially spherical-shaped head. The internal bag allows the dispensing container to spray from any angle while separating the liquid from the pressurized air, whereby the liquid from the bag is expelled through a dip tube to an applicator connected to the canister, producing an airless spray eliminating over spray that cannot be contaminated. The small battery powered air compressor makes recharging the sprayer very convenient whereby the dispenser may be refilled, pressurized, or depressurized at any remote location.

The present disclosure is also generally drawn to a system and method, according to one or more exemplary embodiments for a dispensing container having an internal piston, having externally arranged annular ridges arranged to sealably contact the internal surface of the container as to create an upper and lower chamber within the container, the container also having a valve arranged to connect to a small battery powered air compressor having a fill needle with a rounded and substantially spherical-shaped head. The internal piston allows the dispensing container to spray from any angle while keeping the dispensable substance in the upper chamber and pressurized air in the lower chamber, producing an airless spray eliminating over spray that cannot be contaminated. The small battery powered air compressor makes recharging the sprayer very convenient whereby the dispenser may be refilled, pressurized, or depressurized at any remote location.

Adverting now to the figures, FIG. **1** illustrates a first embodiment of a reusable dispensing container system **100** according to the present invention. Dispensing container system **100** may include a fluid tight compartment defined by a canister **102** connected to an actuator **104**. Canister **102** may have an enclosing bag **103**. Bag **103** allows dispensing container system **100** to spray from any angle while also separating liquid or other solutions inside the bag from surrounding pressurized air so as to prevent cross contamination from the pressurized air in canister **102**. Bag **103** may operate as reservoir for a variety of liquids as well as viscous products, such as gels, creams and ointments, in a number of application areas including oxygen-sensitive and sterile products that may be safely separated from pressurized air.

Bag **103** may be continuous and without seams. Bag **103** may be comprised of a circumferential sidewall with a bottom defined by a circle. Bag **103** may have an opening **112** formed at the top of bag **103**. The circumferential sidewall and bottom of bag **103** may be sealed using methods known by those of ordinary skill in the art. Bag **103** may be comprised of layers of foldable resilient silicone, rubber, or other stretchable elastomeric (such as three or four layers depending on product requirements). Bag **103** may have series of ridges or bumps on the surface of bag **103** that prevent bag **103** from sticking to the internal walls of canister **102** In other limiting embodiments bag **103** may be plastic, metal, or in other non-limiting embodiments another suitable material. The layers offer a superior barrier which eliminates the possibility of oxidation and cross contamination. The various types of construction of bags are well-known in the art and the particular method of manufacture is not intended to limit the present invention in any way.

The interior and exterior of bag **103** may be fabricated in a manner which enables bag **103** to remain flexible, yet provides a significant barrier between the contents of the bag **103** and the pressurized air in canister **102** surrounding bag **103**. The exterior of bag **103** may have a surface with raised portions **212** such as a plurality of dots, ribs or protrusions to facilitate the circulation of pressured air surrounding bag **103** within the container and keep bag **103** from bunching up and inadvertently sealing to the inside of canister **102** and allowing the dip tube to poke a hole in bag **103**. Raised portions **212** also ensure bag **103** does not stick to the internal walls of canister **102**. Bag **103** may be shaped and designed with a thickened top portion to provide better stability and durability for multiple uses including removal and replacement of actuator **104** onto canister **102**.

Opening **112** may have a lipped portion protruding outward on the exterior of upper surface boundary. The lipped portion allows bag **103** to engage and rest inside canister **102** with the lipped portion resting upon the upper portion of canister **102**. This configuration permits cover piece **114** to be fitted around canister **102** and to mechanically lock actuator **104** with canister **102** and bag **103**. Lipped portion may have a series of grooves or other fasteners to hold bag **103** in place.

Canister **102** may be comprised of the same material as a standard aerosol can such as plastic or metal. Canister **102** may be comprised of a base **105** whereby base **105** is preferably concave at its exterior surface (and convex at its interior), as shown in FIGS. **2** and **3**, having an aperture **106** in the center of base **105**. Canister **102** may have a circumferential sidewall **107** projecting upwardly from base **105**. The lower portion of sidewall **107** may be tubular in shape having a consistent diameter throughout extending to the upper portion of sidewall **107**. Upper portion of sidewall **107** may be defined by a shape having an upper area of less diameter than the bottom area of the upper portion of sidewall **107**, the upper portion extending upwards until forming a circular opening **108**. In other non-limiting embodiments, opening **108** may be square, rectangular, oval, triangle, trapezoid, octagon, or hexagon in shape.

Canister **102** may have threaded portion **215** on the exterior of upper surface boundary near opening **108**. Threaded portion **215** may also have one or more vertical air pressure relief slots. Threaded portion **215** is configured to allow cover piece **114** to engage and mechanically lock actuator **104** with canister **102** and bag **103**.

The fluid contents in bag **103** may be sealed by valve cup **113**, shown away from bag **103** in FIG. **1**A and on bag **103** in FIG. **1**B. Valve cup **113** may be injection molded plastic

and fits into a region-formed by the upper portion of circumferential sidewall of bag **103** and opening **112** that may be threaded to engage threaded portion **113***a* of valve cup **113**. Valve cup **113** may be sized to be frictionally held by bag **103**. Valve cup **113** may carry a vent tube (not shown) for communicating atmospheric pressure to the liquid within the bag **103**. Valve cup **113** may have radially extending lip which is positioned immediately above opening of bag **103** which includes a substantially horizontal and flat surface suitable for being sealingly engaged by a connected actuator **104** via attachment means **104***a* and cover piece **114**. Attachment means **104***a* may be a hollow stem that protrudes from valve cup **113**, similar to those found in single use spray paint cans. Valve cup **113** may include a dip tube **127** which downwardly extends into bag **103** to pick up the liquid contained therein. Dip tube **127** may be configured for feeding liquid from bag **103**. With this arrangement there is substantially no leakage of liquid from the container during use, even if bag **103** and canister **102** are inverted.

