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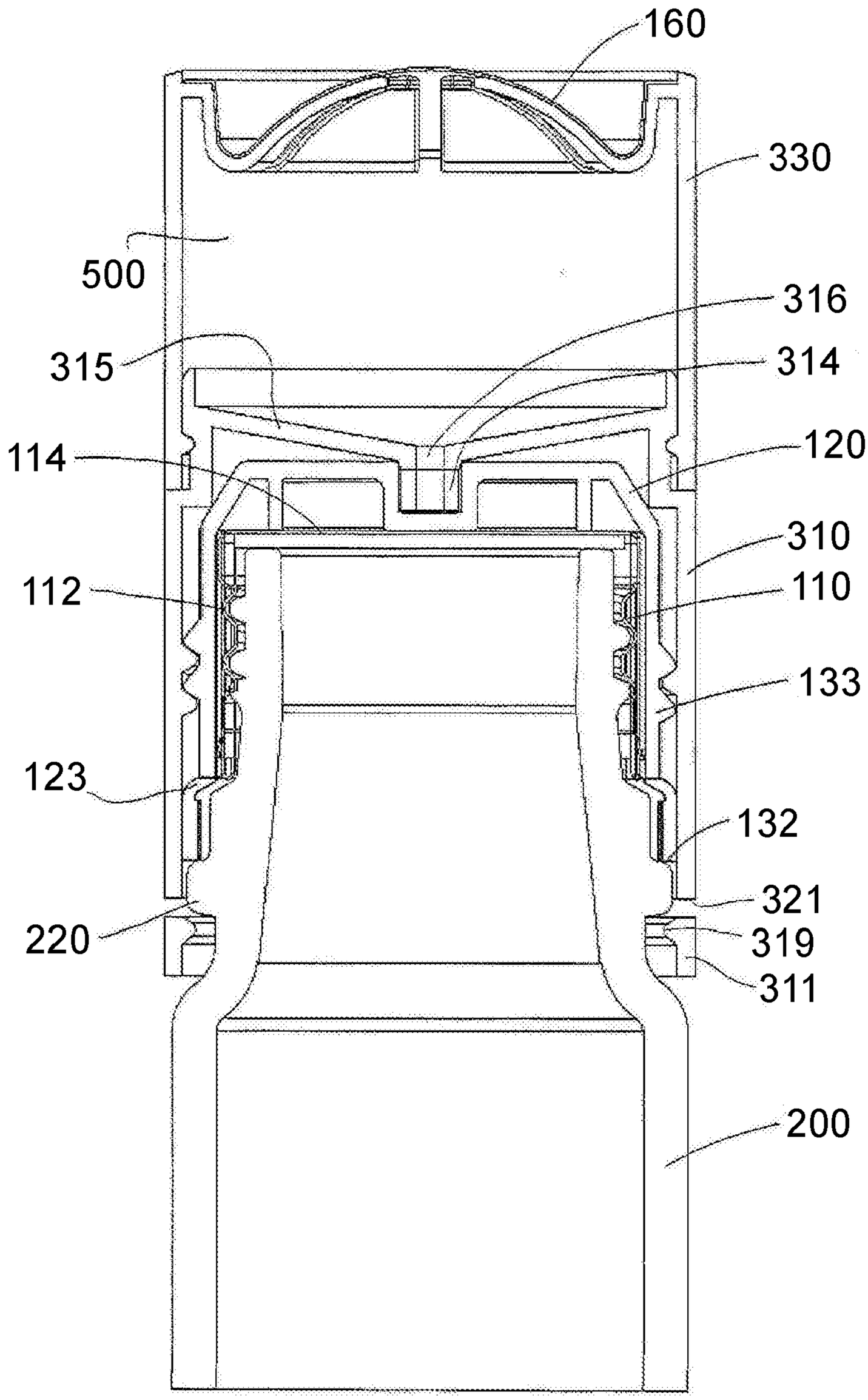
160
330
500
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FIG. 1

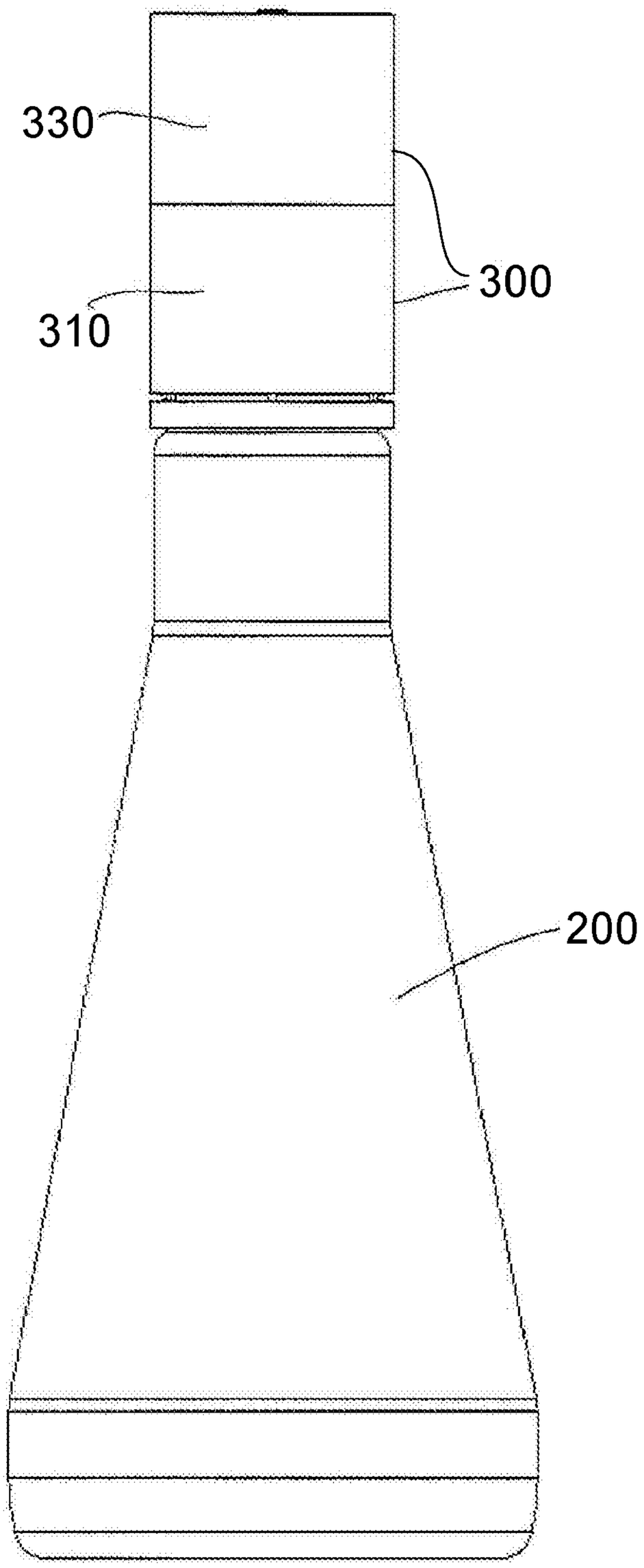

FIG. 2

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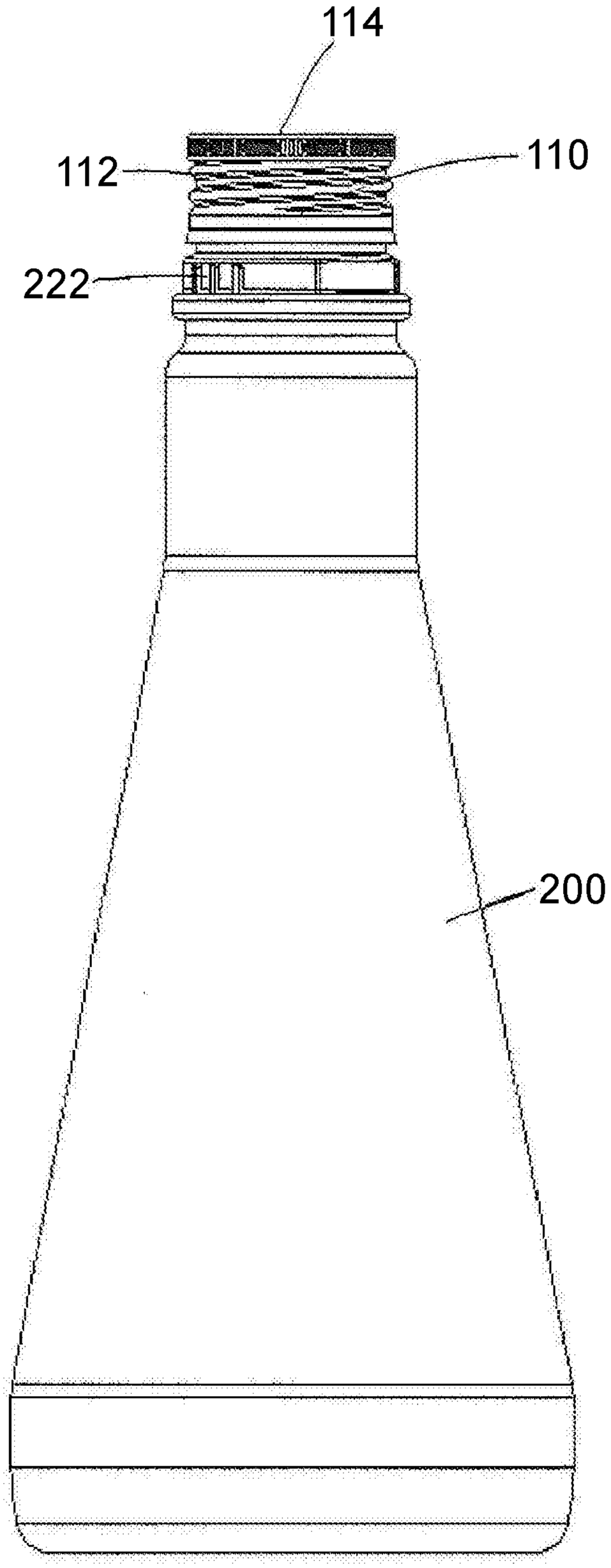

