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(54) **CONTAINER WITH INTEGRATED PROTECTION FEATURE**

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(73) Proprietor: **Colgate-Palmolive Company**
New York, NY 10022 (US)

(72) Inventors:
- **DEMAREST, Scott**
  Loudon, TN 37774 (US)
- **XOY, Oscar**
  New Brunswick, NJ 08901 (US)

(74) Representative: **Schicker, Silvia**
Wuesthoff & Wuesthoff
Patentanwälte PartG mbB
Schweigerstraße 2
81541 München (DE)

(56) References cited:
DE-A1- 2 758 392
DE-C1- 3 627 101
DE-U1- 20 115 364
US-A- 3 192 978
US-A- 4 177 939
US-A- 4 842 140

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Description

FIELD OF THE INVENTION

[0001] The present invention relates generally to the field of packaging, and specifically to protective packaged containers used to dispense a fluid or gel.

BACKGROUND OF THE INVENTION

[0002] Various containers are known in the art for the retention and exhibition of fluids or gels such as cleaning products, fabric care products or oral care products. Such containers are typically formed with a primary packaging having a shape and size selected to minimize weight and/or outer profile so as to maximize the quantity of containers receivable in a shipping carton. However, this primary packaging sacrifices structural integrity for other factors such as weight, size and aesthetics. Thus, in order to ship said container, they must be provided with a secondary or tertiary packaging to protect the container during transport. In some cases, the primary packaging is loaded into a shipping carton (secondary packaging) and the shipping carton is provided with a means to prevent further damage to the container during transport (tertiary packaging). For example, a cushioning material (e.g., loose-fill styrofoam packing material or "packing peanuts", air-filled sacs, etc.) is inserted into the shipping carton to prevent free movement of the container during transport. However, these packaging systems are cumbersome and require the addition of additional packaging materials at various stages of transport, therefore increasing the manpower needed to transport goods to a consumer, creating extra steps to be completed by the shipper and any intermediary parties (e.g., third-party seller), and increasing the overall cost of shipping the container.

[0003] Further, in a situation where only a small quantity of containers is to be shipped, the containers are often loaded in a large shipping box, thereby using valuable space in a transport vehicle and reducing the quantity of items that can be shipped together.

[0004] There is a need for a container which is configured to withstand forced applied thereto during transport (e.g., e-commerce) while preventing the need for repackaging a container during transport.

US 4,177,939 A refers to a squeeze bottle that includes a container. An opening in communication with an interior of container is provided in the top of the container. Portions of walls of the container are bellowed.

[0005] DE 201 15 364 U1 refers to a packaged consumer product which provides a vessel in accordance with the preamble of appended claim 1 and a single molded plastic protective casing. The casing is closed at the top and open at the bottom, possesses means for releasably retaining the vessel, and comprises cutouts in opposite sides.

[0006] DE 2758392 A1 refers to an edge protection for suitcase and box casings.

[0007] US 3,192,978 A refers to an egg carton comprising a base that includes a flat bottom wall, front and back accordion-pleated side walls, and left and right accordion-pleated end walls.

BRIEF SUMMARY

[0008] The present invention is directed to a container as defined in claim 1. Preferred embodiments are defined by the dependent claims. A container may comprise a container body having a cavity for receiving a product therein and a lid sealing an opening to said cavity, the container body having a front surface, back surface, first sidewall and second sidewall, and a first bumper attached to the first sidewall of the container body, the first bumper configured to absorb forces applied to the container, wherein the first bumper comprises a first engagement mechanism configured to lockingly engage a second engagement mechanism located on the container body.

[0009] A container may comprise a container body having a cavity for receiving a product therein and a lid sealing an opening to said cavity, the container body having a front surface, back surface, first sidewall and second sidewall, and a first bumper and a second bumper attached to said container body, said first and second bumpers being movable from a first configuration having a first outer profile to a second configuration having a second outer profile smaller than the first outer profile, wherein the bumper is a bellows, said first and second bumpers comprising a plurality of folds extending parallel to a longitudinal axis of said container body.

[0010] A container may comprise a container body having a cavity for receiving a product therein and a lid sealing an opening to said cavity, the container body having a front surface, back surface, first sidewall and second sidewall, a first bumper attached to the first sidewall of the container body, and a second bumper attached to the second sidewall of the container body, wherein the first and second bumpers are configured to absorb forces applied to the container, wherein each of the first and second bumpers extends over an edge connecting the front surface to the first and second sidewalls, respectively.

[0011] A method of shipping may comprise affixing a shipping label directly to a container to be shipped, said container comprising a container body having a cavity for housing a fluidic product therein and a lid enclosing said cavity, the container body having a front surface, back surface, first sidewall and second sidewall, and a first bumper attached to the first sidewall of the container body, the first bumper configured to absorb forces applied to the container, wherein the first bumper comprises a first engagement mechanism configured to lockingly engage a second engagement mechanism located on the container. The method may also comprise the step of shipping said container, with the proviso that no sec-

ondary packaging is provided for said container, wherein said container is configured to withstand forces applied thereto during shipping without fracturing or leaking.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The features of the exemplified embodiments will be described with reference to the following drawings in which like elements are labeled similarly. The present invention will become more fully understood from the detailed description and the accompanying drawings, wherein:

FIG. 1A is a front perspective view of a container according to an example useful for understanding the present invention in a biased, resting configuration;
FIG. 1B is a side view of the container of FIG. 1A in partially compressed configuration;
FIG. 2A is a front perspective view of a container according to an example useful for the understanding of the present invention in a biased, resting configuration;
FIG. 2B is a side view of the container of FIG. 2A in partially compressed configuration;
FIG. 3A is a perspective view of a container according to another example useful for the understanding of the present invention;
FIG. 3B is a partially cross-sectional view of the container body of the container of FIG. 3A;
FIG. 4A is a perspective view of a container according to another example useful for the understanding of the present invention;
FIG. 4B is a perspective view of a container according to another example useful for the understanding of the present invention;
FIG. 4C is a perspective view of a container according to another example useful for the understanding of the present invention;
FIG. 4D is a perspective view of a container according to another example useful for the understanding of the present invention;
FIG. 5A is a perspective view of a container according to another example useful for the understanding of the present invention with a cover in a partially retracted configuration;
FIG. 5B is a perspective view of the container of FIG. 5A with the cover in a locked position over a container body;
FIG. 5C is a partial cross-sectional configuration of the cover of FIG. 5A;
FIG. 6A is a perspective view of a container according to another example useful for the understanding of the present invention with a cover in a partially retracted configuration;
FIG. 6B is a top view of the container of FIG. 6A with the cover in a locked position over a container body;
FIG. 6C is a perspective view of a container according to another example useful for the understanding of the present invention with a cover in a partially retracted configuration;
FIG. 7A is a perspective view of a container according to another example useful for the understanding of the present invention with a cover in a fully seated configuration;
FIG. 7B is a perspective view of the container of FIG. 7A with the cover in a partially retracted configuration;
FIG. 8A is a perspective view of a container according to another example useful for the understanding of the present invention with a cover in a fully seated configuration;
FIG. 8B is a perspective view of the container of FIG. 8A with the cover in a partially retracted configuration;
FIG. 8C is a partial cross-sectional view of the container of FIG. 8A;
FIG. 9A is a perspective view of a container according to another example useful for the understanding of the present invention with a cover in a fully seated configuration;
FIG. 9B is a perspective view of the container of FIG. 9A with the cover in a partially retracted configuration;
FIG. 9C is a perspective view of a container according to another example useful for the understanding of the present invention with a cover in a partially retracted configuration;
FIG. 10A is a perspective view of a container according to another example useful for the understanding of the present invention;
FIG. 10B is a partially see-through top view of the container of FIG. 10A;
FIG. 10C is a partially see-through top view of a container according to another example useful for the understanding of the present invention;
FIG. 10D is a perspective view of a container according to another example useful for the understanding of the present invention;
FIG. 10E is a perspective view of a container according to another example useful for the understanding of the present invention;
FIG. 10F is a perspective view of a container according to another example useful for the understanding of the present invention; and
FIG. 10G is a perspective view of a container of FIGS. 10C and 10D with the cover in an open configuration.

DETAILED DESCRIPTION

[0013] The following description is merely exemplary in nature and is in no way intended to limit the invention, its application, or uses.

[0014] The description of illustrative examples showing some principles of the present invention is intended

to be read in connection with the accompanying drawings, which are to be considered part of the entire written description. In the description of containers disclosed herein, any reference to direction or orientation is merely intended for convenience of description and is not intended in any way to limit the scope of the present invention. Relative terms such as "lower," "upper," "horizontal," "vertical," "above," "below," "top" and "bottom" as well as derivative thereof (e.g., "horizontally," "downwardly," "upwardly," etc.) should be construed to refer to the orientation as then described or as shown in the drawing under discussion. These relative terms are for convenience of description only and do not require that the apparatus be constructed or operated in a particular orientation unless explicitly indicated as such. Terms such as "attached," "affixed," "connected," "coupled," "interconnected," and similar refer to a relationship wherein structures are secured or attached to one another either directly or indirectly through intervening structures, as well as both movable or rigid attachments or relationships, unless expressly described otherwise. Moreover, the features and benefits of the invention are illustrated by reference to the exemplified containers.

[0015] Accordingly, the scope of the invention is defined by the claims appended hereto.

[0016] Exemplary containers with some features of the present invention will now be described with respect to a packaging system for a fluid or fluid-like material including, but not limited to a cleaning product, water solution, skin-care product, fabric care product, a hair care product and/or oral care product. However, embodiments of the present invention may be used to store and dispense any suitable type of fluid and the invention is expressly not limited to any particular fluidic material alone.

[0017] A container according to the present invention is formed with protective features in the form of bumpers on an outer surface thereof, the protective features being configured to permit transport of the container without the need for secondary packaging. Whereas conventional containers (e.g., containers housing oral care products such as toothpaste or mouthwash; containers housing home care products such as detergent, softener, cleaning solution, dish soap; etc.) are packaged within a shipping carton including a cushioning material therein to prevent container breakage and/or leakage during transport, the containers described herein are configured to permit shipping without the use of any secondary packaging. In formulating the containers described herein, extensive research was done to determine the forces and loads applied to items during transport from a manufacturing facility to an end user. The containers described herein are capable of withstanding forces from dropping, radial compression (e.g., when loaded in a delivery vehicle with other packages), etc. in particular, the containers described herein are provided with features configured to absorb and insulate the interior of the container from external forces. Any of the protective features described herein may be formed integral to the container or may be removably attached thereto. Further, any of the containers described herein may be provided with any combination of the protective features described herein. The exemplary containers described herein are further configured to receive a shipping label directly thereonto. The shipping labels may be removable or permanently attached to the container. The exemplary container described herein may be shipped by itself without any secondary packaging or with any plurality of additional containers. Further, the exemplary container may be shipped to a brick and mortar retail store and sold with the exemplary protective bumpers provided thereon.

[0018] The containers described herein may, not in accordance with the invention, be formed with integrally formed bumpers which are permanently attached thereto. For example, the container may be manufactured with the bumper provided thereon (e.g., via injection stretch blow molding, extrusion blow molding, etc.), as those of skill in the art will understand. Alternatively, the bumper may be formed separately from the container body and attached thereto during a manufacturing step via one or more of an adhesive, welding, a mechanical attachment (e.g.tongue and groove, snap-fit, friction-fit, keyed fit, etc.) or any other method of attachment known to those of skill in the art. According to the invention, a first bumper comprises a first engagement mechanism configured to lockingly engage a second engagement mechanism located on the container body and a second bumper is configured to lockingly engage the container body. Any of the container bodies described herein may be modified to include one or more of the bumpers described in any of the embodiments described herein to provide added strength to specific portions of the container body. Further, various features of the containers described herein may be combined with one another without deviating from the scope of the invention. As a non-limiting example, the shape of the container body may be substantially rectangular as in FIGS. 1A-8C, frusto-conical as in FIGS. 9A-9C, cylindrical, elliptical, or any other shape. In an embodiment where a cylindrical container body is used, a front surface of the container body may correspond to a portion of the container outer body oriented in first direction. Side surfaces of the container body may be offset from the front surface by approximately 90 degrees and a back surface of the container body may correspond to a surface located opposite the front surface and separated from the side surfaces by approximately 90 degrees. Bumpers, as described herein may be attached to a cylindrical container body in the same manner described herein with respect to rectangular container bodies. Further, any of the container bodies may be modified to include any of the lids described herein, necked or otherwise. Additionally, any of the protective bumpers described herein may be formed with a solid or hollow configuration.

[0019] The integrally formed bumper containers described herein may be formed of one or more of polyole-

fins (polypropylenes, low, medium and high density polyethylenes), which may be formed via extrusion blow molding), polyethylene terephthalate ("PET") (made via injection stretch blow molding) and elastomeric materials, and any combination of the above. Such containers adhere to limitations of the blow molding process and can thus be manufactured faster than multi-component pieces and are fully recyclable. Non-integrally formed containers, which comprise separately formed bumpers, provide the added advantage that a number of different materials may be used to provide a desired combination of strength, resilience, weight and aesthetic appeal to the completed container. The container body of the separately formed containers may be formed of the same materials discussed above. The bumpers of the separately formed containers may be formed of extruded resins, polyolefins (polypropylenes, low, medium and high density polyethylenes) (made via extrusion blow molding), PET (made via injection stretch blow molding), elastomeric materials, rubbers, molded or extruded cellulose (e.g. paper pulp), and any combination of the above.