Valve cup **113** may have threaded portion **113***a* around the exterior of valve cup **103**. Threaded portion **113***a* allows valve cup **113** to sealably engage with bag **103**. In operation, valve cup **113** may be lowered until threads **113***a* of valve cup **103** contact interior threads of bag **103**. Valve cup **113** is then rotated clockwise on the correlating threads. As valve cup **113** is further rotated clockwise, downwardly, the lip of valve cup **113** comes into contact with the lip of canister **102**. The bottom portion of valve cup **113** move downward past the lip of bag **103** whereby valve cup **113** is then movably retained, allowing valve cup **113** to further advance downwardly into the closed position. This engagement applies a radial force inward and downward force to create a substantially air-tight seal that prevents exiting of liquid and gas from bag **103** unless through valve cup **113**. Valve cup **113** may be removed by applying a force greater than the radial force, such as by a user rotating valve cup **113** in a counterclockwise motion and then pulling valve cup **113** away from bag **103**. The securing configuration described above is shown in greater detail in FIGS. **5-6**, and **9**, and discussed in greater detail infra.

The fluid contents in bag **103** may be released by an actuator **104**, shown away from valve cup **113** in FIG. **1**A and on valve cup **113** in FIG. **1**B whereby actuator **104** may be connected, fastened to, or integral to valve cup **113**. Actuator **104** may have a flat bottom surface and a curved vertical side wall extending from the flat bottom surface to a nozzle **119**. Nozzle **119** may be connected to dip tube **127** of valve cup **113**. Nozzle **119** may further be configured to be an outlet for the contents with the bag **103**. Actuator **104** may also operate as trigger mechanism such that when trigger mechanism is depressed, fluid is forced from bag **103** into dip tube **127**, and then out through nozzle **119**. When actuator **104** is manipulated or actuated by a user a vacuum is produced in the dip tube **127** attached to valve cup **113**. This vacuum in dip tube **127** in combination with atmospheric pressure on the upper surface of the liquid within bag **103** causes the liquid to flow up dip tube **127** and into actuator **104** where it is forced through the orifice of nozzle **119**.

Canister **102** and actuator **104** may be mechanically locked together by cover piece **114**, shown away from canister **102** in FIG. **1**A and covering canister **102** and actuator **104** in FIG. **1**C. Cover piece **114** may be cylindrical in shape. Cover piece **114** may function so that when screwed onto canister **102** via threads **215**, cover piece **114** acts as a reinforcing seal and prevents any leakage of fluid in bag **103** during a stationary state and as the fluid exits bag **103**. In one or more embodiments cover piece **114** may be configured to screw onto canister **102** and over actuator **104**. In one example arrangement, cover piece **114** may have a threaded portion on the interior of upper surface boundary near opening **108**. The threaded configuration allows cover piece **114** to engage and mechanically lock actuator **104** with canister **102** via threads **215** and thus the contained bag **103**.

Cover piece **114** may be lowered until interior threads contact threads **215** of canister **102**. Cover piece **114** is then rotated clockwise on the correlating threads. As cover piece **114** is further rotated clockwise, downwardly, the internal threads of cover piece **114** comes into contact with actuator **104** and cover actuator **104** whereby cover piece **114** is then movably retained after being fully twisted onto canister **102**. This engagement applies a radial force inward and downward to create a substantially air-tight seal that prevents exiting of liquid and gas from canister **102**. Cover piece **114** may be removed by applying a force greater than the radial force, such as by a user rotating actuator **104** and then pulling cover piece **114** away from canister **102**.

Lid **115** may be fit over cover piece **114**, shown away from canister **102** in FIG. **1**A and FIG. **1**B and on canister **102** in FIG. **1**C. Lid **115** may be structured to form a friction fit with the upper portion of sidewall **107** of canister **102** when lid **115** is positioned on top of canister **102**. When positioned on top of canister **102**, a portion of canister **102** rests inside the recess of lid **115** whereby lid **115** provides an aesthetically pleasing look to dispensing container system **100** having the other components such as actuator **104** and cover piece **114** covered by lid **115**.

Turning to FIG. **2**, hole **106** at base **105** of canister **102** may be provided with a valve **130** made of rubber or any other suitable material, the valve being generally of the duck-bill variety. Valve **130** may include an upper split portion **132** defining two relatively flat "bills" **134**, **136** that meet to provide a seal, a generally frustoconical section **138** expanding downward and terminating in a barb **140**, a lower annular flared flange **142**, and an interior space **144**. An annular groove **145** is defined between the barb **140** and the flange **142**.

Valve **130** may be stabilized within hole **106** with an annular catch **146** which resides at the circumference of hole **106** and a resilient annular strain relief member **148** which engages the inner portion of catch **146**. More particularly, catch **146** includes ring groove **151**, a barb projection **156**, inner rim **158**, and a side wall **160**. When catch **146** is positioned at the hole **106** from inside the canister **102**, side wall **160** fits against the circumference of hole **106** to position catch **146** concentrically with hole **106**. The ring groove **151** holds an O-ring **152** against the interior surface of the bottom **105** of the canister **102** to provide a fluid tight seal. The strain relief member **148** includes an upper barb **162** and a groove **164**. When the strain relief member is pushed through catch **146** from bottom **105** of the canister **102** (i.e., from outside the canister), barb **162** seats over inner rim **158** of catch **146**, and inner rim **158** is engaged within the groove **164**.

