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(72) Inventor; and

(71) Applicant : PFOTENHAUER, Michael [US/US]; 38
Miller Avenue #5, Mill Valley, CA 94941 (US).

(74) Agent: WEIR, Bruce; 20203 Goshen Road #385,
Gaithersburg, MD 20879 (US).

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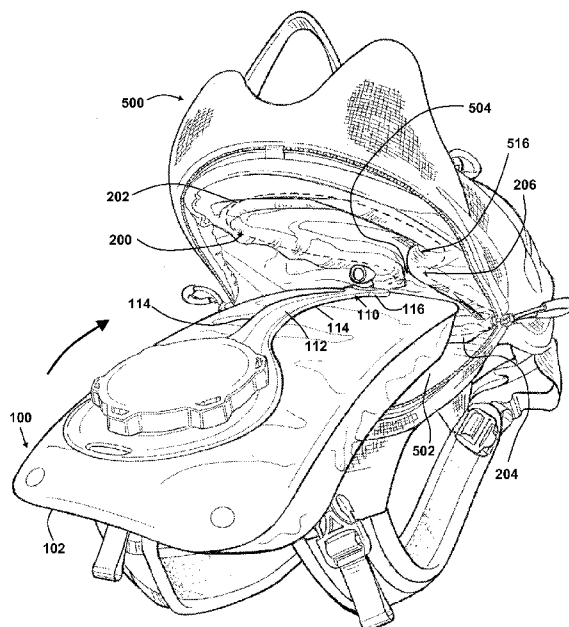


FIG. 6

(57) Abstract: An apparatus for temporarily attaching a fluid reservoir to a backpack (500) has a fluid reservoir (100) with a handle (110) attached at its upper and lower ends to a bladder (102). The central portion (112) of the handle (110) arches away from the bladder (102) to engage a reservoir attachment slot (504) within a reservoir compartment (502) in the backpack (100). The central portion (112) of the handle (110) is wider than the ends. The reservoir attachment slot (504) is formed by an hourglass-shaped frame (200) that is a loop with a wide upper lobe (202), a wide lower lobe (204), and a narrow frame waist (206). The widest portion of the central portion (112) of the handle (110) is wider than the narrowest portion of the frame waist (206), allowing the handle (110) to engage the reservoir attachment slot (504) by passing within the frame waist (206) at least until the narrowest portion of the frame waist (206) is disposed between the bladder (102) and the handle (110).

DescriptionPERSONAL HYDRATION SYSTEMTechnical Field

5 The present disclosure relates to personal hydration reservoirs.

Background Art

Adequate hydration is critical in maintaining the body's homeostasis. Maintenance of adequate hydration becomes both more important and more difficult as the duration of a strenuous physical activity increases. Various techniques have been employed to maintain hydration during activity. The most common are pre-hydration, in which an athlete consumes large quantities of fluids before starting an activity, and carrying additional fluids in some external container.

Though simple and convenient, pre-hydration is of limited utility. Since consumption of excessive quantities of fluid may cause bloating, nausea, and hyponatremia, an athlete often cannot pre-hydrate sufficiently to avoid dehydration during extended strenuous activity. Unless a reliable source of hydration is readily available, dehydration and loss of performance will occur.

An athlete may carry a much greater volume of fluids in external containers than may be comfortably consumed in a short period of time, allowing the athlete to rehydrate more or less continuously for the duration of an activity. The quantity of fluids available for hydration is limited only by what the athlete is willing to carry.

However, the need to carry large volumes of fluids creates its own set of problems. Fluids are relatively heavy and change shape and shift position easily in response to motion and pressure. Since most athletes find it awkward and tiring to carry more than very small fluid containers by hand while active, a preferred method for carrying fluids relies on a backpack that holds one or more watertight containers.

A variety of personal hydration systems have evolved to fill this need. A popular personal hydration system takes the form of a small, frameless backpack. The backpack contains hydration system components and usually additional space for personal items such as clothing, food, and first aid supplies. Typical hydration system components are a flexible plastic reservoir with a one to three liter capacity; a hose, one end communicating

with the reservoir and the other end closed by a bite valve; and a fill cap or roll top as a means for fluid to enter and fill the reservoir.

The hydration system components are integrated into the small backpack to ease their removal for cleaning and re-filling. Typically, the hydration reservoir is located in a
5 dedicated compartment behind the surface of the backpack that contacts the user's back. This compartment keeps the backpack's contents separate from the reservoir and keeps the pack contents dry and further protects the reservoir from accidental puncture. The reservoir compartment also holds the weight of the fluid-filled reservoir closer to the individual's center-of-mass, thus enhancing balance and stability.

10 In the current art, when the reservoir is filled with fluid it assumes a columnar or semi-cylindrical shape in response to internal fluid pressure. Since most personal hydration systems are designed to accept a semi-cylindrical reservoir, this shape fits most hydration systems. However, the reservoir's columnar or cylindrical shape forces the reservoir away from user's back and thus away from his or her center-of-mass, creating a tendency for the
15 pack to roll from side-to-side in response to changes in direction by a user.

An abrupt and unexpected shift of the relatively massive fluid reservoir can throw a user off-balance at a critical moment, causing injury or death. Hydration packs therefore often incorporate load control features designed to arrest this motion, adding weight and expense in the form of straps, connectors and fabric. Taken together with the dedicated
20 reservoir compartment these load control features can greatly increase the difficulty of installing and removing a reservoir for cleaning and filling. A reservoir attachment system that secures a reservoir within a pack while allowing quick removal and installation would provide a significant benefit for hydration pack users.

