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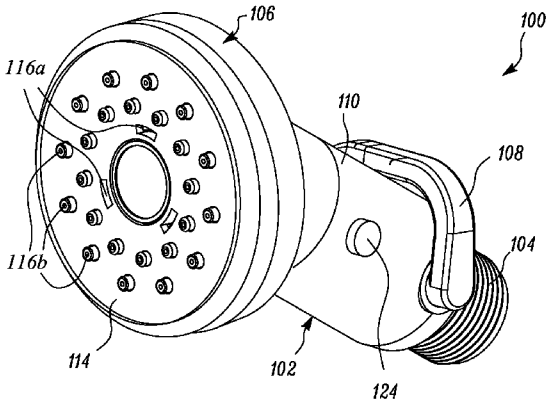

FIG.1A

(57) Abstract: A fluid dispensing device (100, 200, 300) including a fluid inlet (104, 204, 304) for supplying fluid to be delivered via a spray head (114, 214, 314), and a fluid outlet (106, 206, 306) having at least two nozzle openings (112a, 112b, 212a, 212b, 312a, 312b). A distributor valve (120, 220, 320) pivotally mounted at the fluid outlet (106, 206, 306) configured to alternately close one of the at least two nozzle openings (112a, 112b, 212a, 212b, 312a, 312b) and at least one flow regulator (108, 208a, 208b, 308a, 308b) operatively connected to the distributor valve (120, 220, 320) to trigger a pivotal movement of distributor valve (120, 220, 320). A bi-stable resilient element (126, 226, 326) coupled to the distributor valve (120, 220, 320) configured to stabilize the distrib - utor valve (120, 220, 320) towards one of the at least two nozzle openings (112a, 112b, 212a, 212b, 312a, 312b).

FLUID DISPENSING DEVICE

TECHNICAL FIELD

The present invention relates to fluid dispensing devices, and more particularly to a fluid dispensing device having a valve arrangement to control and select different fluid flow characteristics.

BACKGROUND

Fluid dispensing devices are well known in the art and are generally used for cleaning and watering applications. A fluid dispensing device generally includes a fluid inlet to supply fluid to be distributed via a fluid outlet. Fluid dispensing devices are generally mounted at an end of a hose or a pipe, wherein the fluid inlet may be provided at the rear end of a handle portion extending from the fluid outlet. The fluid outlet of a fluid dispensing device may include two nozzle openings for dispensing the fluid with different fluid flow characteristics, and a manual actuatable means associated with the fluid dispensing device is used selecting the flow of the fluid through at least one of the nozzle openings. The actuatable means may a flow regulator, for example, a dial at the fluid outlet or a pressing means like a button to select different fluid flow characteristics. The actuatable means may act on a distributor valve, such as a see-saw valve, wherein, the actuable means may provide a combination of contact and/or frictional forces to hold the distributor valve in a selected position to close and seal one of the nozzle openings.

When the fluid dispensing device is under use, the contact and/or frictional forces of the actuable means may not be able to provide a proper sealing force between the distributor valve and the nozzle openings. Further, the contact and/or frictional forces of the actuable means for selecting different fluid flow characteristics may not be able to actuate the distributor valve either by turning the dial at the fluid outlet or by pressing buttons due to a high fluid pressure. In this situation, a user has to press or turn the actuable means multiple times and/or keep it

pressed or hold for a prolonged time. Furthermore, the actuation by rotation of the dial may not accurately align the distributor valve with the nozzle openings. Thus, the rotation of the dial for selecting the flow characteristic (e.g. spray pattern) may not be convenient as the user has to be alert while turning and aligning the distributor valve with the nozzle openings. Furthermore, the actuation by the pressing means, like the push buttons, may also be cumbersome as the sufficient pressing and holding time of the button may be unknown to the user. Also, selection of flow characteristics by pressing the button may require high force to move the button due to the fluid pressure present inside the fluid dispensing device.

U.S. Patent 8, 490, 891 (the '891 patent) issued on July 23, 2013 to Chen, discloses a washing fluid supply structure of a water outlet device and a shower device which is arranged in the water supply pipeline of the water outlet device. The device has a container for washing liquid, and a fluid supply device disposed in a main body which is a water flow pipeline. The upper end of the water flow pipeline is connected with a water supply pipeline, and the lower end of the water flow pipeline is connected with the water outlet device. A connecting pipe connects the container to the fluid supply device. The washing liquid flows into the fluid supply device through a pathway of one-way valves. The fluid supply device is connected to the water outlet device through a washing fluid delivery pipe. The washing liquid in the fluid supply device flows into the water outlet device through the pathway. The shower head includes a diverter which includes a shower head button, a washing liquid button, two pressing rods and, a seesaw. On pushing of either of the shower head button or the washing liquid button, the respective pressing rods act on the seesaw. Further, the seesaw opens one of a water division hole and blocks the other water division hole. Thus, the selection of fluid flow from either of the two outlets is performed.

The '891 patent suggests a selection of fluid flow to dispense from different outlets by pressing either of the two buttons mounted on the

shower head to dispense fluid from either of the two outlets. The pressing of the button requires great force as the pressure of the fluid inside the shower head is high which needs to be overcome by the pressing force of the button. Also, there may be frictional force acting while pressing one of the two buttons which also needs to be overcome by the pressing force of the button. Moreover, the frictional forces acting between the buttons and the shower head are not sufficient to maintain and keep the buttons in the pressed position and during the operation of the fluid pressure inside the shower head may overcome these frictional forces and accidentally move the buttons.

Therefore, in light of the foregoing, there is a need for an improved actuable means for the selection of different flow characteristic.

SUMMARY

In view of the above, it is an objective of the present invention to solve or at least reduce the problems discussed above. The objective is at least partially achieved according to a fluid dispensing device including a fluid inlet for supplying fluid to be delivered via a spray head and a fluid outlet having two nozzle openings. The fluid dispensing device further includes a distributor valve pivotally mounted at the fluid outlet and is configured to alternately close one of the nozzle openings, and a flow regulator operatively connected to the distributor valve to trigger a pivotal movement of distributor valve. In the fluid dispensing device a bi-stable resilient element coupled to the distributor valve which configured to stabilize the distributor valve towards one of the nozzle openings. The bi-stable resilient element have two mechanically stable positions of deflection and is configured to stabilize the distributor valve towards one of the nozzle openings while improving the sealing capability between the distributor valve and the nozzle openings. According to an aspect of the present invention, the fluid dispensing device having the bi-stable resilient element facilitates an accurate and swift selection of the of the distributor valve position and fluid flow characteristics in the fluid dispensing device

upon actuation of the flow regulator. Moreover, during the working of the fluid dispensing device, the actuation force acting on the distributor valve remains independent of the inside fluid pressure.