Valve **130** may then be pushed through the lower end of the strain relief member **148** such that the frustoconical portion **138** resides within canister **102** and barb **140** passes through and seats above projections **156** of catch member **146**. Catch member **146** and strain relief member **148** may be positioned within and about the annular groove **145** in valve **130** (with the barb **140** of valve **130** seating above members **146** and **148**, and flared flange **142** of valve **130** seating below members **146** and **148**). This configuration locks valve **130** relative to the bottom of the canister **102** and

provides a fluid tight seal about the valve's periphery. Importantly, where hole **106** in the canister **102** is a punched hole with potentially sharp edges **166**, catch **146** and strain relief **148** operate to shield such sharp edges from contact with valve **130**, thereby preventing damage to valve **130** that may otherwise occur. The interior space of valve **130** may include a relatively large first portion **170**, a reduced diameter neck portion **172**, and a flared third portion **174**. It should also be appreciated that interior space **144** of valve **130** provides a configuration that locks head portion **190** of needle **184** into place such that canister **102** will not release or disengage from valve **130** while canister **102** is pressurized unless a user physically pulls canister **102** away from needle **184**. This configuration of valve **130** is incorporated by reference via U.S. Pat. No. 6,883,564 in its entirety.

Turning now to FIG. **3**, illustrating a second embodiment of the coupling between a valve **130***a* and the canister **102** that is shown rotated 90° with respect to FIG. **2**. Valve **130***a* may include an upper portion **132***a* defining two protrusions. In the second embodiment, edge **166***a* at the bottom **126***a* of the canister **102** may be bent inward (i.e., upturned) to provide a rounded contour. In such an embodiment, the rounded contour is unlikely to cause damage to the valve **130***a*. Thus, the catch **146** and strain relief **148** (FIG. **2**) are not as advantageous and may be eliminated. If eliminated, the annular groove **145***a* about the valve **130***a* is preferably reduced in width (the dimension between the barb **140***a* and the flange **142***a*) to correspond to the upturned portion of the bottom **126***a*, while the other aspects of the valve preferably substantially remain the same. The valve **130***a* is then pushed through the hole **128***a* such that the barb **140***a* of the valve **130***a* resiliently deforms, passes through the hole, and then expands to capture the upturned edge **166***a* within the annular groove **145***a*, between the barb **166***a* and the flange **142***a*.

Referring now to FIG. **4**, canister **102** may be connected to a pressurization station **150**. Pressurization station **150** may include a housing **180** having an external dock **182** for receiving the lower end of canister **102** and a hollow needle **184** at the center of external dock **182**. Needle **184** may be coupled to a compressor within housing **180**. pressurization station **150** may also include appropriate circuits, switches, and other components, to activate the compressor, and other essential components, not shown, but which are well known in the art. For example, U.S. Pat. No. 6,883,564 Risch; U.S. Pat. No. 5,623,974 to Losenno et al.; U.S. Pat. No. 5,462,099 to Demarest et al.; and U.S. Pat. No. 5,343,904 to Kaeser disclose the essential elements within a docking station and are hereby incorporated by reference herein in their entireties.

Pressurization station **150** may have a power system designed to provide the energy to the circuits, switchers, and other components of station during the process of pressurizing canister **102**. Pressurization station **150** may be powered by methods known by those of ordinary skill in the art and is shown in FIG. **4** with power button **150***a*. In some embodiments, pressurization station **150** may plug into an electrical outlet using an electrical cord to supply power to the circuits and components of pressurization station **150**. Further power system may include a rechargeable battery pack whereby the rechargeable battery is of a charge, design, and capacity, to provide sufficient power to the circuits and components of pressurization station **150** during operation for a set period of time needed to pressurize canister **102**.

In some non-limiting embodiments the pressurization station may have one or more battery compartments for receiving and holding batteries such as but not limited to AA or AAA sized conventional batteries. The battery compartment may include one or more electrodes (e.g. conventional electrodes) that are configured to contact electrically conductive surfaces of the battery received inside the compartment. The battery compartments are selectively accessible by removal of a latch cover whereby the battery compartments and the batteries are accessible only when the user removes a removable battery cover or latch mechanism concealing the battery compartment from external view. Pressurization station **150** may include a latch receiving component that engages with the latch cover concealing battery compartment to facilitate removal and reattachment of the latch cover from pressurization station **150**.

Needle **184** may include an enlarged generally oval shaped head portion **190**, a reduced diameter neck portion **192**, and a relative larger diameter base portion **194**. An axial through bore **196** is defined therethrough. Head portion **190** of needle **184** may be an enlarged generally oval shaped, a round and substantially spherical-shaped, or any other shape that does not have the defined edges associated with prior art needles having a frustoconical shape that, necessarily, have a defined edge on the circular base. The interior space **144** of valve **130** accommodates head portion **190** and neck portion **192** of needle **184**, with head **190** fitting within first portion **170** of space **144**, and neck portion **192** of needle **184** fitting diametrically snugly within neck portion **172** of the space and extending within the flared third portion **174** of space **144**. Bills **134** and **136** are located higher than the head **190** of the needle **184**, such that even when the needle is fully inserted into the valve **130**, valve **130** remains closed. The oval shape of needle **184** is an improvement over existing frustoconical heads because the oval shape no longer has any sharp edges capable of cutting or otherwise damaging the rubber material of valve **130**. As discussed above, the shape of needle **184** may comprise any shape that does not have defined edges, such as a rounded and substantially spherical-shape. For example, U.S. Pat. No. 6,883,564 discloses a needle having a substantially frustoconical shaped needle head or point, defined by a rounded apex and a circular edge defining the terminating distal end of the head or point. Head portion **190** of Needle **184** of the present invention does not have the rounded frustoconical head portion, rather it is oval or substantially spherical in shape. Specifically, head **190** does not have a defined circular edge at its distal end. This improvement in the shape of head portion **190** of needle **184** not only preserves the structural integrity of valve **130**, as discussed above, but it additionally allows valve **130** to be opened to facilitate a de-pressurization configuration of valve **130** that is discussed in view of FIGS. **8** and **10**, infra.

