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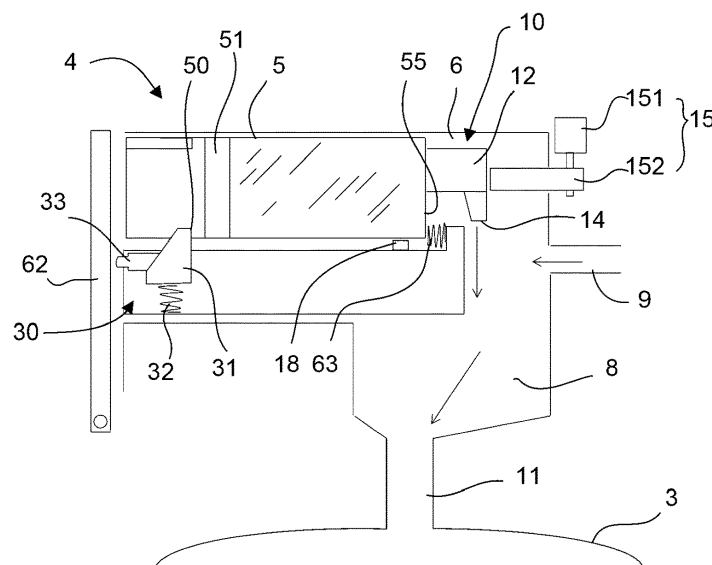
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**(54) WASHING MACHINE**

(57) The present invention provides a washing machine, including a treating agent input device (4). The treating agent input device (4) includes an independent treating agent container (5). A pressing-type suction device is mounted on the treating agent container. The suction device includes a reciprocating pressure head (12) and a conveying channel (13) connected to the pressure head and in fluid communication with the treating agent container (5). The pressure head (12) includes a liquid outlet (14). A pressure applying device controlled by a control device is disposed opposite to the pressure head,

and can push the pressure head (12) to move in a direction towards the treating agent container, to pump a treating agent out of the treating agent container. The independent treating agent container (5) may be taken out of the mounting chamber, which is convenient for overall replacement, or addition of the treating agent to the treating agent container (5). The treating agent is not in direct contact with any electrical device, so that sealing requirements do not need to be considered, and the complexity of assembly is reduced.

**FIG. 2****EP 3 960 923 A1**

## Description

**[0001]** The present invention relates to a washing machine, and in particular, to the technical field of adding a clothes treating agent to a washing machine.

**[0002]** A washing machine is generally provided with a clothes treating agent input device that contains a pre-added treating agent and inputs the treating agent to a washing chamber during running of a washing program. In an existing liquid/colloidal treating agent input device, a treating agent is generally in contact with electric parts. These electric parts include gear pumps, peristaltic pumps, valves, vacuum pumps, and the like for pumping liquid. The liquid flows into a pump body and then flows out. It is extremely inconvenient to change a type of treating agent. In addition, most gear pumps and peristaltic pumps are expensive and bulky, occupy a large space in mass production, and have high costs.

**[0003]** In most existing treating agent input devices, the treating agent is in contact with air, so that it is difficult to ensure that the treating agent does not dry out after being stored for a long time, especially when used in high-temperature situations, such as near a heating part or high-temperature part, or beside a drying tunnel of a laundry dryer. If not used by a user for a long time, water in the treating agent evaporates and dries out, which increases the viscosity, and even affects the operation of the pump body.

**[0004]** An existing treating agent input device generally uses contact sensing, that is, a probe or sensor is in contact with the liquid to sense whether a remaining amount of the treating agent is insufficient. This type of sensing is prone to errors, such as an impact of liquid level fluctuations, a tilt angle of the whole machine, and the viscosity of the liquid (if the liquid is viscous, the liquid sticks to the sensor, which is related to surface tension thereof). In addition, it is inconvenient to change a type of liquid.