The distributor valve is also provided with a sealing arrangement which is configured to seal the nozzle openings while in a stable position by the bi-stable resilient element. In an aspect of the present invention, the flow regulator is pivotally mounted on the fluid dispensing device such that the bi-stable resilient element is attached to the distributor valve adjacent to the pivotal mounting of the distributor valve at one end and the flow regulator is attached to another end of the bi-stable resilient element.

Moreover, in another aspect of the present invention, the flow regulator may be directly attached to or interact with the distributor valve and is configured to deflect the bi-stable resilient element by actuating the pivotal movement of the distributor valve.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be described in more detail with reference to the enclosed drawings, wherein:

FIG. **1A** illustrates a perspective view of a fluid dispensing device, according to an embodiment of the present invention;

FIG. **1B** illustrates a longitudinal sectional view of the fluid dispensing device of FIG. **1A**;

FIG. **1C** illustrates another perspective view of the fluid dispensing device of FIG. **1A**;

FIG. **1D** illustrates a longitudinal sectional view of the fluid dispensing device of FIG. **1C**;

FIG. **2A** illustrates a longitudinal sectional view of a fluid dispensing device, according to another embodiment of the present invention;

FIG. **2B** illustrates another longitudinal sectional view of the fluid dispensing device of FIG. **2A**;

FIG. **3A** illustrates a longitudinal sectional view of a fluid dispensing device, according to yet another embodiment of the present invention; and

FIG. **3B** illustrates another longitudinal sectional view of the fluid dispensing device of FIG. **3A**.

DESCRIPTION OF EMBODIMENTS

The present invention will be described more fully hereinafter with reference to the accompanying drawings, in which example embodiments of the invention incorporating one or more aspects of the present invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. For example, one or more aspects of the present invention can be utilized in other embodiments and even other types of structures and/or methods. In the drawings, like numbers refer to like elements.

FIGS. **1A**, **1C** and FIGS. **1B**, **1D** illustrate perspective views and longitudinal sectional views of a fluid dispensing device **100**, respectively, in accordance of an embodiment of the present invention. The fluid dispensing device **100** as illustrated in FIGS. **1A** to **1D** is a hand-held fluid nozzle used for watering and cleaning in gardening, domestic and agricultural applications. The hand-held fluid nozzle may be used to distribute a fluid over an area, to increase fluid surface area, and to create impact force by fluid on a surface. In various other embodiments, the fluid dispensing device **100** may be any other type of fluid dispensing device with a valve arrangement to control and select different fluid flow characteristics, for example, a spray gun, a spray nozzle, a shower device, a pressure sprayer, or a spray lance.

As illustrated, the fluid dispensing device **100** includes a housing **102** with a fluid inlet **104**, a fluid outlet **106** and a flow regulator **108**. The

housing **102** is generally made of plastics, such as thermoplastics, using injection moulding method and define a handle portion **110** extending form the fluid outlet **106**. The fluid inlet **104** is generally located at a rear end of the handle portion **110**. The fluid inlet **104** has a substantially cylindrical shape with threads to facilitate connection with a hose or a pipe by means of a connecting nipple or hose connector for supplying fluid to the fluid dispensing device **100**. Further, the fluid inlet **104** may also allow quick coupling and de-coupling with the hoses of varying size and shape.

The housing **102** further defines at least two nozzle openings, for example, a first nozzle opening **112a** and a second nozzle opening **112b** (see FIGS. **1B** and **1D**) forming the fluid outlet **106**. The nozzle openings **112a**, **112b** may be formed to deliver the fluid through a spray head **114** and are suitably designed in order to enable different types of fluid flow characteristics, such as spray patterns, fluid amount/droplet size, fluid impact force, or spray angle. The spray head **114** may be made of suitable plastic, metal or metal alloy by moulding or forming processes and includes an array of spray openings **116a** and **116b** in fluid communication with the first nozzle opening **112a** and the second nozzle opening **112b**, respectively. It will be apparent to a person having ordinary skill in the art that the spray head **114** may be attached to housing **102** by interference fitting or a threaded arrangement.

The flow regulator **108** is provided to select between different types of fluid flow characteristics of the fluid dispensing device **100**. In the illustrated embodiment, the flow regulator **108** is a manually actuatable U-shaped lever arm pivotally mounted on the housing **102**. The flow regulator **108** provides a quick and ergonomic means for accomplishing a change in flow characteristics of the fluid dispensing device **100**. The fluid supply device **100** further includes a valve arrangement **118** (see FIGS. **1B** and **1C**) to control and select between different fluid flow characteristics. According to an embodiment of the present invention, the valve arrangement **118** includes a distributor valve **120** pivotally mounted to the housing **102** at the fluid outlet **106** and configured to alternately

close one of the nozzle openings **112a**, **112b**. The distributor valve **120** may include a sealing arrangement **122** to seal the nozzle openings **112a**, **112b**, while in a closed position of the nozzle openings **112a**, **112b**. Further, in the illustrated embodiment, the distributor valve **120** is mounted to the housing **102** using a pivot pin **124**. However, in various other embodiments the mounting of the distributor valve **120** may vary based on the design and application of the fluid supply device **100**. The flow regulator **108** is operatively connected to the distributor valve **120** of the valve arrangement **118** to trigger a pivotal movement towards one of nozzle openings **112a**, **112b**.

According to an embodiment of the present invention, the fluid dispensing device **100** includes a bi-stable resilient element **126** coupled to the distributor valve **120** at one end and the flow regulator **108** is attached to other end of the bi-stable resilient element **126**. The bi-stable resilient element **126** is deflection element with mechanically constrained ends and is oriented substantially normal to the pivot pin **124** which supports the distributor valve **120**. The bi-stable resilient element **126** includes a first end **128** and a second end **130**. The first end **128** of the bi-stable resilient element **126** is attached to the distributor valve **120** adjacent to the pivotal mounting of the distributor valve **120** and the second end **130** of the bi-stable resilient element **126** is supported on an interior portion of the housing **102**. In an embodiment, the fluid dispensing device **100** may include a rotatable support **132** to support the second end **130** of the bi-stable resilient element **126** on the interior portion of the housing **102**. Wherein, a rotation of the rotatable support **132** is configured to affect a counter-rotation of the distributor valve **120** via the bi-stable resilient element **126**. In the embodiment of the fluid dispensing device **100** as illustrated in FIGS. **1A** to **1D**, the flow regulator **108** is configured to actuate rotation of the rotatable support **132** and cause deflection of the bi-stable resilient element **126** and actuate pivotal movement of the distributor valve **120**. In an alternative embodiment, the flow regulator **108** may be directly attached to the distributor valve **120** at

the pivot pin **124** such that the pivotal movement of the distributor valve **120** may cause the deflection of the bi-stable resilient element **126**.