In some non-limiting embodiments dock **182** may be generally collar sized and contoured to guide canister **102** into an orientation in which valve **130** is aligned with pressurization needle **184** on pressurization station **140**. Dock **182** may have a cylindrically tubular lower portion **198** (approximately 0.53 inch in height) having an inner diameter (e.g., 1.980 inches) which is just slightly larger (e.g., 0.010 inch clearance) than the outer diameter at the lower end of the canister **102** (e.g., 1.970 inches), and an upper portion **200** with a surface **202** beveled outward relative to the inner surface of the lower portion **204**. The upper portion **200** bevels out to an inner diameter of, e.g., 2.060 inches; i.e., preferably approximately 0.090 inch greater than the lower end of the container. The dock **182** has a total height of preferably approximately 0.780 inch, with the lower portion **204** having a height of preferably approximately 0.53 inch, and upper portion **200** having a height of

preferably approximately 0.23 inch. When canister **102** is positioned at dock **182**, even at an angle, beveled surface **202** guides the lower end of canister **102** into lower portion **204**. In this manner, interior space **144** of valve **130** is automatically aligned relative to needle **184** without user concern for a misalignment, which could otherwise cause valve **130** puncture or wasted user time with respect to alignment.

Adverting now to FIG. **5**; illustrating a sectional view of bag **103** within canister **102** taken generally along lines **5-5** in FIG. **1**. Bag opening **112** is seated within opening **108** of canister **102**. Bag opening **112** includes annular ridge **208** that is arranged to sealably engage inner wall **107***a* of opening **108** and circumferential sidewall **107** of canister **102**. Seal point **210** is created via the combination of annular ridge **208** and the lip of opening **112** when bag **103** is engaged within canister **102**, as discussed supra. Opening **112** also includes threads **113***b* that are arranged to accept threading **113***a* of valve cup **113**. Also shown is upper aperture **112***a* of bag opening **112**. Upper aperture **112***a* is arranged to be a circumference greater than that of lower aperture **112***b*. Lower aperture **112***b* opens into the inside of bag **103**.

Adverting now to FIG. **6**, illustrating a second and preferred embodiment of the present invention. As previously discussed, a bag may present various issues such as puncturing or sticking to the inside walls of the canister of the present invention. The second embodiment aims to alleviate these problems by replacing the bag apparatus discussed supra with deformable piston **300**. It should be appreciated that all of the discussed components of the present invention still apply with the second embodiment of canister **102** shown in FIG. **6** with the exception of bag **103**, and valve cup **113**. In the second embodiment of the present invention, actuator **104** is directly connected to the inside of canister **102** and is still fixedly attached to opening **108** via cover piece **114**. Threads **215** engage threads **215***a* of cover piece **114** to sealably secure cover piece **114** and actuator **104** to opening **108** in an airtight manner.

Deformable piston **300** is preferably constructed from a medium-soft flexible silicone and is configured to include plurality of annular ridges **302** arranged on outside surface **301** of piston **300**. Annular ridges **302** resemble a plurality of O-rings that are fixed to outside surface **301** of piston **300**. Piston **300** may be comprised of any other suitable plastic or silicone combination, or silicone and metal combination such that it may be deformably and forcibly removed through opening **108** of canister **102** (shown in FIGS. **10** and **11**, discussed infra). Ridges **302** of piston **300** are arranged to contact inner wall **107***a* of opening **108** and circumferential sidewall **107** of canister **102**. This contact creates a seal between upper chamber **510** and lower chamber **520**, defined by piston **300**. Upper chamber **510** is where dispensable substances are stored when canister **102** is filled and lower chamber **520** is pressurized via pressurization station **105**.

Piston **300** may comprise various different constructions. In one possible configuration, piston **300** may be substantially hollow and include an aperture on its distally arranged bottom surface that would lead to an internal cavity. This hollow configuration would allow piston **300** to inflate when canister **102** is pressurized, further sealing annular ridges **302** against inner wall **107***a* of opening **108** and circumferential sidewall **107** of canister **102**. The hollow configuration also would allow piston **300** to deflate when canister **102** is de-pressurized, making piston **300** easier to remove from opening **108**, as shown in FIGS. **10** and **11**, discussed further infra.

In use, during a first filling, actuator **104** and valve cup **113** may be removed from canister **102** and a selected content such as a liquid is poured through the open end of the canister **102** into bag **103**. Valve cup **113** is then placed on bag **103** and then actuator **104** is connected to valve cap. Cover piece **114** is then threaded back onto the canister **102** until the canister is closed and an airtight seal is created. It should be appreciated that in the second embodiment of the present invention, valve cup **113** and bag **103** are absent. Thusly, during a first filling, actuator **104** and cover piece **114** may be removed from canister **102** and a selected content such as a liquid is poured through opening **108** directly into upper camber **510**, defined by the top surface of piston **300**. Cover piece **114** is then threaded back onto canister **102** to secure actuator **104** to opening **108**, creating an airtight seal. For both embodiments of the present invention, canister **102** is then inserted into dock **182** such that needle **184** is inserted into valve **130**. The tapered end of the head **190** of the needle **184** and flared opening **174** of the valve **130** facilitate the coupling between needle **184** and valve **130** such that canister **102** and valve **130** may be coupled with relatively little user force.