FIG. 3

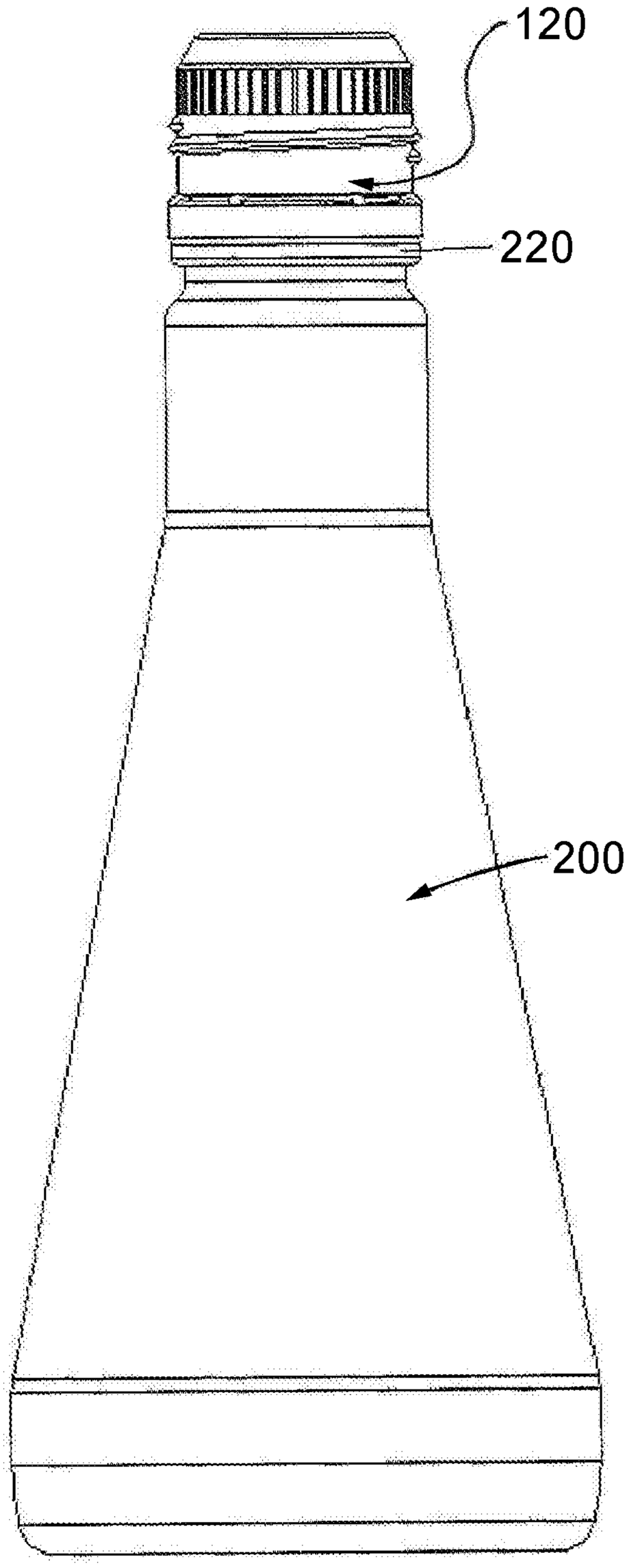

FIG. 4

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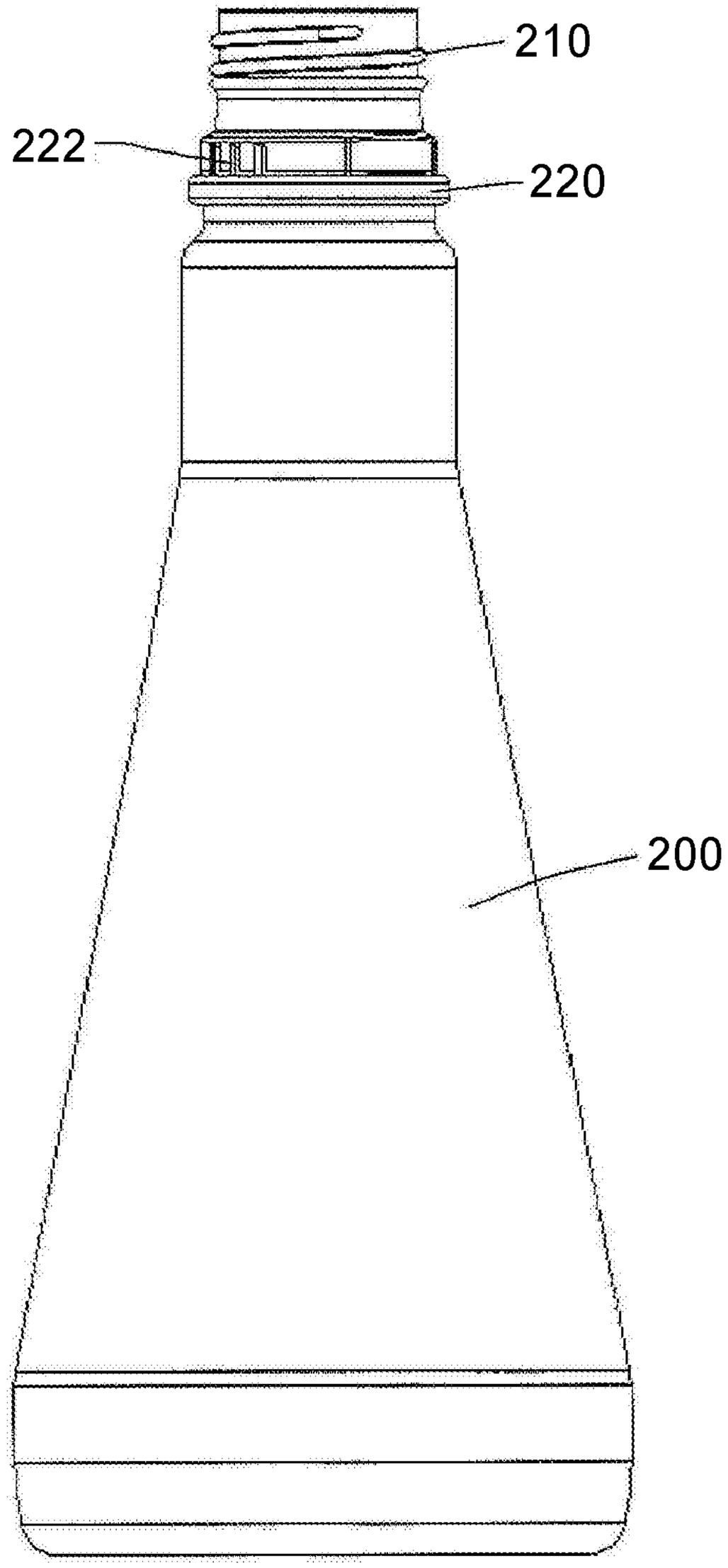

FIG. 5

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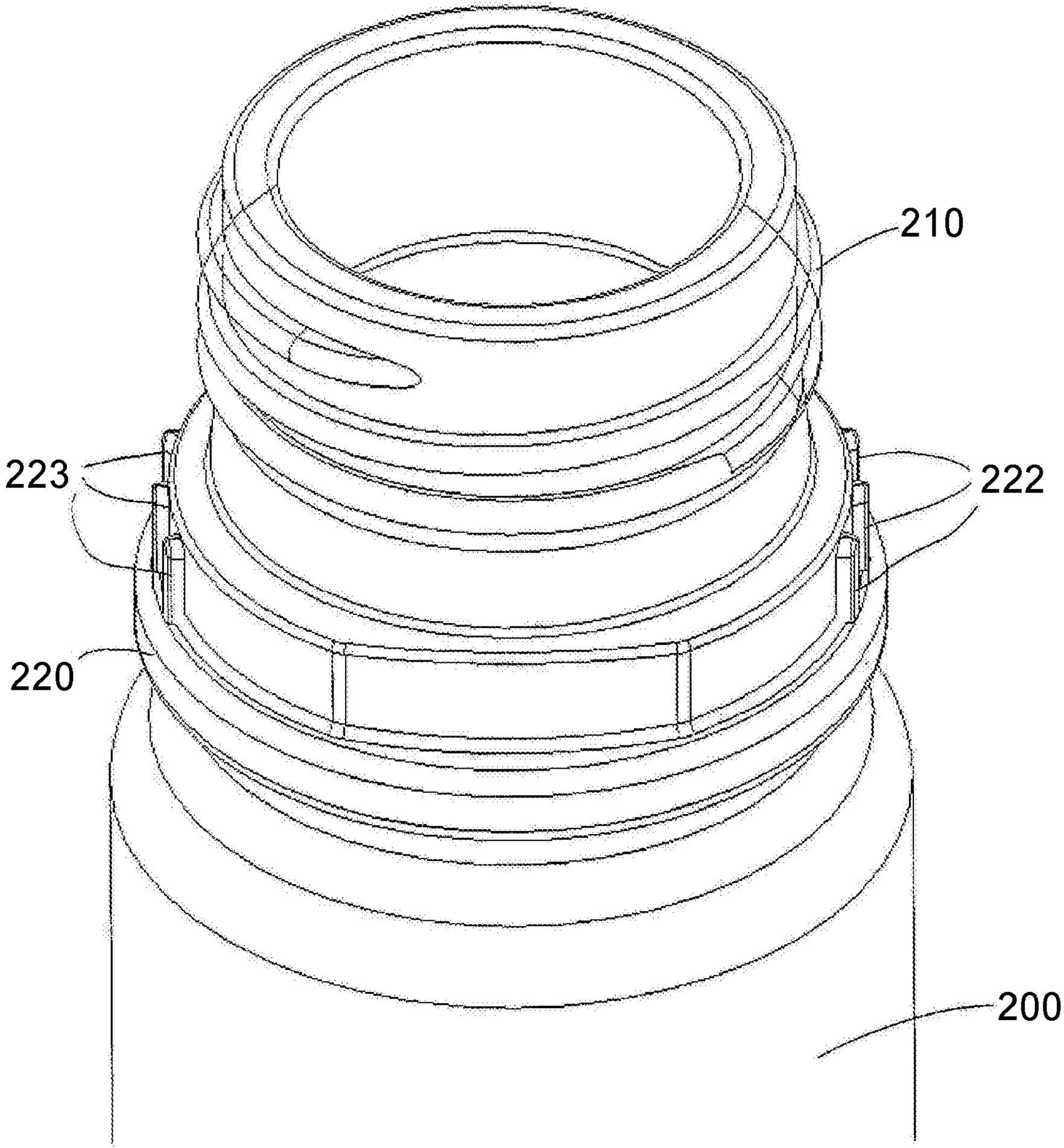