In an embodiment of the present invention, the bi-stable resilient element **126** may be made of a flexible material having a co-operative longitudinal span extending between the first and second ends **128**, **130** to allow deflection between two stable positions, namely a first stable position (**FP**) as illustrated in FIG. **1B**, and a second stable position (**SP**) as illustrated in FIG. **1D**. The first and second stable positions (**FP**, **SP**) of the bi-stable resilient element **126** correspond to the positions of the flow regulator **108** as illustrated in FIGS. **1A** and **1C**, respectively. In an aspect of the present invention, the bi-stable resilient element **126** is designed to have curved structure with minimal mechanical stress acting along the longitudinal span while in the first and second stable positions (**FP**, **SP**). Thus, while in one of the first and second stable positions (**FP** or **SP**), the longitudinal span of the bi-stable resilient element **126** is constrained to substantially prohibit deflecting into the other stable positions (**FP** or **SP**). Subsequently**,** the bi-stable resilient element **126** having two mechanically stable positions of deflection is configured to stabilize the distributor valve **120** towards one of the at least two nozzle openings **112a**, **112b**. In an embodiment, the bi-stable resilient element **126** may be embodied as a composite structure of thin flexible metallic strips or plates. Alternatively, any resilient means such spring member can be used as a bi-stable resilient element **126**.

According to an aspect of the present invention, the fluid dispensing device **100** having the bi-stable resilient element **126** advantageously provide accurate and swift selection of the distributor valve **120** position by the flow regulator **108**. Moreover, during the working of the fluid dispensing device **100**, the actuation force acting on the distributor valve **120** remains independent of a fluid pressure inside the housing **102**. In an exemplary embodiment, high fluid pressure acting on the distributor valve **120** can be overcome by bending moment acting on the bi-stable resilient element **126**. Otherwise, when a low fluid

pressure exists inside the housing **102** the distributor valve **120** is stabilized by the bi-stable resilient element **126** and remains at a pre-selected position. The bi-stable resilient element **126** also improves the sealing capability between the distributor valve **120** and the nozzle openings **112a**, **112b**. The bi-stable resilient element **126** provides a dependable and low cost solution to achieve mechanically stable position of the distributor valve **120** without a need of more complex and bulky mechanical or electro-mechanical mechanisms to achieve accurate and swift selection of fluid flow characteristics in the fluid dispensing device **100**. Thus, overall reducing the size and manufacturing cost of the fluid dispensing device **100**. In another aspect of the present invention, the bi-stable resilient element **126** can be retrofittable on any conventional fluid dispensing device. FIGS. **2A** and **2B** illustrate longitudinal sectional views of a fluid dispensing device **200**, according to another embodiment of the present invention. The fluid dispensing device **200** includes a housing **202** with a fluid inlet **204**, a fluid outlet **206** and a pair of flow regulators **208a** and **208b**. The housing **202** define a handle portion **210** which is extending form fluid outlet **206** and the fluid inlet **204** is located at a rear end of the handle portion **210**. The housing **202** further defines a first nozzle opening **212a** and a second nozzle opening **212b** forming the fluid outlet **206**. The nozzle openings **212a**, **212b** may be formed to deliver the fluid through a spray head **214** having an array of spray openings **216a** and **216b** in fluid communication with the first nozzle opening **212a** and the second nozzle opening **212b**, respectively. The nozzle openings **212a**, **212b** and the spray openings **216a**, **216b** are suitably designed in order to enable different types of fluid flow characteristics.

According to an embodiment, the flow regulators **208a** and **208b** are manually actuatable press buttons sealingly disposed on the housing **202**. The flow regulators **208a**, **208b** provide a quick and ergonomic means for accomplishing a change in flow characteristics of the fluid dispensing device **200**. A valve arrangement **218** associated with the fluid dispensing device **200** includes a distributor valve **220** which is pivotally

mounted, using a pivot pin **224**, to the housing **202** at the fluid outlet **206** and configured to close one of the nozzle openings **212a**, **212b**. The distributor valve **220** may also include a sealing arrangement **222** to seal the nozzle openings **212a**, **212b**. The flow regulators **208a**, **208b** are operatively connected to the distributor valve **220** to trigger a pivotal movement towards one of nozzle openings **212a**, **212b**.

According to an embodiment of the present invention, the fluid dispensing device **200** includes a bi-stable resilient element **226** coupled to the distributor valve **220**. The bi-stable resilient element **226** is deflection element with mechanically constrained ends and is oriented substantially normal to the pivot pin **224** supporting the distributor valve **220**. The bi-stable resilient element **226** includes a first end **228** and a second end **230**. The first end **228** of the bi-stable resilient element **226** is attached to the distributor valve **220** adjacent to the pivotal mounting of the distributor valve **220** and the second end **230** of the bi-stable resilient element **226** is supported on an interior portion of the housing **202**. In an embodiment, the fluid dispensing device **200** may include a rotatable support **232** to support the second end **230** of the bi-stable resilient element **226** on the interior portion of the housing **202**. In the embodiment of the fluid dispensing device **200** as illustrated in FIGS. **2A** and **2B**, the flow regulators **208a** and **208b** are configured to act on the bi-stable resilient element **226** and cause deflection to actuate pivotal movement of the distributor valve **220**. As illustrated in the FIG. **2A**, the when the flow regulator **208a** is pressed it pushes the bi-stable resilient element **226** at a substantially middle portion, and thus deflect the bi-stable resilient element **226** into a first stable position (**FP**) and also pivotally move the distributor valve **220**. As illustrated in the FIG. **2B**, the when the flow regulator **208b** is pressed it pushes the bi-stable resilient element **226** at a substantially middle portion from other side, and thus deflect the bi-stable resilient element **226** into a second stable position (**SP**) and also pivotally move the distributor valve **220**.