The following description should be taken in view of FIGS. **1A-6**. When canister **102** is fully seated in dock **182** and fully seated on the needle **184** and no pressurizing force is present, head **190** of the needle **184** resides within a first portion **170** of interior space **144** and neck **192** of the needle **184** resides in the narrower neck portion **172** of the space, and the split valve **130** remains closed. This prevents any of the fluid contents of the canister **102** from escaping.

When the compressor of pressurization station **150** is operated, e.g., by actuation of switch **150***a*, gas, e.g., air, under pressure is forced through needle **184** and into valve **130**. This causes the bills **134** and **136** of valve **130** to flutter open such that the gas pressurizes canister **102**. Furthermore, as the pressure within canister **102** increases, the force against valve **130** from canister **102** contents increases. As such, the force of the contents against the frustoconical portion **138** of valve **130** decreases the diameter of neck portion **172** of interior space **144**. This captures head portion **190** of needle **184** within valve **130** and prevents canister **102** from blowing off needle **184**, even at maximum fill pressure, e.g., 70 to 100 psi. Preferably, pressurization station **150** includes means for automatically deactivating the compressor **182** when a desired fill pressure is reached. As soon as the compressor is turned off, bills **134** and **136** of valve **130** close; preventing any backflow of the contents through valve **130**.

Canister **102** may then be removed from the pressurization station **150**. Spray nozzle **119** may then be depressed to release the contents of bag **103**, or upper chamber **510** in the second embodiment. When canister **102** is depressurized (either partly or completely), i.e., after significant use or after removal and replacement of cover piece **114**, and actuator **104** from the canister, canister **102** may be positioned within dock **182** of pressurization station **150**, and re-pressurized as described above.

The following description should be taken in view of FIGS. **7-10**. FIG. **7** is a partial view of the canister and valve engaging the needle of the pressurization station of the first and second embodiments of the present invention in a first engagement position. FIG. **8** is a partial view of the canister and valve engaging the needle of the pressurization station of the first and second embodiments of the present invention

in a second engagement position. It should be appreciated that FIG. **7** (first engagement position) corresponds with the sectional view of the second embodiment of the present invention shown in FIG. **9** and that FIG. **8** (second engagement position) corresponds with the sectional view of the second embodiment of the present invention shown in FIG. **10**. Notwithstanding, the engagement positions illustrated in FIGS. **7** and **8** also apply to the first embodiment of the present invention.

Valve **130** is illustrated in a first engagement position with needle **184** in FIG. **7**. When valve **130** of canister **102** is engaged to needle **184**, whereas head portion **190** of needle **184** is inserted within interior space **144** of valve **130**. This first engagement position allows pressurization of lower chamber **520**. Gas that is pushed through needle **184** pressurizes interior space **144** until upper spilt portion **132** of valve **130** opens first bill **134** and second bill **136** to allow gas to enter lower chamber **520** of canister **102** (Described further supra in view of FIGS. **2** and **3**). With respect to the second embodiment of the present invention, gas **400** fills lower chamber **520** creating an upward force on the distal end of piston **130**. When actuator **104** is actuated, gas **400** pushes piston **130** upwardly, along inside surface **107***a* of canister **102** towards nozzle **119** and expels a dispensable substance that is within upper chamber **510**, as shown in FIG. **9**.

Valve **130** is illustrated in a second engagement position with needle **184** in FIG. **8**. When valve **130** of canister **102** is engaged to needle **184**, whereas head portion **190** of needle **184** is inserted within interior space **144** and within the seam created via first bill **134** and second bill **136** of split upper portion **132** of valve **130**. This second engagement position allows for depressurization of lower chamber **520** of canister **102** allowing gas **400***a* to exit **401** through head **190** of needle **184** that is protruding through the opened spilt upper portion **132** of valve **130**, as shown in FIG. **10**. It should also be appreciated that pressurization station **150** may facilitate exit **401** of gas **400***a* by applying a suction to needle **184**. The suction feature of station **150** will reset piston **300** in a manner shown in FIG. **6**.

Also illustrated in FIGS. **10** and **11** is removal tool **310** that facilitates pulling piston **300** through opening **108** for cleaning or replacement. On the top surface of piston **300** is through-bore **305**, that may be threaded. Removal tool **310** has neck **311** that terminates to threaded end **312** which is arranged to engage through-bore **305**. Due to the deformable construction of piston **300**, removal tool **310** may be used to forcibly pull piston out from within canister **102**. It should also be appreciated that removal tool **310** and through-bore **305** may still be used on an inflatable configuration of piston **300**, whereas removal tool **310** may assist a user to remove a deflated piston **300** through opening **108** of canister **102**.

Alternative Piston Configurations

Adverting now to FIGS. **12**A through **16**C, which generally describe alternative embodiments of piston **300**, described supra, that may be used in conjunction with canister **102**, also described supra.