25 Disclosure of Invention

In accordance with the present disclosure, I provide an apparatus for temporarily attaching a fluid reservoir to a backpack. The fluid reservoir has a bladder, a handle, an orifice for filling the bladder, a cap for sealing the orifice, a tube for withdrawing fluid from the bladder, and a bite valve to control fluid flow from the tube.

30 The handle is attached to the bladder at an upper handle end and a lower handle end. A central portion of the handle arches away from the bladder between the upper and lower ends of the handle. The central portion of the handle is wider than the upper and lower ends of the handle.

The backpack contains a reservoir compartment with an hourglass-shaped frame secured within. The frame is a loop of stiff material with a wide upper lobe, a wide lower lobe, and a narrow frame waist disposed between the upper lobe and the lower lobe. The lower end of the handle is narrower than the frame waist. The central portion of the handle is wider than the narrowest portion of the frame waist.

The fluid reservoir may be at least partially inserted into the reservoir compartment so that the handle passes through the upper lobe of the frame and within the frame waist until the narrowest portion of the frame waist is disposed between the bladder and the handle, effectively securing the handle within the frame and discouraging the reservoir from shifting or rolling in response to movement of the pack.

The frame may be attached directly to the pack or contained within a frame sleeve within the reservoir compartment, the frame then forming a reservoir attachment slot within the frame sleeve. A reservoir support strap may attach to the reservoir to support at least a portion of the weight of the fluid reservoir. The edges of the handle may curve away from the bladder to facilitate insertion of the handle within the frame.

All of these features and advantages of the present invention, and more, are illustrated below in the drawings and detailed description that follows.

Brief Description of Drawings

Fig. 1 is a perspective view of a fluid reservoir.

Fig. 2 is a front elevation view of a frame.

Fig. 3 is a side elevation view of a frame.

Fig. 4 is a top plan view of a frame atop a fluid reservoir.

Fig. 5 is a perspective view of a backpack containing a reservoir compartment with a reservoir attachment slot.

Fig. 6 is a perspective view of a fluid reservoir being inserted into the reservoir attachment slot of Fig. 5.

Fig. 7 is a perspective view of a backpack with a partial sectional view of a reservoir installed in a reservoir attachment slot.

Fig. 8 is a side elevation view of a backpack with a partial sectional view of a reservoir installed in a reservoir attachment slot.

Fig. 9 is a transverse cross-sectional view of the lower portion of the backpack of Fig. 8.

Fig. 10 is a rear perspective view of the backpack of Fig. 8 with a fluid reservoir installed and the tube and bite valve attached to a shoulder strap.

Modes for Carrying Out the Invention

5 A hydration backpack may be equipped with a simple and effective fluid reservoir attachment system in which a reservoir structure easily engages a structure on the pack to hold the reservoir securely in place. Fig. 1 shows a perspective view of an elongated, flexible fluid reservoir **100** with a handle **110** shaped to engage a tapered slot within a hydration backpack. The reservoir **100** includes a collapsible bladder **102**, the handle **110**,
10 an orifice and cap **108**, a tube **104**, and a bite valve **106**. The bladder **102** is made of flexible plastic sheets welded together at the edges. Fluids within the bladder **102** may be withdrawn through a tube **104** that is opened or closed by the bite valve **106**. The bladder **102** may be emptied or filled through the orifice (not visible) that sealed by the cap **108**.

The lower end **116** and the upper end **118** of the handle **110** are attached to the
15 bladder **102** near opposite ends of the bladder **102**. A central portion **112** of the handle **110** arches away from the bladder **102**. The edges **114** of the handle **110** also curve away from the bladder **102**. A support loop **120** may be attached to a supporting structure within a pack to support the weight of a filled bladder **102**.

In one embodiment of the invention the handle **110** may engage a frame within a
20 hydration backpack. Fig. 2 shows a front elevation view of an exemplary frame **200** shaped as a loop having a wide upper lobe **202**, a wide lower lobe **204**, and tapering from either end to a narrow central waist **206**. Fig. 3 shows a side elevation view revealing that the frame **200** curves to follow the shape of a pack user's upper torso.

Fig. 4 shows a top plan view of the reservoir **100** overlain by the frame **200** to
25 illustrate the relative sizes of these system components and to suggest the manner in which they engage. The edges **114** of the handle **110** widen in a central portion **112** and narrow toward the lower end **116** and upper end **118** of the handle **110**. The frame **200** widens at the upper lobe **202** and lower lobe **204** and narrows at the waist **206**. In this embodiment, the widest portion of the central portion **112** of the handle **110** is slightly wider than the
30 narrowest portion of the frame waist **206**, so that the lower end **116** of the handle **110** may be inserted within the upper lobe **202** of the frame **200** and slid through the frame waist **206** until the central portion **112** of the handle is captured by the narrowest portion of the frame waist **206**.

Fig. 5 shows a perspective view of a hydration backpack **500** with shoulder straps **514**, a reservoir support strap **508**, load transfer flaps **510**, and male load transfer side release buckle components **512**. The frame **200** (in broken lines) is inserted in a frame sleeve (not visible) behind the fabric rear wall **518** of the reservoir compartment **502**. In this description the “rear” of a backpack is the portion furthest from a user’s back when the backpack is worn in the usual fashion. A first space or structure that is “behind” a second space or structure is further from a user’s back than the second space or structure when the backpack is worn in the usual fashion. A reservoir attachment slot **504** is formed into the rear wall **518** of the reservoir compartment **502** by the frame **200** (in broken lines). The frame waist **206** gives shape and some rigidity to the rear wall **518** to create a slot rim **516** on either side of the reservoir attachment slot **504**.