FIG. 6

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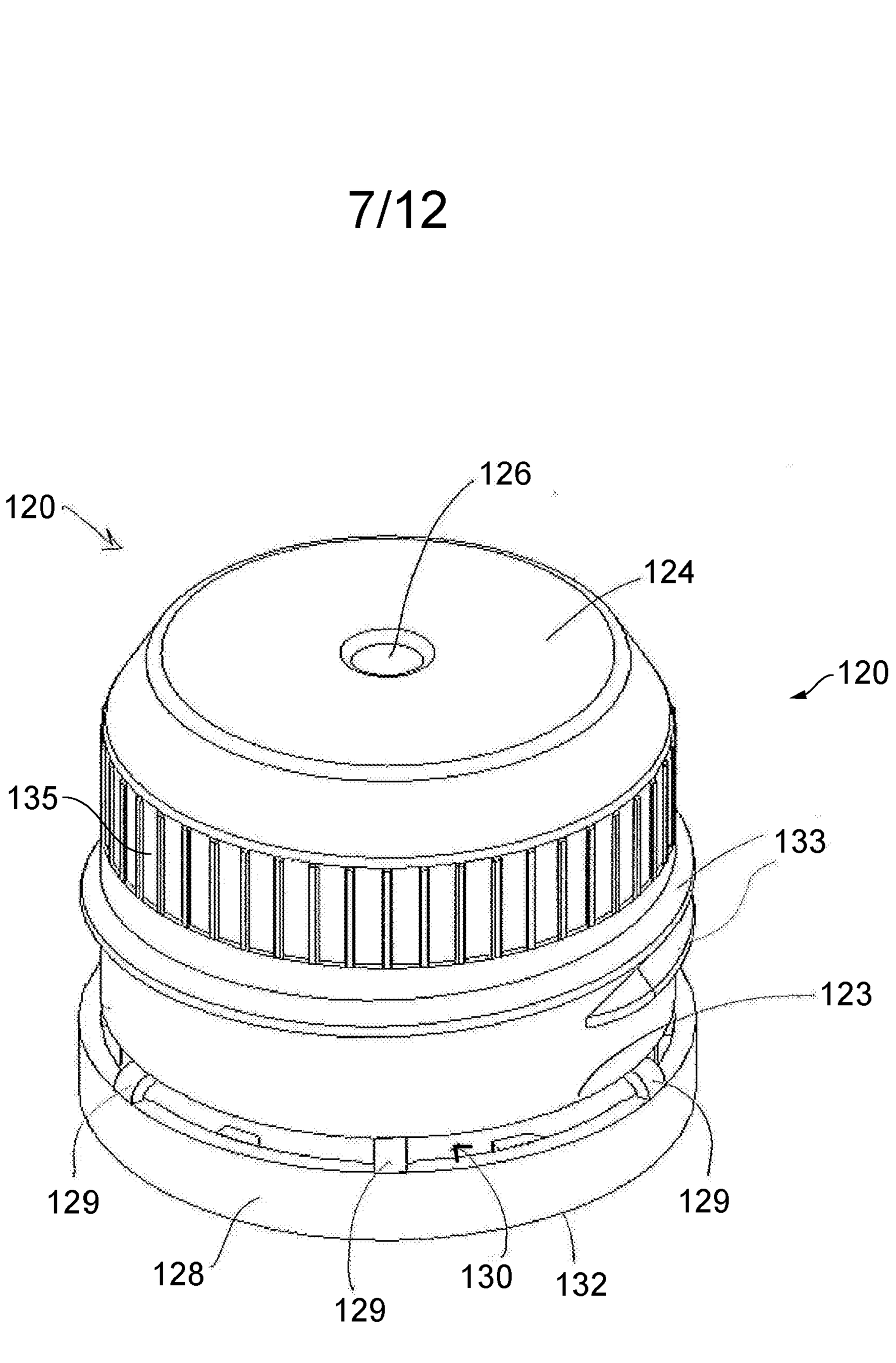

FIG. 7A

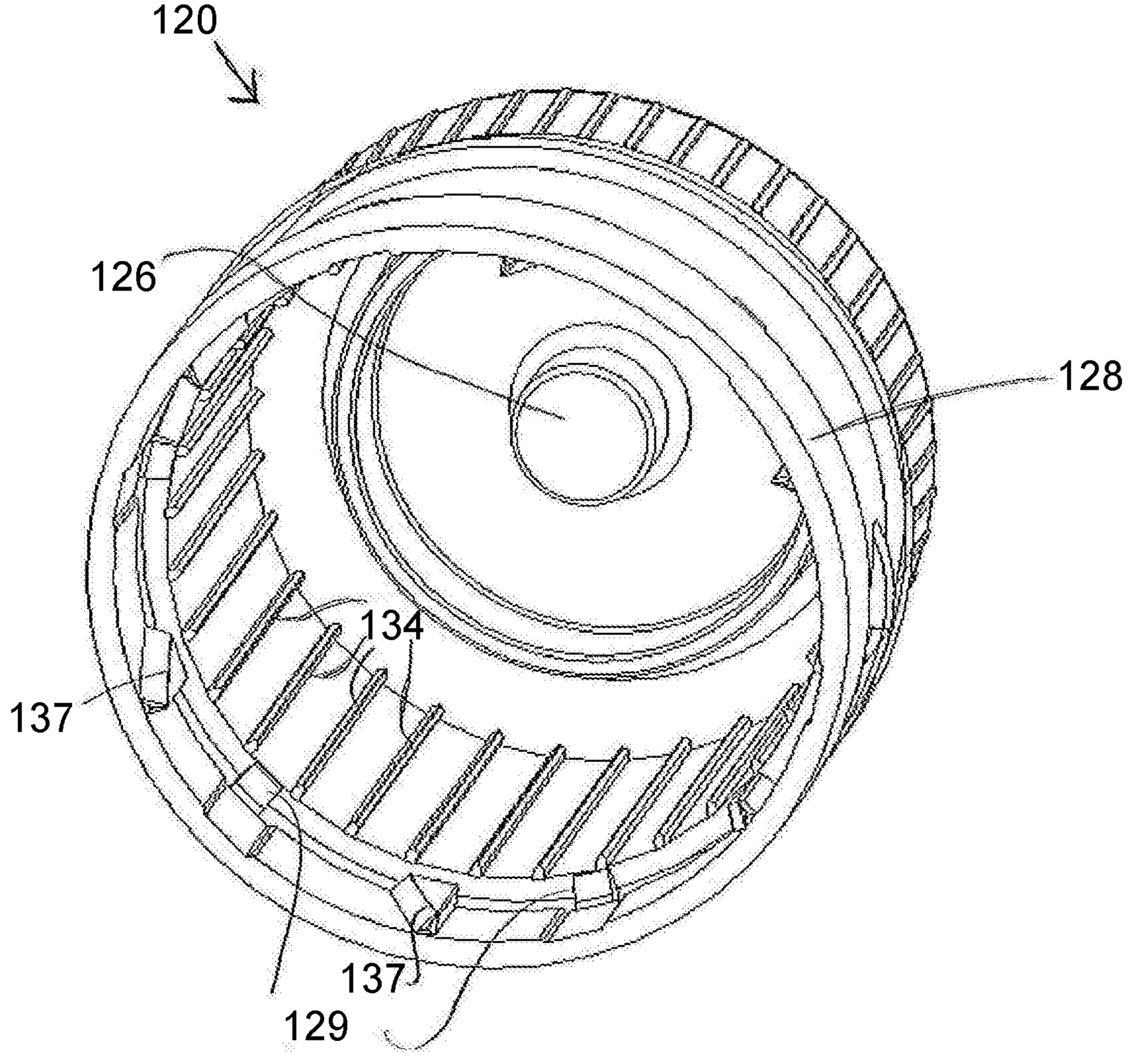

FIG. 7B

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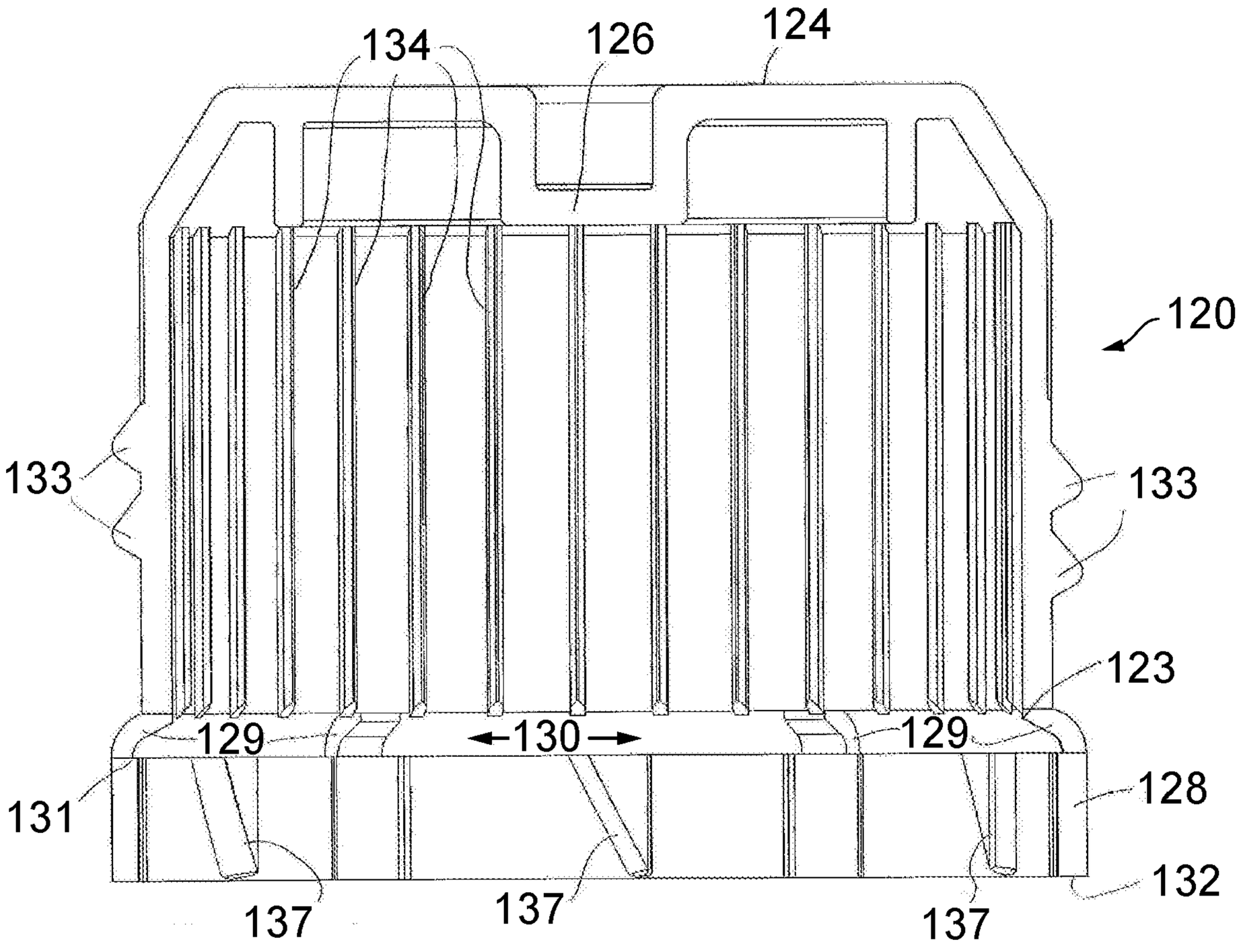