The following description should be taken in view of FIGS. **12**A and **12**B. FIG. **12**A illustrates a perspective view of reinforced piston **800** and FIG. **12**B illustrates a right-side view of the same. Reinforced piston **800** is preferably constructed of a silicon, or other flexible materials. Reinforced piston **800** includes domed portion **804** extending from tubular portion **805**, where domed portion **804** is proximate top end **810** and tubular portion **805** is proximate open end **811**. Dome portion **804** has a semi-spherical shape and terminates at apex **803**, which may, or may not, be planar. Extending from external surface **801** and arranged on domed portion **804** are plurality of stoppers **820** comprising first, second, third, and fourth stopper, **820***a*, **820***b*, **820***c*, and **820***d*, respectively. First, second, third, and fourth stopper, **820***a*, **820***b*, **820***c*, and **820***d* may all collectively prevent piston **800** from accidentally being dislodged from a pressurized canister. Alternatively, first, second, third, and fourth stopper, **820***a*, **820***b*, **820***c*, and **820***d* may be connected across apex **803**, such that first and fourth stopper **820***a* and **820***c* extend and connect as a single stopper and second and third **820***b* and **820***d* extend and connect as a single stopper, forming a cross-member above apex **803**. Extending from external surface **801** and arranged on tubular portion **805** are plurality of O-rings **802** comprising first, second, and third O-ring, **802***a*, **802***b*, and **803***c*, respectively.

The following description should be taken in view of FIGS. **13**A and **13**B. FIG. **13**A illustrates a bottom plan view of reinforced piston **800** and FIG. **13**B generally illustrates a cross-sectional view taken generally along line **13**B-**13**B in FIG. **13**A. Embedded within domed portion **804** and tubular portion **805** is reinforcement apparatus **850**, which may also protrude from internal surface **801***a* into cavity **830**. Reinforcement apparatus **850** is preferably constructed from a semi-rigid material, that is, the semi-rigid material may allow for partial flexion. Reinforcement apparatus **850** generally comprises cross member **855** and arm members **851**-**854** extending from cross member **855** and terminating proximate open end **811**. Each of arm members **851**-**854** integrate with cross member **855** at flex points **851***a*-**854***a*, respectively.

FIG. **14** illustrates a perspective view of reinforcement apparatus **850** removed from piston **800**. Each of arm members **851**-**854** include curved portions **851***b*-**854***b* extending from their respective flex points **851***a*-**854***a*, respectively. Flex points **851***a*-**854***a* may all individually be a living hinge, that is, a flexible portion made from the same material as the two more rigid pieces (cross member **855** and curved portions **851***b*-**854***b*). Alternatively, flex points **851***a*-**854***a* may instead be configured to have less material than cross member **855** and curved portions **851***b*-**854***b*, thusly allowing arm members **851**-**854** to move inwardly and outwardly, i.e., first arm member **851** may move in first direction D**1** and in second direction D**2**; second arm member **852** may move in third direction D**3** and in fourth direction D**4**; third arm member **853** may move in first direction D**1** and in second direction D**2**; and, fourth arm member **854** may move in third direction D**3** and in fourth direction D**4**—when pressurized gas enters canister **102** (shown FIG. **9**) or when canister **102** is depressurized (shown in FIG. **10**).

The following description should be taken in view of FIGS. **14** through **15**B. FIG. **15**A illustrates a cross-sectional view of canister **102** taken generally along line **15**A-**15**A in FIG. **1**C, having piston **800** therein, where canister **102** is depressurized (depressurization also generally illustrated in FIG. **10**). FIG. **15**B illustrates a cross-sectional view of canister **102** taken generally along line **15**A-**15**A in FIG. **1**C, having piston **800** therein, where canister **102** is pressurized (pressurization also generally illustrated in FIG. **9**).

When canister **102** is not pressurized, as generally illustrated in FIG. **15**A, plurality of O-rings **802** of piston **800** will not contact, or will only lightly (without pressure), inside surface **107***a*, as there is no pressurization within canister **102** to expand reinforcement apparatus **850** which in turn will expand piston **800**. As stated supra, since piston **800** is preferably made from a flexible and deformable material, such as silicon, when piston **800** is not expanded

from pressurization, it may be deformed further by user, allowing the user to pull piston **800** out from canister **102**.

However, when canister **102** is pressurized, as generally illustrated in FIG. **15**B, gas **400** will fill cavity **830** of piston **800**. When gas **400** fills cavity **830**, the pressure will expand piston **800**. Specifically, the respective arms of reinforcement apparatus **850** will expand outwardly (towards inside surface **107***a*) in first, second, third, and fourth radial directions RD**1**, RD**2**, RD**3**, and RD**4**. When the arms of reinforcement apparatus **850** are expanded, plurality of O-rings **802** will each abut inside surface **107***a* of canister **102**, bifurcating upper chamber **510** and lower chamber **520** in a gas-tight and sealed manner. This arrangement prevents dispensable contents with upper chamber **510** from leaking into lower chamber **520** and also prevents gas **400** inside lower chamber **520** from leaking into upper chamber **510**. Due to the more rigid construction of reinforcement member **850**, when canister **102** is pressurized and the arms of reinforcement member **850** are expanded, if actuator **114** is disengaged from pressured canister **102** (accidentally, purposefully, or by structural failure), piston **800** will not be able to dislodge itself from pressurized canister **102**—thereby preventing possible injury.

The following description should be taken in view of FIGS. **16**A through **16**C. FIG. **16**A illustrates a perspective view of solid piston **700**, FIG. **16**B illustrates a ride side view of solid piston **700**, and FIG. **16**C illustrates a cross-sectional view of solid piston **700** take generally along line **16**C-**16**C in FIG. **16**B. Solid piston **700** generally comprises plurality of O-rings arranged circumferentially on external surface **701**. Plurality of O-rings **702** comprises first O-ring **702***a*, second O-ring **702***b*, and third O-ring **703***c*—collectively increasing the sealing ability of piston **700** against inner wall **107***a* of canister **102** (shown in FIG. **16**A). Solid piston **700** includes tubular portion **705** disposed proximate bottom end **711** and extending into domed portion **704**, where domed portion **704** terminates at apex **703**. Apex **703** may, may not, be planar.