**[0005]** Some bottled treating agent input devices are provided with a valve at an outlet. After the valve is opened, a liquid or colloidal treating agent flows out from the outlet under the action of gravity. Due to the limitation of an internal space and structure of the washing machine, the outlet is often set on a side surface instead of a bottom surface of a mounted treating agent bottle. Therefore, residues are prone to remaining, and it is difficult to completely empty the treating agent, thereby resulting in waste.

**[0006]** An objective of the present invention is to provide a washing machine, to improve a treating agent input device.

**[0007]** Embodiments of the present invention provide a washing machine, including a treating agent input device for inputting a liquid or colloidal treating agent into a washing chamber. The treating agent input device includes an independent treating agent container, a mounting chamber for receiving the treating agent container, and a mixing chamber for receiving the treating agent and water. The mixing chamber is connected to a water

inlet passage and a liquid outlet passage separately. The liquid outlet passage is connected to the washing chamber, to introduce a mixed liquid of the treating agent and water into the washing chamber. A pressing-type suction device is mounted on the treating agent container, and the suction device includes a reciprocating pressure head and a conveying channel connected to the pressure head and in fluid communication with the treating agent container. The pressure head includes a liquid outlet, and the liquid outlet is in space communication with the mixing chamber, so that the treating agent enters the mixing chamber after passing through the liquid outlet. A pressure applying device controlled by a control device is disposed opposite to the pressure head, and can push the pressure head to move in a direction towards the treating agent container, to pump the treating agent out of the treating agent container.

**[0008]** The independent treating agent container may be taken out of the mounting chamber, which is convenient for overall replacement, or addition of the treating agent to the treating agent container. It is especially convenient for overall replacement of the treating agent container and the suction device containing the treating agent as a whole. Therefore, it is very convenient for a user to change a type of the treating agent, and there is no need to consider the residual and cross contamination of different treating agents. Moreover, the treating agent is completely separated from an electrical device, which greatly prolongs the service life of the electrical device and reduces costs of the electrical device required for pumping liquid. The treating agent directly falls into the mixing chamber from the liquid outlet of the pressure head, so that sealing requirements do not need to be considered, and the complexity of assembly is reduced. Moreover, while improving the user experience and the product grade, this type of bottle-pressing treating agent container is not expensive and is suitable for mass production.

**[0009]** The suction device includes an elastic device that acts on the pressure head to reset the pressure head.

**[0010]** A check valve that restricts the treating agent in the conveying channel from returning to the treating agent container is disposed in the conveying channel. A bottom end of the elastic device abuts against the check valve.

**[0011]** The pressure applying device includes a drive portion and a movable portion driven by the drive portion, and the movable portion is driven to push the pressure head to move.

**[0012]** In some implementations, the drive portion includes a motor, and the movable portion includes a reciprocating mechanism or a rotating mechanism, so that the pressure head can be pushed for a plurality of times under the drive of the motor.

**[0013]** In some implementations, the movable portion includes a cam.

**[0014]** In some implementations, the pressure applying device includes a solenoid valve, and the solenoid

valve includes a valve plug that can reciprocate to push the pressure head.

**[0015]** In some implementations, the control device is configured to control, according to a pre-obtained required delivery amount of the treating agent, a quantity of times for which the pressure applying device pushes the pressure head. A stroke of the pressure applying device to push the pressure head is generally fixed. Therefore, an amount of the treating agent that can be pumped out each time the pressure head is pushed is pre-measured, and then the quantity of times for which the pressure head needs to be pushed is calculated according to the required delivery amount of the treating agent. The required delivery amount of the treating agent may be set by the user, or obtained by the control device according to a program setting or a detected related parameter during running of a program.

**[0016]** In some implementations, the mounting chamber is provided with a mouth, and the treating agent container is mounted in the mounting chamber through the mouth.

**[0017]** In some implementations, the washing machine includes a cover portion for closing or opening the mouth.

**[0018]** In some implementations, the washing machine includes a detection device that is disposed adjacent to the treating agent container and that can send a detected signal associated with a remaining amount of the treating agent to the control device. Because the detection device is not in contact with the treating agent, a detection result is not affected by the viscosity of the treating agent, or the like and can be more accurate, and the service life of the detection device is prolonged.

