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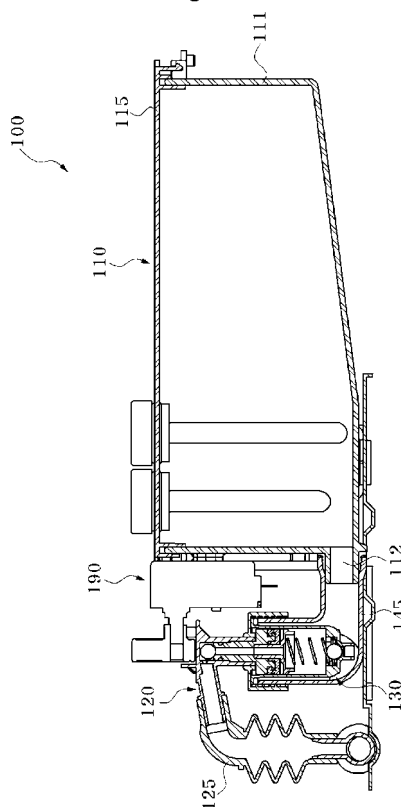
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(54) **DEVICE FOR SUPPLYING A LIQUID DETERGENT**

(57) Disclosed is an invention relating to a device for supplying a liquid detergent. The disclosed invention comprises: a detergent-supply unit for supplying the liquid detergent; a nozzle unit which is provided so as to move to a first position or a second position, and squirts out the liquid detergent supplied from the detergent-supply unit; and a pump unit which is provided between the detergent-supply unit and the nozzle unit and receives a supply of liquid detergent from the detergent-supply unit when the nozzle unit is moved to the first position and supplies the detergent to the nozzle unit when the nozzle unit is moved to the second position. When the present invention is employed, the liquid detergent is supplied automatically, thereby making it possible to ensure timely supply of the liquid detergent in the desired amount without the trouble of the user introducing the liquid detergent piecemeal when washing.

Fig. 2



Description

[TECHNICAL FIELD]

[0001] Exemplary embodiments of the present invention relate to a device for supplying a liquid detergent, which can timely supply a desired amount of liquid detergent.

[Background Art]

[0002] In general, a washing machine is a laundry treating appliance that removes various kinds of contaminants adhered to clothes, bedclothes, etc., using the emulsification of a detergent, the frictional action of water flow according to the revolution of a pulsator, and the like. A fully automatic washing machine automatically sequentially performs a series of washing, rinsing and dewatering processes without any separate manipulation by a user during the use thereof.

[0003] The washing machine is classified into a top-loading washing machine in which a wash tub is arranged vertically, and a drum-type washing machine in which the wash tub is arranged horizontally depending on the shape of the wash tub for accommodating laundry therein. In case of the drum-type washing machine, its entire height can be reduced, its washing capacity can be increased, and problems such as laundry twisting and the like hardly occur. For this reason, the demand for the drum-type washing machine is increasing gradually.

[0004] FIG. 1 is a schematic cross-sectional view illustrating the structure of a drum-type washing machine.

[0005] Referring to FIG. 1, the washing machine includes a main body 1, a tub 2 configured to be supported a spring 6 and a damper 7 within the main body 2, a drum 3 mounted rotatably within the tub 2 to accommodate laundry therein, and a driving unit 4 axially connected to the drum 3. The driving unit 4 includes a rotor (not shown) and a stator (not shown). In addition, the driving unit 4 has a driving shaft connected to the rotor to transfer a driving force therefrom to the drum 3.

[0006] At an upper portion of a front surface of the drum 3 is installed a detergent box 8 connected to a water supply hose 10 and a detachable drawer type body 9 installed so as to enable a user to draw the body 9 outwardly from the detergent box 8 so that the user can put a detergent into the body 9. A front door 5 is pivotally rotatably installed to the front surface of the main body 1 so as to confront an opening of the drum 3.

[0007] The washing machine as constructed above automatically sequentially executes a series of processes of washing, rinsing and dewatering when a user sets the kind or the washing time of laundry through a control panel (not shown) and presses a start button on the control panel after introducing a powdered detergent, a bleaching agent, and a fabric softener into the drawer type body 9 before performing a wash cycle.

[0008] Recently, a liquid detergent is widely distributed

which is well diluted in the washing water and exhibits excellent emulsification. In the case where it is desired to introduce the liquid detergent into the washing machine, it is impossible to open the front door 5 and introduce the liquid detergent into the washing machine in a state in which the washing water has been supplied to the washing machine in terms of the characteristics of the drum-type washing machine. For this reason, it is required that the liquid detergent should be directly introduced to laundry prior to the supply of the washing water to the washing machine, or should be introduced into the washing machine through the detergent box 8.

[Disclosure]

[Technical Problem]

[0009] According to the washing machine as described above, when the liquid detergent is directly introduced to the laundry, there occurs a problem in that the laundry is damaged. In addition, when the liquid detergent is introduced into the washing machine through the detergent box, there occurs a problem in that the amount of the liquid detergent introduced is inaccurate in terms of the structural characteristics of the detergent box for the powdered detergent.

[0010] In other words, the detergent box has a structure in which a sufficient quantity of the powdered detergent is diluted with the washing water being supplied and is introduced into the drum. On the other hand, although the liquid detergent is not diluted with the washing water, it can be directly introduced into the drum owing to its fluidity. Further, since the detergent box is intended for the powdered detergent, the amount of the powdered detergent diluted is different from that of the liquid detergent. As a result, there occurs a problem in that it is difficult to adjust the desired amount of the detergent introduced. Therefore, there is a need for the improvement of such a problem.

[Technical Solution]

[0011] Accordingly, the present invention has been made to solve the above-mentioned problems occurring in the prior art, and it is an object of the present invention to provide a device for supplying a liquid detergent which has a structure improved so as to timely supply a desired amount of the liquid detergent.

[0012] An embodiment of the present invention relates to a device for supplying a liquid detergent, including: a detergent supply unit configured to supply the liquid detergent; a nozzle unit provided so as to be able to move to a first position or a second position, and configured to inject the liquid detergent supplied from the detergent-supply unit; and a pump unit disposed between the detergent supply unit and the nozzle unit and configured to receive a supply of the liquid detergent from the detergent-supply unit when the nozzle unit is moved to the

first position and supply the detergent to the nozzle unit when the nozzle unit is moved to the second position.