In an embodiment of the present invention, the bi-stable resilient element **226** may allow deflection between two stable positions, namely the first stable position (**FP**) as illustrated in FIG. **2A**, and the second stable position (**SP**) as illustrated in FIG. **2B**. The first and second stable positions (**FP**, **SP**) of the bi-stable resilient element **226** are corresponding to the pressed positions of the flow regulators **208a** and **208b**, respectively. As describes above**,** the bi-stable resilient element **226** having two mechanically stable positions of deflection is configured to stabilize the distributor valve **220** towards one of the at least two nozzle openings **212a**, **212b**.

FIGS. **3A** and **3B** illustrate longitudinal sectional views of a fluid dispensing device **300**, according to yet another embodiment of the present invention. The fluid dispensing device **300** as illustrated in FIGS. **3A** and **3B** is a shower device used for use in washroom and kitchen applications. The fluid dispensing device **300** includes a housing **302** with a fluid inlet **304**, a fluid outlet **306** and a pair of flow regulators **308a** and **308b**. The housing **302** define a handle portion **310** extending form the fluid outlet **306** and the fluid inlet **304** is located at a rear end of the handle portion **310**. The housing **302** further defines a first nozzle opening **312a** and a second nozzle opening **312b** forming the fluid outlet **306**. The nozzle openings **312a**, **312b** may be formed to deliver the same fluid or different fluids through a spray head **314** and/or are suitably designed in order to enable different types of fluid flow characteristics. The spray head **314** includes an array of spray openings **316a** and **316b** in fluid communication with the first nozzle opening **312a** and the second nozzle opening **312b**, respectively.

According to an embodiment, the flow regulators **308a** and **308b** are manually actuatable press buttons sealingly disposed on the housing **302**. The flow regulators **308a**, **308b** provide a quick and ergonomic means for accomplishing a change in flow characteristics of the fluid dispensing device **300**. A valve arrangement **318** associated with the fluid dispensing device **300** includes a distributor valve **320** which is pivotally

mounted, using a pivot pin **324**, to the housing **302** at the fluid outlet **306** and configured to open one of the nozzle openings **312a**, **312b**. The distributor valve **320** may also include a sealing arrangement **322** to seal the nozzle openings **312a**, **312b**. The flow regulators **308a**, **308b** are directly interacting with the distributor valve **320** to trigger a pivotal movement towards one of nozzle openings **312a**, **312b**.

According to an embodiment of the present invention, the fluid dispensing device **300** includes a bi-stable resilient element **326** coupled to the distributor valve **320**. The bi-stable resilient element **326** is deflection element with mechanically constrained ends and is oriented substantially normal to the pivot pin **324** supporting the distributor valve **320**. The bi-stable resilient element **326** includes a first end **328** and a second end **330**. The first end **328** of the bi-stable resilient element **326** is attached to the distributor valve **320** adjacent to the pivotal mounting of the distributor valve **320** and the second end **330** of the bi-stable resilient element **326** is supported on an interior portion of the housing **302**. In an embodiment, the fluid dispensing device **300** may include a rotatable support **332** to support the second end **330** of the bi-stable resilient element **326** on the interior portion of the housing **302**. In the embodiment of the fluid dispensing device **300** as illustrated in FIGS. **3A** and **3B**, the flow regulators **308a** and **308b** are configured to actuate the pivotal movement to the distributor valve **320** and also deflect the bi-stable resilient element **326** while actuating the pivotal movement to the distributor valve **320**. As illustrated in the FIG. **3A**, the when the flow regulator **308a** is pressed it rotates the distributor valve **320** in anticlockwise direction about the pivot pin **324**, and thus deflect the bi-stable resilient element **326** into a first stable position (**FP**). As illustrated in the FIG. **3B**, the when the flow regulator **308b** is pressed it rotates the distributor valve **320** in clockwise direction about the pivot pin **324**, and thus deflect the bi-stable resilient element **326** into a second stable position (**SP**).

The bi-stable resilient element **326** may allow deflection between two stable positions, namely the first stable position (**FP**) as illustrated in FIG. **3A**, and the second stable position (**SP**) as illustrated in FIG. **3B**. The first and second stable positions (**FP**, **SP**) of the bi-stable resilient element **326** are corresponding to the pressed positions of the flow regulators **308a** and **308b**, respectively. As describes above**,** the bi-stable resilient element **326** having two mechanically stable positions of deflection is configured to stabilize the distributor valve **320** towards one of the at least two nozzle openings **312a**, **312b**.

The fluid dispensing devices **100**, **200** and **300**, according to illustrated embodiments of the present invention, are configured to provide an accurate and swift selection of fluid flow characteristics in the fluid dispensing device **100**, **200** and **300**.

In the drawings and specification, there have been disclosed preferred embodiments and examples of the invention and, although specific terms are employed, they are used in a generic and descriptive sense only and not for the purpose of limitation of the scope of the invention being set forth in the following claims.

PART LIST

100	fluid dispensing device
102	housing
104	fluid inlet
106	fluid outlet
108	flow regulator
110	handle portion
112a, 122b	nozzle openings
114	spray head
116a, 116b	spray openings
118	valve arrangement
120	distributor valve
122	sealing arrangement
124	pivot pin
126	bi-stable resilient element
128	first end of bi-stable resilient element
130	second end of bi-stable resilient element
132	rotatable support
200	fluid dispensing device
202	housing
204	fluid inlet
206	fluid outlet
208a, 208b	flow regulator
210	handle portion
212a, 222b	nozzle openings
214	spray head
216a, 216b	spray openings
218	valve arrangement
220	distributor valve
222	sealing arrangement
224	pivot pin
226	bi-stable resilient element

228	first end of bi-stable resilient element
230	second end of bi-stable resilient element
232	rotatable support
300	fluid dispensing device
302	housing
304	fluid inlet
306	fluid outlet
308a, 308b	flow regulator
310	handle portion
312a, 322b	nozzle openings
314	spray head
316a, 316b	spray openings
318	valve arrangement
320	distributor valve
322	sealing arrangement
324	pivot pin
326	bi-stable resilient element
328	first end of bi-stable resilient element
330	second end of bi-stable resilient element
332	rotatable support
FP	first stable position
SP	second stable position

CLAIMS

1. A fluid dispensing device (**100**, **200**, **300**) comprising:

a fluid inlet (**104**, **204**, **304**) for supplying fluid wherein the fluid is delivered via a spray head (**114**, **214**, **314**);

a fluid outlet (**106**, **206**, **306**) having at least two nozzle openings (**112a**, **112b**, **212a**, **212b**, **312a**, **312b**);

a distributor valve (**120**, **220**, **320**) pivotally mounted at the fluid outlet (**106**, **206**, **306**) configured to alternately close one of the at least two nozzle openings (**112a**, **112b**, **212a**, **212b**, **312a**, **312b**);

at least one flow regulator (**108**, **208a**, **208b**, **308a**, **308b**) operatively connected to the distributor valve (**120**, **220**, **320**) to trigger a pivotal movement towards one of the at least two nozzle openings (**112a**, **112b**, **212a**, **212b**, **312a**, **312b**); and

characterized in that

a bi-stable resilient element (**126**, **226**, **326**) coupled to the distributor valve (**120**, **220**, **320**) configured to stabilize the distributor valve (**120**, **220**, **320**) towards one of the at least two nozzle openings (**112a**, **112b**, **212a**, **212b**, **312a**, **312b**).