[0020] FIGS. 1A-1B depict a container 100 for the storage of a fluidic material. The container comprises a unitary container body 102 formed of a polymer and extending along a longitudinal axis 101. A lid 104 is provided on an upper surface 106 of the container 100, the lid 104 selectively sealing an opening (not shown) formed in said upper surface 106 to provide access to the contents of the container. In a preferred embodiment, the lid 104 is coupled to the container 100 by a hinge mechanism, wherein the hinge may be integrally formed with the lid. The lid 104 may alternatively be separable from the container 100. Preferably, the container body 102 is substantially rectangular and comprises rounded edges to minimize damage thereto when impacted. This shape further facilitates case packing and is robust enough to minimize the need for secondary packaging. The upper surface 106 further comprises a recessed portion 108 adjacent the opening (not shown). The recessed neck of the container body 102 further comprises a retention ring (not shown) which engages a corresponding retention ring on the lid 104.The recessed portion 108 is longitudinally offset from the upper surface 106 by a predetermined depth selected so that, when the lid 104 is positioned thereover, the lid 104 lies flush with or below the upper surface 106. This configuration reduces forces applied to the lid during transport and therefore reduces the risk of the lid becoming accidentally detached from the container. The lid 104 further comprises a protrusion or tab 110 provided on a gripping surface thereof to enhance the ability of a user to grip and open the lid. The lid 104 may alternatively be coupled to the container 100 by a screw engagement, friction-fit or another attachment means known in the art. An additional securement may optionally be provided over the lid 104 (*e.g.*, removable sealing mechanism such as a sticker, etc.). At least an outer portion of the lid 104 is rectangular to prevent the lid 104 from rotating and changing orientation once received over the container body 102.

[0021] The container comprises a front surface 112, lower surface 114 opposite the upper surface 106, opposing side surfaces 116, 118 and a back surface 120. One or both of the front and back surfaces 112, 120 may comprise a label or decorative item indicative of, for example, the contents of the package. For example, the front surface 112 may include a label indicating the contents of the package while the back surface 120 may remain blank or may include instructions on product use, instructions for use, or any other information that is conventionally provided on a package for end-consumer reference. The back surface 120 is further adapted to receive a shipping label (not shown) thereon. The back surface 120 may be provided with a surface treatment (*e.g.*, a high gloss finish) that permits the shipping label to be removed therefrom by an end recipient without tearing, damaging or otherwise inhibiting access to the instruction label. Alternatively, the instruction label may not be obstructed by the shipping label. In yet another embodiment, the instruction label may be included in a separate booklet (not shown) shipped with the container 100. Alternatively, the shipping label may be a dual layer sticker wherein a first clear layer (not shown) is permanently attached to the back surface 120 by a permanent or semi-permanent adhesive and a second removable layer is provided thereover, the second removable layer including shipping information including, but not limited to, sender details, recipient details, order number, QR code, etc.

[0022] An optional beveled surface 107 may be provided between the upper surface 106 and the front surface 112. Corresponding beveled surfaces may be provided between the front surface 112 and lower surface 114, between the back surface and the upper surface 106 and/or between the back surface 120 and the lower surface 114.

[0023] The container 100 further comprises bumpers in the form of first and second bellows 122, 124 separating the side surfaces 116, 118 respectively from the front and back surfaces 112, 120. The bellows 122, 124 are formed as an accordioned layer of the container adapted to be compressible when subjected to an outside force exceeding a predetermined minimum. In a preferred embodiment, the bellows 122, 124 are biased to a resting configuration in which adjacent folds 124 are in a partially compressed configuration and are capable of being radially compressed as indicated by arrows A, as depicted in FIG. 1B, or radially expanded (not shown). The folds 124 are oriented parallel to a longitudinal axis of the container 100. As seen in FIG. 2, the folds are configured such that, when radially compressed, the folds 124 remain flush with an outer profile of the container 100, substantially aligned with the front and back surfaces 112, 120. That is, a height of the bellows 122, 124 does not increase beyond a height H of the container 100 when radially compressed. This configuration is selected to minimize an expansion of the height of the container 100

when the bellows is compressed. Alternatively, the bellows may be configured to extend beyond the original height H, length L and/or depth D when compressed to increase dimensions of the container 100.

[0024] Preferably, the bellows 122, 124 are adapted to be radially compressible by a predetermined distance. For example, the bellows 122, 124 may be configured such that a length of the container 100 moves from a length L in a biased resting configuration (*i.e.*, when no external forces are applied to the container) to a radially compressed configuration which may be a percentage of the length L. This configuration has been selected to permit the container to deform under external forces which would otherwise result in a fracture or breakage of the container. This configuration has also been selected to strengthen the container 100 while avoiding the addition of any unnecessary bulk to the container, which would result in increased manufacturing and shipping costs. The result is a container 100 which exhibits substantially increased rigidity when compared to prior art containers while minimizing production and shipping costs. Through extensive testing, it has been found that the container 100 is capable of withstanding forces applied during shipping (*e.g.*, from a warehouse, to a shipping carrier and ultimately to delivery address such as a home or business) and obviates the need for packaging within an additional shipping box. That is, whereas conventional containers must be packaged within a separate shipping box with additional padding provided therein, the exemplary container 100 described herein is capable of being shipped on its own without the use of any additional shipping containers.

[0025] For example, if a force exceeding a predetermined minimum force is applied to any of the upper, lower, front or back surfaces, the bellows may radially expand to absorb compressive forces applied to the container and prevent a fracture or rupture of the container. The container 100 may be biased to return to the resting configuration of FIG. 1 upon removal of the extraneous force applied thereto. It is noted that although the bellows 122, 124 is depicted with six folds 126, any number of folds may be used without deviating from the scope of the invention (*e.g.*, one or more folds). The bellows 122, 124 may be identical to one another or may include variable numbers of folds.

[0026] The bellows 122, 124 are formed integrally with the container 100 such that an inner wall of the bellows defines an inner surface of the container in direct contact with a fluid, gel or other material contained therein. In such configurations, the container body is filled with a quantity of fluid to allow for compression of the bellows 122, 124 without causing overflow. Alternatively, the bellows 122, 124 may be formed separately from the container and attached thereto via adhesive, sealing/welding other mechanical as discussed earlier, wherein the bellows 122, 124 are hollow. In one embodiment, the bellows may be slidably receivable over the container body via, for example, a tongue and groove mechanism as in FIGS. 9A-9B. Optionally, additional sidewalls (not shown) may be provided in the non-integral bellows configuration to restrict the flow of the fluid, gel or other material therewithin.

[0027] FIGS. 2A-2B depict a container 200 according to another example useful to understand the present invention. The container 200 is substantially similar to the container 100 except as discussed below. Similar to the container 100, the container 200 comprises a unitary outer body 202, lid 204, upper surface 206, recessed portion 208, front surface 212, lower surface 214, side surfaces 216, 218 and back surface 220. Unlike the container 100 which is formed with two bellows 122, 124, the container 200 comprises a single bellows 222 oriented along the width W of the container 200. The bellows 222 comprises a plurality of folds 226 extending parallel to a longitudinal axis of the container and configured to permit radial compression of the container along its width.

[0028] FIGS. 3A-3B depict a container 300 according to another example useful to understand the present invention. The container 300 comprises a container body 302 having a lid 304, upper surface 306, recessed portion 308, front surface 312, lower surface 314, side surfaces 316, 318 and back surface 320. The front and back surfaces 312, 320 each comprise a pair of longitudinal grooves 322, 324 extending parallel to a longitudinal axis of the container 300. The grooves 322, 324 are formed with a C-shaped cross-section defining a channel 326 and an opening 328 open to said channel. As depicted in the partial cross-sectional view of FIG. 3B, the channel 326 has a substantially circular cross-section, although any other shape may be used with the condition that a width of the channel 326 is greater than a width of the opening 328. For example, the channel 326 cross-section may be triangular, trapezoidal, oval, diamond-shaped or oblong. The grooves 322, 324 may be provided on both the front surface 312 and back surface 320 to, for example, ensure proper alignment of the bumper 330 over the container. Alternatively, any number of grooves may be provided on any of the front, back or side surfaces of the container.

[0029] The container 300 further comprises a bumper 330 receivable thereover. The bumper 330 may be permanently attached to the container body 302 or be removable therefrom. The bumper 330 comprises an upper wall 332 and a pair of side walls 334, 336 extending orthogonal to the upper wall 332. A pair of extensions 333 is provided on either side of an opening 335 extending through the upper wall 332. The extensions 333 are configure to protect the lid 304 when it is received through the opening 335. Preferably, the extensions 333 are configured to be flush with or have greater dimensions than the lid 304 when the lid is seated within opening 335. The extensions 333 may be solid in construction or hollow. Flaps 338 extend substantially orthogonally from each of the side walls 334, 336 and flaps 340 extend orthogonally from the upper wall 332 over the front and back surfaces 312, 320 of the container 300. A juncture be-

tween the upper wall 332 and the side walls 334, 336 and flaps 338, 340 comprises an optional pleated portion 342 configured to conform to the shape of the container body.

[0030] Although the bumper 330 of FIG. 3A extends over only a portion of container body 302, the bumper 330 may be modified to cover any portion or all of the container body.

[0031] The bumper 330 comprises a plurality of lips 344 provided on an inner surface of the flaps 338, the lips configured to be slidingly received within the grooves 322, 324. The lips 344 may be configured to frictionally engage the grooves 322, 324 to lock the cover in place over the container. Optionally, an additional temporary locking mechanism such as a locking tab or adhesive may be provided on one or both of the cover and the container to lock the cover in place during transport. The lips 344 may be formed of a rubber or other compressible material to enhance grip and prevent premature detachment. Alternatively, the bumper may lock over the container body 302 via one or more of a friction fit, adhesive, boss, snap-fit, stake-on, uni-directional ratchet, or any alternative mechanical locking means known to those of skill in the art.

[0032] The bumper 330 is adapted to be received over the container during, for example, transport. In a preferred example, the bumper 330 is receivable over the container 300 in two configurations. In a first preferable configuration for transport, the upper wall 332 is covers the lid 304, protecting the lid 304 from inadvertently opening. Once delivered to an end user, the cover may be removed and discarded or, may be inserted over the lower end of the container such that the upper wall 332 covers the lower surface 314 of the container. The flaps 338, 340 provide added protection to the container 300 when the bumper 330 is received thereover.

[0033] FIG. 4A depicts a container 400 having a body 402 and cover 430 formed substantially similar to the container 300 and bumper 330, except as discussed below. The container body 402 is formed with a neck that is not recessed into its body. Rather, a lid 404 is provided on a neck 406 that extends longitudinally out of the container body 402 and defines a shoulder 407. Although the lid 404 is depicted with a tapered rectangular cross-section, any other lid shape can be used without deviating from the scope of the invention. A rectangular, elliptical or oblong lid is preferred to avoid rotation thereof over the container body but any other shape may be used without deviating from the scope of the invention.

[0034] The cover 430 is a two-piece cover having upper and lower portions 428, 432 configured to encase both the upper and lower surfaces of the container body 402. A first, lower cover portion 432 has a rigid construction and includes first, second and third wall sections 434, 436, 438. An inner surface 440 of the first cover portion 432 is corrugated, including a series of raised ridges 442 separated from one another by a series of grooves 444. Ridges 442 and grooves 444 on the first and third surfaces 434, 438 extend parallel to a longitudinal axis 401 of the container body 402. The lower cover portion 432 includes the above-described corrugations on an inner surface while an inner surface of the upper portion 428may be substantially smooth, including no ridges or grooves. This configuration reduces manufacturing costs as well as the overall profile of the container 400.

[0035] The exemplary corrugated configuration of the cover 430 has been selected to impart a predetermined strength to the container 400. Specifically, the size, depth and orientation of ridges 442 and grooves 444 has been selected to withstand compressive forces applied thereto - e.g., during shipping from a manufacturing facility to an end user, without the use of any extraneous padding or additional protective means. In particular, the corrugated design is configured to reduce and/or eliminate deformation of the container under out of plane compression (i.e., wherein radially compressive forces are applied to any outer planar surface of the container), in-plane lateral forces, transverse shear stress, etc.

[0036] In a preferred example, the corrugated cover 430 is capable of withstanding a predetermined shear stress of on the upper surface 431 and lower surface 433, where:

$$\tau_1 = \frac{F}{A}$$

wherein,

τ_1 = shear stress;
F = force applied to upper surface 431 and lower surface 433; and
A = area of one of the upper surface 431 and the lower surface 433.

[0037] Side surfaces 435, 437 are capable of withstanding at least a shear stress τ_2. Front and back surfaces 434, 438 are capable of withstanding at least a predetermined shear stress τ_3. The corrugated cover 430 is capable of withstanding a greater shear stress on side surfaces, front surface and back surface due to the orientation of the ridges 442 and grooves 444 - i.e., parallel to the longitudinal axis of the container 400. In a preferred example, the cover 430 is configured so that ridges 442 and grooves 444 extend parallel to the longitudinal axis 401. Alternatively, the ridges 442 and grooves 444 may extend orthogonal to the longitudinal axis 401 or at any other angle relative to the longitudinal axis 401.

[0038] The cover 430 is further configured to withstand a at least a predetermined compressive force of without deformation or fracture.