FIG. 7C

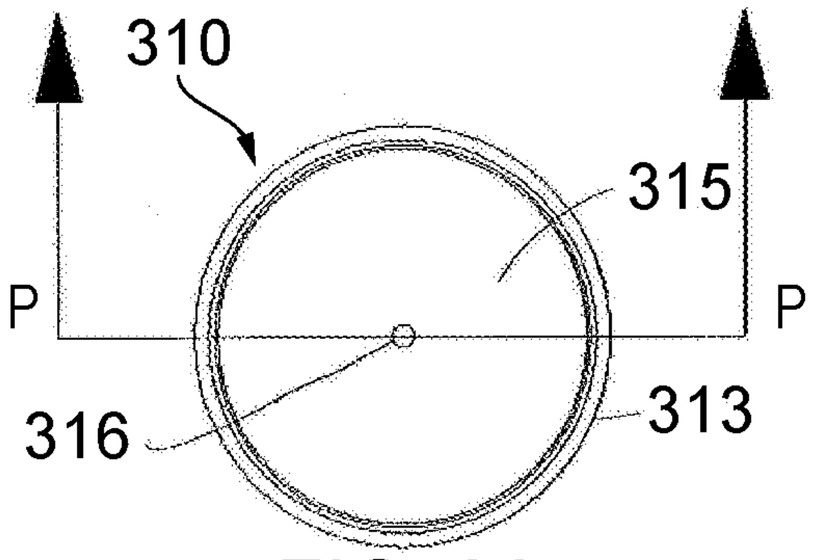

FIG. 8A

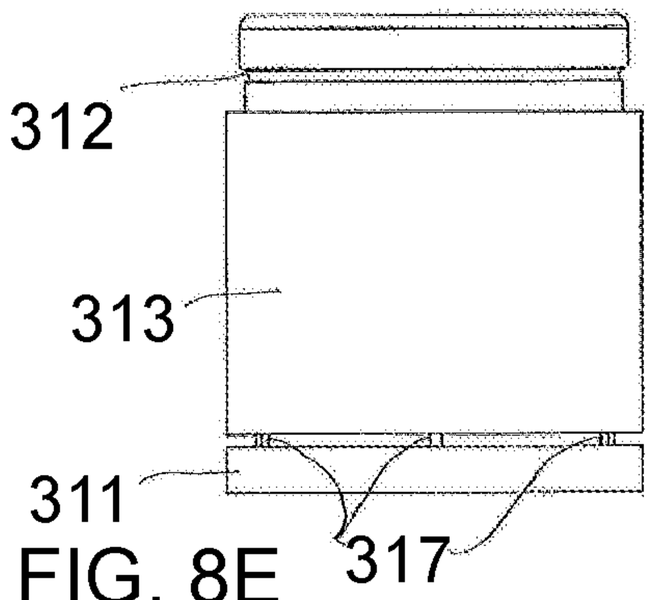

FIG. 8E

FIG. 8F

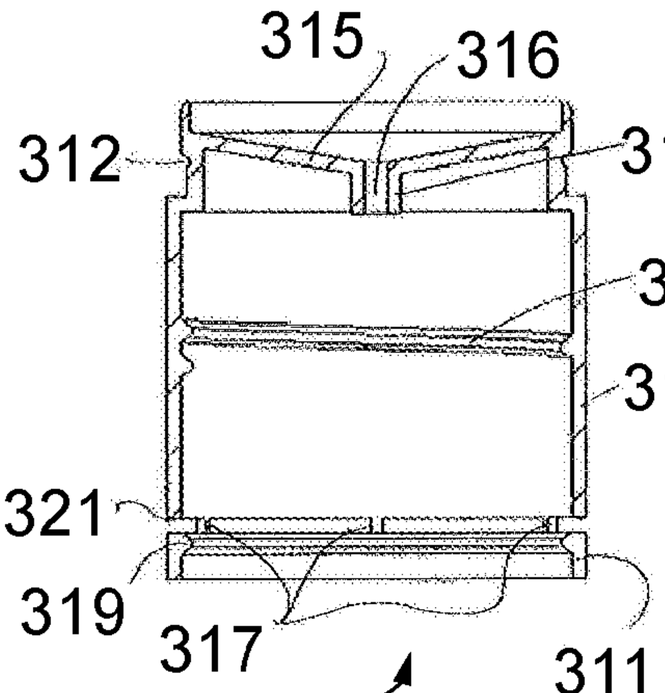

FIG. 8B

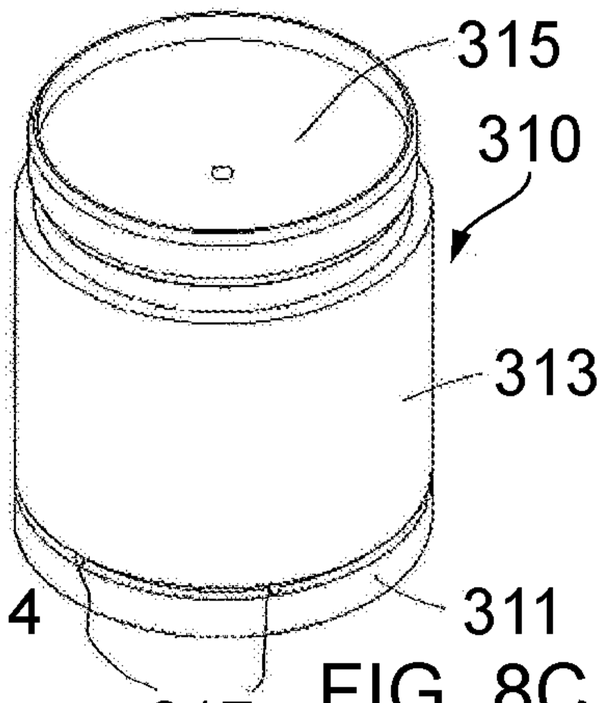

FIG. 8C

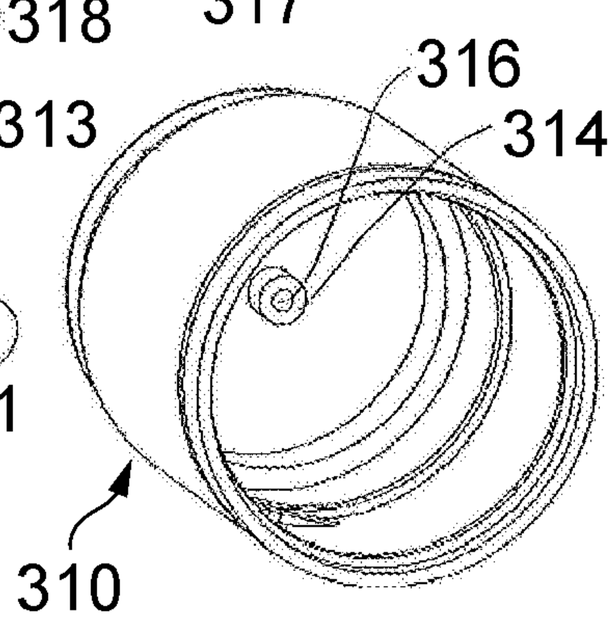

FIG. 8D

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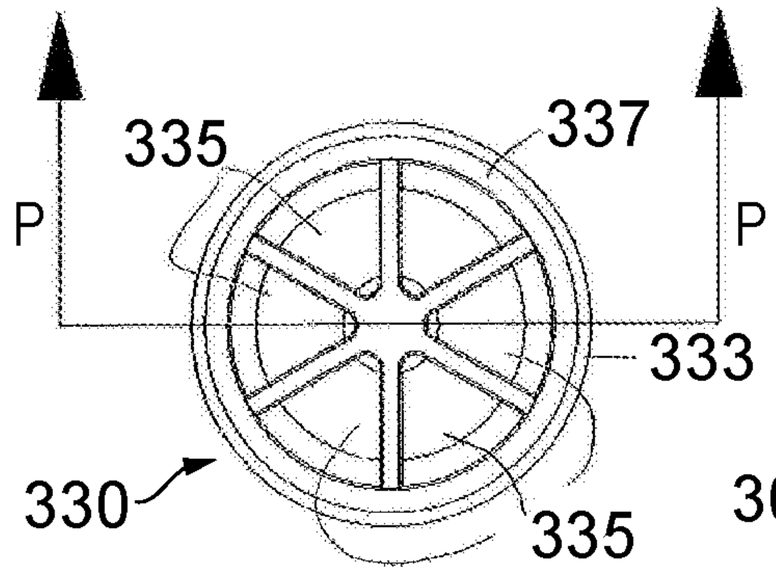