**[0019]** In some implementations, the detection device includes a load cell disposed under the treating agent container. By using the load cell, the remaining amount of the treating agent can be obtained intuitively, so that the user can be reminded in time.

**[0020]** In some implementations, the mounting chamber is provided with a stop portion that limits axial movement of the treating agent container. The stop portion can ensure that the treating agent container does not move when the pressure applying device pushes the pressure head, so that a liquid pumping action can be performed effectively and accurately.

**[0021]** In some implementations, the stop portion includes a stop block disposed close to the treating agent container, and the stop block can move between a first position at which the axial movement of the treating agent container is blocked and a second position at which the axial movement of the treating agent container is allowed.

**[0022]** In some implementations, an unlocking member acts on the stop block, so that the stop block moves from the first position to the second position.

**[0023]** In some implementations, an elastic member is disposed in the mounting chamber, and the elastic member acts on an end surface of the treating agent container close to the pressure head along an axial direction of the treating agent container, so that when the stop block

moves from the first position to the second position, the treating agent container is pushed to move in a direction of exiting the mounting chamber. In this way, at least a part of the treating agent container may be pushed out of the mounting chamber, thereby making it convenient for the user to take out the treating agent container and facilitating replacement or addition of the treating agent.

**[0024]** The foregoing embodiments may be combined in various ways.

**[0025]** Some specific implementations of the present invention are illustrated below with reference to the accompanying drawings.

FIG. 1 is a schematic three-dimensional diagram of a washing machine, in which a cover portion disposed on a mouth of a mounting chamber is opened to expose a treating agent container;

FIG. 2 is a schematic diagram of a treating agent input device according to an embodiment;

FIG. 3 is a schematic diagram of a treating agent input device according to another embodiment;

FIG. 4 is a schematic diagram of a treating agent container and a solenoid valve; and

FIG. 5 is a diagram of modules of a washing machine control circuit.

## DETAILED DESCRIPTION

**[0026]** As shown in FIG. 1, a washing machine 1 includes a box body 2. A washing chamber 3 (as shown in FIG. 2) for treating clothes is disposed in the box body 2. An independent treating agent input device 4 is further disposed in the box body, and may input a liquid or colloidal treating agent to the washing chamber 3 during running of a clothes treating program, especially a washing program.

**[0027]** The treating agent input device 4 includes an independent treating agent container 5 that may be accommodated in a mounting chamber 6 disposed in the box body 2. The mounting chamber 6 is provided with a mouth 61 disposed on a front side of the box body 2. The treating agent container 5 is mounted in the mounting chamber 6 through the mouth 61. The cover portion 62 for closing or opening the mouth 61 is hinged on the box body 2. A stop portion 7 is disposed close to the bottom of the treating agent container 5, to limit axial movement of the treating agent container 5.

**[0028]** As shown in FIG. 2, the treating agent input device 4 includes a mixing chamber 8 disposed adjacent to the mounting chamber 6. Actually, the mixing chamber 8 and the mounting chamber 6 are in space communication. The mixing chamber 8 is connected to a water inlet passage 9 and a liquid outlet passage 11 separately. The liquid outlet passage 11 is connected to the washing chamber 3, to introduce a mixed liquid of the treating agent and water into the washing chamber 3.

**[0029]** A pressing-type suction device 10 is mounted on the treating agent container 5. The suction device 10

includes a reciprocating pressure head 12 and a conveying channel 13 connected to the pressure head 12 and extending into the treating agent container 5 (as shown in FIG. 4). The pressure head 12 includes a liquid outlet 14. The liquid outlet 14 is in space communication with the mixing chamber 8, so that the treating agent enters the mixing chamber 8 after passing through the liquid outlet 14. In the embodiment shown in FIG. 2, the pressure head 12 is located above the mixing chamber 8, and the liquid outlet 14 is disposed downwards, so that the treating agent flows out of the liquid outlet 14 and then enters the mixing chamber 8 under the action of gravity. In another implementation, the mounting chamber 6 and the mixing chamber 8 may be alternatively connected by a pipe, and the treating agent enters the mixing chamber 8 through the pipe.