Referring now to Fig. 6, the reservoir **100** (for clarity, shown without the tube **104** and bite valve **106**) may be easily and securely attached to the hydration backpack **500** by orienting and inserting the reservoir **100** into the reservoir compartment **502** so that the lower end **116** of the handle **110** slides into the reservoir attachment slot **504**. As the handle **110** slides down into the reservoir attachment slot **504**, the narrow lower end **116** of the handle **110** and the transverse cross-sectional curve of the handle **110** allow the edges **114** of the handle **110** to pass freely between the opposing sides of the slot rim **516** within the reservoir attachment slot **504**.

As reservoir **100** slides further into the reservoir compartment **502**, the end-to-end arch of the handle **110** allows the edges **114** of the central portion **112** of the handle **110** to project and slide behind the slot rim **516**. The wider central portion **112** of the handle **110** engages the slot rim **516**, securing the reservoir **100** to the hydration backpack **500** in a manner that prevents the reservoir **100** from shifting or rolling.

Fig. 7 shows a partially broken-away rear perspective view of a hydration backpack **500** with a reservoir **100** fully inserted into a reservoir compartment and engaged with the reservoir attachment slot. The cap **108** is approximately centered within the upper lobe **202** of the frame **200** (shown in broken lines) and the central portion **112** of the handle **110** is positioned behind the frame waist **206**. Alternate embodiments of the invention may utilize reservoirs with compatible attachment means other than the handle disclosed herein, such as knobs or rails that are attached to a reservoir and sized and positioned to engage a reservoir attachment slot. The embodiment of Fig. 7 utilizes snaps **700** in place of side release buckles.

Referring now to Fig. 8, a reservoir **100** has been inserted completely into the reservoir compartment **502** may be supported by the reservoir support strap **508**, which in this embodiment passes a male side-release buckle component **520** through a support loop **120** on the handle **110** and snaps into a female side-release buckle component **522** attached to the hydration backpack **500**, thus preventing the reservoir **100** from sliding too far down into the reservoir compartment **502**. Although most of the tube **104** has been omitted for clarity in Figs. 6, 7, and 8, the tube **104** may lie behind the handle **110** of an installed reservoir **100**, passing through the reservoir attachment slot **504** and following the handle **110** past the cap **108** to exit the upper portion of the reservoir compartment **502**, or passing forward through the lower lobe **204** to pass upward on either side of the handle **110**.

Fig. 8 also shows a cross sectional view of the frame sleeve **822** that contain the frame **200**. The frame **200** may be inserted into the frame sleeve **822** through an access zipper (not shown) in the rear wall **518** of the reservoir compartment **502**. In alternate embodiments the frame **200** may be sewn into the backpack during the manufacturing process, eliminating the need for an access zipper.

Fig. 9 shows a cross-sectional view of the lower portion of a hydration backpack **500** with a reservoir **100** engaging a frame **200** within a reservoir compartment **502**. As described above, the edges **114** of the central portion **112** of the handle **110** rest behind and are engaged with the frame waist **206**, with the rear wall **518** of the reservoir compartment **502** sandwiched between. Fig. 9 clearly shows the transverse cross-sectional curve of the handle **110**. One or more cargo compartments **900** may contain equipment and personal effects.

Once the reservoir **100** is engaged with the reservoir attachment slot **504** and the tube **104** routed to exit the reservoir compartment **502**, the reservoir compartment **502** may be zipped shut. Male load transfer side release buckle components **512** may be attached to female load transfer side release buckle components **1012** that are mounted on the load transfer flaps **510**, transferring a portion of the weight of the reservoir **100** directly to the shoulder straps **514** in the manner shown in Fig. 10.

The tube **104** may be attached to a shoulder strap **514** and the hydration backpack **500** may be used to carry a significant quantity of hydration fluids in a comfortable and stable manner. When necessary, the reservoir **100** may be quickly removed for refilling and/or cleaning by zipping open the reservoir compartment **520**, unbuckling the reservoir support strap **508**, and sliding the reservoir **100** and handle **110** back out of the reservoir

attachment slot **504** and reservoir compartment **502**. In alternate embodiments the side release buckle components **512**, **1012** may be replaced by snaps or other fasteners known in the art.

5 The principles, embodiments, and modes of operation of the present invention have been set forth in the foregoing specification. The embodiments disclosed herein should be interpreted as illustrating the present invention and not as restricting it. The foregoing disclosure is not intended to limit the range of equivalent structure available to a person of ordinary skill in the art in any way, but rather to expand the range of equivalent structures in ways not previously contemplated. Numerous variations and changes can be made to the
10 foregoing illustrative embodiments without departing from the scope and spirit of the present invention.

Industrial Applicability

15 From the foregoing it can be seen that the teachings of this disclosure have applicability in the manufacture and use of portable hydration reservoirs, particularly those carried in backpacks. A reservoir manufactured according to the teachings of this disclosure may increase the stability and comfort of a backpack containing the reservoir.