FIG. 9B

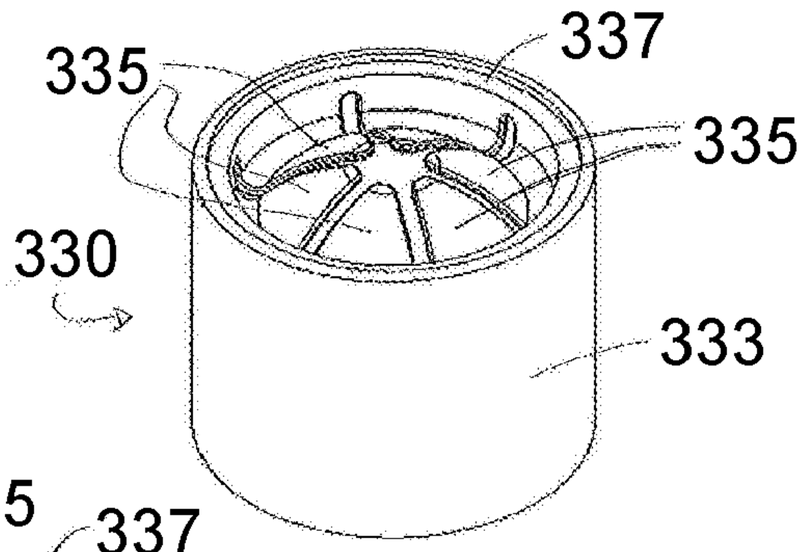

FIG. 9A

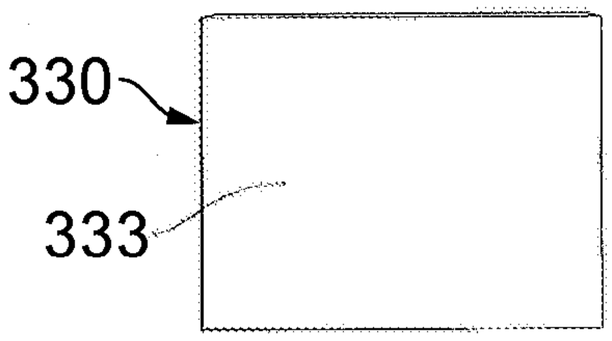

FIG. 9D

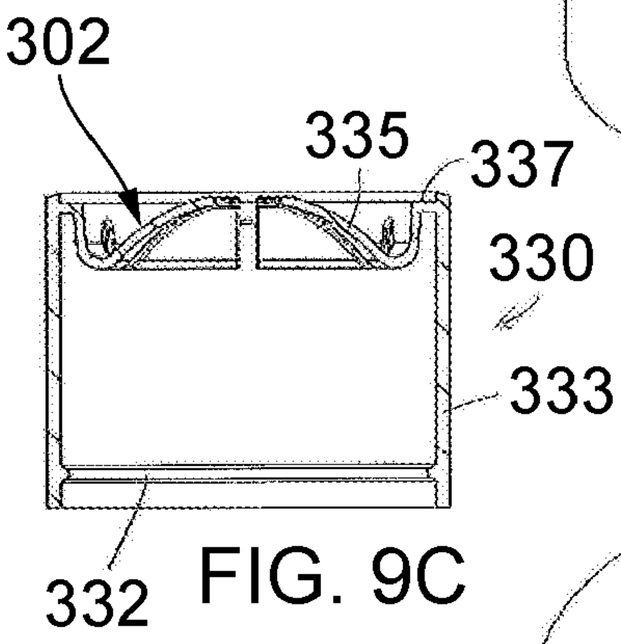

FIG. 9C

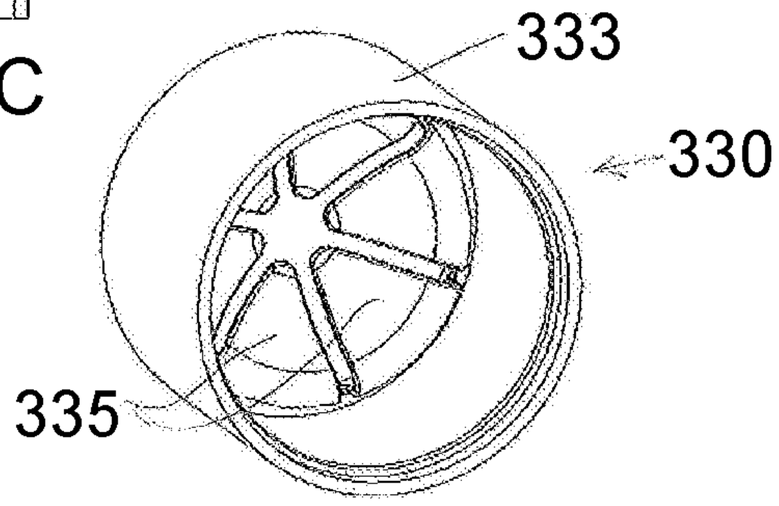

FIG. 9E

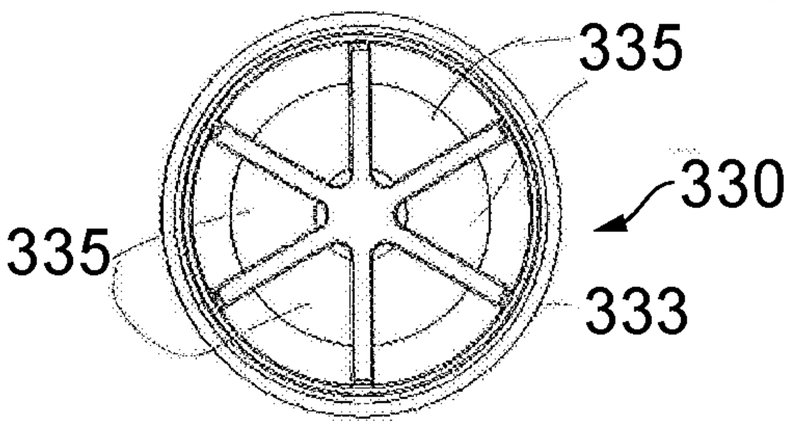

FIG. 9F

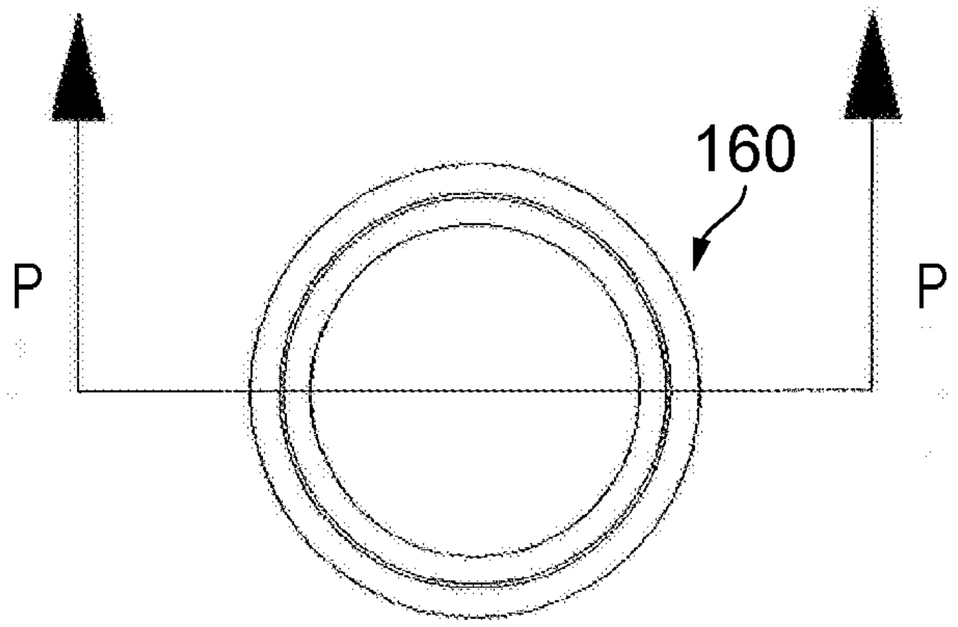

FIG. 10A

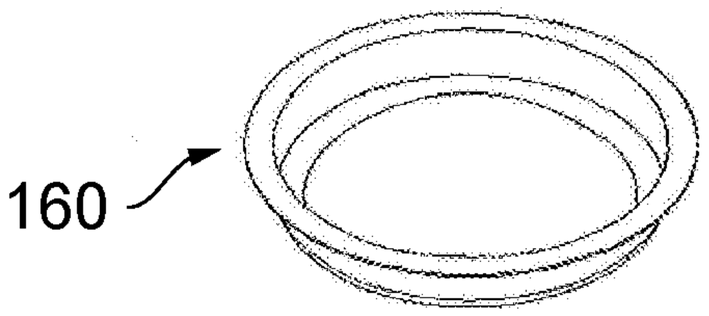

FIG. 10C

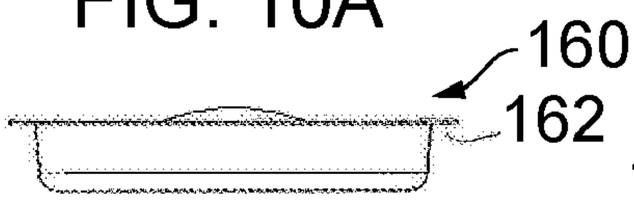

FIG. 10D

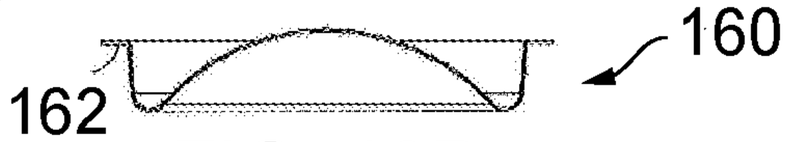

FIG. 10B

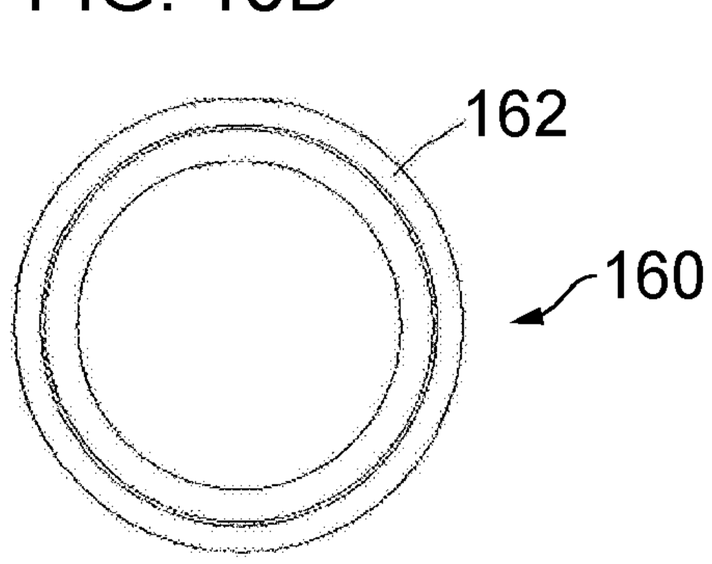

FIG. 10E

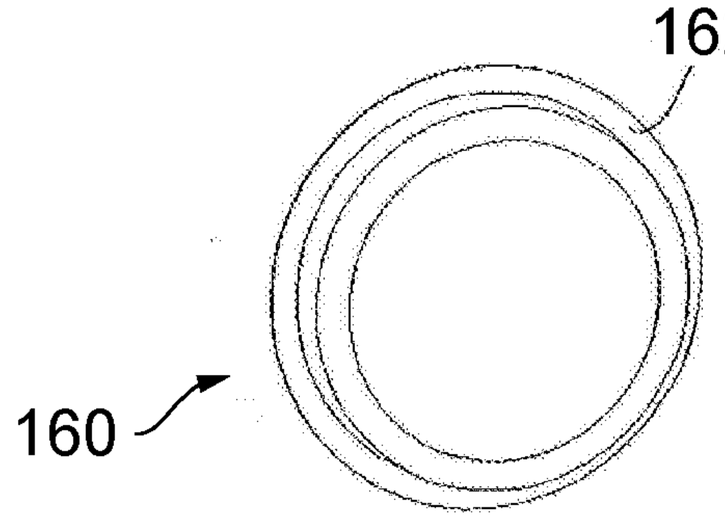

FIG. 10F

A LIQUID DISPENSER AND METHOD

Field of the Invention

This invention relates generally to devices in the form of a bottle closure to dispense a measured amount of liquid. More specifically the invention relates to devices adapted dispense the liquid into a bottle of liquid for drinking.

Background

Sealed drinks bottles are used to store and preserve liquids for drinking. Most drinks bottles contain a single liquid sealed inside.

Some liquid flavourings such as natural juices deteriorate quickly unless kept pure and sealed. Some liquid flavourings decompose when mixed with other liquids.

So, some mixed liquids have short shelf lives even in sealed bottles.

Prior Art

From the distant past, flavourings which decompose when mixed with another liquid have simply been stored in a separate bottle from the other liquid. This has always had the disadvantage of requiring two bottles.

More recently metered trap dispenser caps have been introduced such as that in Dejonge US20090139882. However, these caps are permanently fixed to the bottle so that the advantage of being able to mix liquids from any two bottles is lost.

Summary of the Invention

According to a first aspect of the invention a liquid dispenser comprises: a container; and an over-cap having a cap top, wherein the over-cap detachably connects the container to a bottle so the cap top covers an opening of the bottle, and which container encloses a reservoir to contain the liquid, the container has a nozzle receivable temporarily in the cap top to close the reservoir as the container is screwed on the over-cap, wherein a portion of the container when squeezed dispenses the liquid from the reservoir via the nozzle.

Preferably the container is adapted to surround the neck of a bottle.

Preferably the container is in the form of a tube and has a partition intermediate an opening for receiving the over-cap and the reservoir. The partition separates the reservoir from the opening and divides the tube.

Preferably the portion of the container which when squeezed dispenses the liquid is a collapsible portion of the container. Squeezing the collapsible portion decreases the volume of the reservoir. Preferably the collapsible portion is a resiliently deformable boundary or wall of the reservoir.

Preferably there is a liquid dispenser, comprising: an over-cap for capping over a bottle opening; an outer casing to temporarily encase the over-cap and enclosing a reservoir within a tube having a partition intermediate an opening to receive the over-cap and a collapsible portion to change the volume of the reservoir; a nozzle passes through the partition for a liquid to exit the reservoir.

Preferably the collapsible portion comprises a depress-able button to change the volume of the reservoir.

Preferably the collapsible button forms an end of the tube distal from the opening.

Preferably the button is sealed around the end of the tube.

Preferably the button comprises a resiliently deformable portion connected to a wall the tube to urge the button from a depressed position to an undepressed position.

Preferably the resiliently deformable portion comprises a flap which extends from a wall of the tube into the reservoir to lift the button from the depressed position to the undepressed position.

Preferably the tube is comprised of a container part comprising the collapsible portion and a receiver part comprising the partition.

Preferably the container part joins to the receiver part by a liquid tight joint to enclose the reservoir.

Preferably the container part and receiver part connect by a snap fit or a press fit.

Preferably the nozzle protrudes from the partition towards the opening.

Preferably the cap top comprises depression to temporarily receive the nozzle and seal the reservoir closed.

Preferably an edible liquid flavouring within the reservoir is contained as the liquid in the reservoir.

Preferably the over-cap is arranged to cap over a screw-on cap screwed onto the bottle.

Preferably the liquid dispenser comprises the screw-on cap.

According to another aspect of the invention there is a method of filling a liquid dispenser according to the first aspect wherein the container comprises: an over-cap for capping over a bottle opening; an outer casing to temporarily encase the over-cap and enclosing the reservoir within a tube having a partition intermediate an opening to receive the over-cap and the portion which when squeezed dispenses the liquid is a collapsible portion to change the volume of the reservoir; a nozzle passes through the partition for a liquid to exit the reservoir, wherein the tube comprises a receiver part comprising the partition; the method including inverting a portion of the container having an open end to open upwards, urging a liquid into the open end, and joining the receiver part to the open end.