2. The fluid dispensing device (**100**, **200**, **300**) according to claim 1, wherein the distributor valve (**120**, **220**, **320**) is provided with a sealing arrangement (**122**, **222**, **322**) configured to seal one of the at least two nozzle openings (**112a**, **112b**, **212a**, **212b**, **312a**, **312b**).

3. The fluid dispensing device (**100**, **200**, **300**) according to claim 1, wherein the bi-stable resilient element (**126**, **226**, **326**) is attached to the distributor valve (**120**, **220**, **320**) adjacent to the pivotal mounting of the distributor valve (**120**, **220**, **320**).

4. The fluid dispensing device (**100**) according to claim 1, wherein the at least one flow regulator (**108)** is pivotally mounted on the fluid dispensing device (**100**).

5. The fluid dispensing device (**100**) according to claim 1, wherein the at least one flow regulator (**108)** is attached to one of the two end of the bi-stable resilient element (**126**).

6. The fluid dispensing device (**100**) according to claim 1, wherein the at least one flow regulator (**108)** is directly attached to the distributor valve (**120**).

7. The fluid dispensing device (**100**, **200**, **300**) according to claim 1, wherein the distributor valve (**120**, **220**, **320**) is attached to one of the two end of the bi-stable resilient element ((**126**, **226**, **326**).

8. The fluid dispensing device (**200**) according to claim 1, wherein the flow regulators (**208a**, **208b**) are configured to act on the bi-stable resilient element (**226**) to actuate the pivotal movement of the distributor valve (**220**).

9. The fluid dispensing device (**300**) according to claim 1, wherein the flow regulators (**308a**, **308b**) directly interact with the distributor valve (**320**) to trigger the pivotal movement.

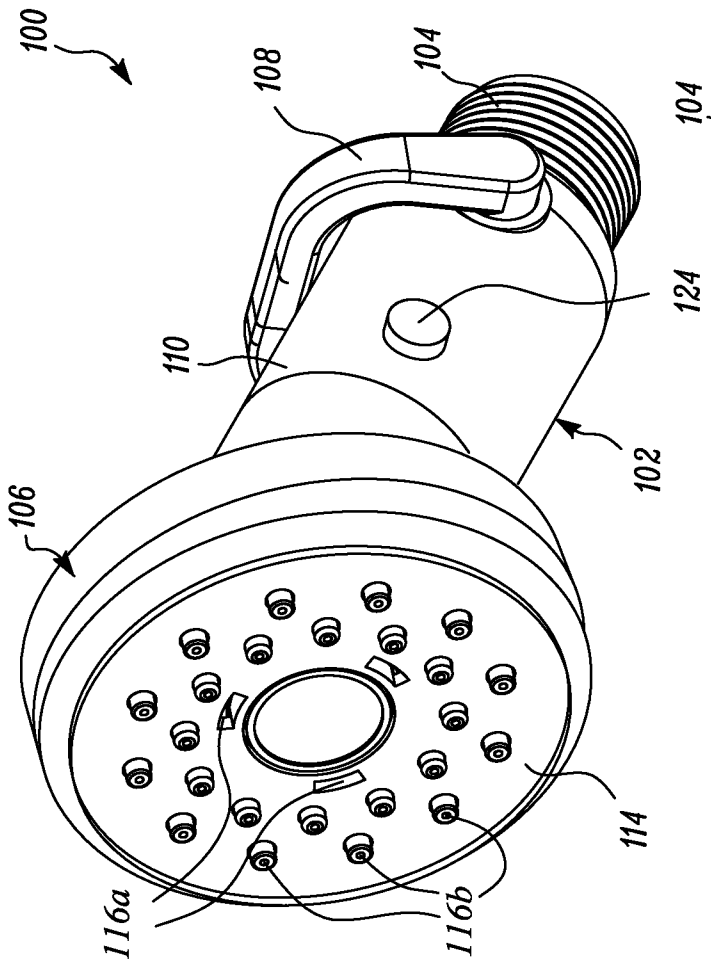
100
106
108
104
110
124
102
114
116a
116b

FIG.1A

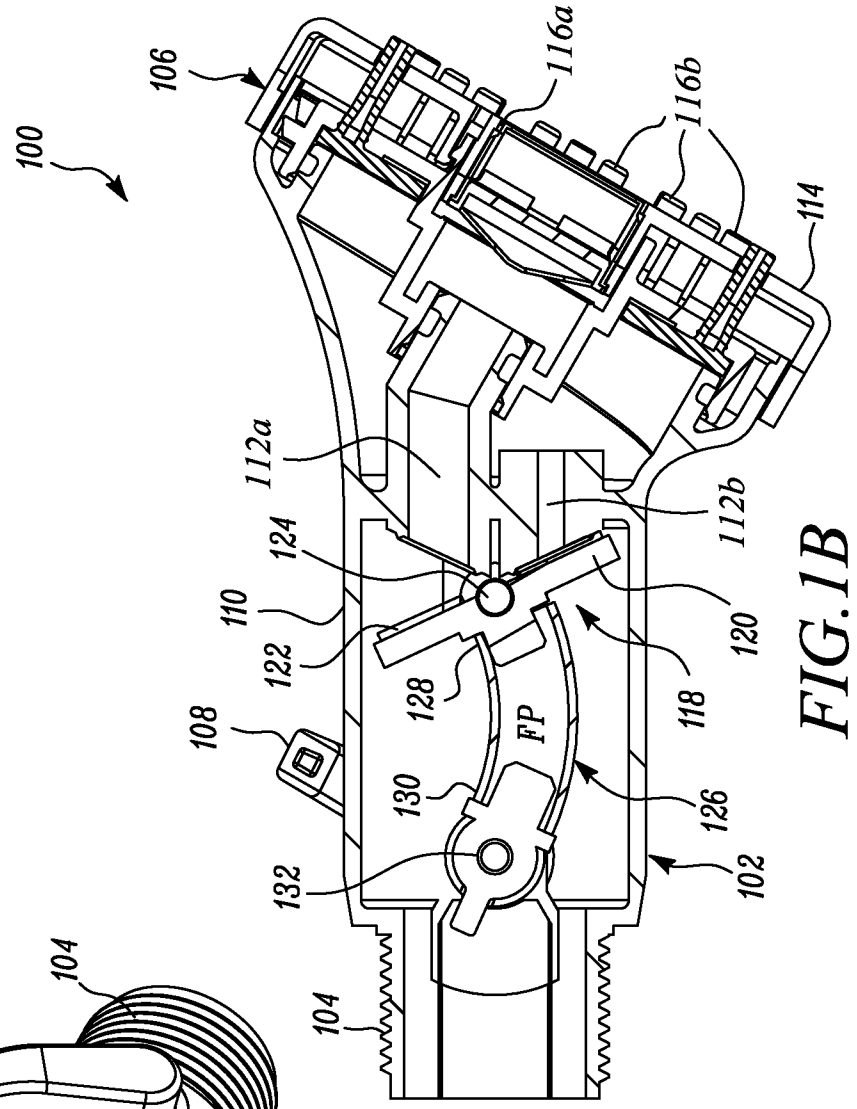
100
106
116a
116b
114
112a
112b
124
110
122
128
FP
108
130
132
120
118
126
102
104