[0013] In one embodiment, preferably, the pump unit may include: a housing part including a first inlet formed at a lower portion thereof so as to allow the liquid detergent to be introduced thereto from the detergent supply unit, and configured to allow the liquid detergent supplied to the housing part from the detergent supply unit to temporarily stay therein; a first opening and closing part configured so as to open and close the first inlet; a rod part operated in cooperation with the movement of the nozzle unit to supply the liquid detergent stayed in the housing part to the nozzle unit, the rod part including an outlet formed therein so as to discharge the liquid detergent to the nozzle unit; and a second opening and closing part configured so as to open and close the outlet of the rod part.

[0014] In one embodiment, preferably, the rod part may include: a discharge part connected to the nozzle unit and formed with the outlet; and a suction part connected to the discharge part, and including a second inlet formed therein so as to allow the inside of the housing part to fluidically communicate with the discharge part.

[0015] In one embodiment, preferably, the pump unit may further include a sealing part coupled to the rod part 160 so as to hermetically seal the inside of the housing part.

[0016] In one embodiment, preferably, the sealing part may include: a first sealing part configured to be brought into close contact at an inner peripheral surface thereof with an outer wall of the rod part; and a second sealing part configured to be brought into close contact at an outer peripheral surface thereof with an inner wall of the housing part.

[0017] In one embodiment, preferably, the second sealing part may include an airtight projection formed on a surface thereof so as to contact with the inner wall of the housing part.

[0018] In one embodiment, preferably, the rod part may include a coupling projection formed thereon, and the sealing part may include a recess part formed at one side thereof so that the coupling projection can be detachably coupled to the recess part.

[0019] In one embodiment, preferably, the pump unit may further include an elastic member disposed within the housing part to allow the nozzle unit moved to the second position to be moved to the first position.

[0020] In one embodiment, preferably, at least one of the first opening and closing part and the second opening and closing part may include a ball valve operated in cooperation with the movement of the rod part to open and close the outlet.

[0021] In one embodiment, preferably, the device may further include a nozzle manipulating part configured to move the nozzle unit.

[0022] In one embodiment, preferably, the nozzle manipulating part may include: a driving unit configured to generate a rotational force; and a cam part configured to

be rotated eccentrically by the driving unit and brought into close contact at the outer peripheral surface thereof with the nozzle unit to move the nozzle unit.

5 [Advantageous Effects]

[0023] According to the device for supplying a liquid detergent of the present invention, the liquid detergent is supplied automatically, thereby making it possible to ensure timely supply of the liquid detergent in the desired amount without the trouble of allowing the user to introduce the liquid detergent piecemeal when washing.

[0024] In addition, the device for supplying a liquid detergent of the present invention has a structure in which the second opening and closing part stably closes the outlet except when the nozzle unit is moved to the second position to cause the liquid detergent to be supplied normally such that the liquid detergent continues to be discharged to the nozzle unit through the outlet or the washing water from the water supply hose can be prevented backflowing into the pump unit or the detergent supply unit through the outlet.

[0025] Moreover, the device for supplying a liquid detergent of the present invention can introduce the liquid detergent using an inexpensive small-sized motor instead of an expensive large-sized motor, thereby reducing the entire volume and weight of the device and saving the manufacturing costs.

[0026] Besides, the device for supplying a liquid detergent of the present invention includes a sealing part that can be detachably coupled to the rod part to hermetically seal the inside of the housing part, so that the liquid detergent stayed in the housing part can be prevented from leaking to the outside through a gap defined between the rod part and the housing part and an abraded or damaged sealing part can be easily replaced with new one.

[Description of Drawings]

[0027] The above and other aspects, features and other advantages will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a schematic cross-sectional view illustrating the structure of a drum-type washing machine;

FIG. 2 is a cross-sectional view illustrating a device for supplying a liquid detergent according to an embodiment of the present invention;

FIG. 3 is a partial cross-sectional view illustrating a device for supplying a liquid detergent according to an embodiment of the present invention;

FIG 4 is an enlarged cross-sectional view illustrating the principal parts of first and second opening and closing parts shown in FIG. 3;

FIG. 5 is a cross-sectional view illustrating a device for supplying a liquid detergent shown in FIG. 3 in a state of being operated; and

FIG. 6 is an enlarged cross-sectional view illustrating the principal parts of first and second opening and closing parts shown in FIG. 5.

[Best Mode]

[0028] Hereinafter, a device for supplying a liquid detergent according to an embodiment of the present invention will be described with reference to accompanying drawings. However, the embodiment is for illustrative purposes only and are not intended to limit the scope of the invention. In the drawings, for the sake of a clearer understanding of the present invention, line thicknesses or sizes of elements may be exaggerated for clarity and convenience. Also, the following terms are defined in consideration of the function of the present invention, which may vary according to an intention of a user or an operator or according to custom. Therefore, definition of such terms should be made based on overall contents of the specification.

[0029] FIG. 2 is a cross-sectional view illustrating a device for supplying a liquid detergent according to an embodiment of the present invention, FIG. 3 is a partial cross-sectional view illustrating a device for supplying a liquid detergent according to an embodiment of the present invention, and FIG. 4 is an enlarged cross-sectional view illustrating the principal parts of first and second opening and closing parts shown in FIG. 3.

[0030] Referring to FIGs. 2 to 4, a device 100 for supplying a liquid detergent according to an embodiment of the present invention is installed at a washing machine (not shown). Preferably, the device 100 for supplying a liquid detergent is installed on a cabinet (not shown) defining an exterior appearance of the washing machine. The device 100 for supplying a liquid detergent allows a user to introduce a liquid detergent into a tub (not shown) installed within the cabinet.

[0031] According to this embodiment, the device 100 for supplying a liquid detergent includes a detergent supply unit 110, a nozzle unit 120, and a pump unit 130. The detergent supply unit 110 receives a detergent therein. In this embodiment, a liquid detergent is generally defined as being called "liquid detergent", "liquid fabric softener", "liquid bleaching agent" and the like. The detergent supply unit 110 can be accommodated within the cabinet, receives a liquid detergent injected from the outside therein, and supplies the liquid detergent received therein to the pump unit 130, which will be described later.

[0032] The detergent supply unit 110 includes a receiving part 111 that receives a liquid detergent, and a covering part 115 that covers an opened top of the receiving part 111.