Advantageously the liquid dispenser is useable to either dispense a liquid from the reservoir into the bottle or into another container.

Preferably the reservoir is at least partially filled with the liquid. Preferably the liquid is an edible flavouring for flavoring another liquid in the bottle.

Advantageously a user can readily observe that depressing the button on the end of the outer casing can be done with just one hand.

Advantageously each time the button is depressed a known metered amount of the liquid in the reservoir is ejected.

While the dispenser is standing upright, a liquid will rest in reservoir with an open space

between the liquid and the button. The liquid rests on the partition through which the aperture of the nozzle passes. The dispenser is preferably filled with liquid when the dispenser is inverted so the liquid rests on the button. When the dispenser is turned back upright, there will be a space between the liquid surface and the button which is relatively low pressure compared to the pressure outside the reservoir.

After the button is depressed to dispense liquid through the aperture of the nozzle and springs back, there will be more space between the liquid surface and the button. The pressure in the space is relatively low pressure compared to the pressure outside the reservoir.

Advantageously, after the button springs back, flow of liquid out of the reservoir will be shut off by the pressure differential and not leak down into the bottle.

Advantageously, the liquid dispensing system is preferably comprised of parts approved by regulatory authorities for use with food and drink.

Advantageously the liquid dispensing system is economically mass produced, and its components may be preferably manufactured from plastic polymers that can be injection moulded. Polymers approved for use by the authorities are advantageously suitable.

Advantageously, the button is easily sealed to the container part with an automatic machine. The button is moved straight along the central axis of the container part cylinder wall until the button is joined to the container. Preferably the button is joined to the container after the reservoir is filled with a liquid; or also preferably the button is first joined to the container, and then the container is inverted for filling with the liquid t.

The outer casing along with the reservoir contents cannot be released from the bottle without leaving a break-away ring behind on the neck. So advantageously tampering would be evident.

Typically fruit juice in a bottle is be carbonated and autoclaved. This means that the bottle screw-on cap must withstand autoclaving temperatures over the required time whilst retaining the pressure. Advantageously the liquid dispensing system is compatible with an aluminium screw-on cap which is used, as standard in the trade. A

fruit drink may therefore be filled in the bottle and capped and processed by a standard method.

Some polymers which are otherwise suitable for the dispensing system components cannot withstand heat or pressure of a heated and pressurized autoclave. Typically, a glass bottle is filled and then closed with an aluminium screw-on cap before autoclaving the closed bottle. Advantageously the over-cap and outer casing are attachable to the bottle after the bottle covered by the screw-on cap has been subjected the heat and pressure within the autoclave.

Another alternative is to use an aseptic filling line on a bottle made from plastic material such a PET. Autoclaving may be executed before filling and so a PET bottle and a plastic screw-on cap can be used.

Advantageously an outer casing and an over-cap can be replaced. Hence multiple liquids are dispensable into the bottle.

Advantageously the outer casing is preferably one packaging which can be separated from the bottle before use.

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Preferably there is a method of supplying a liquid dispenser with a liquid to be dispensed comprising inverting the container part so that its open end opens upwards, urging a liquid into the open end to put the substance into the container part, snapping the bottom part onto a rim of the cylinder wall portion of the open end of the container part to seal the liquid into a reservoir.

In a preferable method, the liquid dispensing system is filled with a liquid by supplying the outer casing in two parts. One of the two parts is the container part sealed by the button, and the other of the two parts is the bottom part screwed onto the over-cap. The container part is inverted so that its open end opens upwards. Then a liquid is urged into the open end to put the liquid into the container part sealed at one end by the button. The bottom part with over-cap is snapped onto the rim of the open end of the container part to seal the liquid into a reservoir.

Alternatively, the outer casing can be supplied in two parts: one part is a combination of the bottom part and the container part without a spring or flap for the button; and the

second part is the spring or flaps.