FIG.1B

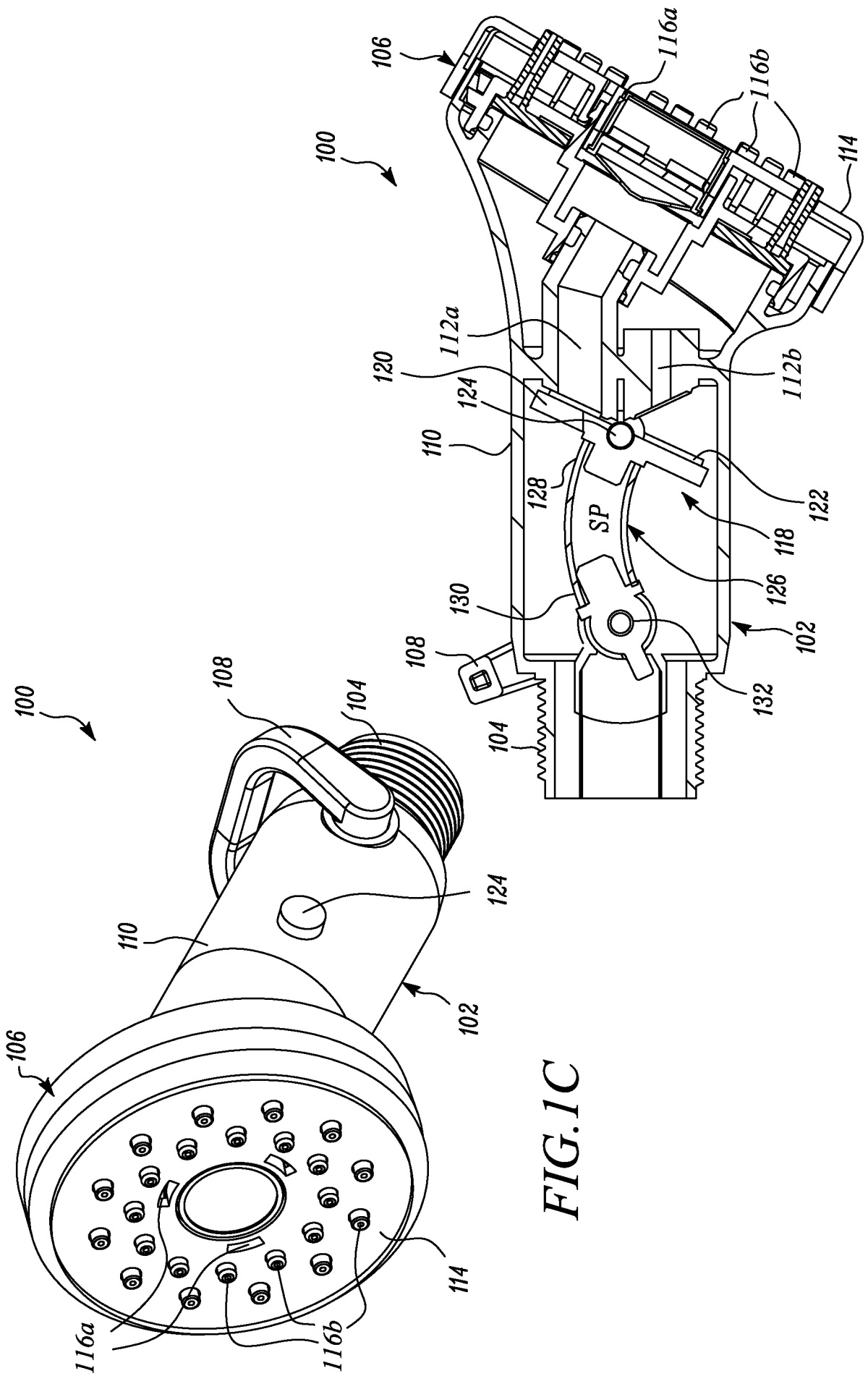
100
106
116a
116b
114
112a
112b
120
124
110
128
SP
122
118
126
130
102
108
104
132
100
108
104
124
110
102
106
114
116a
116b

