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(54) **Closure device for drinking vessel**

(57) A closure device (100) for use at the opening of a drinking vessel (10), comprises a body (110) for connection to the drinking vessel (10) at its opening (8), and a valve comprising a valve member (120) supported by the body (110) for movement relative thereto between an inner open position allowing flowing out of liquid from

inside the drinking vessel (10) through its opening (8) and an outer closed position sealing off the opening (8). A spring (130) is included to resiliently bias the valve member (120) towards the closed position. The valve member (120) has an internal passage (X) through which liquid from inside the drinking vessel (10) may flow out when the valve member (120) is in the open position.

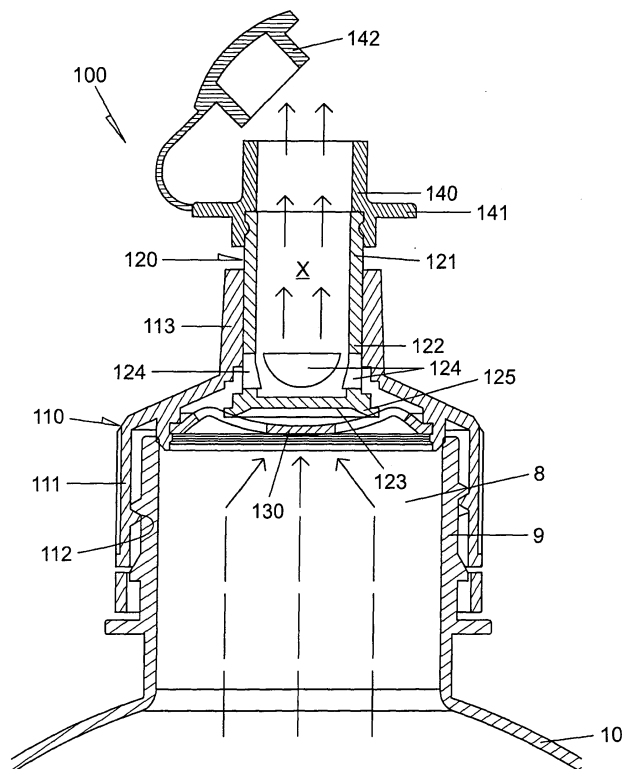


FIG. 4

Description

[0001] The present invention relates to a closure device for a drinking vessel and particularly, but not exclusively, for a sports drink bottle, which is leak-proof.

BACKGROUND OF THE INVENTION

[0002] Leak-proof drinking vessels have generally been known particularly for infants and sports, which typically include a lid or cap closing the vessel body and a user is to drink through the cap. The cap usually incorporates a valve that is operated either manually or by way of suction.

[0003] The invention seeks to provide a new or otherwise improved closure device for a drink vessel, which is leak-proof and more convenient to use.

SUMMARY OF THE INVENTION

[0004] According to the invention, there is provided a closure device for use at the opening of a drinking vessel, comprising a body for connection to said drinking vessel at said opening, and a valve comprising a valve member supported by the body for movement relative thereto between an inner open position allowing flowing out of liquid from inside said drinking vessel through said opening and an outer closed position sealing off said opening. Spring means is included to resiliently bias the valve member towards the closed position. The valve member has an internal passage through which liquid from inside said drinking vessel may flow out when the valve member is in the open position.

[0005] Advantageously, the closure device includes a tear strip retaining the valve member in the closed position.

[0006] In a preferred embodiment, the valve member has a protruding part for engagement by a drinker's mouth to move the valve member to the open position.

[0007] More preferably, the protruding part of the valve member includes the passage.

[0008] Further more preferably, the closure device includes a mouthpiece provided at the protruding part, and a tear strip provided immediately behind the mouthpiece and retaining the valve member in the closed position.

[0009] Further more preferably, the includes a closing member engageable upon the protruding part of the valve member to close the passage.

[0010] Yet further more preferably, the closing member is connected to a mouthpiece provided at the protruding part.

[0011] In a preferred embodiment, the valve member is at least in part tubular.

[0012] More preferably, the valve member has a tubular outer end which is protruding for engagement by a drinker's mouth to move the valve member to the open position.