[0033] According to this embodiment, the receiving part 111 includes an outlet 112 formed at one side thereof, more specifically, at a side of thereof, which is adjacent to the pump unit 130, so that the liquid detergent received in the receiving part 111 is supplied to the pump unit 130 through the outlet 112.

[0034] Further, the covering part 115 is constructed so as to be able to be exposed to the top of the cabinet. The covering part 115 is also constructed so as to be able to be opened or closed so that a user can open the covering part 115 exposed to the top of the cabinet and inject a liquid detergent into the receiving part 111.

[0035] The nozzle unit 120 is constructed so as to be able to be moved to a first position (a) or a second position (b). The nozzle unit 120 is connected to the pump unit 130 to receive a supply of a liquid detergent from the detergent supply unit 110 by means of the pump unit 130 and inject the received liquid detergent.

[0036] According to this embodiment, the nozzle unit 120 has a pressing surface 122 formed on a top thereof, and an ejection passageway 124 formed therein so as to fluidically communicate with the inside of the pump unit 130. The nozzle unit 120 is moved to the first position (a) or the second position (b) to receive a supply of the liquid detergent from the detergent supply unit 110.

[0037] Herein, the first position (a) is defined as a position in which an upward movement of the nozzle unit 122 is terminated, and the second position (b) is defined as a position of a downward movement of the nozzle unit 122 is terminated, which will be described later.

[0038] To the nozzle unit 120 may be connected a connection duct part 125. The liquid detergent introduced into the nozzle unit 120 is supplied into the tub through the connection duct part 125. The connection duct part 125 is connected at one end thereof to the nozzle unit 120 and is connected at other one thereof to a water supply hose 10 that supplies washing water to the tub.

[0039] The pump unit 130 is disposed between the detergent supply unit 110 and the nozzle unit 120. The pump unit 130 is operated in cooperation with the movement of the nozzle unit 120. That is, the pump unit 130 receives a supply of the liquid detergent from the detergent-supply unit 110 when the nozzle unit 120 is moved to the first position (a) and supplies the detergent supplied thereto from the detergent supply unit 110 to the nozzle unit when the nozzle unit 120 is moved to the second position (b). The pump unit 130 includes a housing part 140, a first opening and closing part 150, a rod part 160, a second opening and closing part 170, and a sealing part 180.

[0040] The housing part 140 is disposed between the detergent supply unit 110 and the nozzle unit 120. The housing part 140 includes a first inlet 142 formed at a lower portion thereof so as to allow the liquid detergent to be introduced thereto from the detergent supply unit 110. The housing part 140 is an element which temporarily store the liquid detergent supplied thereto from the detergent supply unit 110. The liquid detergent supplied to the housing part 140 from the detergent supply unit 110 temporarily stays in the housing 140 before being supplied to the nozzle unit 120.

[0041] The housing part 140 can be connected to the detergent supply unit 110 by a connection part 145. The connection part 145 couples the housing part 140 to the detergent supply unit 110, and provides a communication

passageway for establishing fluid communication between the outlet 112 of the detergent supply unit 110 and the first inlet 142 of the housing part 140.

[0042] The first opening and closing part 150 is constructed so as to open and close the first inlet 142. The first opening and closing part 150 is disposed within the housing part 140, specifically at an upper portion of the first inlet 142. The first opening and closing part 150 is operated in cooperation with the movement of the rod part (160), and may include a ball valve (whose reference numeral is omitted) that opens and closes the first inlet 142.

[0043] According to this embodiment, the ball valve is seated on a retaining step 143 formed around the first inlet 142 so as to close the first inlet 142. When the nozzle unit 120 is moved to the first position (a), the ball valve ascends by vacuum pressure formed within the housing part 140 to open the first inlet 142.

[0044] The rod part 160 is operated in cooperation with the movement of the nozzle unit 120 to supply the liquid detergent stayed in the housing part 140 to the nozzle unit 120. The rod part 160 is disposed within the housing part 140 and is constructed so as to be vertically movably in response to the movement of the nozzle unit 120. The rod part 160 includes a flow channel F defined therein so as to fluidically communicate with the nozzle unit 120. According to this embodiment, the rod part 160 includes a discharge part 161 and a suction part 165.

[0045] The discharge part 161 is formed at a side adjacent to the nozzle unit 120 so as to be connected to the nozzle unit 120. The discharge part 161 is formed with an outlet 162 that allows the liquid detergent to be discharged to the nozzle unit 120 therethrough. The outlet 162 is connected to the flow channel F so as to allow the flow channel F to communicate with the inside of the nozzle unit 120. The liquid detergent introduced into the discharge part 161 through the flow channel F is discharged to the inside of the nozzle unit 120 through the outlet 162.

[0046] The suction part 165 is formed at a side adjacent to the first opening and closing part 150 so as to be connected to the discharge part 161. The suction part 165 includes a second inlet 166 formed therein so as to allow the inside of the housing part 140 to fluidically communicate with the outlet 162. The second inlet 166 fluidically communicates with the outlet 162 through the flow channel F. The liquid detergent stayed in the housing part 140 is introduced into the inside of the rod part 160, i.e., the flow channel F through the second inlet 166.

[0047] In this embodiment, the suction part 165 is detachably coupled to the discharge part 161.

[0048] The suction part 165 is fittingly coupled at one end thereof to the inside of the discharge part 161 so that it is connected to the discharge part 161 which internally defines the flow channel F together with the discharge part 161. At this time, the one end of the suction part 165 is positioned adjacent to the discharge part 161.

[0049] The second opening and closing part 170 is

constructed so as to open and close the outlet 16. The second opening and closing part 170 is disposed at the discharge part 161, more specifically at an upper portion of the outlet 162. The second opening and closing part 170 is operated in cooperation with the movement of the rod part 160, and may include a ball valve (whose reference numeral is omitted) that opens and closes the outlet 162.

[0050] According to this embodiment, the ball valve is seated on a retaining step 143 formed around the outlet 162 so as to close the outlet 162. When the nozzle unit 120 is moved to the second position (b), the ball valve ascends by oil pressure of the liquid detergent discharged through the outlet 162 to open the outlet 162.

[0051] The second opening and closing part 170 opens the outlet 162 only when the nozzle unit 120 is moved to the second position (b) to cause the oil pressure of the liquid detergent discharged through the outlet 162 to be increased, and closes the outlet 162 when the nozzle unit 120 is moved to the first position (a) or is stopped in movement.