Claims

I claim:

- 5 1. An apparatus for temporarily attaching a fluid reservoir to a backpack, comprising:
a fluid reservoir, the fluid reservoir comprising a bladder and a handle, the handle
being attached to the bladder at an upper end of the handle and at a lower end of the
handle, the handle arching away from the bladder between the upper and lower ends of the
handle, the handle having a central portion disposed between the upper and lower ends, the
10 central portion of the handle being wider than the upper and lower ends of the handle;
a frame, the frame comprising a loop with a wide upper lobe, a wide lower lobe,
and a narrow frame waist disposed between the upper lobe and the lower lobe, the lower
end of the handle being narrower than the frame waist, the widest portion of the central
portion of the handle being wider than the narrowest portion of the frame waist; and
15 a backpack, the backpack comprising at least a reservoir compartment with at least
a first opening through which the fluid reservoir may be at least partially inserted into the
reservoir compartment, the frame secured to the backpack within the reservoir
compartment, the upper lobe of the frame disposed proximate to the first opening and
operable to allow the handle to pass within the frame waist at least until the narrowest
20 portion of the frame waist is disposed between the bladder and the handle.
2. An apparatus for temporarily attaching a fluid reservoir to a backpack as claimed in
claim 1, wherein the frame is secured within a frame sleeve disposed within the reservoir
compartment, the frame forming a reservoir attachment slot within the frame sleeve.
25
3. An apparatus for temporarily attaching a fluid reservoir to a backpack as claimed in
claim 1, wherein the backpack further comprises a reservoir support strap operable to
support at least a portion of the weight of the fluid reservoir.
- 30 4. An apparatus for temporarily attaching a fluid reservoir to a backpack as claimed in
claim 1, wherein the handle has edges that curve away from the bladder.

5. An apparatus for temporarily attaching a fluid reservoir to a backpack as claimed in claim 1, wherein the frame comprises steel wire.