**[0030]** A pressure applying device 15 controlled by a control device 20 is disposed opposite to the pressure head 12, and can push the pressure head 12 to move in a direction towards the treating agent container 5, to pump the treating agent out of the treating agent container 5.

**[0031]** In the embodiment shown in FIG. 2, the pressure applying device 15 includes a drive portion 151 and a movable portion 152 driven by the drive portion 151. The movable portion 152 may include a reciprocating mechanism, a rotating mechanism, and the like, for example, include a cam. The drive portion 151 includes a motor. In an embodiment, the motor drives the cam to rotate, and the cam then pushes the pressure head 12 to move. The movable portion 152 in FIG. 2 represents a side structure of the cam. A front view thereof, that is, a view along an axis of rotation, is a normal cam structure. For a person skilled in the art, the relationship between the cam structure and the pressure head 12 may be understood with reference to the foregoing text and FIG. 2.

**[0032]** In the embodiment shown in FIG. 4, the pressure applying device 15 may further include a solenoid valve 153. The solenoid valve 153 includes a valve plug 154 that can reciprocate to push the pressure head 12, a first spring 155 acting on the valve plug 154 in an axial direction, and a coil 156 disposed around the valve plug 154. An electromagnetic force is generated by the coil 156 through electrification, and the electromagnetic force is removed after a power-off. The electromagnetic force fits in with the first spring 155 to cause the valve plug 154 to reciprocate.

**[0033]** The pressure applying device 15 is not limited to the foregoing specific embodiment, and may further include various other mechanisms that may periodically push adjacent members to move axially.

**[0034]** The control device 20 is configured to control, according to a pre-obtained required delivery amount of the treating agent, a quantity of times for which the pressure applying device 15 pushes the pressure head 12.

**[0035]** As shown in FIG. 4, the suction device 10 includes an elastic device 16 that acts on the pressure head 12 to reset the pressure head 12.

**[0036]** A check valve 17 that restricts the treating agent in the conveying channel 13 from returning to the treating agent container 5 is disposed in the conveying channel 13. A bottom end of the elastic device 16 abuts against the check valve 17. In the embodiment shown in FIG. 4, the check valve 17 is a round ball, and the elastic device 16 is a spring.

**[0037]** In the embodiment shown in FIG. 4, a piston 51 is disposed in the treating agent container 5. As the amount of the treating agent decreases, the piston 51 moves toward the pressure head 12 under the action of a pressure difference, so that the treating agent is fully used. The functional features of the parts and components are simply described in FIG. 4 merely in a schematic manner, and may be different in an actual application. For example, in an embodiment including the piston 51, the conveying channel 13 is made shorter, so that the treating agent in the treating agent container 5 may be fully discharged, reducing waste. In another embodiment, a straw may be connected to the bottom of the conveying channel 13, and a bottom mouth of the straw is located at the bottom of an internal space of the treating agent container 5, so that the treating agent may be fully discharged through the straw.

**[0038]** As shown in FIG. 1, FIG. 4, and FIG. 5, a detection device 18 is disposed in the mounting chamber 6 and adjacent to the treating agent container 5. A signal associated with a remaining amount of the treating agent may be obtained by using the detection device 18, and the signal is sent to the control device 20. The control device 20 may then send a remaining amount prompt signal according to information about the remaining amount of the treating agent. For example, a display device may be controlled to display the remaining amount of the treating agent, or a warning signal may be sent when the remaining amount is less than a set value, to remind the user to perform replacement.