[0052] The second opening and closing part 170 stably closes the outlet 162 although the operation of a nozzle manipulating part 190 which will be described later is stopped to cause the nozzle unit 120 to be suspended in an intermediate stroke, i.e., the movement of the nozzle unit 120 is suspended between the first position (a) and the second position (b). Thus, it can be prevented that the liquid detergent continues to be discharged through the outlet 162 or the washing water of the water supply hose 10 backflows to the pump unit 130 or the detergent supply unit 110 through the outlet 162.

[0053] A sealing part 180 is coupled to the rod part 160 so as to hermetically seal the inside of the housing part 140.

[0054] Preferably, the sealing part 180 is formed in a ring shape. The sealing part 180 is disposed in a space defined at the outside of the discharge part 161 and the outside of the suction part 165, and includes a first sealing part 181 and a second sealing part 185.

[0055] The first sealing part 181 corresponds to an inner portion of the sealing part 180, which is formed penetratingly. The rod part 160, more specifically the suction part 165 is inserted into the first sealing part 181, and the first sealing part is brought into close contact at an inner peripheral surface thereof with an outer wall of the rod part 160.

[0056] The second sealing part 185 corresponds to an outer portion of the sealing part 180, which is formed so as to be extended outwardly from the first sealing part 181. The second sealing part 185 is brought into close contact at an outer peripheral surface thereof with an inner wall of the housing part 140.

[0057] The second sealing part 185 includes an airtight projection 186 formed thereon. The airtight projection 186 is protrudingly formed on a surface thereof so as to contact with the inner wall of the housing part 140, i.e., on the outer peripheral surface of the second sealing part

185 so as to reinforce airtightness between the second sealing part 185 and the housing part 140.

[0058] According to the sealing part 180 as constructed above, a sealing structure is implemented in which the first sealing part 181 comes close contact with the outer wall of the rod part 160, the second sealing part 185 comes close contact with the inner wall of the housing part 140. Thus, the sealing structure hermetically seals the inside of the housing part 140 so as to prevent the liquid detergent from leaking through a gap defined between the rod part 160 and the housing part 140.

[0059] The sealing part 180 is detachably coupled to the rod part 160. According to this embodiment, the rod part 160 includes a coupling projection 168 formed thereon. The sealing part 180 includes a recess part 182 formed at one side thereof so as to confront the coupling projection 168 so that the coupling projection 168 can be detachably coupled to the recess part 182.

[0060] The coupling projection 168 is formed at the rod part 160, more specifically at an end of the discharge part 161 so as to be protruded toward the sealing part 180. Preferably, the coupling projection 168 is formed to have a hook-shaped end. In addition, the recess part 182 is concavely formed between the first sealing part 181 and the second sealing part 185 so as to correspond the shape of the coupling projection 168.

[0061] An assembling process of the rod part 160 and the sealing part 180 will be described hereinafter in brief.

[0062] First, the sealing part 180 is coupled to the discharge part 161 so that the coupling projection 168 formed at an end of the discharge part 161 is fittingly coupled to the recess part 182. Thereafter, the suction part 165 is fittingly coupled to the discharge part 161 while being inserted through the penetrated inside of the first sealing part 181.

[0063] As a result, the sealing part 180 is disposed in a space defined between the outer surface of the discharge part 161 and the inner surface of the suction part 165 so as to implement a sealing structure in which the first sealing part 181 is brought into close contact at the inner peripheral surface thereof with the outer wall of the rod part 160 and the second sealing part 185 is brought into close contact at the outer peripheral surface thereof with the inner wall of the housing part 140. In addition, the suction part 165 is coupled to the discharge part 161 so as to form the rod part 160, and supports the other end of the sealing part 180 to suppress escape of the sealing part 180.

[0064] The pump unit 130 according to this embodiment may include an elastic member 135. The elastic member 135 is disposed within the housing part 140 to allow the nozzle unit 120 moved to the second position (b) to be moved to the first position (a). Preferably, the elastic member 135 may be a coil spring that is supported at one end thereof by the retaining step 143 of the housing part 140, and is supported at the other end thereof by the underside of the rod part 160 or the sealing part 180. The elastic member 135 upwardly moves the rod part

160 descended by the nozzle unit 120 moved to the second position (b), and provides an elastic force to allow the rod part 160 and the nozzle unit 120 to be moved to the first position (a).

[0065] The device 100 for supplying a liquid detergent of this embodiment, may include a nozzle manipulating part 190 for moving the nozzle unit 120. The nozzle manipulating part 190 includes a driving unit 192 and a cam part 194. The driving unit 192 generates a rotational force. The driving unit 192 may include a motor for generating a rotational force. According to this embodiment, the driving force required by the motor of the driving unit 192 is sufficient as long as it is a force capable of moving the nozzle unit 120 to the second position (b), i.e., a force capable of overcoming the elastic force of the elastic member 135. Thus, the driving unit 192 may include an inexpensive small-sized motor instead of an expensive large-sized motor.

[0066] The cam part 194 is rotated eccentrically by the driving unit 192, and is brought into close contact at the outer peripheral surface thereof with the pressing surface 122 of the nozzle unit 120. By virtue of the cam part 194, when a small diameter portion of the cam part 194 comes into close contact with the pressing surface 122, the nozzle unit 120 is positioned in the first position (a) (see FIG. 3). On the other hand, when a large diameter portion of the cam part 194 comes into close contact with the pressing surface 122 by rotation of the cam part 194, the nozzle unit 120 is moved to the second position (b) by being pushed by the cam part 194 (see FIG. 5).

[0067] FIG. 5 is a cross-sectional view illustrating a device for supplying a liquid detergent shown in FIG. 3 in a state of being operated, and FIG. 6 is an enlarged cross-sectional view illustrating the principal parts of first and second opening and closing parts shown in FIG. 5.

[0068] Hereinafter, the operation and effects of the device 100 for supplying a liquid detergent according to this embodiment will be described with reference to FIGs. 3 to 6.

[0069] As shown in FIG. 3, when the nozzle manipulating part 190 is operated to cause the pressing surface 122 to be pressed by the contact with the large diameter portion (1) of the cam part 194 as shown in FIG. 5 in a state in which the nozzle unit 120 is positioned in the first position (a), the nozzle unit 120 is moved to the second position (b) from the first position (a). Here, it is illustrated that the liquid detergent supplied from the detergent supply unit 110 stays in the housing part 140.