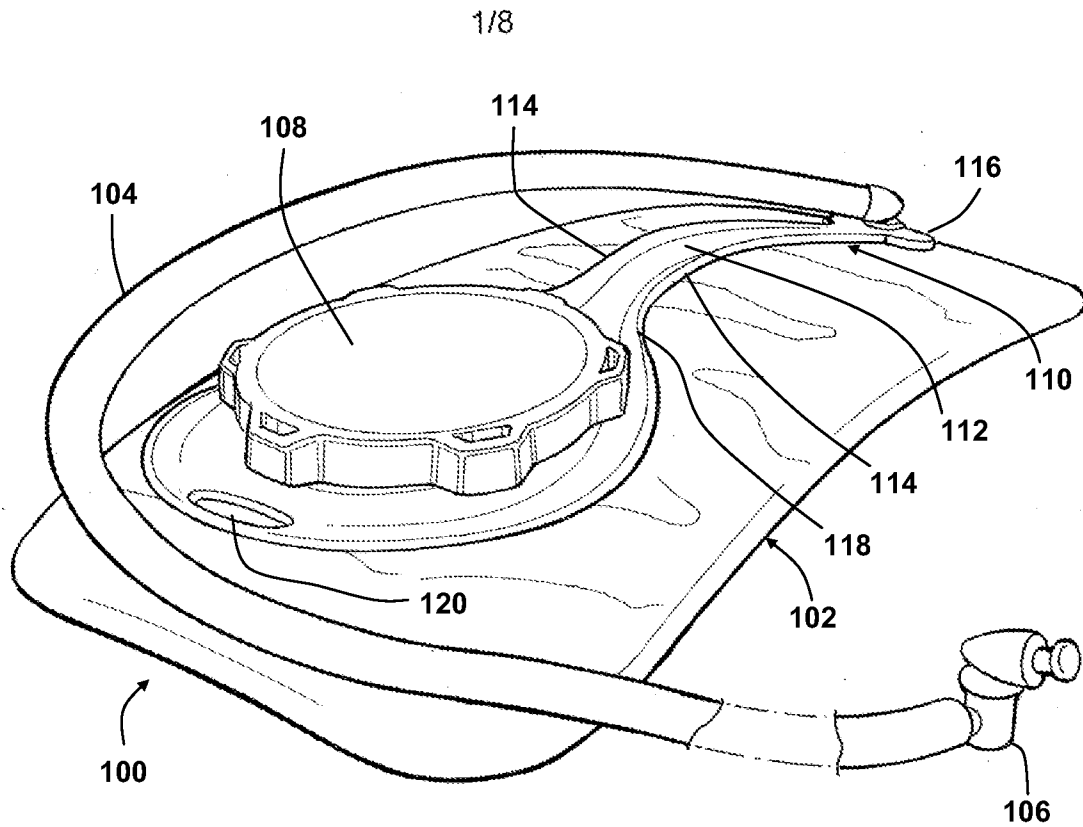


FIG. 1

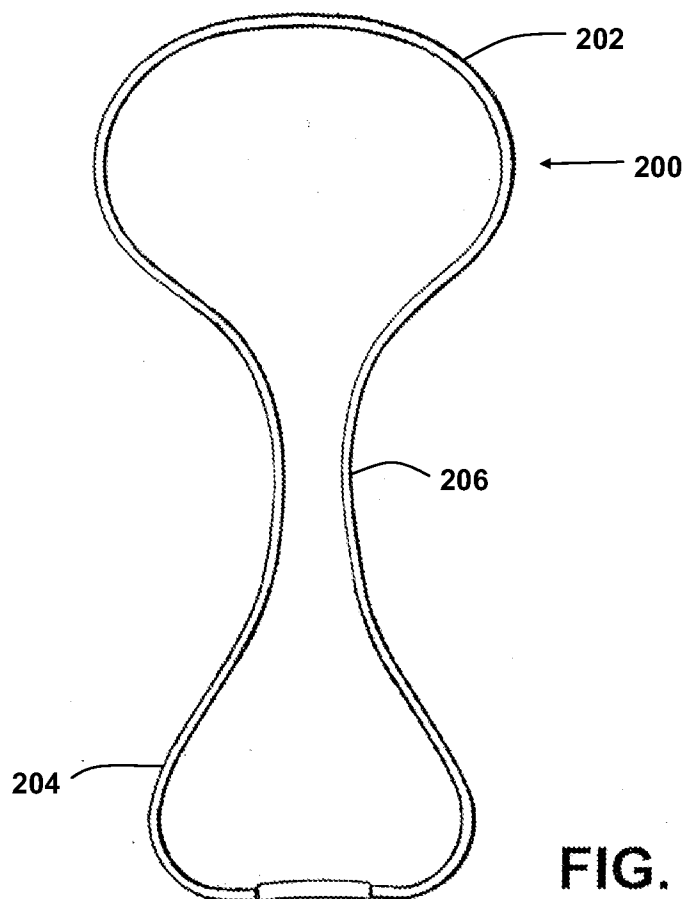


FIG. 2

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