[0013] More preferably, the valve member has a tubu-

lar inner end having at least one aperture that acts as an entrance to the passage.

[0014] Further more preferably, the spring means is located adjacent, and acts upon, the inner end of the valve member.

[0015] Further more preferably, the body has a solid part adjacent said at least one aperture for blocking off said at least one aperture when the valve member is in the closed position, said at least one aperture being out of alignment with the solid part when the valve member is in the open position.

[0016] Yet further more preferably, the interface between said at least one aperture and the solid part extends in the direction of movement of the valve member.

[0017] Yet further more preferably, the solid part is part of a tubular part of the body, the tubular part surrounding and supporting the valve member co-axially about a common axis for sliding movement along the axis.

[0018] Yet yet further more preferably, the inner end of the valve member has a tubular wall around which a plurality of said apertures are formed.

[0019] It is preferred that the body has a cylindrical base having a screw-threaded inner side for engaging around said opening.

BRIEF DESCRIPTION OF DRAWINGS

[0020] The invention will now be more particularly described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a side view of an embodiment of a closure device in accordance with the invention for use at the opening of a drinking vessel;

Figure 2 is a side view similar to Figure 1, showing a stopper of the closure device released;

Figure 3 is a cross-sectional side view of the closure device of Figure 1, showing its internal construction; and

Figure 4 is a cross-sectional side view similar to Figure 3, showing a stopper of the closure device released and an internal valve thereof pushed open.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

[0021] Referring to the drawings, there is shown a closure device 100 embodying the invention for use at an opening of a drinking vessel such as an opening 8 at a neck 9 of a water bottle 10, which closure device has a body 110 for connection to the bottle 10 at its opening 8, and a manually-operated valve. The valve comprises a valve member 120 that is provided generally in the body 110 for controlling the flow of water from inside the bottle 10, when the bottle 10 is used upside down.

[0022] The body 110 includes a cylindrical base 111 which has a screw-threaded inner side 112 for engaging around the bottle opening 8, behind which the neck 9 is formed with external screw-threads as is commonly known. Extending vertically upwardly from the base 111 is an integrally connected cylindrical sleeve 113 of a smaller diameter, which supports the valve member 120.

[0023] The valve member 120 is a cylindrical tube which has an outer diameter marginally smaller than the inner diameter of the sleeve 113 and is inserted through the sleeve 113 from below, with both of its opposite outer/upper and inner/lower tubular ends 121 and 122 exposed. The valve member 120 is surrounded and supported by the sleeve 113 co-axially about a common vertical axis as a sliding fit for sliding movement along the axis upwards and downwards.

[0024] The outer end 121 protrudes out of the sleeve 113 for engagement by a drinker's mouth to push the valve member 120 further into the sleeve 113 for opening the valve. The inner end 122 has a peripheral wall, equi-angularly around which four apertures 124 are formed near the bottom, and the bottom is closed by an end wall 123. A circular bottom flange 125 retains the inner end 122 against sliding completely into the sleeve 113.

[0025] The interior of the valve member 120 defines a tubular passage X along almost its entire length, through and along which water from inside the bottle 10 may flow out when the bottle 10 is turned upside down and the valve is opened. To this end, the bottom apertures 124 together act as an entrance to the passage X, and the uppermost opening of the valve member 120 is the exit. The apertures 124 are situated adjacent to the lowermost end of the sleeve 113.

[0026] The valve member 120 is slidable vertically in opposite directions relative to the sleeve 113 between an inner open position (Figure 4), in which the valve is open and allows flowing out of water from inside the bottle 10 through its opening 8, and an outer closed position (Figure 3), in which the valve is closed and seals off the opening 8.

[0027] An inverted wok-shaped leaf spring 130 is located within the body 110 at a position immediately below the valve member 120, and it acts upon the inner end 122 to resiliently bias the valve member 12 upwardly towards its outer closed position. The valve is thus normally-closed.

[0028] Like the rest of the cylindrical wall of the sleeve 113, the lowermost end of the wall is solid, and it is aligned with and blocks off all four apertures 124 when the valve member 120 is in its outer closed position, whereby water cannot enter into the sleeve 113. The interface between the apertures 124 and the said solid wall portion extends vertically i.e. in the direction of movement of the valve member 120.