[0070] When the nozzle unit 120 is moved to the second position (b), the rod part is operated in cooperation with the movement of the nozzle unit 120 so that it descends. Accordingly, the liquid detergent supplied from the detergent supply unit 110 and stayed in the housing part 140 is introduced into the flow channel F through the second inlet 166 positioned at the lower portion of the suction part 165.

[0071] The liquid detergent introduced into the flow channel F is discharged to the nozzle unit 120 through

the outlet 162 positioned at the upper portion of the discharge part 161. The second opening and closing part 170 opens the outlet 162 as the ball valve (not shown) ascends by the oil pressure of the liquid detergent discharged through the outlet 162.

[0072] The liquid detergent discharged to the nozzle unit 120 through the outlet 162 is supplied to the connection duct part 125 through the ejection passageway 124. The liquid detergent supplied to the connection duct part 125 can be introduced into the tub 2 (see FIG. 1).

[0073] As shown in FIG. 3, when the nozzle manipulating part 190 is operated to cause the small diameter portion of the cam part 194 to come into close contact with the pressing surface 122, a pressing force against the nozzle unit 120 is released. Accordingly, the rod part 160 is moved upwardly by the elastic force of the elastic member 135, and the nozzle unit 120 is moved to the first position (a) in response to the movement of the rod part 160.

[0074] Like this, when the nozzle unit 120 is moved, the discharge of the liquid detergent through the outlet 162 is suspended and the ball valve of the second opening and closing part 170 is seated on the retaining step 163 formed around the outlet 162 to close the outlet 162.

[0075] By virtue of this operation, the ball valve of the first opening and closing part 570 ascends to open the first inlet 142 by the vacuum pressure produced by introduction of the liquid detergent into the nozzle unit 120 from the inside of the housing part 140 when the second opening and closing part 170 is opened. As a result, the liquid detergent received in the detergent supply unit 110 and the connection part 145 is supplied to and stays in the housing part 140 through the opened first inlet 142.

[0076] Such introduction of the liquid detergent can continue as the operation of the nozzle manipulating part 190, i.e., the rotation of the cam part 194 is performed continuously, and thus the movements of the nozzle unit 120 to the first position (a) and the second position (b) are repeatedly executed.

[0077] Furthermore, since the pump unit 130 introduces a certain amount of the liquid detergent each time the nozzle unit 120 is moved, when the operation of the nozzle manipulating part 190 is controlled, i.e., the number of movements of the nozzle unit 120 and the number of introductions of the liquid detergent by the pump unit 130 are controlled by controlling the number of rotations of the cam part 194, a desired amount of the liquid detergent can be introduced into the tub 2.

[0078] Therefore, according to the device 100 for supplying a liquid detergent of this embodiment, the liquid detergent is supplied automatically, thereby making it possible to ensure timely supply of the liquid detergent in the desired amount without the trouble of allowing the user to introduce the liquid detergent piecemeal when washing.

[0079] In addition, the device 100 for supplying a liquid detergent of this embodiment has a structure in which the second opening and closing part 170 stably closes

the outlet 162 except when the nozzle unit 120 is moved to the second position (b) to cause the liquid detergent to be supplied normally such that the liquid detergent continues to be discharged to the nozzle unit 120 through the outlet 162 or the washing water from the water supply hose 10 can be prevented backflowing into the pump unit 130 or the detergent supply unit 110 through the outlet 162.

[0080] Moreover, the device 100 for supplying a liquid detergent of this embodiment can introduce the liquid detergent using an inexpensive small-sized motor instead of an expensive large-sized motor, thereby reducing the entire volume and weight of the device and saving the manufacturing costs.

[0081] Besides, the device 100 for supplying a liquid detergent of this embodiment includes a sealing part 180 that can be detachably coupled to the rod part 160 to hermetically seal the inside of the housing part 140, so that the liquid detergent stayed in the housing part 140 can be prevented from leaking to the outside through a gap defined between the rod part 160 and the housing part 140 and an abraded or damaged sealing part 180 can be easily replaced with new one.

[0082] While the present invention has been described in connection with the exemplary embodiment illustrated in the drawings, it is merely illustrative and the invention is not limited to these embodiments. It will be appreciated by a person having an ordinary skill in the art that various equivalent modifications and variations of the embodiments can be made without departing from the spirit and scope of the present invention. In addition, while the present invention has been described by way of an example of a drum type washing machine, it is merely illustrative and can also be applied in other type washing machine, but not the drum type washing machine. Therefore, the true technical scope of the present invention should be defined by the technical spirit of the appended claims.

Claims

1. A device for supplying a liquid detergent, comprising:
 - a detergent supply unit configured to supply the liquid detergent;
 - a nozzle unit provided so as to be able to move to a first position or a second position, and configured to inject the liquid detergent supplied from the detergent-supply unit; and
 - a pump unit disposed between the detergent supply unit and the nozzle unit and configured to receive a supply of the liquid detergent from the detergent-supply unit when the nozzle unit is moved to the first position and supply the detergent to the nozzle unit when the nozzle unit is moved to the second position.

2. The device of claim 1, wherein the pump unit comprises:

a housing part including a first inlet formed at a lower portion thereof so as to allow the liquid detergent to be introduced thereto from the detergent supply unit, and configured to allow the liquid detergent supplied to the housing part from the detergent supply unit to temporarily stays therein;

a first opening and closing part configured so as to open and close the first inlet;

a rod part operated in cooperation with the movement of the nozzle unit to supply the liquid detergent stayed in the housing part to the nozzle unit, the rod part including an outlet formed therein so as to discharge the liquid detergent to the nozzle unit; and

a second opening and closing part configured so as to open and close the outlet of the rod part.

3. The device of claim 2, wherein the rod part comprises:

a discharge part connected to the nozzle unit and formed with the outlet; and

a suction part connected to the discharge part, and including a second inlet formed therein so as to allow the inside of the housing part to fluidically communicate with the discharge part.

4. The device of claim 2, wherein the pump unit further comprises a sealing part coupled to the rod part so as to hermetically seal the inside of the housing part.

5. The device of claim 4, wherein the sealing part comprises:

a first sealing part configured to be brought into close contact at an inner peripheral surface thereof with an outer wall of the rod part; and

a second sealing part configured to be brought into close contact at an outer peripheral surface thereof with an inner wall of the housing part.