[0039] The upper portion 428 of the cover 430 further comprises front and back panels 446 extending orthogonal to side surfaces 435, 437. The front and back panels 446 are configured to distribute forces applied to the upper surface 431. Adjacent pairs of the panels 446 may

be connected to one another by an adjoining panel 448. The panels 446, 448 may be sized and shaped such that lid 404 of the container body 402 is fully or partially received therein. This configuration is selected to prevent the container body 402 from sliding or otherwise moving within the cover 430. Alternatively, the lid 404 may be flush with an upper surface of the container body 402. In this configuration, the panel 448 may be omitted and panels 446 connected to one another across the front surface.

[0040] One or both of the front and back surfaces 412, 420 may include a product label (not shown) while one or both of the front and back surfaces 432, 437 may include a shipping label 450. An additional product label may be provided on any outer surface of the cover 430 to indicate product contents, handling instructions, and/or opening instructions.

[0041] The upper portion 428 of the cover 430 locks in place over lower portion 432 via an adhesive, welding or any of the mechanical means discussed above.

[0042] FIG. 4B depicts a container 400' according to another example useful to understand the present invention. The container 400' is substantially similar to the container 400 except as detailed below. Container body 402' is formed substantially similar to container body 402, with the exception of lid 404' which is substantially similar to lid 104 described with respect to FIG. 1. Cover 430' comprises an upper portion 428' and a lower portion 432'. Lower portion 432' is formed substantially similar to lower portion 432 with the exception of the composition of the corrugated portion. Specifically, ridges 444'of FIG. 4B are porous and adapted to absorb a quantity of fluid/gel that may inadvertently leak from the container body 402'. The ridges 444' may be formed of a porous materials such as, but not limited to, an open or closed cell foam, absorbent polymer, paper pulp and sponge-like materials. The porous material may also be elastically deformable. Upper portion 428' includes corrugations, in the form of ridges 444' and grooves 442' on an inner wall thereof. The ridges 444' and grooves 442' are aligned with ridges 444' and grooves 442' of the lower portion 432' and also extend parallel to longitudinal axis 401.

[0043] Optionally, the container 400' may omit panels 446 (e.g., when the container body 402' has a rectangular cross-sectional shape and no necked portions).

[0044] Similar to the cover 430, the cover 430' is removably connected to container body 402'. The cover 430' may be locked in position over the container body 402' during transport via an adhesive, welding or mechanical means, as discussed above. Once received by an end user, the cover 430' may be separated from the container body 402' and discarded.

[0045] FIG. 4C depicts a container 400" according to another example useful to understand the present invention. The container 400" comprises a cover 430" having a first portion 428" and a second portion 432". Whereas the two-piece cover 430 is slidably receivable over the container body 402 in a direction parallel to the longitudinal axis 401, the cover 430" is slidably receivable over the container body 402 in a direction parallel to orthogonal axis 401'. Corrugations, in the form of grooves 442 and ridges 444, are provided along the entire inner wall of only the first cover portion 428".

[0046] A bumper 450, bounded by panels 446, 448, 452 is provided and conforms to the outer profile of the container body 402 (e.g., to prevent movement of the container body 402 within the cover 430" during transport, to secure the lid 404 during transport, and/or to dampen the impact of any external forces applied to the container 400". In one example, the region bounded by panels 446, 448, 450 may be filled with an absorbent material (e.g., a porous polymer, sponge, open or closed cell foam, paper pulp, etc.) to absorb any fluids that may inadvertently leak from the container body 402. Alternatively, this region may be filled with a non-porous material or may be hollow. The bumper 450 may be formed with any size and shape corresponding to a size and shape of the container body 402 being housed therein. The bumper 450 may be permanently attached to the inner surface of the second portion 432" of the cover 430" (e.g., via an adhesive, welding, or other known means of attachment).

[0047] FIG. 4D depicts an alternative configuration having a cover 430" as discussed with respect to FIG. 4C, except that both first and second cover portions 428", 432" comprise a corrugated inner surface. Preferably, the configuration of FIG. 4D is used when a cross-sectional shape of the container body 402 substantially matches a cross-sectional shape of the cover 430" (e.g., rectangular). However, this configuration may also be used with non-matching cross-sectional geometries (e.g., wherein a container body has a necked portion).

[0048] The exemplary containers 400, 400' of FIGS. 4A and 4B are configured with covers 430, 430' which lockingly receive a standard-sized container body 402, 402'. That is, the container body does not necessarily include a separate mechanism or feature to which the cover is attached. Thus, the cover described herein is universal and can be applied over any container sized to be receivable therein with a minimal degree of movement therewithin. Alternatively, the cover and container body may be provided with an interlocking mechanism such that only a container body having a particular engagement feature can be received in the cover, as described for example with respect to FIGS. 3A-3B, and 5A-9C.

[0049] FIGS. 5A-5C depict a container 500 according to another example useful to understand the present invention. Container body 502 is formed substantially similar to container body 402' and comprises a lid 504 which is flush with an outer profile thereof. The container body 502 comprises two longitudinal grooves 506, 508 extending through sidewalls 516, 518. The grooves 506, 508 are sized and shaped to slidingly receive front and back cover portions 532, 534 of a bumper 530. Grooves 506, 508 terminate at openings 507, 509 on upper and lower ends thereof, respectively. The bumper 530 is configured

to absorb and dissipate energy applied if the container 500 is dropped or subjected to shock. The bumper 530 pads the sides and upper and lower shoulders of the container body 502. In the example of FIGS. 5A-5C, the bumper 530 may be integrated into the structure of the container body 502 using a tongue and groove mechanism. In other examples, as discussed later on, the bumper may be attached to a container body via adhesive, sealing/welding or mechanical means such as an interlocking mechanism. The bumper 530 comprises a front portion 532 and a back portion 534, each of which may be formed as shock-absorbing foam piece removably attachable to the container body 502. The front portion 532 and a back portion 534 may wrap about the entirety of the container body 502 or may extend over only a portion of the container body 502 (e.g., only portion which may be most susceptible to deformation or fracture). The front cover portion 532 comprises a front surface 536 and side surfaces 538, wherein a width of the side surface 538 is half of the width of side wall 516 of the container body 502, as shown in FIGS. 5A and 5B. A tongue 540 extends orthogonally from each of the side surfaces 538, the tongue 540 being sized to be receivable in the grooves 506, 508. In a preferred example, the tongue 540 is only insertable into the groove 506, 508 from one of the openings 507, 509. Preferably, one or both of the tongue 540 and groove 506, 508 comprises a feature enabling this cooperative relationship. In one example, the lip 540 may comprise an increased width portion 542 adapted to engage a corresponding feature (not shown) in the groove 506, 508. The tongue may comprise a rectangular increased width portion 542 or a circular increased width portion 542'. The increased width portion may have any cross-sectional shape including, but not limited, to oval, square, triangular, diamond-shaped and oblong. In some examples, the front and back portions 532, 534 may each separately lock to the container body. Alternatively, only one of the front and back portions 532, 534 may lock to the container body. In this configuration, the free one of the front and back portions may lock to the other one of the front and back portions.

[0050] One or both of the front and back cover portions 534, 534 comprises a cutout 550 extending completely therethrough, the cutout 550 adapted to provide access to the lid 504 even while the bumper 530 is locked in position over the container body 502.

[0051] The bumper 530 may comprise a shipping label and/or product label on one or both of the front and back cover portions 534, 534.

[0052] FIGS. 6A-6B depict a container 600 according to another example useful to understand the present invention. The container 600 is substantially similar to the container 500, except as discussed below. Whereas container 500 is provided with a container body 502 having grooves 506, 508 formed in side wall 516, the container body 602comprises grooves 606, 608 formed into front and back walls 612, 620. The grooves 606, 608 define a tongue 610 on sidewalls of the container body 602.

[0053] The bumper 630 comprises first and second portions 628, 632, each comprising a groove 634 adapted to slidingly receive the tongue 610. The groove 634 is defined by wall sections 636. In operation, the first and second sections 628, 632 of the bumper 630 may be connected to the container body 602 prior to shipping to provide added structural integrity and cushioning. Once received by an end user, the bumpers may optionally be removed and discarded.

[0054] FIG. 6C depicts a container 600' according to another example useful for the understanding of the invention. The container 600' is substantially similar to the container 600 with the exception that a length of the bumpers 630' is less than a length of container body 602'. The bumper 630' is prevented from freely sliding over the container body 602 by one or more detents (not shown) provided on one or both of the container body 602' and bumper 630'. The detents (not shown) may inhibit movement of the bumper 630' over the container body 602' beyond a predetermined location. The container body 602' may be formed with structurally reinforced sections 650 on upper and lower sections thereof.

[0055] FIGS. 7A-7B depict a container 700 according to another example useful to understand the present invention. The container 700 comprises a removable bumper 730 having first and second portions 728, 732 removably received over container body 702. Unlike bumpers 530, 630, 630', the bumper 730 extends over both the side walls and at least a portion of an upper wall of the container body 702. First and second bumper portions 728, 730 include a curved portion 736 providing a junction between side walls 738 and upper wall 740. Panels 742 extend from each of the first and second bumper portions 728, 732 to overlie at least a portion of the front and back surface of the container body 702, thus providing additional protection thereto. The first and second bumpers 728, 732 connect to the container body 702 via a tongue 710 and groove 712 engagement, as described in greater detail with respect to earlier embodiments and examples.

[0056] FIGS. 8A-8C depict a container 800 according to another example useful for the understanding of the invention. The container comprises a container body 802 and a keyed slide bumper 830. The bumper 830 comprises first and second bumper portion 828, 832. Similar to bumpers 530, 630, 730, the bumpers 830 are formed of one or more of paper, foam, corrugated material and porous materials. The bumpers 830 are adapted to removably lock to the container body 802 via a keyed mechanism 850. The mechanism 850 comprises a tapering protrusion 810 formed on respective sidewalls of the container body 802, the protrusion tapering from a first width at end 812 to a second, smaller width at end 814. An inner wall of each of the first and second bumper portions 828, 832 comprises a recess 840 having a shape matching a shape of the protrusion 810. A lock button 816 further protrudes from the protrusion 810, the lock button 816 slidingly receivable within a corresponding recess

846 formed in the bumper 830. The lock button 812 is received within the recess 846 with a substantial friction fit so as to lock the bumper 830 to the container body 802. To remove the bumper 830 from the container 802, a longitudinally directed force in the direction B is applied to each of the first and second bumper portions 828, 832 to push the lock button 812 out of the recess 846. Preferably, the force required to separate the bumper portions 828, 832 from the container body 802 exceeds the forces the container 800 is expected to experience during shipping, to prevent a premature removal of the bumper 830 from the container body 802.

[0057] FIGS. 9A-9B depict a container 900 according to yet another example, the container 900 comprising a container body 902 having a lid 904 and bumper 930. In a preferred example, the container body is formed with a substantially frusto-conical cross-sectional shape, although other cross-sectional shaped may be used without deviating from the scope of the invention. The container 900 also comprises a set of bumpers 930 compressing a first bumper 928 and a second bumper 932. The bumper 930 may be solid or hollow. The bumpers 930 are formed of a series of compressible vertical ribs 936 that are positioned next to each other. The ribs 936 are extruded or molded in this geometry from a base surface. The design of the thin parallel ribs 936 is engineered to absorb and dissipate energy generated by shock. The ribs 936 may extend parallel to a side wall 916 of the container body 902 or may extend perpendicular thereto. A portion of each of the first and second bumpers 928, 932 may extend over front and back surfaces 912, 920 of the container body 902 to provide added protection thereto. Specifically, the front and back surfaces 912, 920 may comprise grooves 938 configured to slidingly engage a tongue 940 formed on the first and second bumpers 928, 932. The ribs 936 may be integrally formed with one another or may be extruded separately and joined to one another via, for example, adhesive, sealing/welding or mechanical means. Similar to other embodiments and examples, the bumper 930 may be removable from the container body 902 upon receipt to an intended destination.

[0058] FIG. 9C depicts an alternative configuration of the examples of FIGS. 9A-9B, wherein the groove 938' is separated from sidewall 916 by a greater distance than groove 938. This configuration thus covers a greater portion of front and/or back surfaces 912, 920 of the container body 902.

[0059] The ribs 936 of the bumper 930 may be formed with any size and shape. For example, the ribs 936 may be replaced or supplemented with semi-spherical protrusions, any combination of concave and convex surfaces, linear protrusions, curved protrusions and pyramid-shaped protrusions. Any alternative shape may be used as long, with the requirement that the bumper 930 be capable of dissipating energy to absorb shock and protect the container contents.

[0060] FIGS. 10A-10E depict containers 1000, 1000', 1000", 1000‴ according to yet another example, wherein a bumper is integrate into a container body 1002, as described earlier with respect to FIGS. 1A-2B. The containers 1000, 1000', 1000", 1000‴ are formed with predetermined bumping patterns on side walls thereof, the bumping patterns being selected to absorb and dissipate forces applied thereto and thereby provide protection to the container body 1002. Container 1000 comprises bumper 1030 comprising a plurality of grooves 1034, 1036, 1038 formed into a sidewall 1016 of the container 1000. In the example of FIGS. 10A-10B, grooves 1034 extend at an acute angle with respect to a plane P extending orthogonal to a longitudinal axis 1001 and bisecting or substantially bisecting the container. Grooves 1036 are angularly offset relative to the grooves 1034 and preferably extend at an angle of 0 degrees along the sidewall. Grooves 1038 extend from the grooves 1036 and have the same angle size as grooves 1034 but are negatively oriented. For example, if grooves 1034 extend at an angle of X° with respect to plane P, grooves 1038 are oriented at -X° with respect to plane P. Further, grooves 1034, 1038 may extend over at least a predetermined portion of front surface 1012 and/or back surface 1020. Alternatively, the grooves 1034, 1038 may terminate at edges joining the front surface 1012 and back surface 1020 to sidewall 1016, respectively.