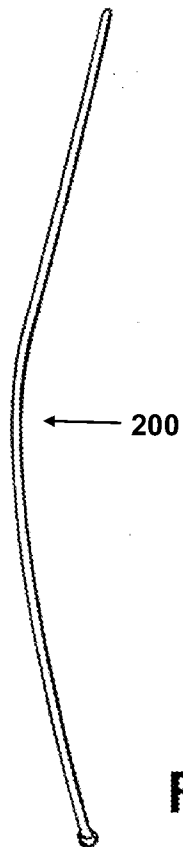


FIG. 3

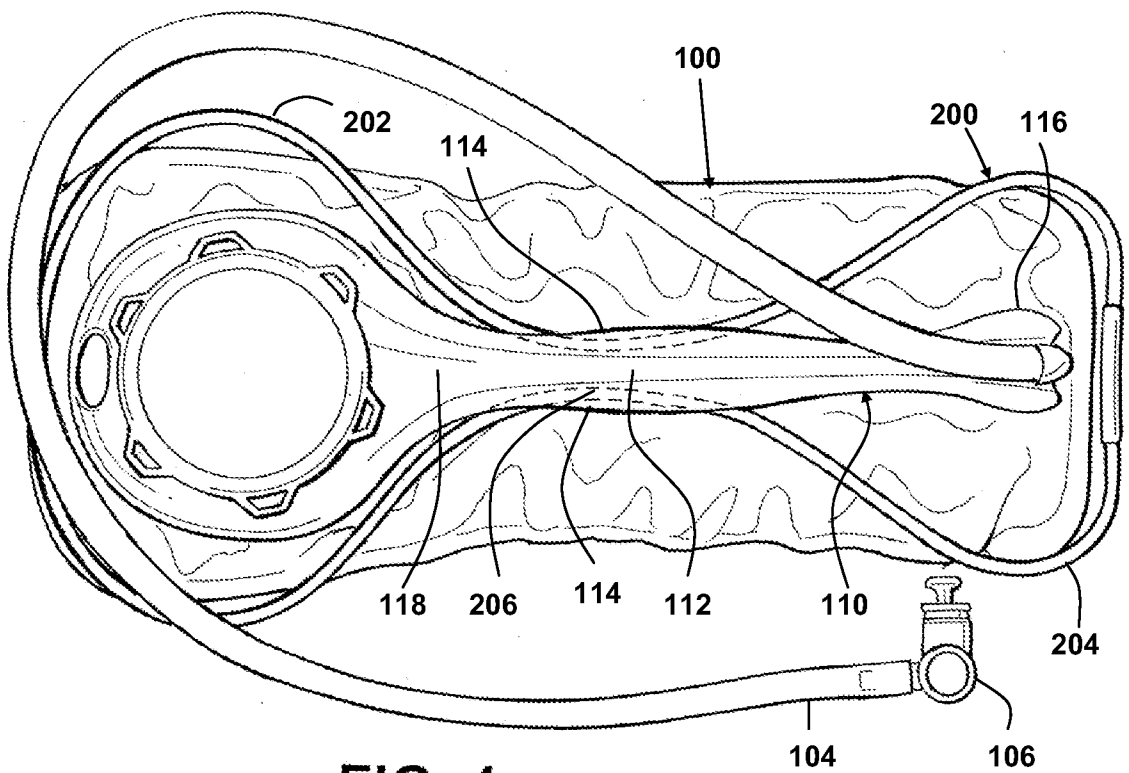
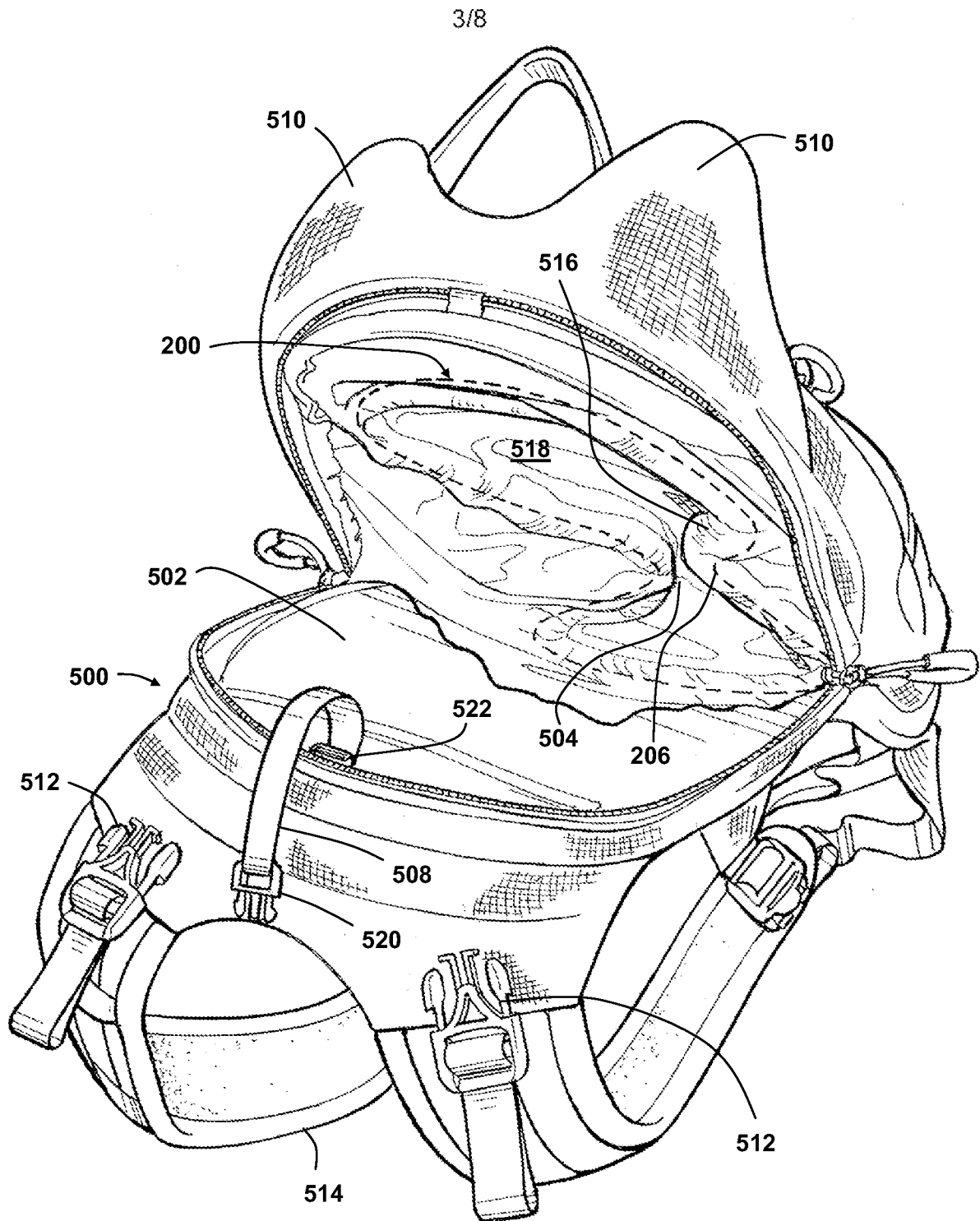