6. The device of claim 5, wherein the second sealing part comprises an airtight projection formed on a surface thereof so as to contact with the inner wall of the housing part.

7. The device of claim 4, wherein the rod part comprises a coupling projection formed thereon, and the sealing part comprises a recess part formed at one side thereof so that the coupling projection can be detachably coupled to the recess part.

8. The device of claim 2, wherein the pump unit further

comprises an elastic member disposed within the housing part to allow the nozzle unit moved to the second position to be moved to the first position.

9. The device of claim 2, wherein at least one of the first opening and closing part and the second opening and closing part comprises a ball valve operated in cooperation with the movement of the rod part to open and close the outlet.

10. The device of claim 1, further comprising a nozzle manipulating part configured to move the nozzle unit.

11. The device of claim 10, wherein the nozzle manipulating part comprises:

a driving unit configured to generate a rotational force; and

a cam part configured to be rotated eccentrically by the driving unit and brought into close contact at the outer peripheral surface thereof with the nozzle unit to move the nozzle unit.

Fig. 1

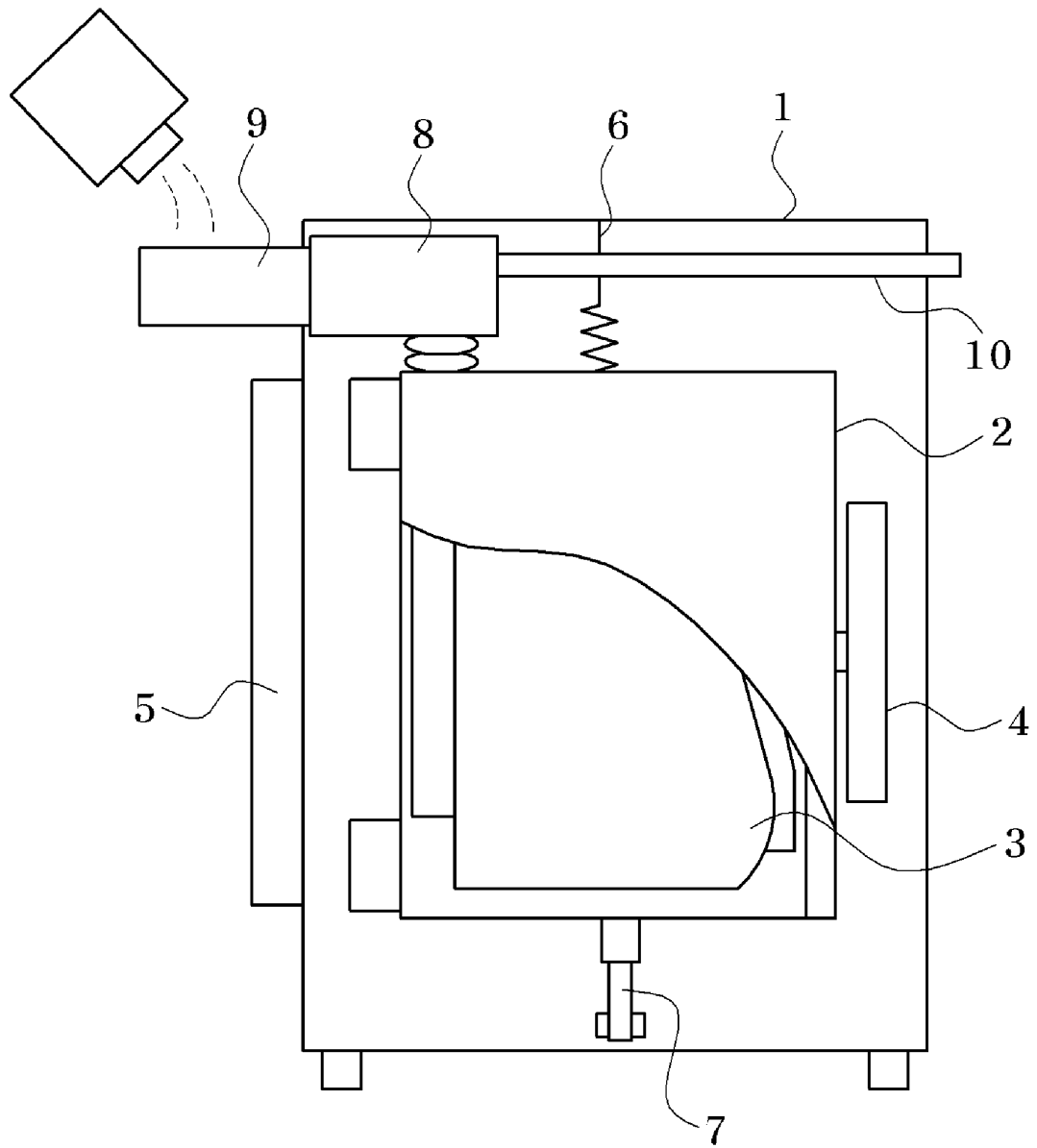


Fig. 2

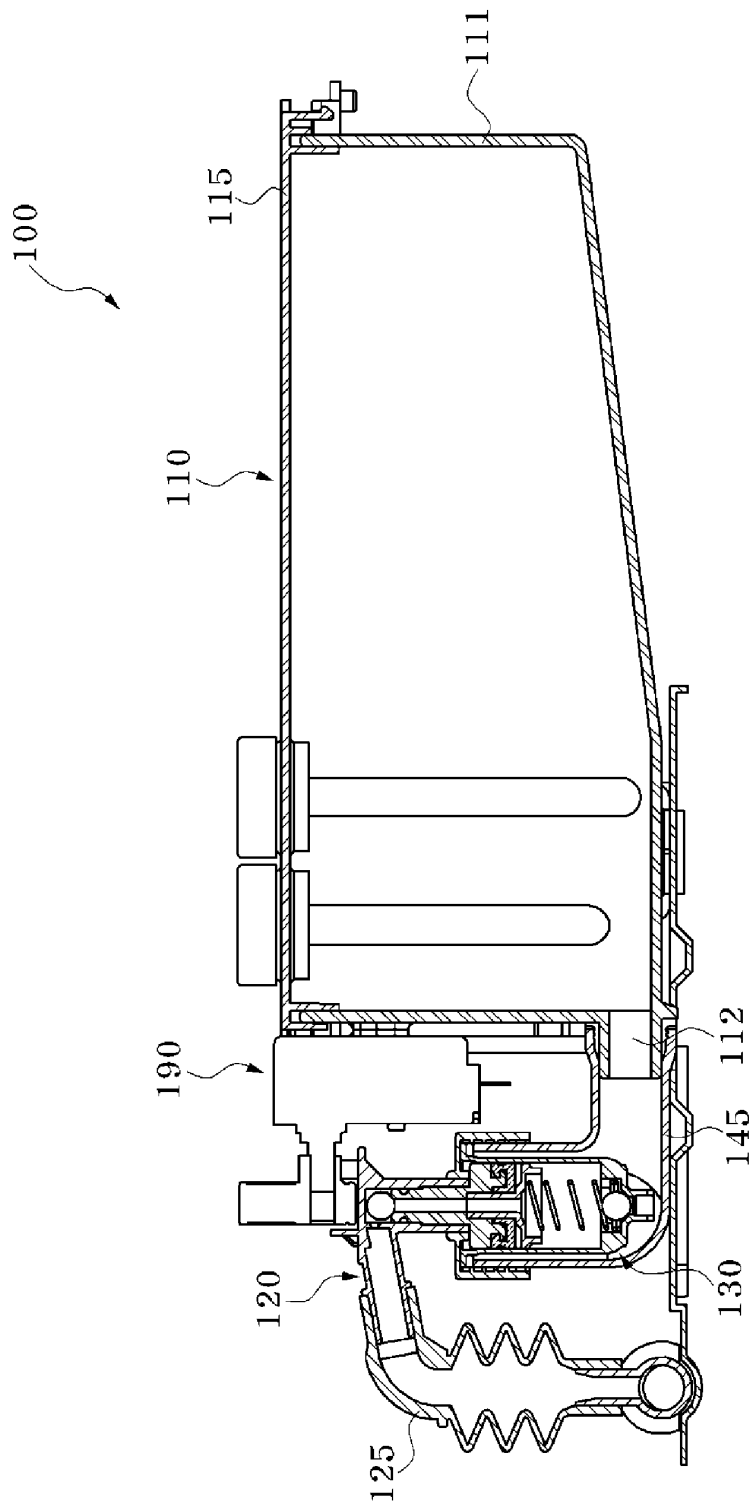


Fig. 3

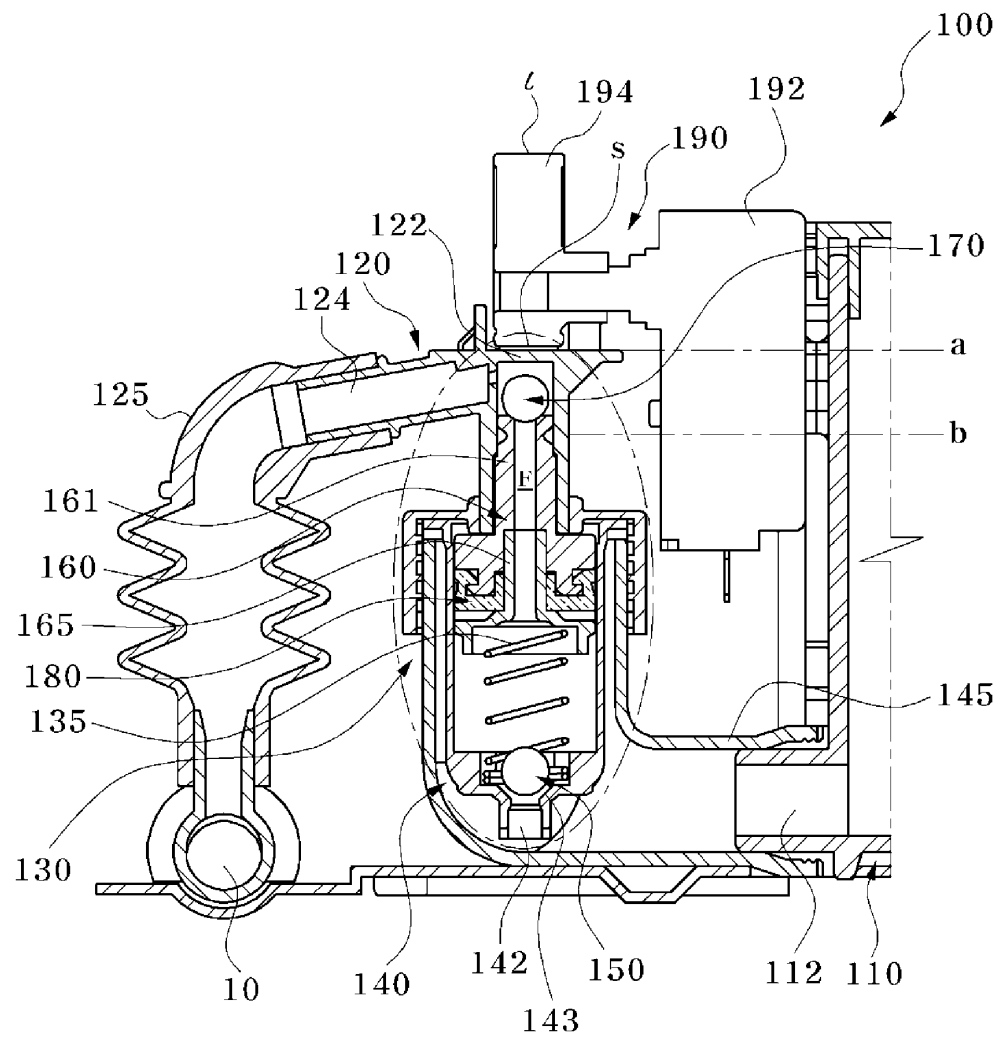


Fig. 4

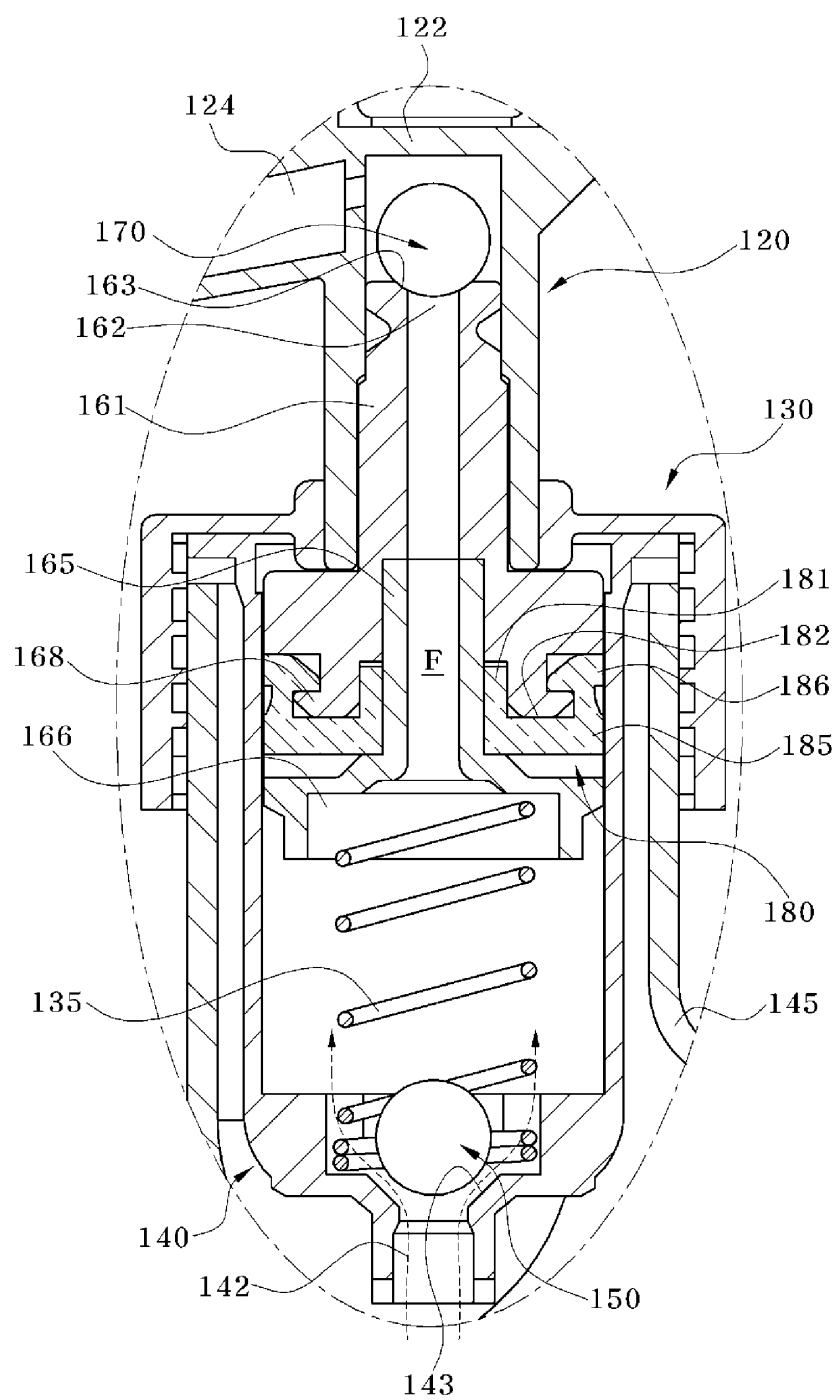


Fig. 5

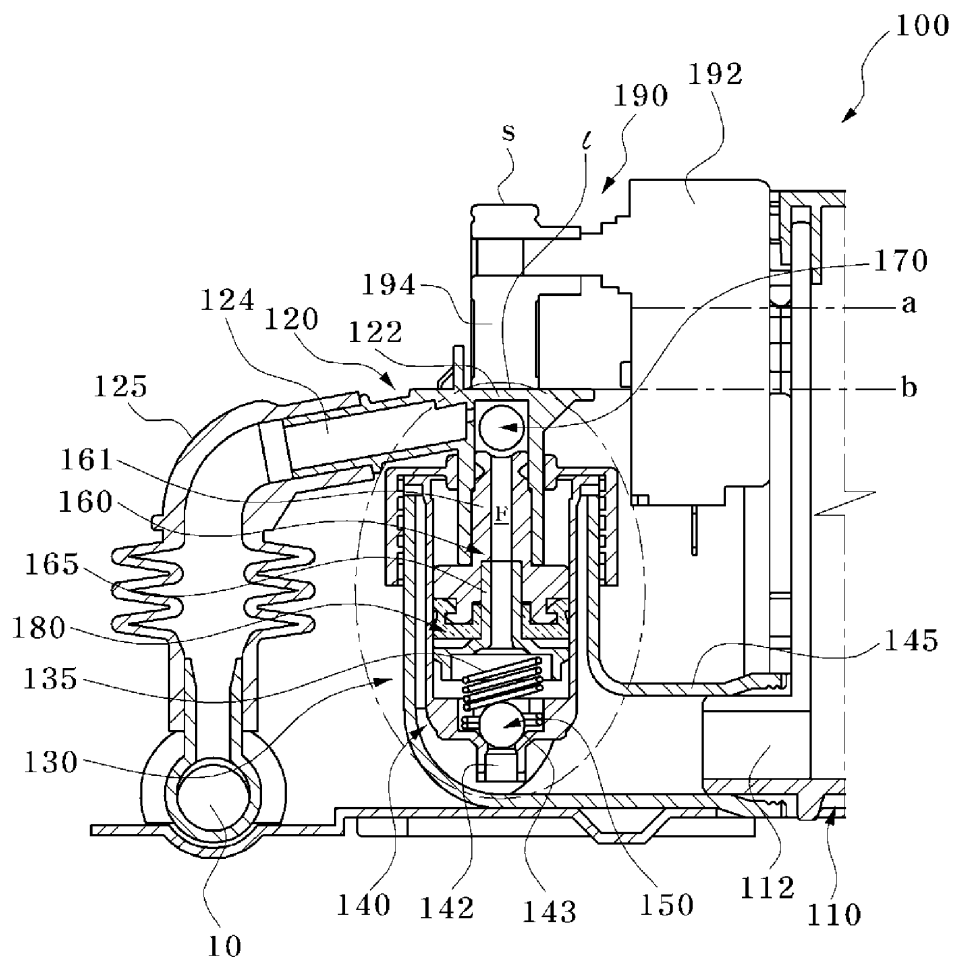


Fig. 6