As shown best in FIG. **16**C, piston **700** is completely solid. Piston **700** is arranged to be installed within canister **102** (shown in FIG. **16**B) before a bottle-necking configuration of canister **102** is conducted, bottleneck **107***b* (shown in FIG. **16**B), that is, decreasing the internal diameter of canister **102** proximate an upper end of canister **102**—permanently enclosing piston **700** within canister **102** as piston **700** will have an external diameter greater than the internal diameter of bottleneck **107***b* of canister **102**, and the portion of canister **102** arranged above bottleneck **107***b* (proximate to actuator **114** in FIG. **16**B).

The corresponding structures, materials, acts, and equivalents of all means or step plus function elements in the claims below are intended to include any structure, material, or act for performing the function in combination with other claimed elements as specifically claimed. The description of the present invention has been presented for purposes of illustration and description but is not intended to be exhaustive or limited to the invention in the form disclosed. Many modifications and variations will be apparent to those of ordinary skill in the art without departing from the scope and spirit of the invention. The present invention according to one or more embodiments described in the present description may be practiced with modification and alteration within the scope of the appended claims. Thus, the description is to be regarded as illustrative instead of restrictive of the present invention.

REFERENCE NUMERALS

100 reusable dispensing container system
102 canister
103 bag
104 actuator
104*a* attachment means to actuator **104**
105 base
106 aperture
107 canister circumferential sidewall
107*a* inside surface of canister **102**
107*b* bottleneck of canister **102**
108 circular opening
112 bag opening
113 valve cup
113*a* threading of valve cup **113**
114 canister cover piece
115 lid
119 nozzle
126*a* bottom
127 dip tube
128*a* hole
130 valve
130*a* valve
132 upper split portion of valve **130**
132*a* upper split portion of valve **130***a*
134 first bill of upper split portion of valve **130**
136 second bill of upper split portion of valve **130**
138 frustoconical section of valve **130**
140 barb of valve **130**
140*a* barb
142 lower annular flared flange
142*a* flange
144 interior space of valve **130**
145*a* annular groove
146 annular catch
148 annular strain relief member
150 pressurization station
150*a* power button of pressurization station **150**
151 ring groove of annular catch **146**
152 O-ring
156 barb projection of annular catch **146**
158 inner rim of annular catch **146**
160 side wall of annular catch **146**
162 upper barb of annular strain relief **148**
164 groove of annular strain relief **148**
166 edges
166*a* edge
170 first portion of interior space **144**
172 neck portion of interior space **144**
174 flared portion of interior space **144**
180 housing
182 dock/compressor
184 needle
190 head portion of needle **184**
192 neck portion of needle **184**
194 base portion of needle **184**
196 axial through-bore of needle **184**
198 tubular lower portion of dock **182**
200 upper portion of dock **182**
202 surface of upper portion **200**
204 lower portion of dock **182**
212 ridges of bag **112**
215 threading
300 piston
301 outside surface of piston **300**
302 annular ridges of outside surface of piston **300**
305 through-bore
310 removal tool
311 neck of removal tool **310**
312 threading of neck **311**

400 gas
400*a* gas
401 exit of gas **400**
510 upper chamber of canister **102**
520 lower chamber of canister **102**
600 internal support member piston
602 annular ridges of outside surface of piston **600**
605 through-bore
610 plurality of internal support members of piston **600**
611 plurality of hinges of internal support members **610**
700 solid piston
701 external surface
702 plurality of O-rings
702*a* first O-ring of plurality of O-rings **702**
702*b* second O-ring of plurality of O-rings **702**
702*c* third O-ring of plurality of O-rings **702**
703 apex
704 domed portion
705 tubular portion
710 top end
711 bottom end
800 reinforced piston
801 external surface
801*a* internal surface
802 plurality of O-rings
802*a* first O-ring of plurality of O-rings **802**
802*b* second O-ring of plurality of O-rings **802**
802*c* third O-ring of plurality of O-rings **802**
803 apex
804 domed portion
805 tubular portion
810 top end
811 open end
820 plurality of stoppers
820*a* first stopper of plurality of stoppers **820**
820*b* second stopper of plurality of stoppers **820**
820*c* third stopper of plurality of stoppers **820**
820*d* fourth stopper of plurality of stoppers **820**
830 cavity
850 reinforcement apparatus
851 first arm of reinforcement apparatus **850**
851*a* flexion point of first arm **851**
851*b* curved portion of first arm **851**
851*c* straight portion of first arm **851**
852 second arm of reinforcement apparatus **850**
852*a* flexion point of second arm **852**
852*b* curved portion of second arm **852**
852*c* straight portion of second arm **852**
853 third arm of reinforcement apparatus **850**
853*a* flexion point of third arm **853**
853*b* curved portion of third arm **853**
853*c* straight portion of third arm **853**
854 fourth arm of reinforcement apparatus **850**
854*a* flexion point of fourth arm **854**
854*b* curved portion of fourth arm **854**
854*c* straight portion of fourth arm **854**
855 cross member of reinforcement apparatus **850**
AD**1** first axial direction
AD**2** second axial direction
D**1** first direction
D**2** second direction
D**3** third direction
D**4** fourth direction
RD**1** first radial direction
RD**2** second radial direction
RD**3** third radial direction
RD**4** fourth radial direction