**[0039]** In various embodiments, the detection device 18 may be a load cell disposed below the treating agent container 5, or may be an optical sensor that detects a liquid level change in the treating agent container 5 or a position of the piston 51. Alternatively, the position of the piston 51 may be detected in another manner, for example, by using a magnetic field induction sensor, and a magnetic substance is disposed in the piston 51.

**[0040]** Because the pressure applying device 15 exerts a thrust on the pressure head 12, a stop portion 30 that limits axial movement of the treating agent container 5 is disposed in the mounting chamber 6.

**[0041]** In the embodiment shown in FIG. 2, the stop portion 30 includes a stop block 31 disposed close to the bottom of the treating agent container 5.

**[0042]** The bottom of the stop block 31 is provided with a second spring 32. Under the action of the second spring 32, the stop block 31 may extend into the space in the mounting chamber 6, to fit in with a groove 50 on the treating agent container 5 to limit the axial movement of the treating agent container 5, and the stop block 31 is

in a first position in this case. An unlocking member 33 fits in with an oblique surface of the stop block 31 in a slidable manner. The user presses the unlocking member 33 to force the stop block 31 out of fitting in with the groove 50, thereby allowing the treating agent container 5 to move axially, and the stop block 31 is in a second position in this case.

**[0043]** In the embodiment shown in FIG. 3, compared with the embodiment shown in FIG. 2, the unlocking member is eliminated. When in the first position, a stop block 310 extends into the mounting chamber 6 and is blocked on a bottom surface 53 of the treating agent container 5. Alternatively, the stop block may extend into a groove 54 disposed on the bottom surface 53 of the treating agent container 5. If the treating agent container 5 needs to be taken out, the stop block 310 is pressed directly.

**[0044]** As shown in FIG. 2 and FIG. 3, a third spring 63 is disposed in the mounting chamber 6. The third spring 63 acts on an end surface 55 of the treating agent container 5 close to the pressure head 12 along an axial direction of the treating agent container 5. Therefore, after the movement limitation of the treating agent container 5 is lifted, that is, when the stop blocks 31 and 310 move from the first position to the second position, the treating agent container 5 is pushed to move in a direction of exiting the mounting chamber 6, thereby making it convenient for the user to take out the treating agent container 5 for replacement.

**[0045]** In addition to replacing the treating agent container 5, it is also feasible to make the treating agent container 5 openable so that the treating agent may be repeatedly added to the treating agent container.

**[0046]** The various specific implementations described above and shown in the accompanying drawings are only used to illustrate the present invention. Any variation made by a person of ordinary skill in the art to the present invention within the scope of the basic technical concept of the present invention shall fall within the protection scope of the present invention.

## Claims

1. A washing machine, comprising a treating agent input device (4) for inputting a liquid or colloidal treating agent into a washing chamber (3), **characterized in that:** the treating agent input device comprises an independent treating agent container (5), a mounting chamber (6) for receiving the treating agent container, and a mixing chamber (8) for receiving the treating agent and water, the mixing chamber is connected to a water inlet passage (9) and a liquid outlet passage (11) separately, the liquid outlet passage is connected to the washing chamber, to introduce a mixed liquid of the treating agent and water into the washing chamber, a pressing-type suction device (10) is mounted on the treating agent container, the

suction device comprises a reciprocating pressure head (12) and a conveying channel (13) connected to the pressure head and in fluid communication with the treating agent container, the pressure head comprises a liquid outlet (14), the liquid outlet is in space communication with the mixing chamber, so that the treating agent enters the mixing chamber after passing through the liquid outlet, and a pressure applying device (15) controlled by a control device (20) is disposed opposite to the pressure head, and can push the pressure head to move in a direction towards the treating agent container, to pump the treating agent out of the treating agent container.