[0061] In another example, as shown in the partial see-through view of FIG. 10C, grooves 1044, 1048 may be formed substantially similar to grooves 1034, 1038 with the exception that grooves 1044, 1048 converge directly with one another at a rounded intersection point located halfway between front and back surfaces of the container body. In another example, as depicted in FIG. 10D, grooves 1034' may extend parallel to plane P. In another example, as depicted in FIG. 10E, only one set of angled grooves 1034" is provided, which extend the complete length of the sidewall of the container body. In yet another example, as depicted in FIG. 10F, grooves 1034‴ and 1036‴ are formed substantially similar to grooves 1034, 1036 with the exception that both sets of grooves 1034‴, 1036‴ extend the full length of the sidewall and overlap one another. This configuration provides cushioning against both vertical and horizontal stress, as those of skill in the art will understand.

[0062] The bumpers 1030 described in FIGS. 10A-10F may be integrally formed with or permanently attached to the container body 1002. Alternatively, bumper 1030' may be removably attached to the container body 1002. For example, as depicted in FIG. 10G, the bumper 1030' may be a two-piece bumper removably receivable over the container body 1002. The bumper 1030' may be provided with a locking mechanism locking the bumper pieces to one another or to the container body, as discussed in greater detail above.

[0063] The container described herein may be used for the storage of any of a variety of liquid, gel, solid or semi-solid products such as toothpaste, oral care solutions, home cleaning products, soaps, fabric softeners,

deodorants, lip treatments, etc. as well as for non-liquid products.

[0064] The examples described herein may be modified to add or replace features of one example with another. For example, any of the containers described herein can be modified to be integrally formed onto a container body or be removably attached thereto. Further, any of the protective features described herein may be combined into a container body to provide added protection.

Claims

1. A container (100) comprising:

   a container body (102) having a cavity for receiving a product therein and a lid (104) sealing an opening to said cavity, the container body (102) having a front surface (112), back surface (120), first sidewall (116) and second sidewall (118), **characterised in that** it has
   a first bumper (122) attached to the first sidewall (116) of the container body (102), the first bumper (122) configured to absorb forces applied to the container (100), wherein the first bumper (122) comprises a first engagement mechanism configured to lockingly engage a second engagement mechanism located on the container body (102); and
   a second bumper (124) attached to the second sidewall (118) of the container body (102), the second bumper (124) configured to lockingly engage the container body (102),
   wherein the first bumper (122) and the second bumper (124) are formed as bellows and are compressible along one of a width and height axis.

2. The container of claim 1, wherein the first bumper (122) is removably attached to the container body (102).

3. The container of claim 1, wherein the first and second engagement mechanisms are, respectively, one of: a tongue and a groove; or a groove and a tongue.

4. The container of claim 1, wherein the lid (104) is flush with an upper surface (106) of the container body (102).

5. The container of claim 1, further comprising a shipping label attached directly to one of the container body (102) and the first bumper (122).

Patentansprüche

1. Behälter (100), der umfasst:

   einen Behälterkörper (102) mit einem Hohlraum zur Aufnahme eines Produkts darin und einen Deckel (104), der eine Öffnung zu dem Hohlraum abdichtet, wobei der Behälterkörper (102) eine Vorderfläche (112), eine Rückfläche (120), eine erste Seitenwand (116) und eine zweite Seitenwand (118) aufweist, **dadurch gekennzeichnet, dass** er aufweist:

   einen ersten Stoßfänger (122), der an der ersten Seitenwand (116) des Behälterkörpers (102) befestigt ist, wobei der erste Stoßfänger (122) konfiguriert ist, auf den Behälter (100) einwirkende Kräfte zu absorbieren, wobei der erste Stoßfänger (122) einen ersten Eingriffsmechanismus umfasst, der konfiguriert ist, verriegelnd mit einem zweiten Eingriffsmechanismus in Eingriff zu gelangen, welcher an dem Behälterkörper (102) angeordnet ist; und
   einen zweiten Stoßfänger (124), der an der zweiten Seitenwand (118) des Behälterkörpers (102) befestigt ist, wobei der zweite Stoßfänger (124) konfiguriert ist, verriegelnd mit dem Behälterkörper (102) in Eingriff zu gelangen,
   wobei der erste Stoßfänger (122) und der zweite Stoßfänger (124) als Faltenbalge ausgebildet sind und entlang einer Breiten- oder Höhenachse komprimierbar sind.

2. Behälter nach Anspruch 1, wobei der erste Stoßfänger (122) abnehmbar an dem Behälterkörper (102) befestigt ist.

3. Behälter nach Anspruch 1, wobei der erste und der zweite Eingriffsmechanismus jeweils eine Zunge und eine Nut oder eine Nut und eine Zunge sind.

4. Behälter nach Anspruch 1, wobei der Deckel (104) mit einer oberen Fläche (106) des Behälterkörpers (102) fluchtet.

5. Behälter nach Anspruch 1, der ferner ein Versandetikett umfasst, das direkt an dem Behälterkörper (102) oder an dem ersten Stoßfänger (122) befestigt ist.

Revendications

1. Récipient (100) comprenant:

   un corps de récipient (102) ayant une cavité destinée à recevoir un produit en son sein et un couvercle (104) rendant étanche une ouverture dans ladite cavité, le corps de récipient (102) ayant une surface avant (112), une surface arrière (120), une première paroi latérale (116) et une seconde paroi latérale (118), **caractérisé en ce qu'**il a

un premier amortisseur (122) fixé à la première paroi latérale (116) du corps de récipient (102), le premier amortisseur (122) étant conçu pour absorber les forces appliquées au récipient (100), dans lequel le premier amortisseur (122) comprend un premier mécanisme de mise en prise conçu pour entrer en prise par verrouillage avec un second mécanisme de mise en prise situé sur le corps de récipient (102); et

un second amortisseur (124) fixé à la seconde paroi latérale (118) du corps de récipient (102), le second amortisseur (124) étant conçu pour entrer en prise par verrouillage avec le corps de récipient (102),

dans lequel le premier amortisseur (122) et le second amortisseur (124) sont formés sous la forme de soufflets et sont compressibles le long d'un parmi un axe de longueur et un axe de hauteur.

2. Récipient selon la revendication 1, dans lequel le premier amortisseur (122) est fixé amovible au corps de récipient (102).

3. Récipient selon la revendication 1, dans lequel les premier et second mécanismes de mise en prise sont, respectivement, l'un parmi: une languette et une rainure, ou une rainure et une languette.

4. Récipient selon la revendication 1, dans lequel le couvercle (104) est aligné avec une surface supérieure (106) du corps du récipient (102).

5. Récipient selon la revendication 1, comprenant en outre une étiquette d'expédition fixée directement à l'un parmi le corps de récipient (102) et le premier amortisseur (122).

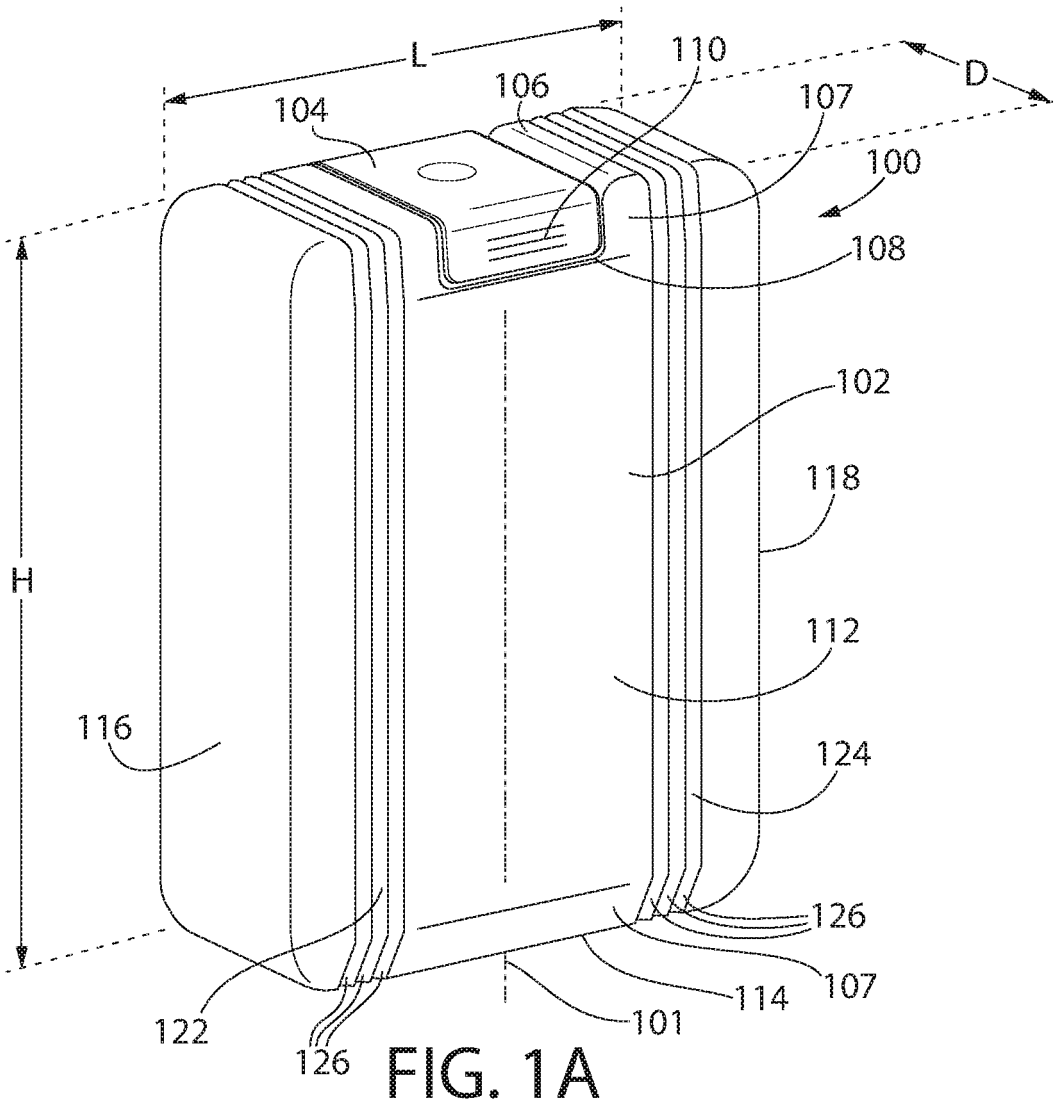
L
D
H
104
106
110
107
100
108
102
118
112
116
124
126
107
114
101
122
126