What is claimed is:

1. A reusable dispensing container assembly, comprising:

a canister having a first end and a second end, said canister having an upper chamber to hold dispensable substance;

an actuator arranged proximate said first end of said canister, in communication with said chamber, said actuator having a nozzle arranged to eject said dispensable substance; and,

a deformable piston arranged within said canister below said upper chamber, said deformable piston having a reinforcement apparatus embedded therein, said reinforcement apparatus having a cross member fixedly secured to said upper portion of said deformable piston and further arranged proximate an apex of said deformable piston, a plurality of arm members extending distally from said cross member and at least partially within said lower portion of said deformable piston, said piston further arranged to sealingly engage an inner surface of said canister, said piston arranged for upward movement within said canister when said actuator is actuated, said deformable piston forming a lower chamber arranged to hold pressurized gas.

2. The reusable dispensing container assembly recited in claim **1**, wherein said deformable piston comprising at least one integral external O-ring about its circumference arranged to sealingly engage said inner surface of said canister and maintain separation of said dispensable substance and said pressurized gas.

3. The reusable dispensing container assembly recited in claim **2**, further comprising a pressurization station having a pressurizing and de-pressurizing needle, said needle having a rounded tip, said pressurization station operatively arranged to pressurize said canister to permit upward movement of said deformable piston when said actuator is actuated to dispense said dispensable substance through said nozzle.

4. The reusable dispensing container assembly recited in claim **3** wherein said canister further comprises a valve arranged on said second end of said canister, said valve is arranged to accept said needle.

5. The reusable dispensing container assembly recited in claim **4** wherein said valve further comprises:

an upper split portion having two bills; and,

an interior cavity having a first portion defined by said upper spilt portion of said valve, said interior cavity having a neck portion, said interior cavity having a flared portion distally arranged in relation to said first portion,

wherein said flared portion of said interior space of said valve is arranged to accept said needle; and,

wherein said first portion of said interior space of said valve is arranged to accept said needle, said rounded tip of said needle is operatively arranged to split said bills of said upper split portion of said valve.

6. The reusable dispensing container assembly recited in claim **3**, wherein said pressurization station is operatively arranged to depressurize said canister to permit downward movement of said deformable piston when said deformable piston is positioned at the apex of said upper chamber of said canister.

7. The reusable dispensing container assembly recited in claim **3**, wherein said pressurization station is operatively arranged to engage said canister and create suction within said canister to pull said deformable piston distally in the direction of said second end of said canister.

8. The reusable dispensing container assembly recited in claim 3, wherein said reinforcement apparatus further includes:

a flexion point connecting each of said plurality of arm members to said cross member.

9. The reusable dispensing container assembly recited in claim 8, wherein said flexion point is a living hinge.

10. The reusable dispensing container assembly recited in claim 9, wherein said cavity of said deformable piston is in communication with said pressurized gas, wherein said pressurized gas causes said piston to expand against an inner wall of said canister, wherein said pressurized gas flexes said plurality of arm members in a direction towards said inner wall of said canister.

11. The reusable dispensing container assembly recited in claim 1, wherein said upper portion of said piston is substantially dome-like and said lower portion of said piston is substantially tubular.

12. The reusable dispensing container assembly recited in claim 1, wherein said piston further comprises:

an internal cavity disposed within said upper and lower portions; and,

an opening to said internal cavity arranged proximate said lower portion.

13. The reusable dispensing container assembly recited in claim 1, wherein said reinforcement apparatus further includes:

a flexion point connecting each of said plurality of arm members to said cross member.

14. The reusable dispensing container assembly recited in claim 1, wherein said deformable piston further comprises:

a plurality of stoppers extending from said upper portion of said deformable piston.

15. A reusable dispensing container assembly, comprising:

a canister having a first end and a second end, said canister having an upper chamber to hold dispensable substance;

an actuator arranged proximate said first end of said canister, in communication with said chamber, said actuator having a nozzle arranged to eject said dispensable substance; and,

a deformable piston arranged within said canister below said upper chamber, said deformable piston having a reinforcement apparatus embedded therein, said reinforcement apparatus having a plurality of arm members arranged at least partially within one or more of an upper portion of said piston or a lower portion of said piston, said piston further comprising a plurality of stoppers extending from said upper portion of said deformable piston, said piston further arranged to sealingly engage an inner surface of said canister, said piston arranged for upward movement within said canister when said actuator is actuated, said deformable piston forming a lower chamber arranged to hold pressurized gas.

16. The reusable dispensing container assembly recited in claim 15, wherein said piston further comprises:

an internal cavity disposed within said upper and lower portions; and,

an opening to said internal cavity arranged proximate said lower portion.

17. The reusable dispensing container assembly recited in claim 15, wherein said reinforcement apparatus further includes:

a cross member fixedly secured within a cavity of said deformable piston arranged proximate an apex of said deformable piston;

said plurality of arm members extending from said cross member, each of said plurality of arm members fixedly secured to and extending the entirety of a cavity within said piston; and,

a flexion point connecting each of said plurality of arm members to said cross member.

18. The reusable dispensing container assembly recited in claim 15, wherein said upper portion of said piston is substantially dome-like and said lower portion of said piston is substantially tubular.

19. The reusable dispensing container assembly recited in claim 17, wherein said flexion point is a living hinge.

20. The reusable dispensing container assembly recited in claim 15, wherein said deformable piston comprising at least one integral external O-ring about its circumference arranged to sealingly engage said inner surface of said canister and maintain separation of said dispensable substance and said pressurized gas.

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