[0029] In the inner open position, the valve member 120 has been slid further into the body 110 to move its apertures 124 out of alignment with the lowermost end of the sleeve 113, extending beyond the lowermost end.

As the apertures 124 are no longer obstructed, water can now enter into the sleeve 113 and flow out via the passage X (Figure 4).

[0030] A tubular mouthpiece 140 is tight-fitted onto and around the protruding outer end 121 of the valve member 120, joining co-axially therewith. The mouthpiece 140 has an integral radial flange 141 for bearing upon by the lips of a drinker when he/she drinks water out of the bottle 10.

[0031] A stopper 142 is connected by an integral strip to the flange 141 for plugging into the mouthpiece 140, i.e. indirectly upon the outer end 121 of the valve member 120, to close the passage X at its outer end. Save for hygiene purposes, the stopper 142 is used to prevent leaking of water when the valve is unintentionally opened i.e. the valve member 120 accidentally pressed.

[0032] A tear strip 143 is provided at the lower end of the mouthpiece 140, integrally connected thereto, for locking the valve member 120 in the outer closed position before the bottled drink is purchased and used. The tear strip 143 is located immediately behind the mouthpiece 140. It extends around the otherwise exposed part of the valve member 120 between the mouthpiece 140 and the sleeve 113, occupying the annular gap therebetween to prevent any downward movement of the valve member 120.

[0033] The closure device 100 of the subject invention is very convenient to use because the valve member 120 should be pressed inwardly to open the valve and this is consistent with the direction in which the user brings the bottle opening 8 to his/her mouth. The valve member 120 will automatically return upon release, and hence the valve closed, under the action of the spring 130. Accordingly, the valve requires no extra force and action from the user.

[0034] All of the components of the subject closure device are conveniently made of moulded food/drink grade plastic materials.

[0035] Leak-proofing is effective as it is dependent upon the tolerance between the diameters of the valve member 120 and sleeve 113, which is readily achievable. In particular, the valve member 120 and sleeve 113 can be made longer to ensure better sealing. Moreover, the flow rate can easily be adjusted by changing the number and/or size of the apertures 124.

[0036] The invention has been given by way of example only, and various modifications of and/or alterations to the described embodiment may be made by persons skilled in the art without departing from the scope of the invention as specified in the appended claims.

Claims

1. A closure device for use at the opening of a drinking vessel, comprising:

a body for connection to said drinking vessel at

said opening;
 a valve comprising a valve member supported by the body for movement relative thereto between an inner open position allowing flowing out of liquid from inside said drinking vessel through said opening and an outer closed position sealing off said opening; and
 spring means resiliently biasing the valve member towards the closed position;

characterized in that the valve member has an internal passage through which liquid from inside said drinking vessel may flow out when the valve member is in the open position.

2. The closure device as claimed in claim 1, **characterized in that** it includes a tear strip retaining the valve member in the closed position.
3. The closure device as claimed in claim 1, **characterized in that** the valve member has a protruding part for engagement by a drinker's mouth to move the valve member to the open position.
4. The closure device as claimed in claim 3, **characterized in that** the protruding part of the valve member includes the passage.
5. The closure device as claimed in claim 4, **characterized in that** it includes a mouthpiece provided at the protruding part, and a tear strip provided immediately behind the mouthpiece and retaining the valve member in the closed position.
6. The closure device as claimed in claim 4, **characterized in that** it includes a closing member engageable upon the protruding part of the valve member to close the passage.
7. The closure device as claimed in claim 6, **characterized in that** the closing member is connected to a mouthpiece provided at the protruding part.
8. The closure device as claimed in any one of claims 1 to 7, **characterized in that** the valve member is at least in part tubular.
9. The closure device as claimed in claim 8, **characterized in that** the valve member has a tubular outer end which is protruding for engagement by a drinker's mouth to move the valve member to the open position.
10. The closure device as claimed in claim 8, **characterized in that** the valve member has a tubular inner end having at least one aperture that acts as an entrance to the passage.