FIG. 1A

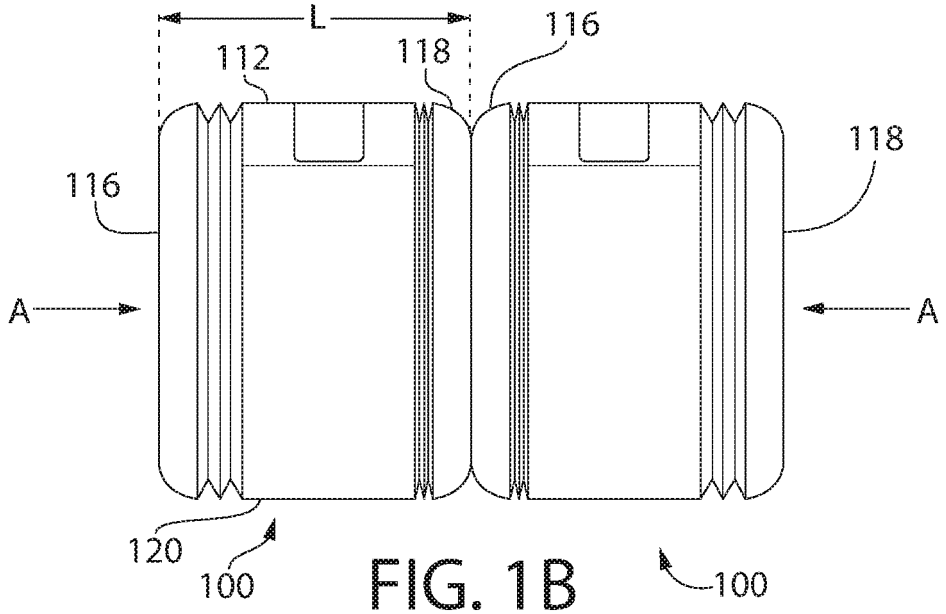
L
112
118
116
118
116
A
A
120
100
100

FIG. 1B

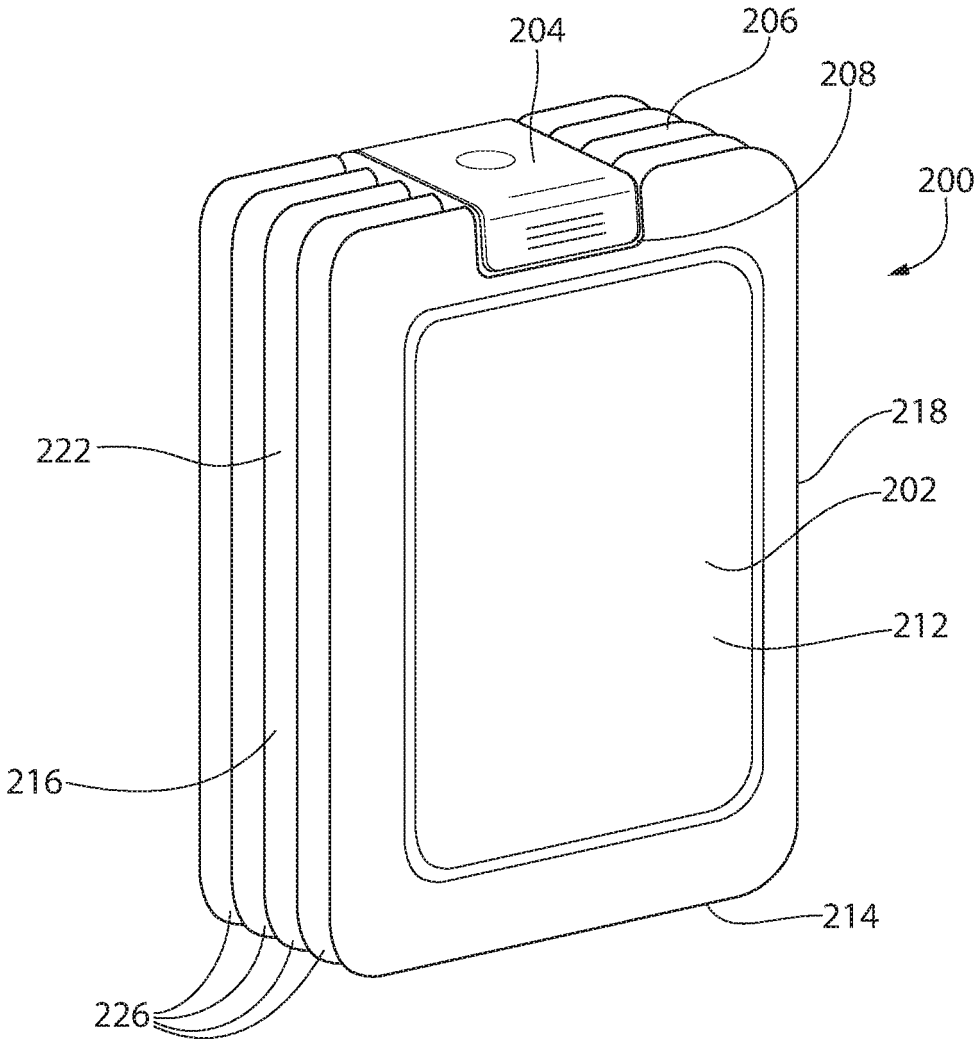

FIG. 2A

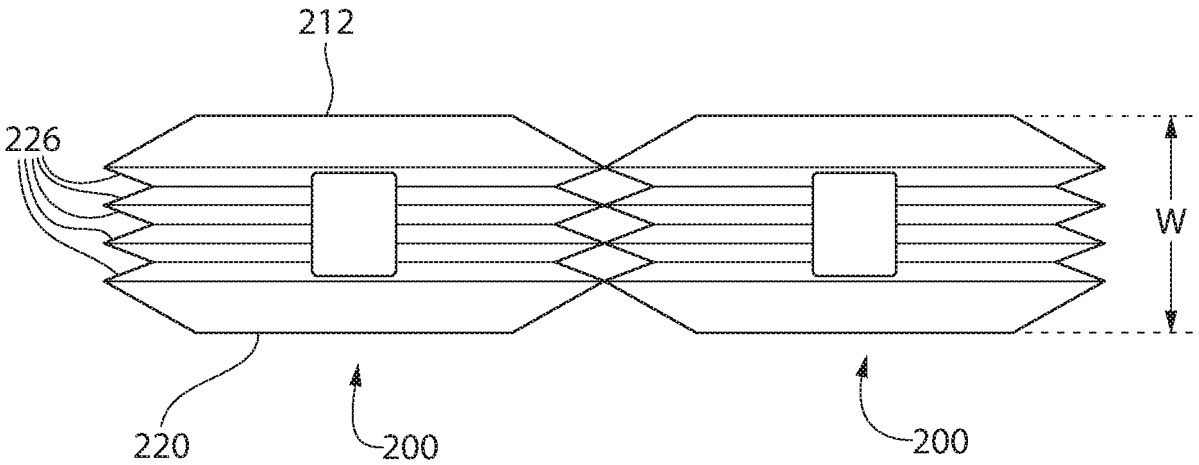

FIG. 2B

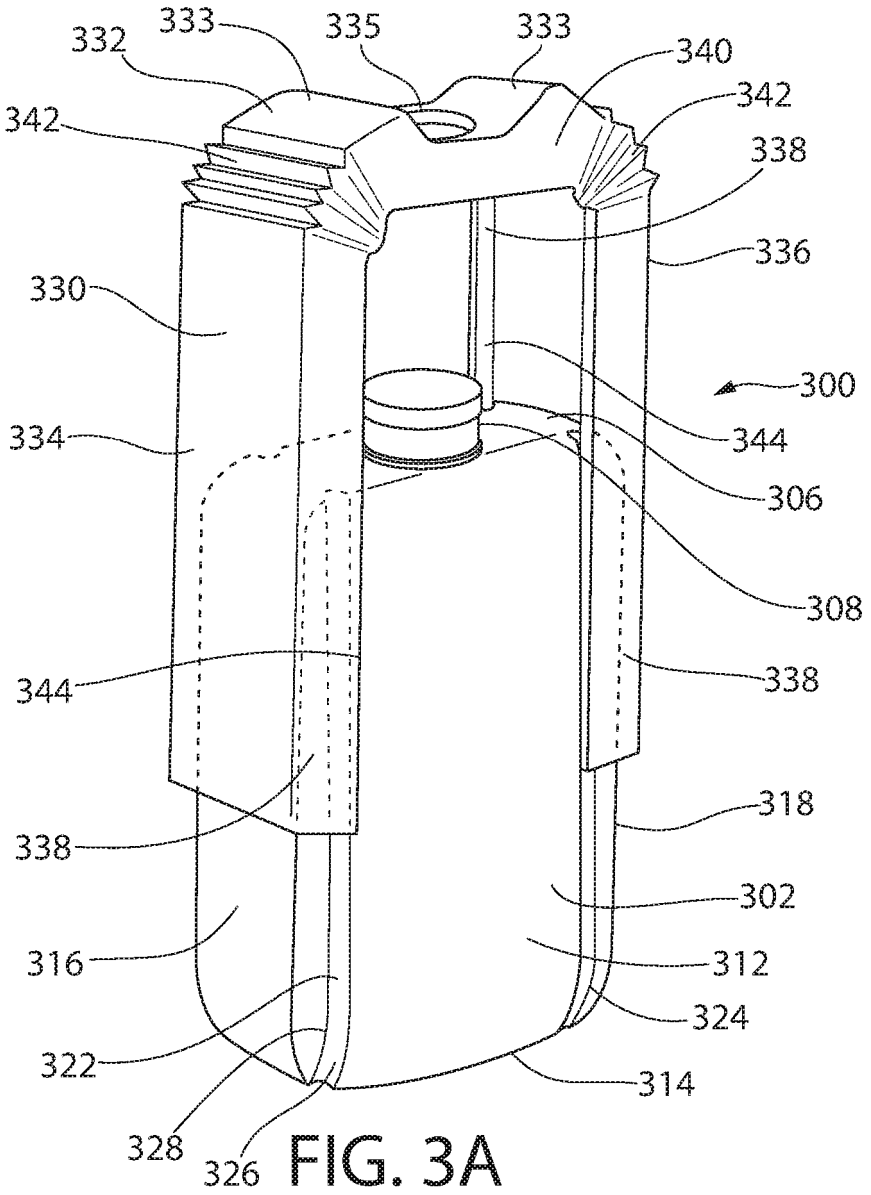
332
333
335
333
340
342
342
338
336
330
300
344
334
306
308
344
338
318
338
302
316
312
324
322
314
328
326

FIG. 3A

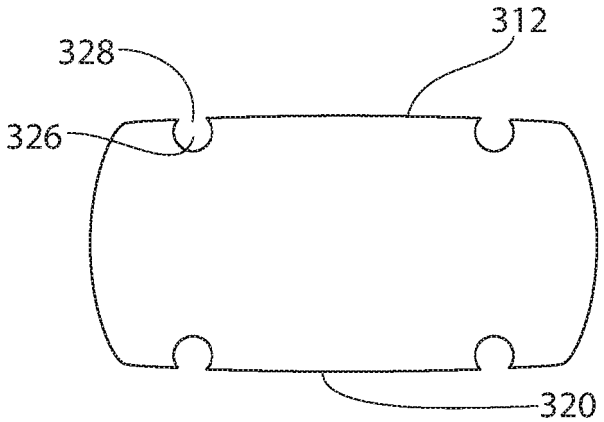
312
328
326
320

FIG. 3B

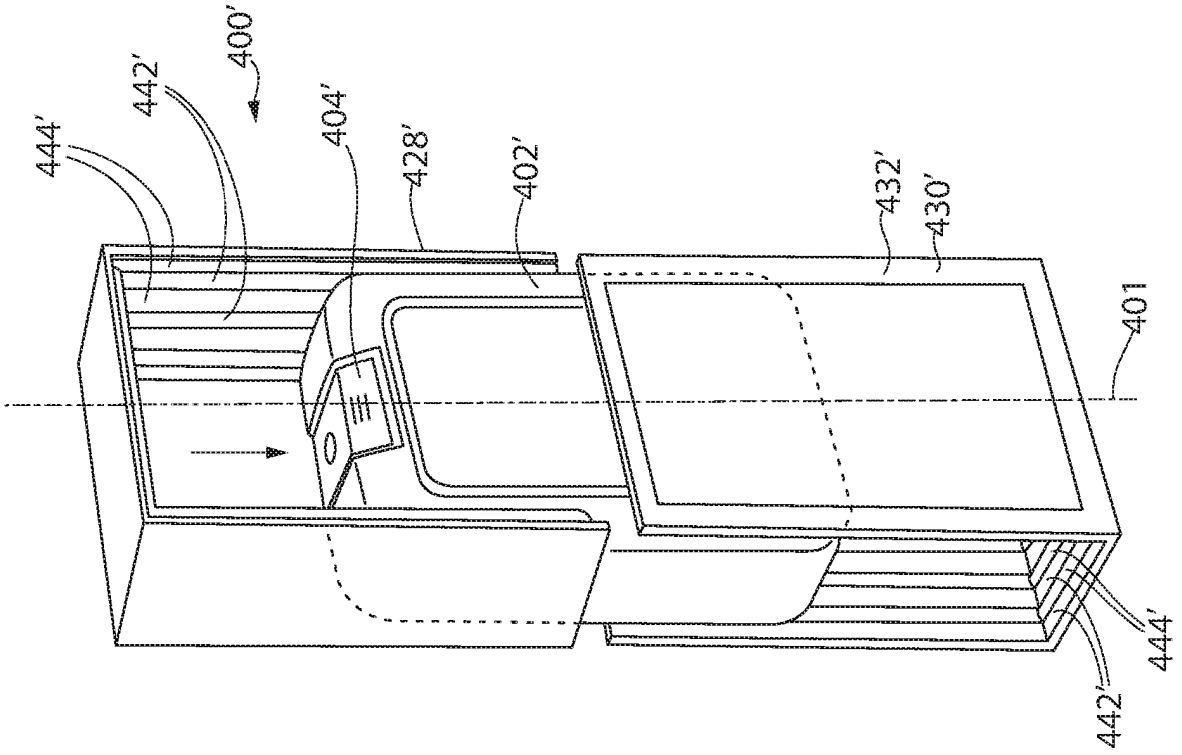
400'
442'
444'
404'
428'
402'
432'
430'
401
442'
444'

FIG. 4B

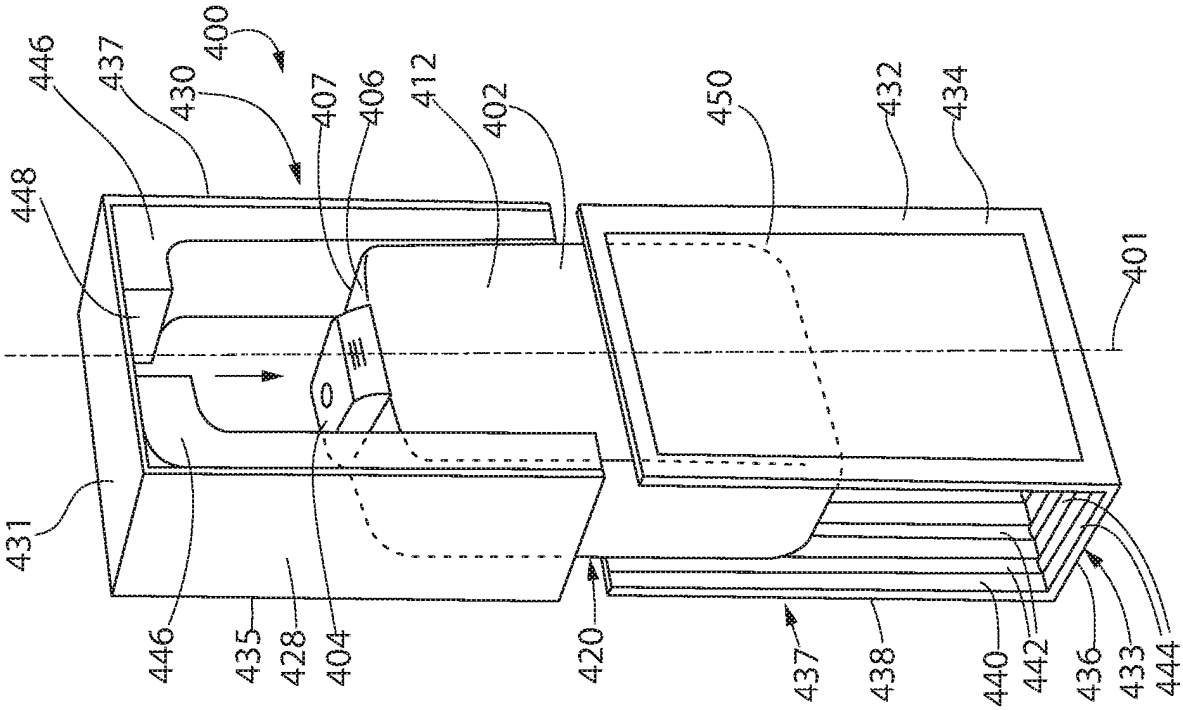
400
446
437
430
407
406
412
402
450
432
434
448
401
431
446
435
428
404
420
437
438
440
442
436
433
444