FIG.1D

FIG.1C

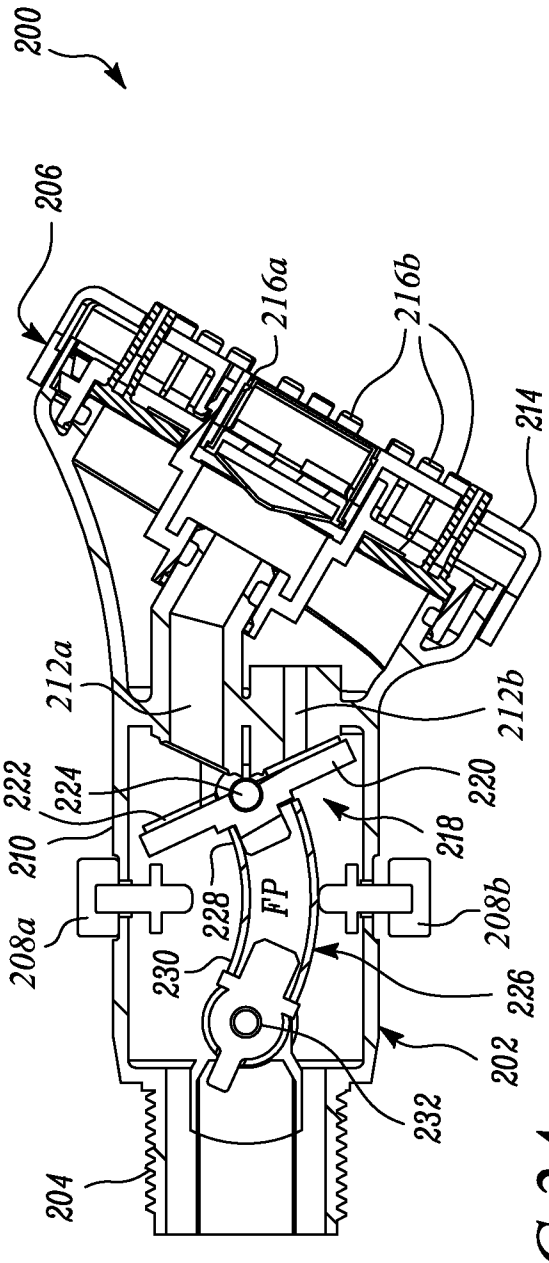
200
206
216a
216b
214
212a
212b
222
224
210
220
218
208a
228
FP
208b
230
226
202
232
204

FIG.2A

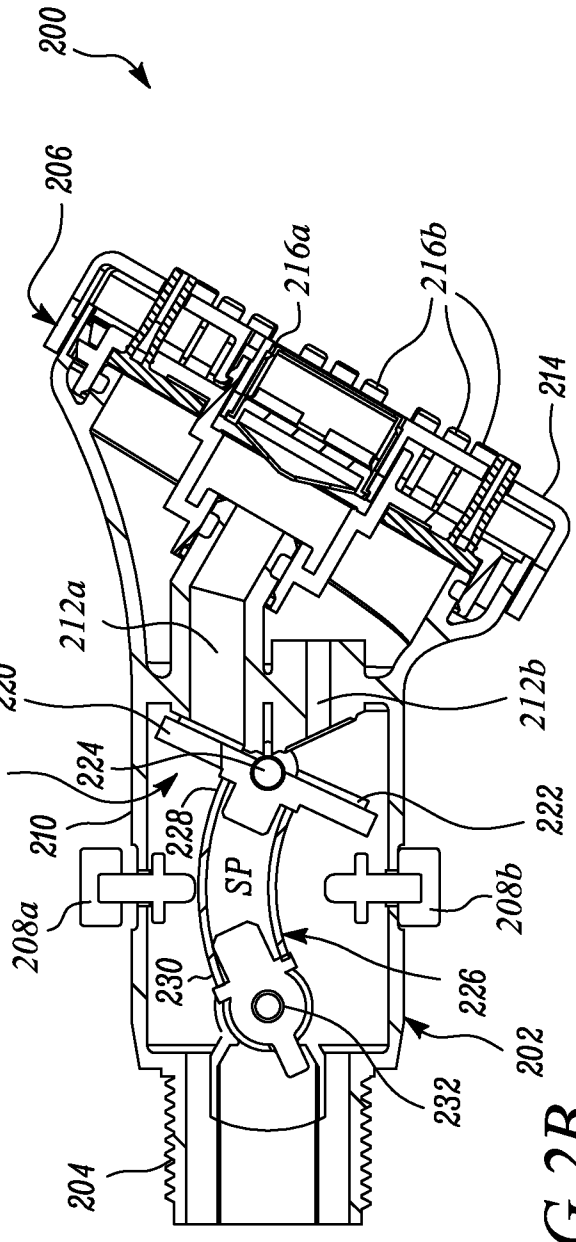
200
206
216a
216b
214
212a
220
212b
218
224
210
222
208a
228
SP
208b
230
226
202
232
204

FIG.2B

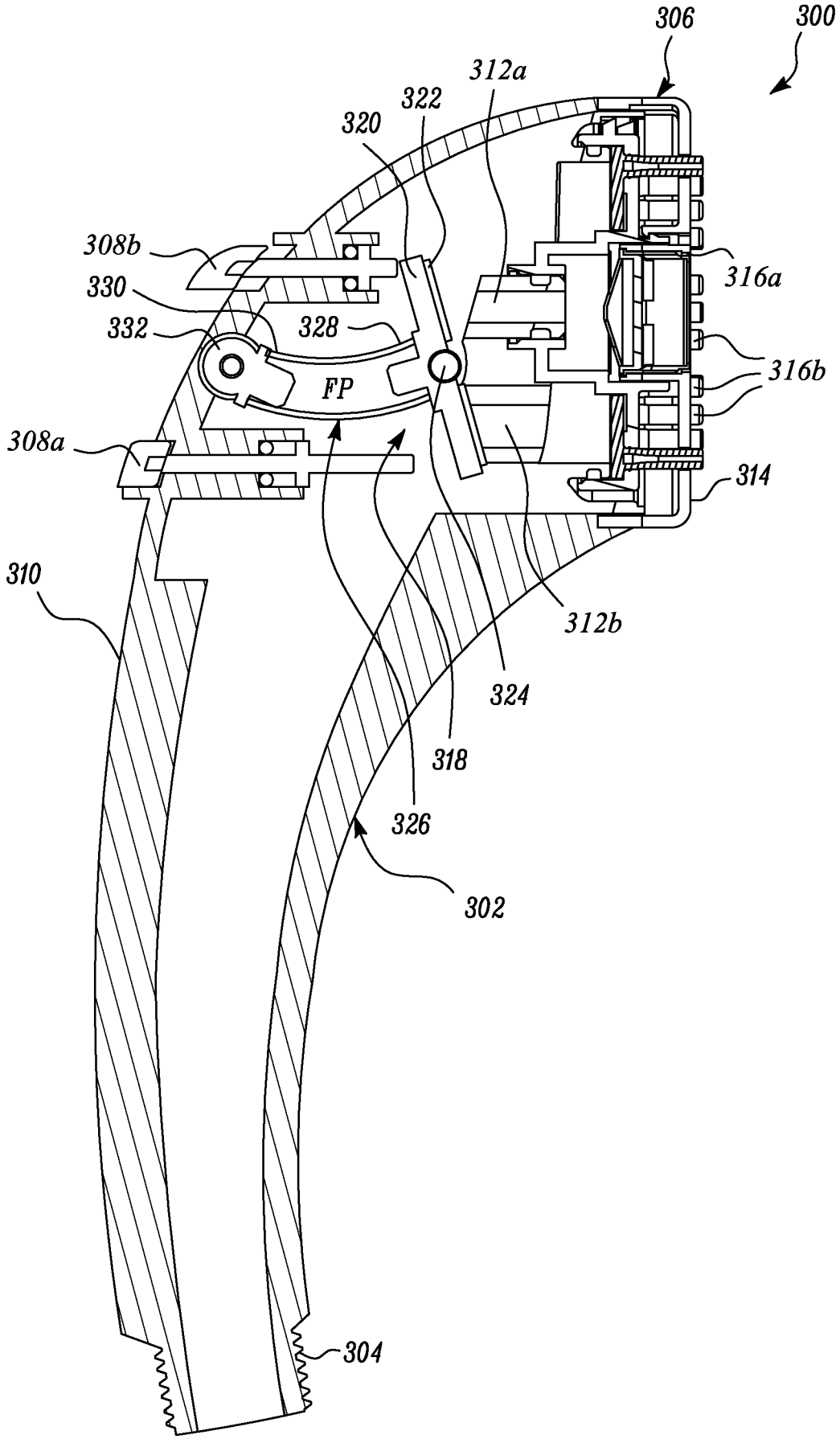
306
300
312a
322
320
308b
330
316a
332
328
316b
FP
308a
314
310
312b
324
318
326
302
304