In another preferable method of filling the liquid dispensing system, three parts (container part, bottom part, and over-cap) are pre-assembled. The container part is filled from the top, through the space between the spring parts. Then the filled container is closed by sealing the flexible button on top of the cylinder.

The features described herein may be combined with any of the above aspects, in any combination.

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

Brief Description of the Figures

Figure 1 is a section view showing parts assembled into a liquid dispenser according to the invention;

Figure 2 is a view of an outer casing of a liquid dispenser in situ on a bottle neck according to the invention;

Figure 3 is a view a screw-on cap covering the opening of a bottle neck according to the invention;

Figure 4 is a view of an over-cap covering the screw-on cap in situ on a bottle neck according to the invention;

Figure 5 is a side view of a bottle having a bottle neck to receive a liquid dispenser according to the invention;

Figure 6 is a is a view into an opening of a bottle having a bottle neck to receive a liquid dispenser according to the invention;

Figures 7A, 7B, and 7C are views of the outside, inside, and cross-section respectively of an over-cap according to the invention;

Figures 8A, 8B, 8C, 8D, 8E, and 8F are views of the top, cross-section, outside, inside, side, and bottom respectively of a bottom part according to the invention;

Figures 9A, 9B, 9C, 9D, 9E, and 9F are views of the outside, top, cross-section, side, inside, and bottom respectively of a container part according to the invention;

Figures 10A, 10B, 10C, 10D, 10E, and 10F are views of the top, cross-section, outside, side, bottom and inside respectively of a button according to the invention;

Detailed Description of the Invention

Referring to the Figures, there is shown in Figure 1 a section view and in Figure 2 a view of the exterior of an outer casing 300 a liquid dispenser fitted to a bottle 200. The liquid dispenser, comprises: an over-cap 120 for capping over a bottle opening; an outer casing 300 to temporarily encase the over-cap 120 and enclosing a reservoir 500 within a tube having a partition 315 intermediate an opening to receive the over-cap 120 and a collapsible portion 160 to change the volume of the reservoir 500; a nozzle 314 passes through the partition 315 for a liquid to exit the reservoir.

Screwed onto the neck of the bottle is a screw-on cap 110. The screw-on cap has a top 114. The over-cap 120 covers the screw-on cap 110. The outer casing 300 covers the over-cap 120.

The outer casing 300 comprises a cylinder wall 313, 333 visible in Figure 8 and Figure 9. The outer casing is part of the tube. The outer casing 300 is closed at an end by a depress-able button 160 which forms the collapsible portion. The button is visible in Figure 1 and Figure 10.

The outer casing has an open end to receive the over-cap 120, and a base 315 which forms the partition. The base 315 closes the cylinder wall 313 from within the tube. The base forms a boundary of the reservoir 500.

A nozzle 314 extends axially from the base 315. The nozzle is sealed by connection with the over-cap 120. The nozzle 316 is visible in Figure 1 and Figure 8.

The button 160 is depress-able into the reservoir 500 to change the volume of the reservoir. Depressing the button urges any liquid in the reservoir 500 out through the nozzle 314. However, until the outer casing 300 is disconnected from the over cap 120 any liquid within the reservoir cannot escape because the nozzle is sealed by

connection with the over-cap 120.

The bottle 200 has neck proximate the bottle opening. The neck has a screw-thread 210 to engage the screw-on cap 110. The screw-thread is located intermediate the bottle opening and a circumferential ridge 220 on the neck.

The screw-on cap 110 also has a screw-thread 112 to engage with the screw-thread 210 on the neck of the bottle.

An over-cap 120 covers the bottle neck and bottle opening. The over-cap 120 also covers the screw-on cap 110 screwed onto the neck. The over-cap 120 is visible in Figure 1, Figure 4, and Figure 7.

The over-cap 120 has a form of an open-ended cylinder with a first rim 123 of the open end.

As shown in Figure 7B and 7C there are axially aligned ribs 134 on the inner surface of the cylindrical wall of the over-cap 120. The ribs 134 of the over-cap 134 grip the cylindrical wall of the screw-on cap so that the screw-on cap is unscrewed from the bottle together with the over-cap 120.

The over-cap has a top 124 which closes one end of the open-ended cylinder. The top 124 is therefore at the distal of the open-ended cylinder from the first rim 123.

The over-cap top 124 has a central depression 126. The central depression 126 is urged into contact with the top 114 of the screw-on cap when the over-cap is secured to the neck of the bottle.

The over-cap 120 protects the top 114 of the screw-on cap from damage. The central depression comprises a portion which intervenes between the nozzle and the top 114 of the screw-on cap. The portion shields the top from damage by the nozzle if the nozzle is deflected downward by overpressure in the reservoir as the button is depressed.

The over-cap fits tightly on to the top 114 of the screw-on cap to stop any rotating movement over the screw-on cap.

The over-cap 120 also comprises a separate ring 128 having a circumference with which greater than the circumference of the first rim 123. The separate ring 128 is separated from the first rim 123 by a circumferential gap 130. The separate ring 128 is connected to the first ring by fingers 129 across the circumferential gap 130.

The separate ring 128 provides the over-cap 120 with a second circumferential rim 131 which located more distal from the top 124 of the over-cap 120 than the first rim 123.

The separate ring fits over vertical raised stops 222 on the bottle neck. The separate ring has locking protrusions 137 which come up against the vertical stops on the bottle neck and will prevent any turning of the over-cap when the outer case 300 is being unscrewed from the over-cap.

Axially aligned ribs 134 shown in Figure 7B and 7C on the inner surface of the outer wall of the over-cap interfere with axially aligned ribs shown in Figure 3 on the cylindrical portion of the screw-on cap. So, when unscrewing the over-cap, the screw-on cap will be unscrewed from bottle.

The over-cap 120 can only been unscrewed from the bottle after the outer casing 300 has been unscrewed from the over-cap 120. The outer casing 300 completely covers the over-cap so the over-cap cannot be touched. Lugs (teeth) 137, 222 between the over-cap (inside the bottom ring) and on the bottle neck prevents the over-cap from unturning and becoming accidentally unscrewed because the separate ring 128 of the over-cap can only 'jump' over the lugs 137 when the separate ring can move to a larger diameter. The outer wall 313 of the bottom part 310 prevents the over-cap from expanding so the lugs 137 on the over-cap cannot jump over the lug 22 on the neck of the bottle.

As the outer case 300 is removed from the over-cap 120 the seal between the nozzle 316 and the over-cap 120 is also removed. The outer case is thereby readied to dispense any liquid within the reservoir through the nozzle by collapsing the collapsible portion, which is effected by depressing the button.

The over-cap 120 seats onto the screw-on cap. The central depression 126 on the top of the over-cap 120 is screwed into contact with the top 114 of the screw-on cap 110. So, the inside top of the over-cap 120 at the bottom of the depression 126

contacts the top of the screw-on cap 110 when assembling. Clearance space remains between the separate ring 128 and the circumferential ridge 220 on the neck of the bottle.

The central depression 126 is a sink in the center of the top 124 of the over-cap 120. The central depression accepts the nozzle defined by the protrusion 314 and aperture 316 protruding from the base 315 of the bottom part 310. The nozzle is 316 is sealed into the central depression.

The central depression seals around the protrusion 314 of the nozzle and acts as a hermetic seal to stop any ingress of oxygen which will degrade a liquid in the bottle or reservoir over time and any loss of liquid from the reservoir due to an extended shelf life or aggressive handling.

The seal also prevents liquid in the reservoir 500 from being dispensed, even if a squeezable portion of the outer casing 300 for collapsing the reservoir 500, such as the button 160 is depressed.

Protruding inwards from the internal side of the separate ring 128 is a tooth 137. The tooth protrudes inwards toward the centre of the ring. The tooth 137 extends from the edge of ring 128 adjacent to the circumferential gap 130. The tooth 137 extends along the internal surface about halfway to the second rim 132. Another tooth 222 on the neck of the bottle on the side of the bottle screw-thread and distal from the bottle opening engages the tooth 127 on the separate ring when the over-cap 120 is fully screwed on the bottle.

On the external side of the cylinder portion of the over-cap 120 is an external screw thread 133. The external screw-thread 133 traverses one turn around the external side of the cylinder portion. The external screw-thread 133 engages an internal screw thread 318 on a bottom part 310 of an outer casing 300.

The outer casing 300 can be unscrewed from the screw-on cap and covering over-cap 120, thereby breaking the tamper evident break-away ring 311 because of circumferential ridge 220 the bottle neck. The break-away ring 311 remains on the bottle. Removing the outer casing 300 releases the nozzle protrusion 314, ready for ejecting a liquid from the reservoir into any space.

While unscrewing the outer casing 300 from the bottle 200 the over-cap 120 will be blocked from turning because of the tooth 137 on the separate ring 128 of the over-cap 120 and corresponding tooth 222 on the bottle neck. The cylinder wall of the bottom part 310 covering the bottom ring of the over-cap 120 prevents the tooth 137 on the separate ring 128 slipping over the corresponding tooth 222 on the bottle neck.

After the outer casing 300 has been unscrewed from the bottle, the over-cap is left on the bottle.

The tooth 137 in the over-cap can jump over the tooth 222 on the bottle once the outer casing is removed. It is then possible to unscrew the over-cap 120 and the screw-on cap inside this over-cap 120. When unscrewing the exposed over-cap 120 that is locked to the screw-on cap, the over-cap 120 unscrews the screw-on cap 110 from the bottle 200 in the normal way.

The bottom part 310 of the outer casing 300 covers the screw-on cap 110 and the outer cap 120. The outer casing is visible on the bottle neck covering the bottle opening as shown in Figure 2. The screw-on cap 110 and the outer cap 120 cannot be seen unless the outer casing 300 is transparent.

The outer casing 300 comprises the bottom part 310 and a container part 330. The bottom part 310 is snap connected to the container part 330.

The general form of the bottom part 310 is an open-ended cylinder with a cylindrical wall 313, one end closed by a base 315 and the distal end open. There is a circumferential slot 312 around the top rim of the cylindrical wall 313.

The general form of the container part 330 is an open-ended cylinder with one end an open separated by a cylinder wall 333 from the other end. The other end is partially closed by flexible flaps 335.