11. The closure device as claimed in claim 10, **characterized in that** the spring means is located adjacent, and acts upon, the inner end of the valve member.
12. The closure device as claimed in claim 10, **characterized in that** the body has a solid part adjacent said at least one aperture for blocking off said at least one aperture when the valve member is in the closed position, said at least one aperture being out of alignment with the solid part when the valve member is in the open position.
13. The closure device as claimed in claim 12, **characterized in that** the interface between said at least one aperture and the solid part extends in the direction of movement of the valve member.
14. The closure device as claimed in claim 12, **characterized in that** the solid part is part of a tubular part of the body, the tubular part surrounding and supporting the valve member co-axially about a common axis for sliding movement along the axis.
15. The closure device as claimed in claim 14, **characterized in that** the inner end of the valve member has a tubular wall around which a plurality of said apertures are formed.
16. The closure device as claimed in any one of claims 1 to 7, **characterized in that** the body has a cylindrical base having a screw-threaded inner side for engaging around said opening.

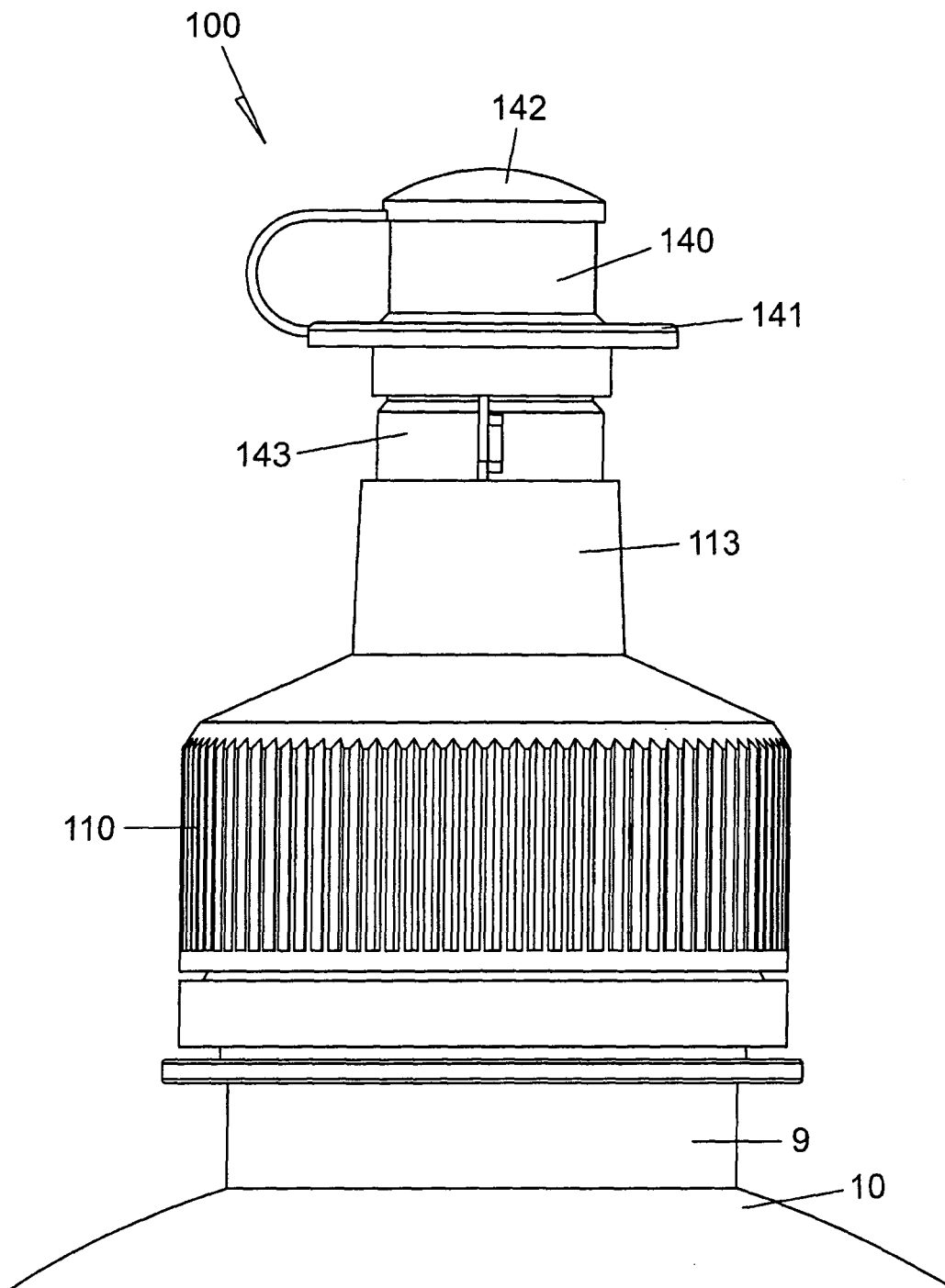


FIG. 1

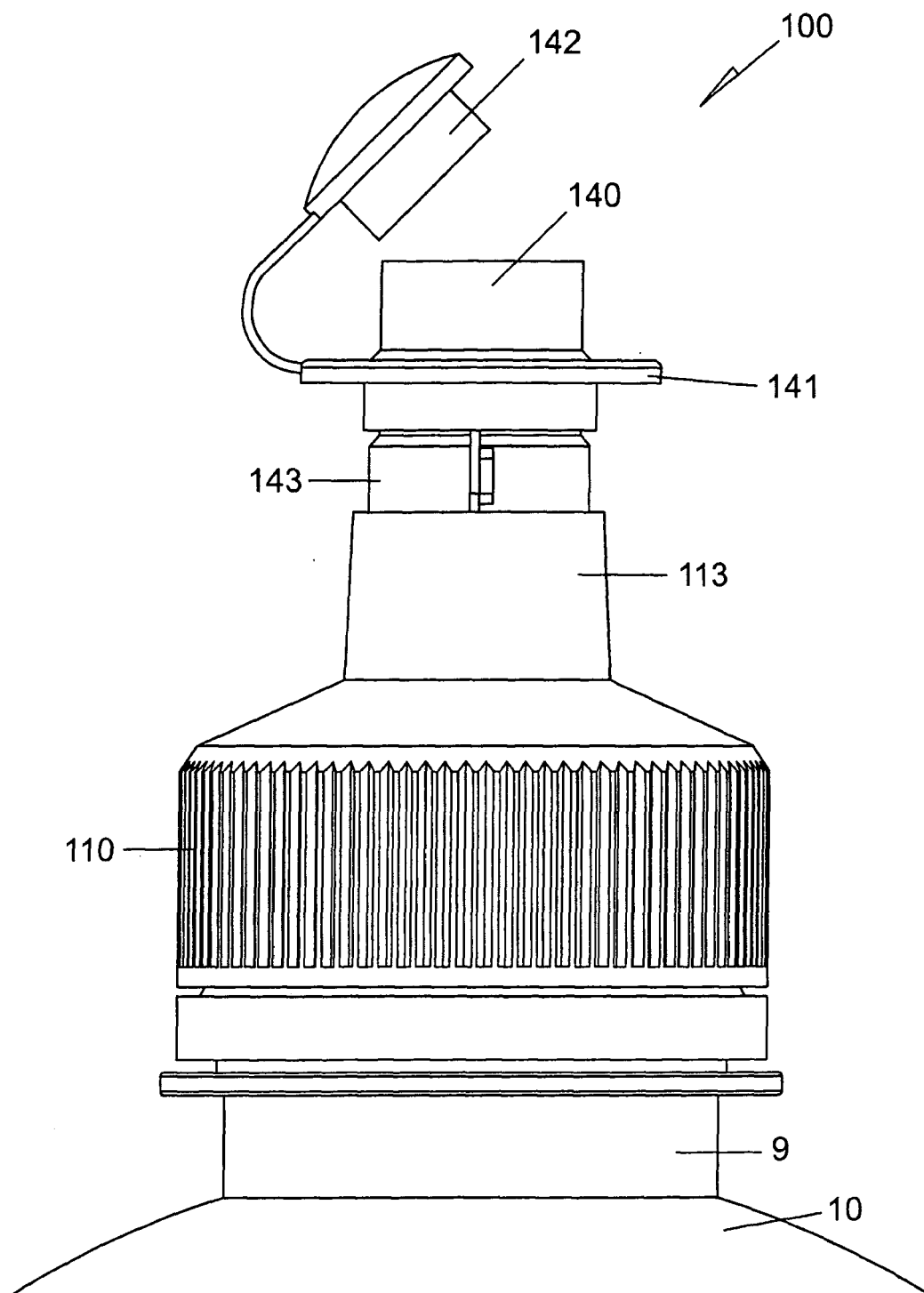


FIG. 2

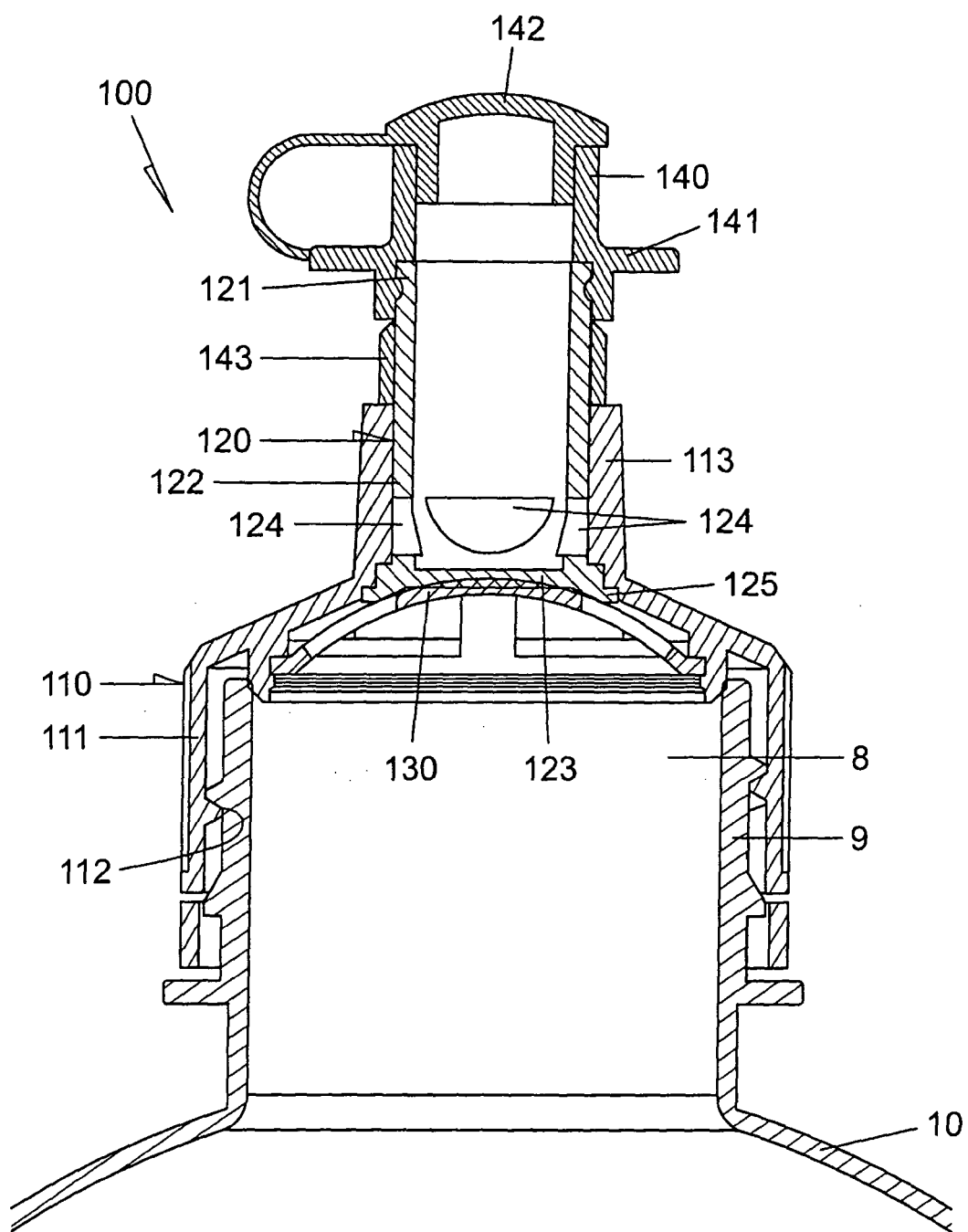


FIG. 3

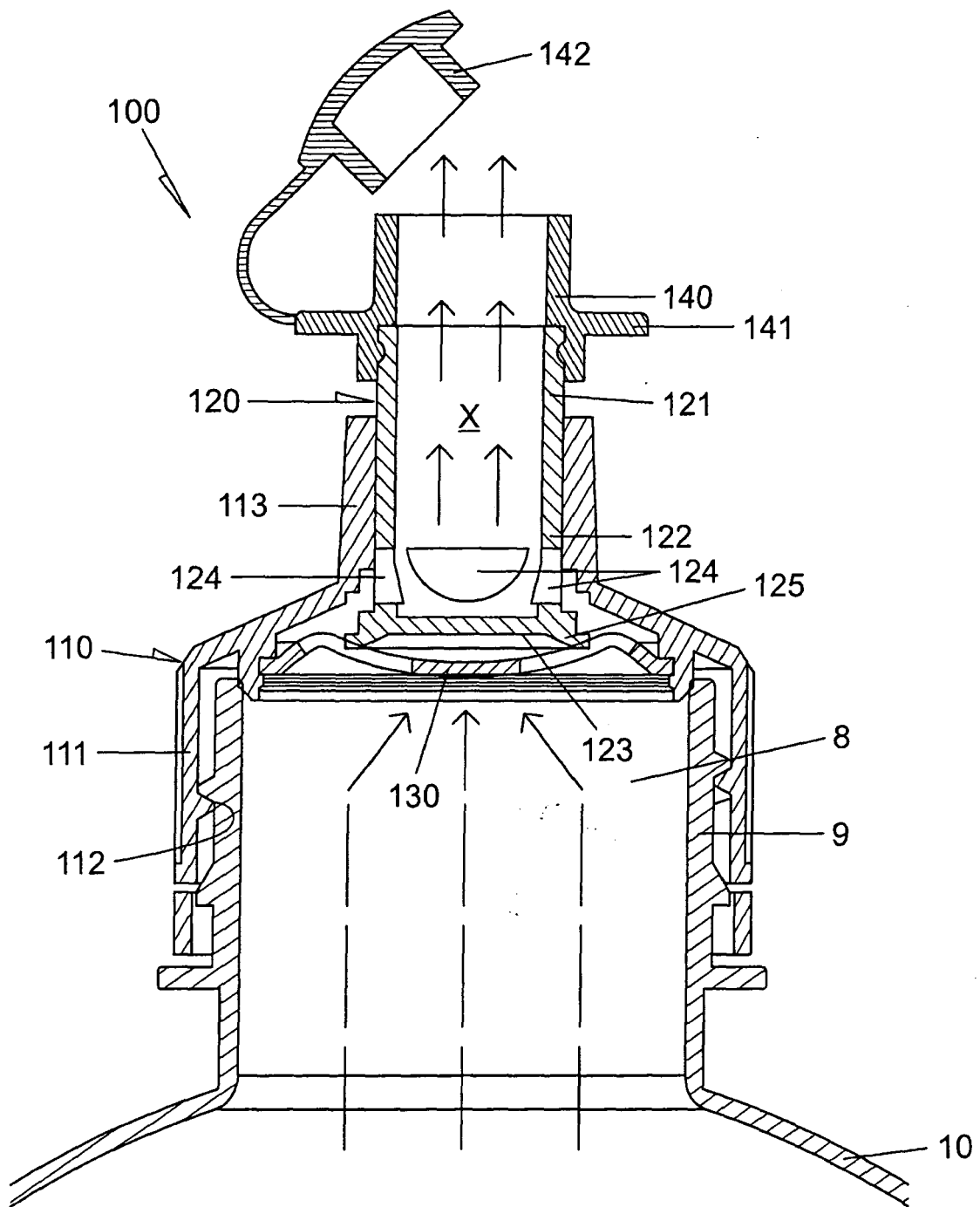


FIG. 4