FIG. 3A

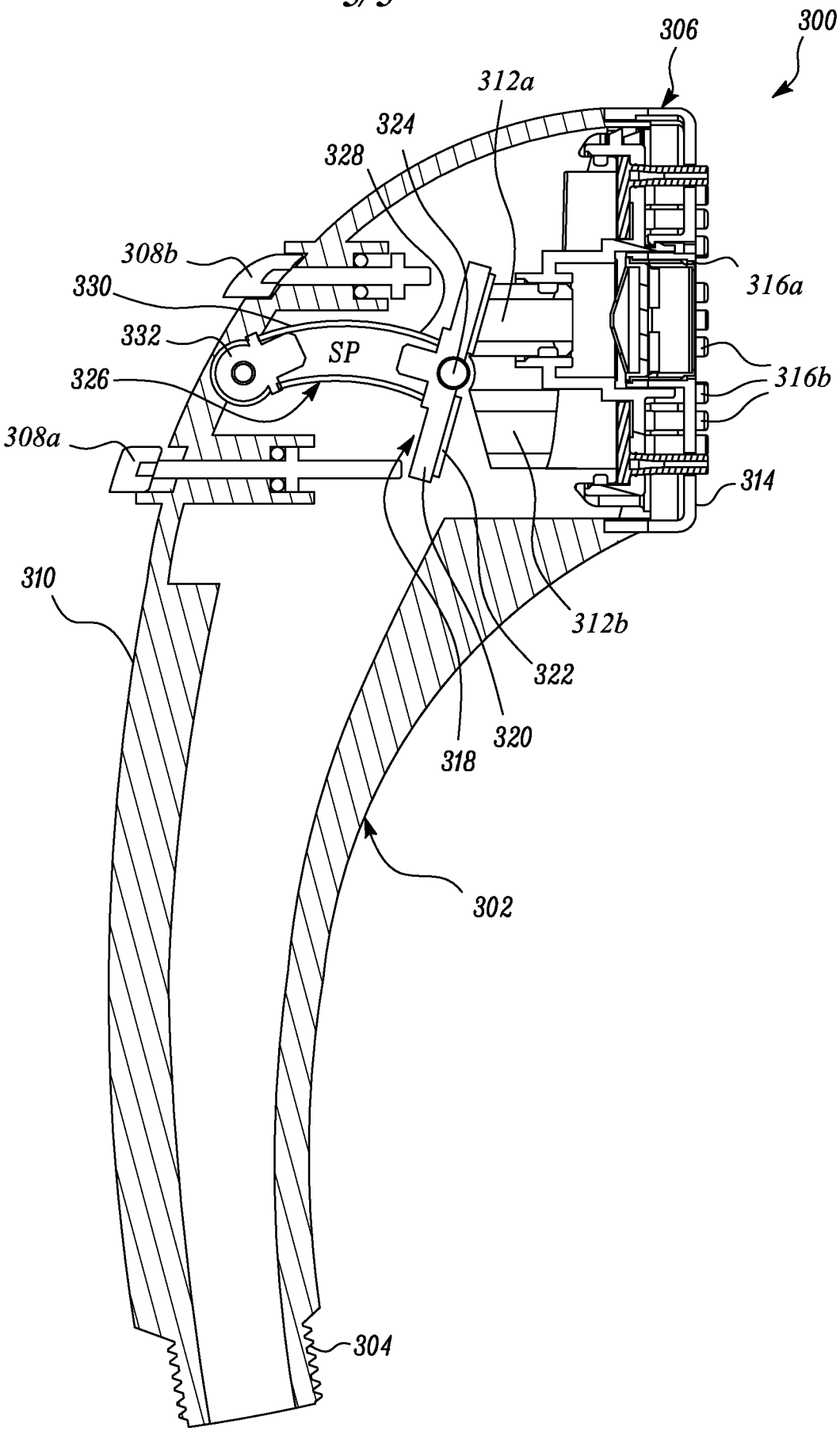
306
300
312a
324
328
308b
330
316a
332
SP
326
316b
308a
314
310
312b
322
320
318
302
304

FIG. 3B

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2014/072493

A. CLASSIFICATION OF SUBJECT MATTER
INV. B05B1/16 B05B1/18
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B05B E03C F16K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3 881 265 A (EATON JOHN L ET AL) 6 May 1975 (1975-05-06) abstract; figures 1-6 column 1, line 54 - column 2, line 29 column 3, line 3 - column 6, line 62	1-9
A	US 2011/215174 A1 (CHEN TIANYU [CN]) 8 September 2011 (2011-09-08) cited in the application the whole document	1-9
A	US 2007/295837 A1 (STORK JOACHIM [DE] ET AL) 27 December 2007 (2007-12-27) abstract; figures 1-4	1-9
A	WO 98/50113 A1 (MASCO CORP [US]; KNAPP ALFONS [DE]) 12 November 1998 (1998-11-12) abstract; figures 1-11	1-9

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
7 July 2015	15/07/2015

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Frego, Maria Chiara

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
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