Proximate the open-end rim of the container part 330 is a circumferential ridge 332. The circumferential ridge 332 is snapped into the circumferential slot 312 of the bottom part 310, thereby connecting the bottom part 310 to the container part 330. A reservoir 500 bounded by the base 315 of the bottom part 310 and the cylindrical wall of the container part 330 is thereby formed.

The cylindrical wall of the container part 330 is resiliently flexible for the circumferential ridge 332 to be snapped into the circumferential slot 312. A liquid tight seal is thereby formed.

The container part 330 and the bottom part 310 are made from polypropylene. The over-cap 120 is made from polyethylene.

These materials are flexible. Separate ring 128, break-away ring 311, and flexible flaps 335 can stretch and bend and can spring to move back to their original position when bent or stretched.

The cylindrical wall 313 of the bottom part 310 has the same diameter as the cylindrical wall 333 of the container part 330.

The bottom part 310 comprises a break-away ring 311 having the same diameter as the cylindrical wall 313 of the bottom part.

The cylindrical wall 313 of the bottom part has an inner diameter the same as the outer diameter of the circumferential ridge 220 on the neck of the bottle 200.

The length of the cylindrical wall 313 is sized such that the bottom part 310 is screwed onto the over-cap 120 until it is blocked by the nozzle axial protrusion 314. The rim of the open end 321 of the cylindrical wall 313 extends to the circumferential ridge 220 of the bottle neck.

The break-away ring 311 is joined by fragile stringers 317 to the rim of the open end 321 of the cylindrical wall 313. The break-way ring 311 is separated from the rim by a cylindrical gap.

The break-away ring 311 comprises a dimple or circumferential ridge 319 extending radially inwards. The dimple or ridge 319 extends radially inward further than the diameter of the circumferential ridge 220 on the neck of the bottle.

The fragile stringers 317 are resiliently flexible to allow the break-away ring 311 including the circumferential ridge 319 to temporarily stretch over the circumferential ridge 220 on the neck of the bottle.

When the bottom part 310 is screwed onto the over-cap 120 the break-away ring 311 is driven over the circumferential ridge 220. The break-away ring 311 then snaps back. The bottom part 310 cannot be removed without breaking the fragile stringers 317 because the dimple or circumferential ridge 319 on the break-away ring is blocked by the circumferential ridge 220 on the bottle.

The outer casing 300 is only removable from the bottle by breaking the fragile stringers 317 and leaving the break-away ring 311 behind on the bottle. This is because the outer casing 300 comprises the bottom part 310 and a container part 330 snapped together.

The base of 315 of the bottom part 310 blocks closed the open end of the container part 330. The base 315 is the bottom of the reservoir 500 formed by the container part 330 being snap connected to the bottom part 310.

The base 315 of the bottom part has a general form of a circular plate. The base 315 is slightly conical as shown in Figure 1 and Figure 8B to more easily empty all the liquid from the reservoir 500.

At the center of the base 315 is a nozzle axial protrusion 314. The nozzle axial protrusion 314 extends into the hollow interior of the bottom part 310.

The nozzle axial protrusion 314 has an aperture 316. The aperture 316 extends through the base 315 of the bottom part. The aperture 316 provides an escape conduit out of the reservoir 500 for a liquid within the reservoir 500.

There is an internal screw-thread 318 on the cylinder wall of the bottom part 310. The internal screw-thread 318 is located intermediate the base 315 and the open end 320 of the cylinder wall 313. The internal screw-thread 318 traverses a single turn around the interior of the cylinder wall 313.

The bottom part 310 is connected to the over-cap 120 by inserting the top of over-cap 120 into the cylindrical interior of the bottom part 310. The bottom part is then screwed onto the over-cap 120 so that the internal screw-thread 318 engages the external screw-thread 133. The bottom part 310 may be screwed until the axial protrusion 314 contacts the seal of the depression 126 in the over-cap top 124.

The axial protrusion 314 fits into the central depression 126 of the over-cap 120. The axial protrusion 314 of the base 315 of the bottom part is set against the over-cap central depression 126. The over-cap central depression 126 is in turn set against the top 114 of the screw-on cap 110.

The protrusion 314 and aperture 316 form a nozzle to direct a stream of liquid out of the reservoir. The nozzle is a specific diameter and length so that when the button 160 returns to its start position after ejecting liquid, gas in the bottle will be drawn back into the reservoir through the nozzle and no liquid will drip from the nozzle. At this state the remaining liquid in the reservoir cannot escape as the liquid is blocking the aperture 316 nozzle opening and therefore entry to gas from the bottle.

As an alternative to the open nozzle aperture 316 shown in Figure 8, the nozzle comprises a 2-way valve to block the aperture.

'To open the bottle, the outer casing 300 is removed by unscrewing and breaking the fragile stringers 317. The over-cap 120 and screw-on cap 110 are unscrewed from the bottle opening.'

After being assembled the over-cap 120 and screw-on cap 110 stay connected. The vertical ribs 134 in the over-cap 120 inner wall shown in Figure 7B and 7C mesh with the ribs on the top end of the vertical cylinder of the screw-on cap 110 shown in Figure 3. The meshed ribs transfer the turning force on the over-cap 120 when unscrewing to the screw-on-cap 110.

The end of the outer casing 300 most distal from the bottle comprises the end of the container part partially closed by flexible flaps 335. The flexible flaps 335 extend radially inwards from a smooth seat 337 on the inner surface of the cylinder wall 333.

A button 160 has a circular sealing surface 162 to be seated on the smooth seat 337. A seal to the button is achieved by inserting the button 160 into the end of the outer casing comprising the flaps 335 until the circular sealing surface is sealed against the smooth seat 337.

The flaps 335 are directly underneath and in contact with the top flexible button. There are six upwardly curved moulded flaps 335 with spaces in between. As the

flexible button 160 is pressed down, so are the moulded flaps. As the flaps 335 are a moulded part of the container part 330 extending from the cylinder wall 333 and are made from an injection moulded polymer which has a stiffness and memory, the flaps 335 act as a spring, increasingly resisting the downward pressure on the button until no further travel is possible. At this point the spaces between the flaps have disappeared also stopping any further movement downwards.

This amount of travel of the depressed button defines the volume of the dose of liquid from the reservoir into the bottle. The spring effect of the flaps returns the flexible button to its original position ready for the next dose.

The reservoir 500 bounded by the base 315 of the bottom part 310 and the cylindrical wall of the container part 330 is thereby enclosed by the button 160. The reservoir is sealed liquid tight.

The button 160 has a flexible convex rise from the circular sealing surface to the button center 162. Depressing the flexible convex rise over-pressurizes a liquid in the reservoir 500.

The distal wall of the reservoir 500 from the button 160 is the base 315 of the bottom part 310.

Claims:

1. A liquid dispenser comprises: a container; and an over-cap having a cap top, wherein the over-cap detachably connects the container to a bottle so the cap top covers an opening of the bottle, and which container encloses a reservoir to contain the liquid, the container has a nozzle receivable temporarily in the cap top to close the reservoir as the container is screwed on the over-cap, wherein a portion of the container when squeezed dispenses the liquid from the reservoir via the nozzle.

2. A liquid dispenser according to claim 1 wherein the over-cap caps over a screw-on cap screwed onto the bottle to unscrew the screw-on cap by unscrewing the over-cap from the bottle.

3. A liquid dispenser according to claim 1 or 2 wherein the over-cap is expandable to detach from the bottle and cooperates with an outer casing of the dispenser which prevents the over-cap from expanding as the outer casing is detached from the bottle.

4. A liquid dispenser according any preceding claim wherein the nozzle is sealable by connection to the over-cap thereby closing the reservoir.

5. A liquid dispenser according to any preceding claim which is adapted to surround the neck of a bottle.

6. A liquid dispenser according to any preceding claim is in the form of a tube and has a partition intermediate to an opening for receiving the over-cap and the reservoir.

7. A liquid dispenser according to any preceding claim wherein the portion of the dispenser which when squeezed dispenses the liquid is a collapsible portion of the dispenser.

8. A liquid dispenser according to claim 7 wherein the collapsible portion comprises a depress-able button to change the volume of the reservoir.

9. A liquid dispenser according to claim 7 or 8 when dependent upon claim 6 wherein the collapsible portion forms an end of the tube distal from the opening.

10. A liquid dispenser according to claim 9 when dependent on claim 8 wherein button is sealed around the end of the tube.

11. A liquid dispenser according to claim 8 or 10 when dependent upon claim 6 wherein the button comprises a resiliently deformable portion connected to a wall of the tube to urge the button from a depressed position to an undepressed position.

12. A liquid dispenser according to claim 11 wherein the resiliently deformable portion comprises a flap which extends from a wall of the tube into the reservoir to lift the button from the depressed position to the undepressed position.

13. A liquid dispenser according to any preceding claim when dependent upon claim 6 and 7 wherein the tube is comprised of a container part comprising the collapsible portion and a receiver part comprising partition.

14. A liquid dispenser according to claim 13 wherein the container part joins to the receiver part by a liquid tight joint to enclose the reservoir.

15. A liquid dispenser according to claim 13 or 14 wherein the container part and receiver part connect by a snap fit or a press fit.

16. A liquid dispenser according to any preceding claim when dependent on claim 6 wherein the nozzle protrudes from the partition towards the opening.

17. A liquid dispenser according to claim 16 wherein the cap top comprises a depression to temporarily receive the nozzle and seal the reservoir closed.

18. A liquid dispenser according to any preceding claim comprising as the liquid an edible liquid flavouring within the reservoir.

19. A liquid dispenser according to any preceding claim wherein the over-cap is arranged to cap over a screw-on cap screwed onto the bottle.

20. A liquid dispenser according to claim 19 comprising the screw-on cap.

21. A method of filling a liquid dispenser according to any previous claim, wherein the container comprises: an outer casing to temporarily encase the over-cap and enclosing the reservoir within a tube having a partition intermediate an opening to

receive the over-cap and the portion which when squeezed dispenses the liquid is a collapsible portion to change the volume of the reservoir; a nozzle passes through the partition for a liquid to exit the reservoir, wherein the tube comprises a receiver part comprising the partition; the method including inverting a portion of the container having an open end to open upwards, urging a liquid into the open end, and joining the receiver part to the open end.