FIG. 4A

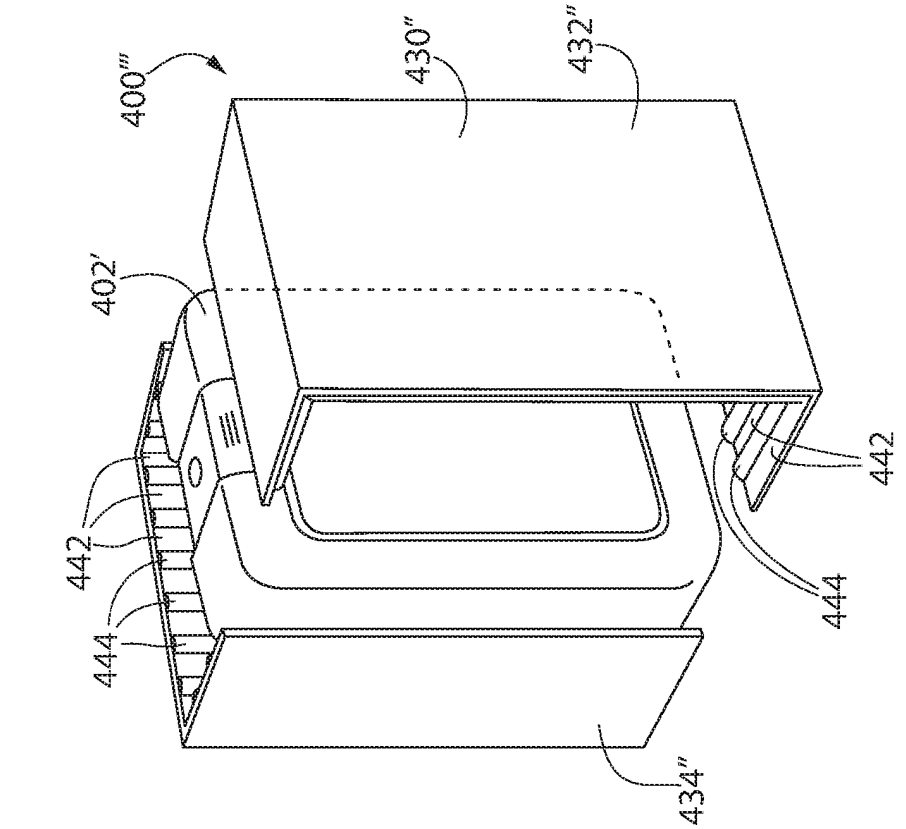
400'''
430''
432''
402'
442
444
442
444
434''

FIG. 4D

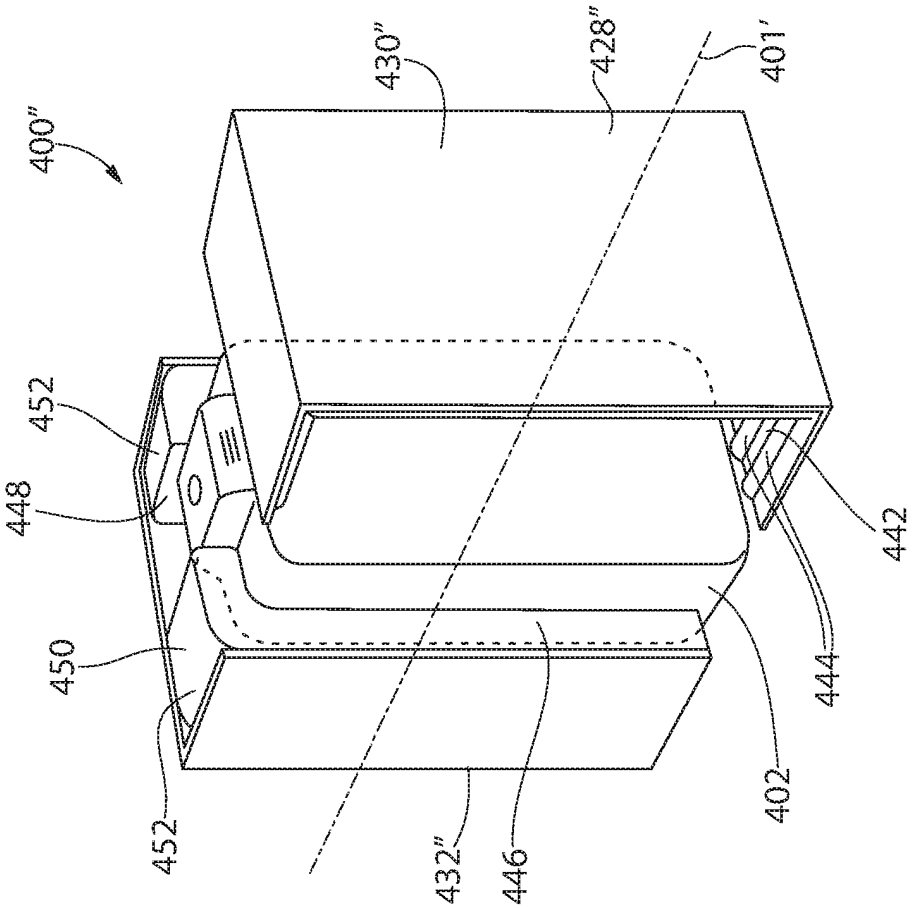
400''
430''
428''
401'
452
448
450
452
432''
446
402
444
442

FIG. 4C

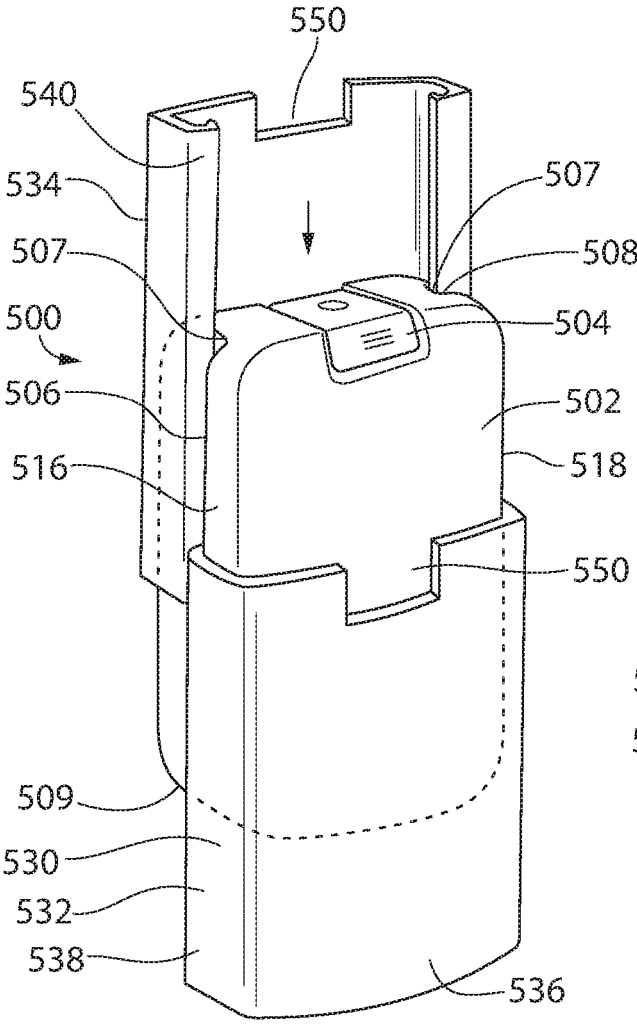

FIG. 5A

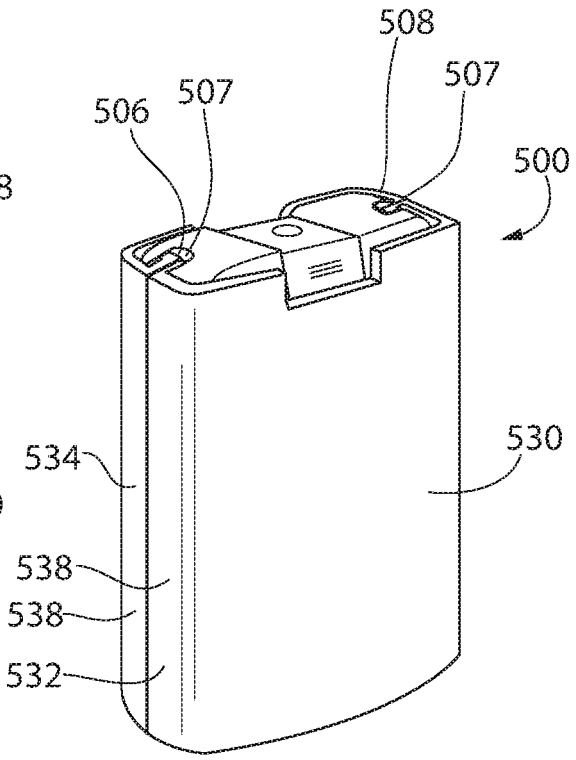

FIG. 5B

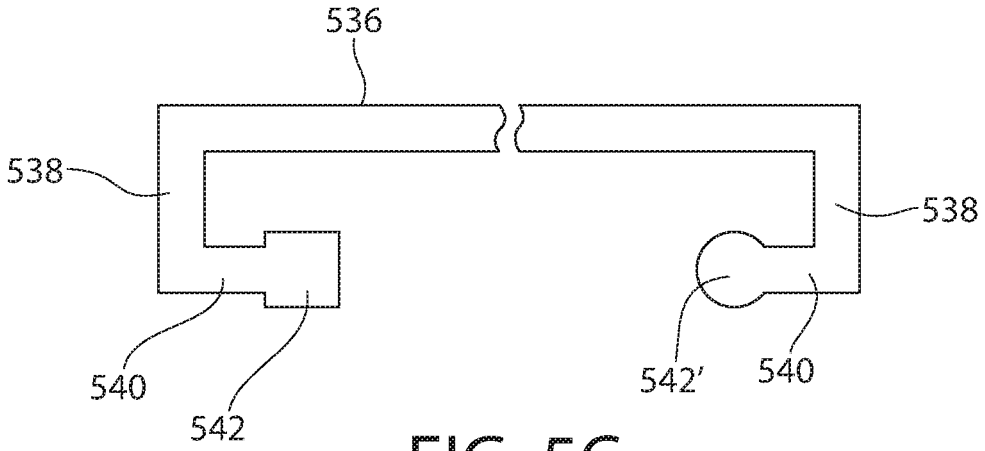

FIG. 5C

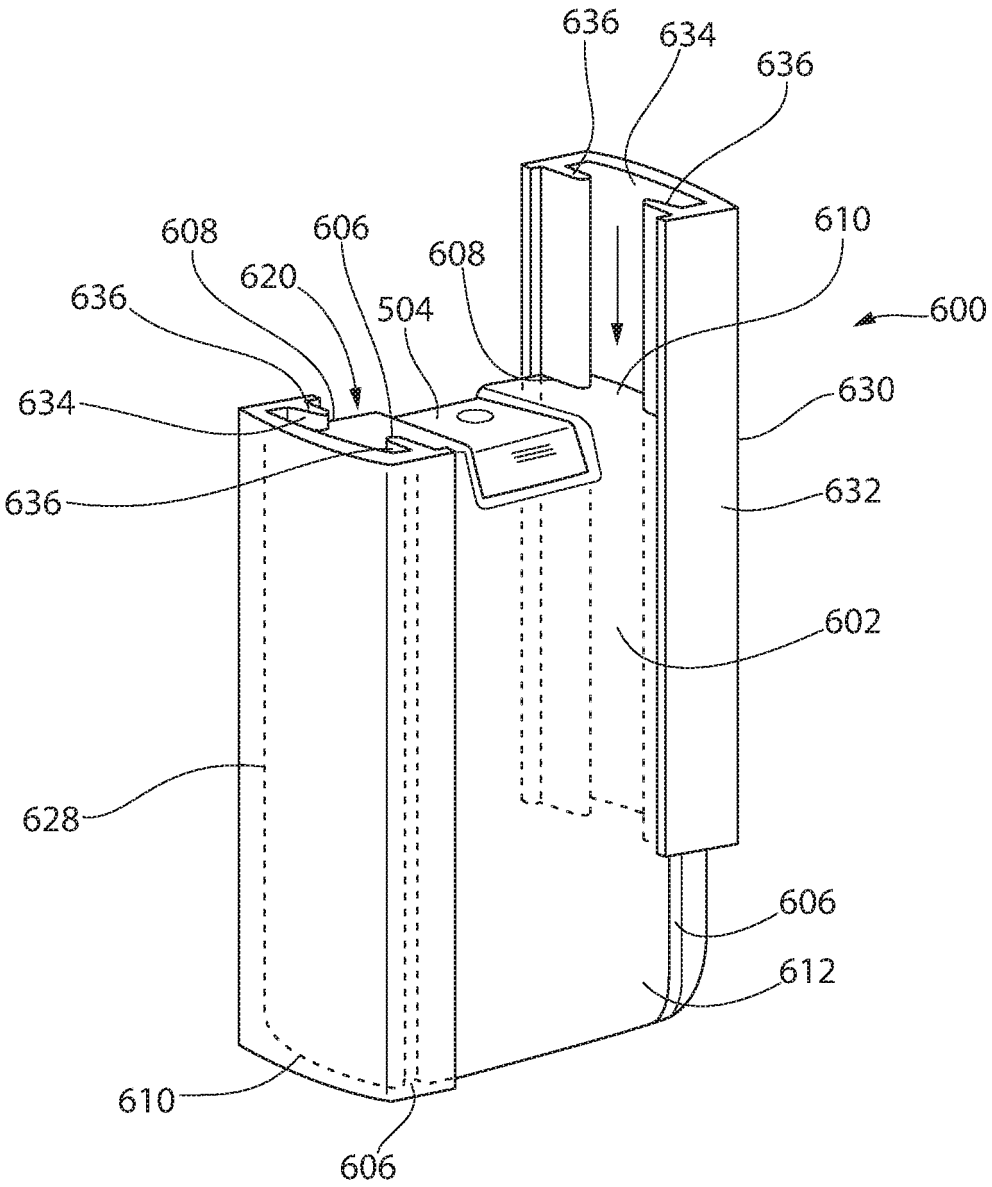
636
634
636
610
608
606
608
620
636
504
600
634
630
636
632
602
628
606
612
610
606