FIG. 4

**FIG. 5**

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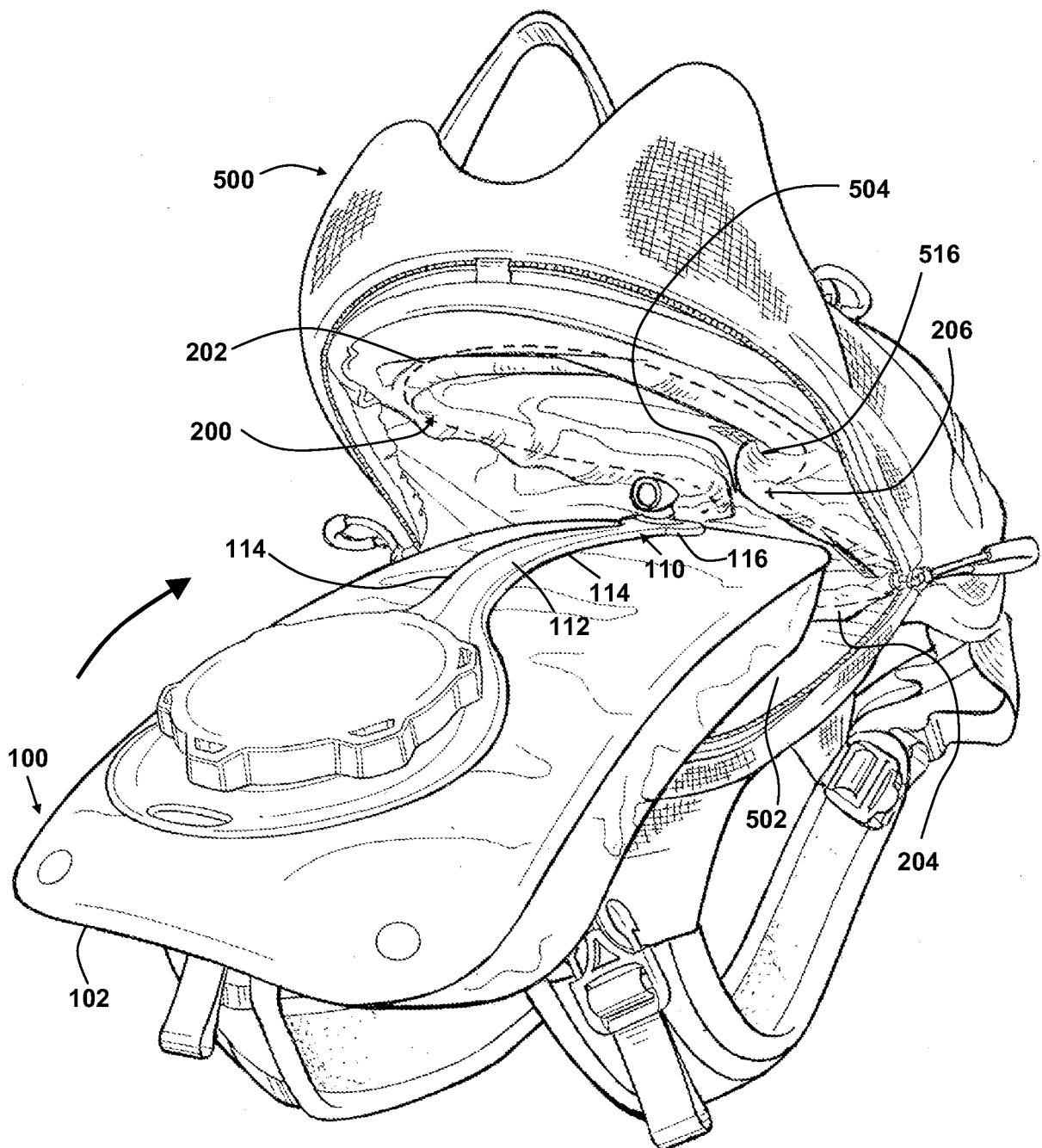