FIG. 6A

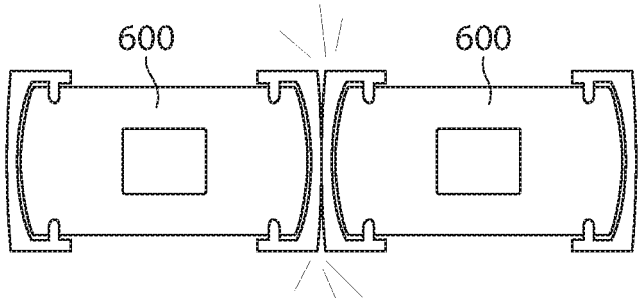

FIG. 6B

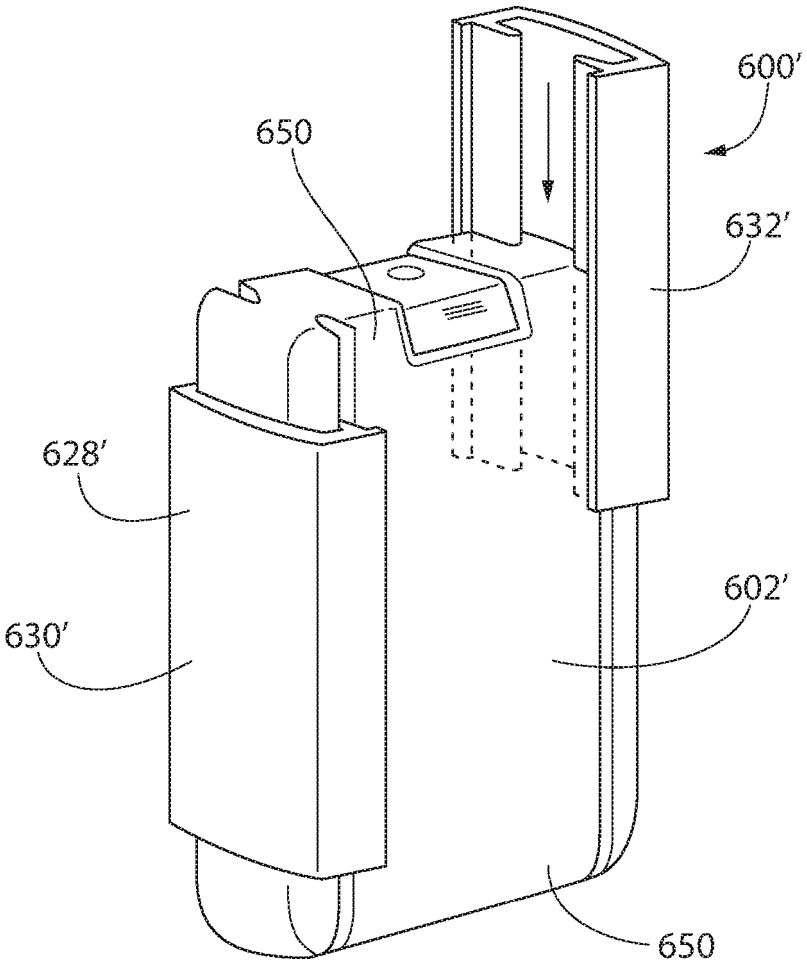

FIG. 6C

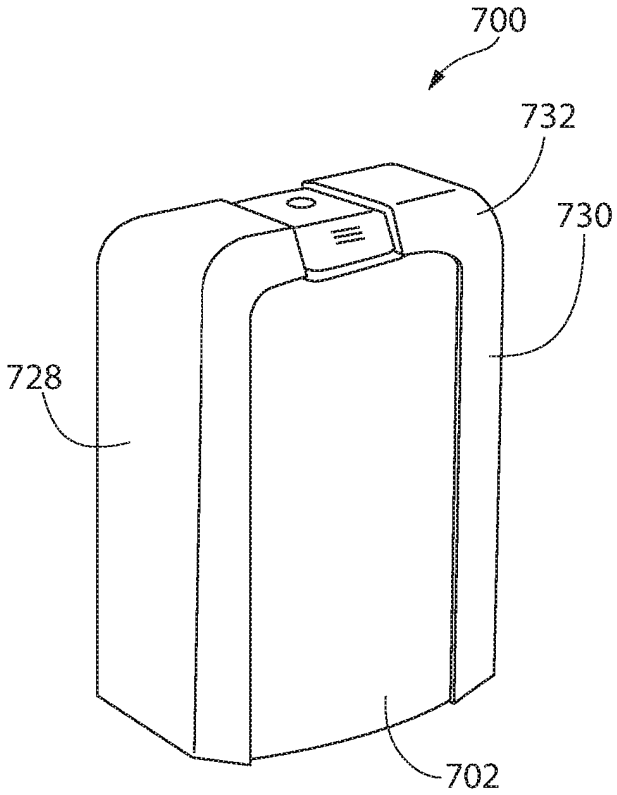

FIG. 7A

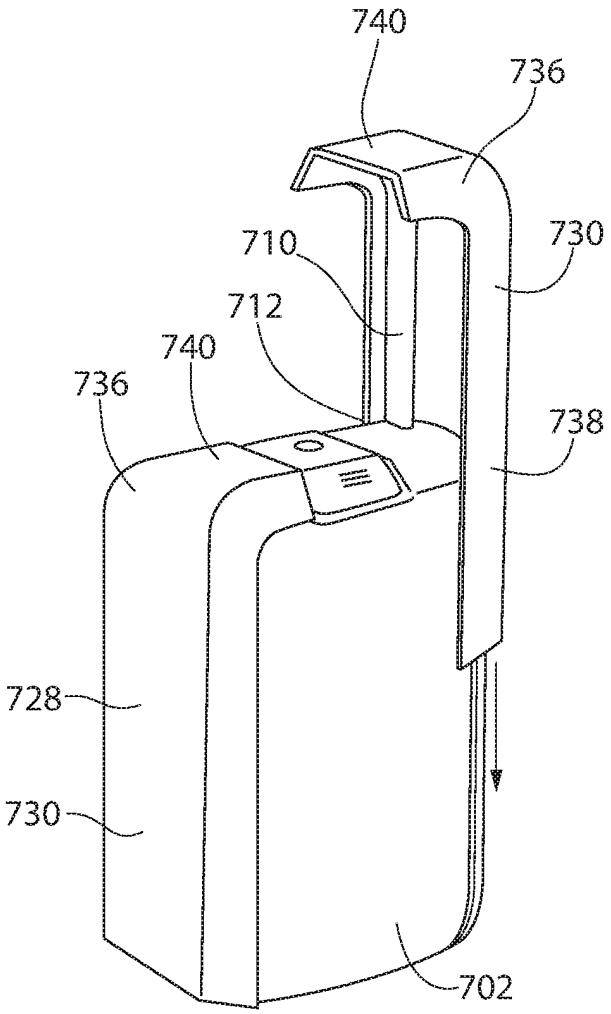

FIG. 7B

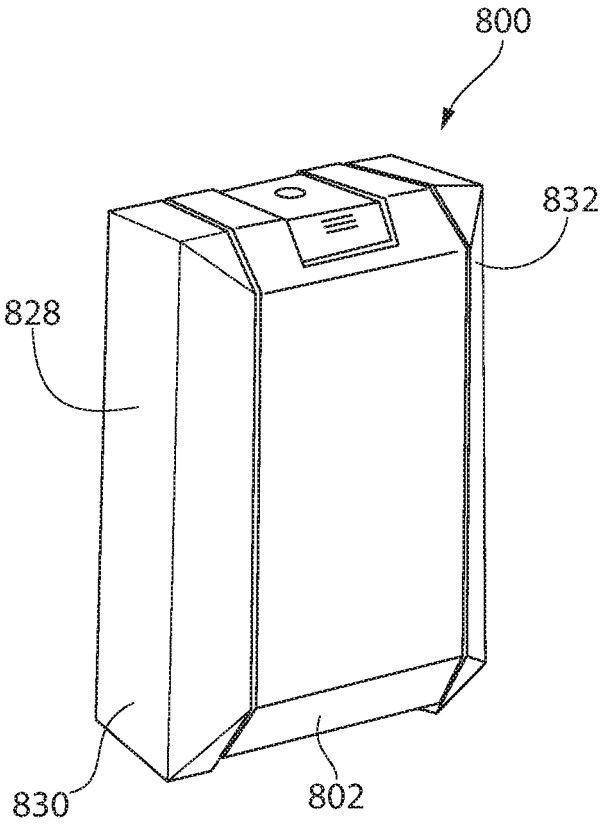

FIG. 8A

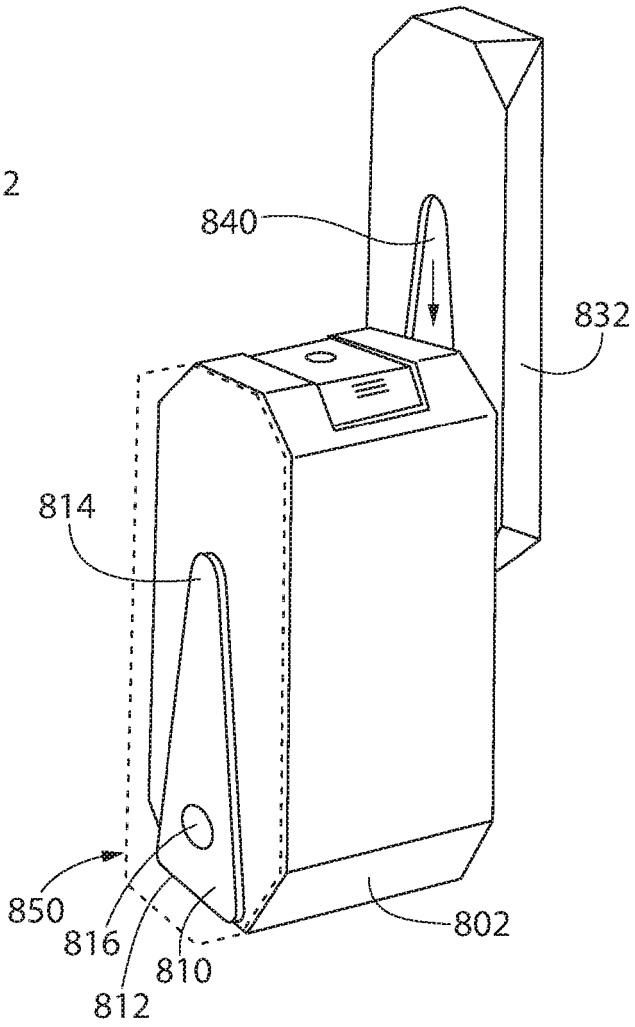

FIG. 8B

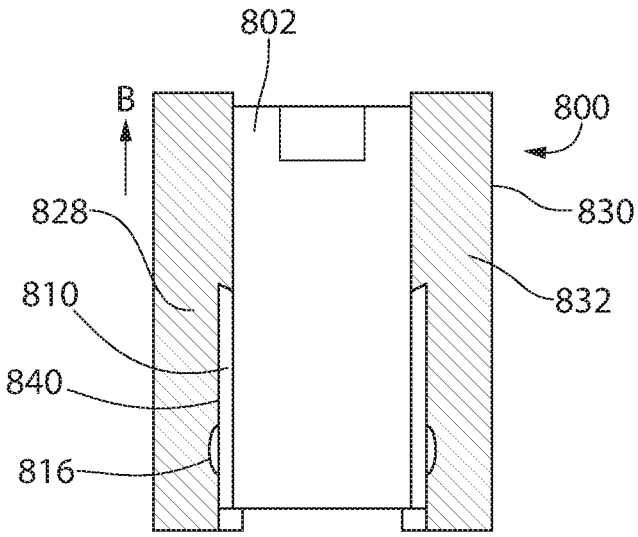

FIG. 8C

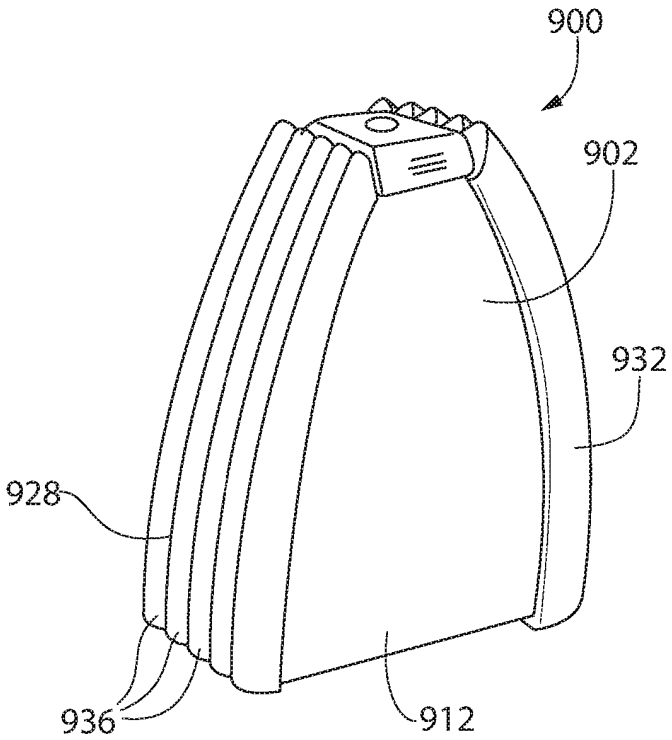

FIG. 9A

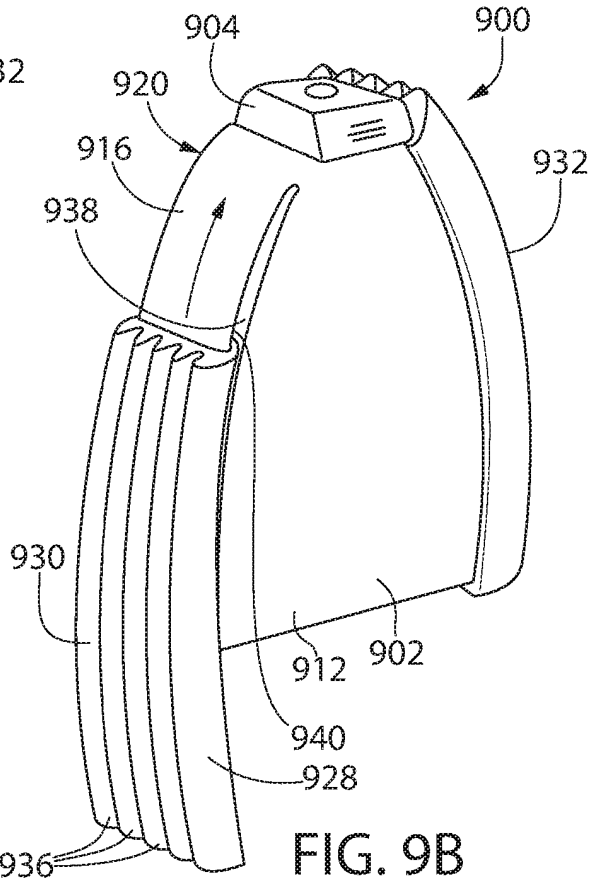

FIG. 9B

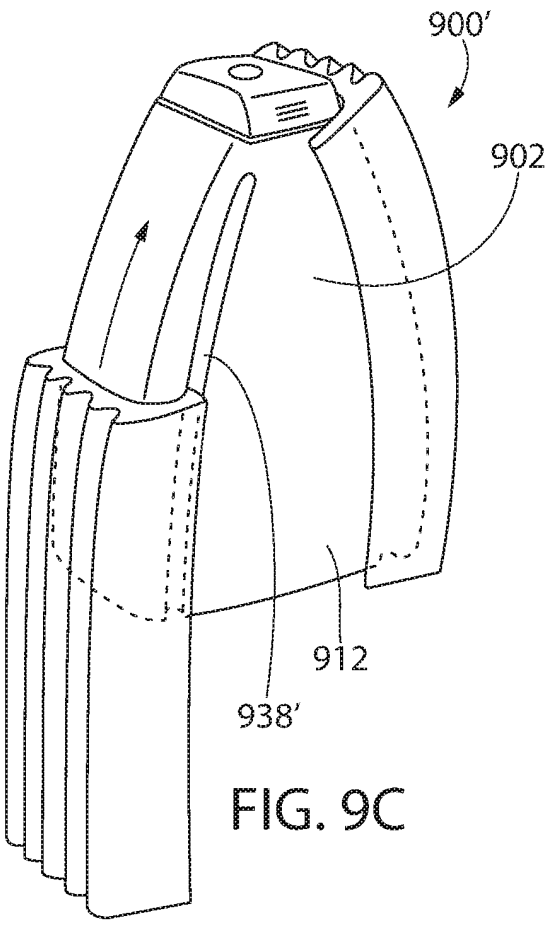

FIG. 9C

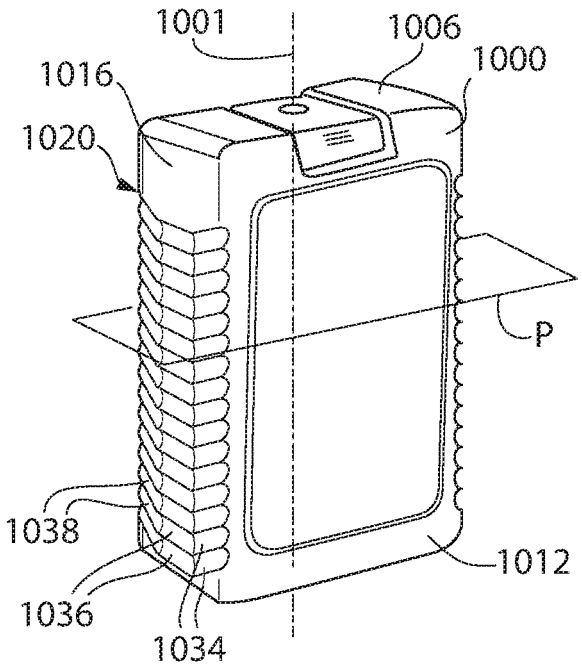

FIG. 10A

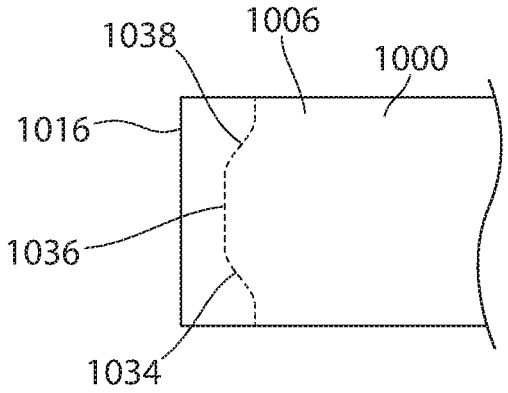

FIG. 10B

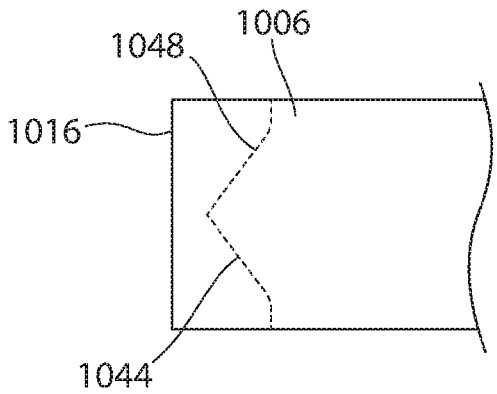

FIG. 10C

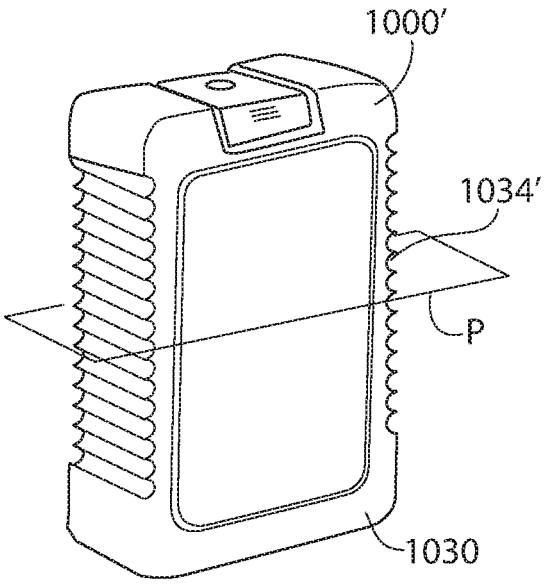

FIG. 10D

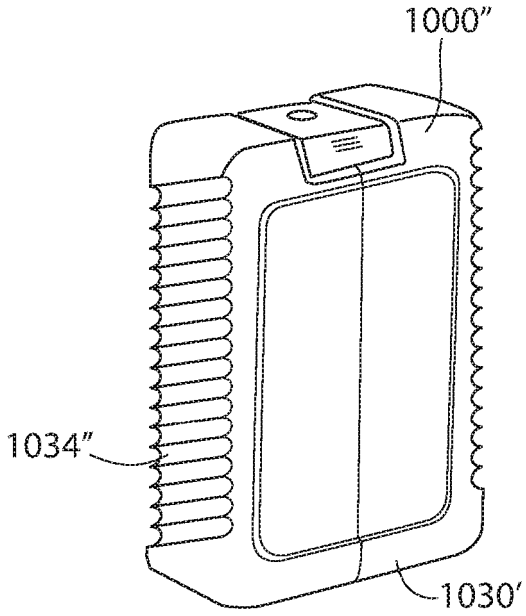

FIG. 10E

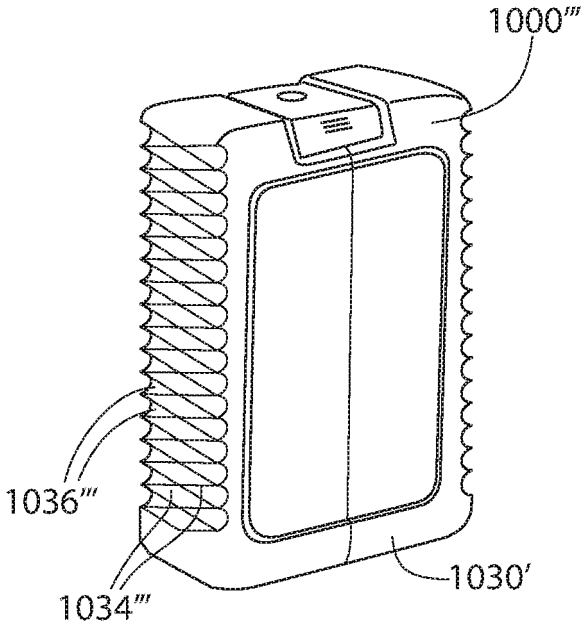

FIG. 10F

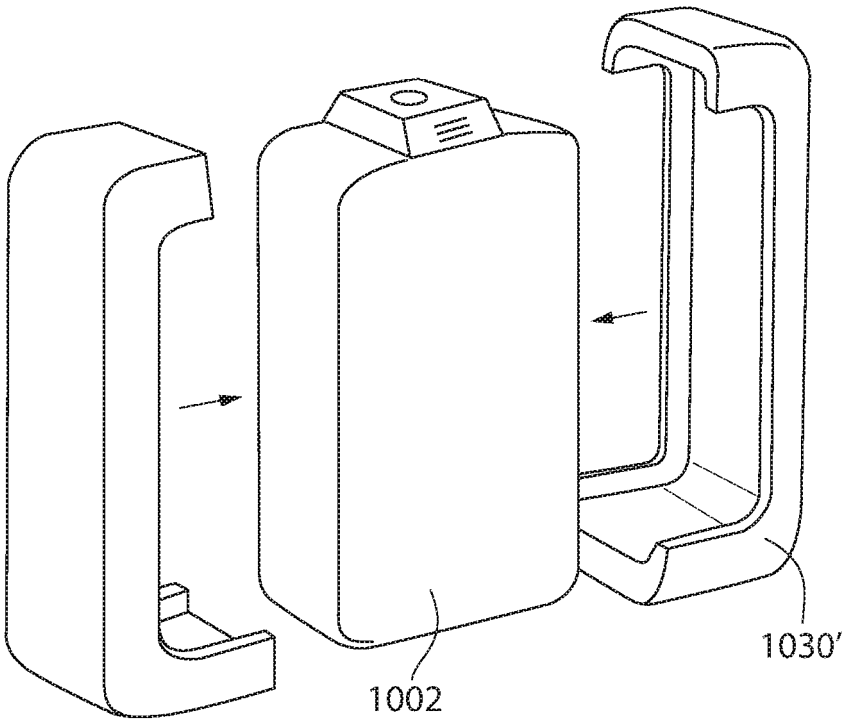

FIG. 10G

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 4177939 A **[0004]**
- DE 20115364 U1 **[0005]**
- DE 2758392 A1 **[0006]**
- US 3192978 A **[0007]**