FIG. 6

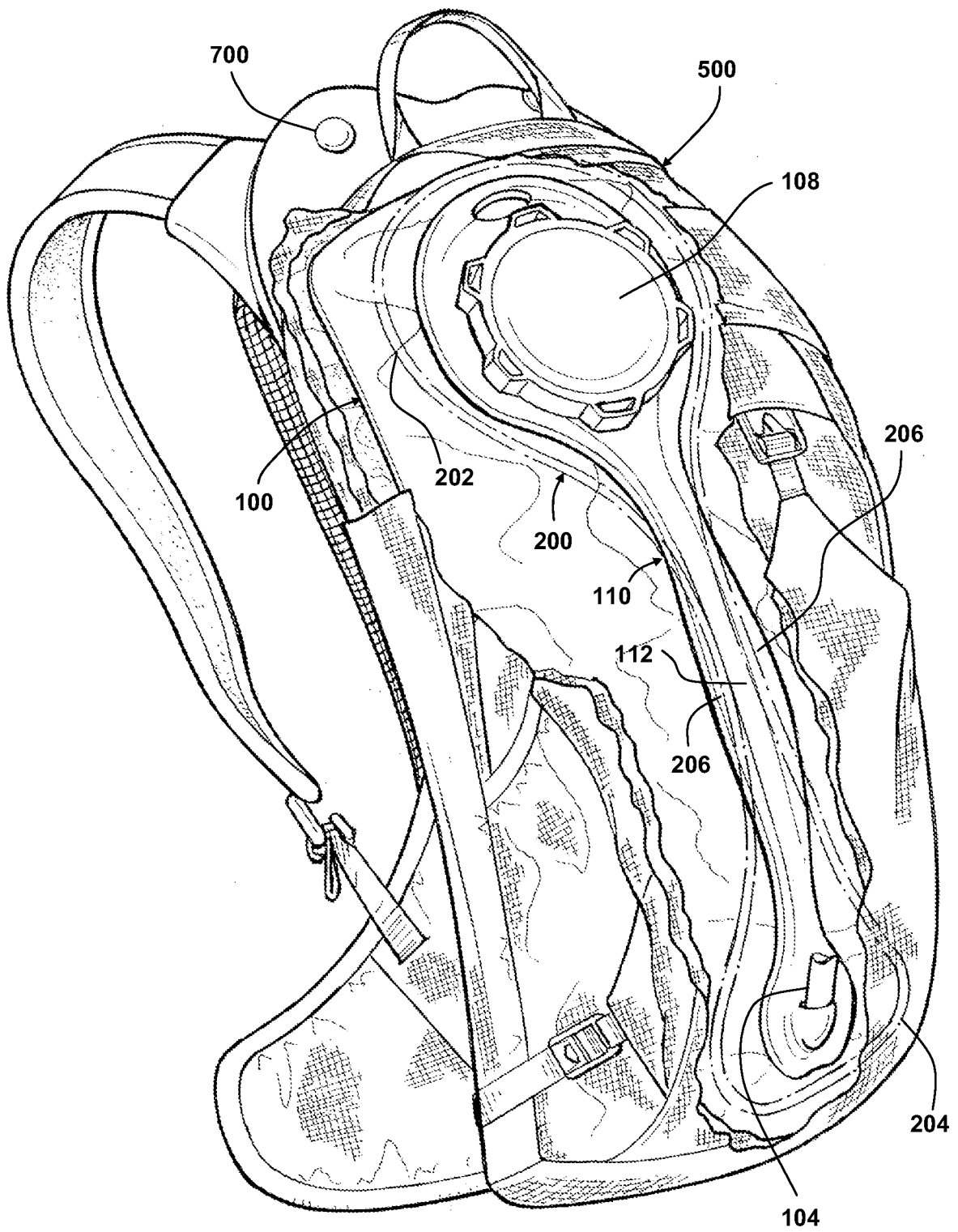


FIG. 7

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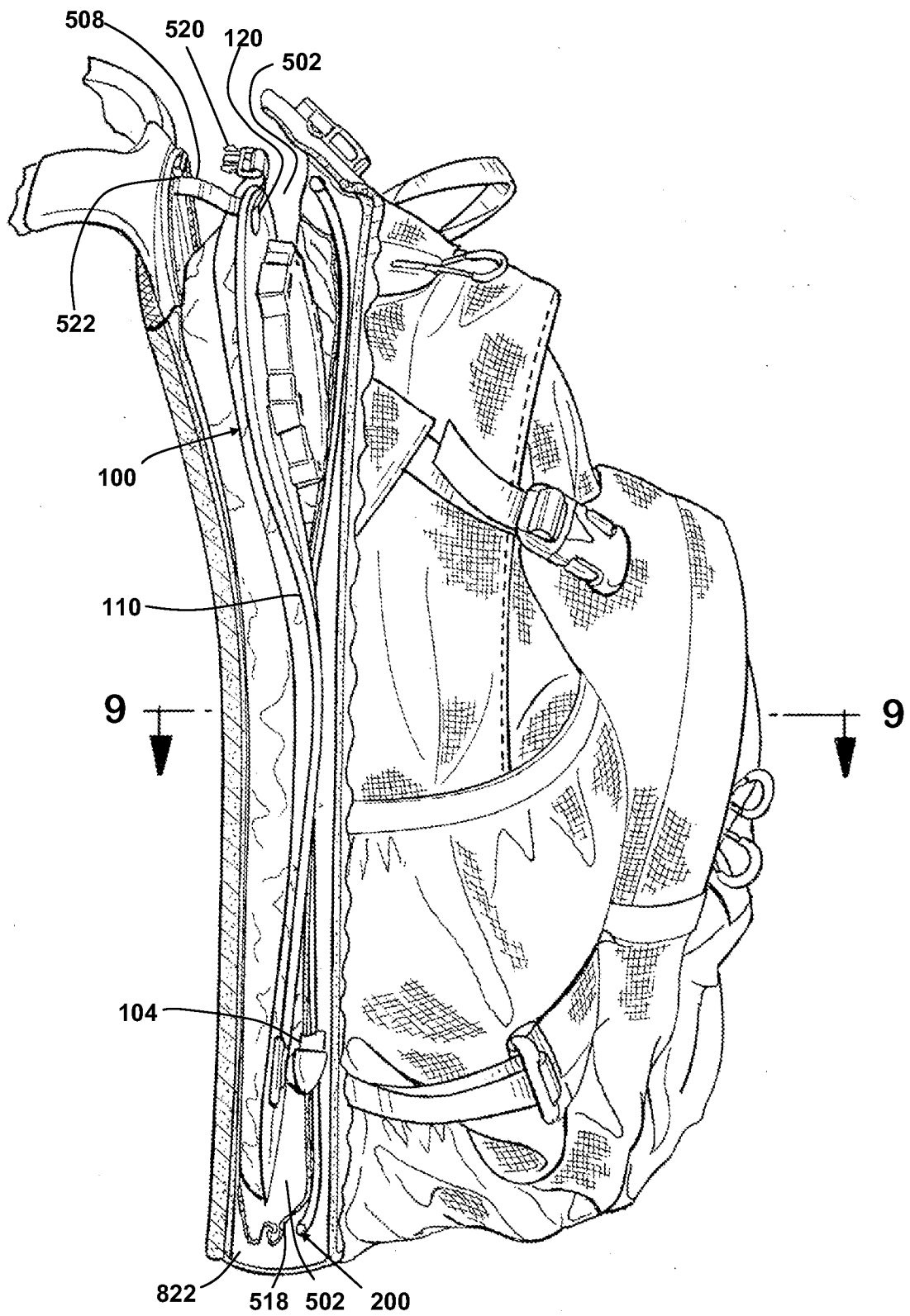


FIG. 8

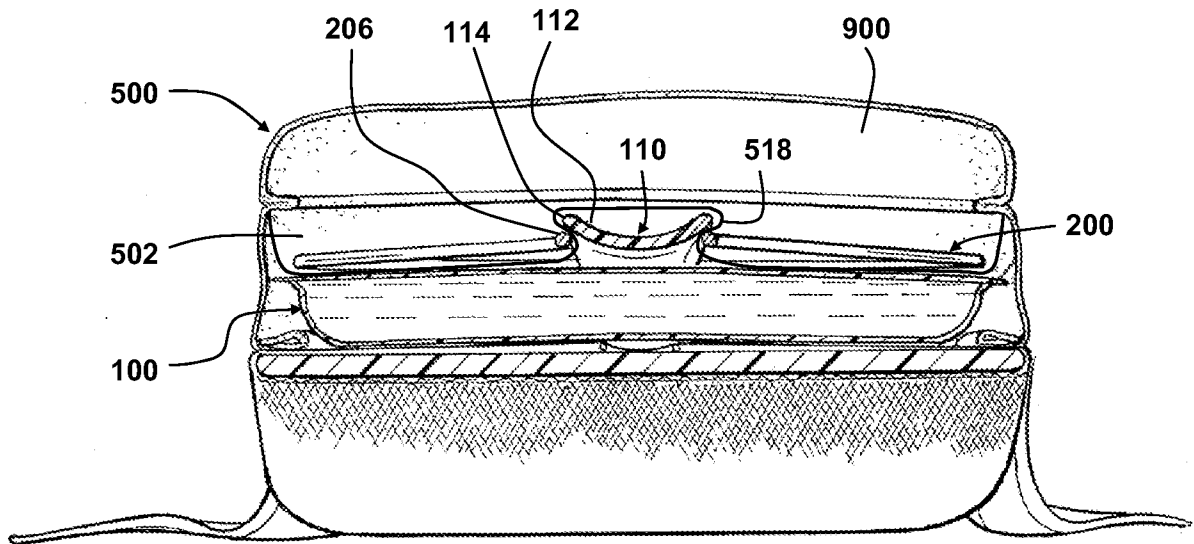


FIG. 9

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