2. The washing machine according to claim 1, **characterized in that:** the suction device comprises an elastic device (16) that acts on the pressure head to reset the pressure head.
3. The washing machine according to claim 2, **characterized in that:** a check valve (17) that restricts the treating agent in the conveying channel from returning to the treating agent container is disposed in the conveying channel.
4. The washing machine according to claim 3, **characterized in that:** a bottom end of the elastic device abuts against the check valve.
5. The washing machine according to claim 1, **characterized in that:** the pressure applying device comprises a drive portion (151) and a movable portion (152) driven by the drive portion, and the movable portion is driven to push the pressure head to move.
6. The washing machine according to claim 5, **characterized in that:** the drive portion comprises a motor, and the movable portion comprises a reciprocating mechanism or a rotating mechanism, so that the pressure head can be pushed for a plurality of times under the drive of the motor.
7. The washing machine according to claim 6, **characterized in that** the movable portion comprises a cam.
8. The washing machine according to claim 1, **characterized in that:** the pressure applying device comprises a solenoid valve (153), and the solenoid valve comprises a valve plug (154) that can reciprocate to push the pressure head.
9. The washing machine according to claim 1, **characterized in that:** the control device is configured to control, according to a pre-obtained required delivery amount of the treating agent, a quantity of times for which the pressure applying device pushes the pressure head.

10. The washing machine according to claim 1, **characterized in that:** the mounting chamber is provided with a mouth (61), and the treating agent container is mounted in the mounting chamber through the mouth. 5
11. The washing machine according to claim 10, **characterized by** comprising a cover portion (62) for closing or opening the mouth. 10
12. The washing machine according to claim 1, **characterized by** comprising a detection device (18) that is disposed adjacent to the treating agent container and that can send a detected signal associated with a remaining amount of the treating agent to the control device. 15
13. The washing machine according to claim 12, **characterized in that:** the detection device comprises a load cell disposed under the treating agent container. 20
14. The washing machine according to claim 1, **characterized in that:** the mounting chamber is provided with a stop portion (30) that limits axial movement of the treating agent container. 25
15. The washing machine according to claim 14, **characterized in that:** the stop portion comprises a stop block (31, 310) disposed close to the treating agent container, and the stop block can move between a first position at which the axial movement of the treating agent container is blocked and a second position at which the axial movement of the treating agent container is allowed. 30
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16. The washing machine according to claim 15, **characterized in that:** an unlocking member (33) acts on the stop block, so that the stop block moves from the first position to the second position. 40
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17. The washing machine according to claim 15, **characterized in that:** an elastic member (63) is disposed in the mounting chamber, and the elastic member acts on an end surface (55) of the treating agent container close to the pressure head along an axial direction of the treating agent container, so that when the stop block moves from the first position to the second position, the treating agent container is pushed to move in a direction of exiting the mounting chamber. 50
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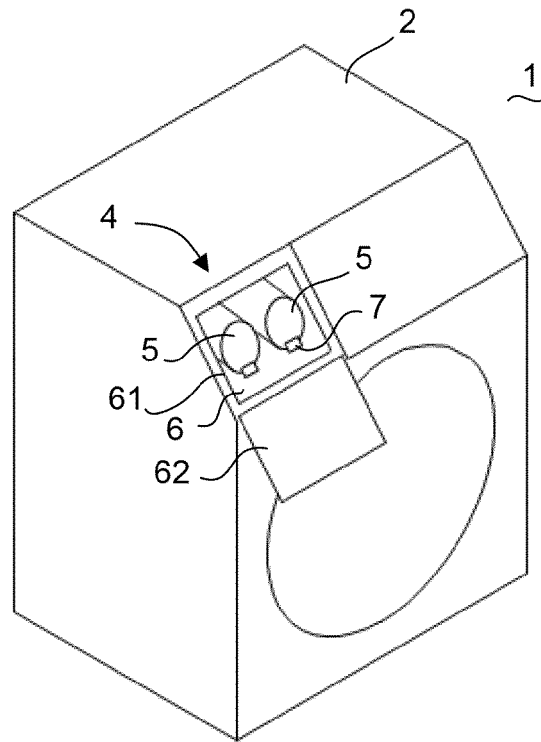


FIG. 1

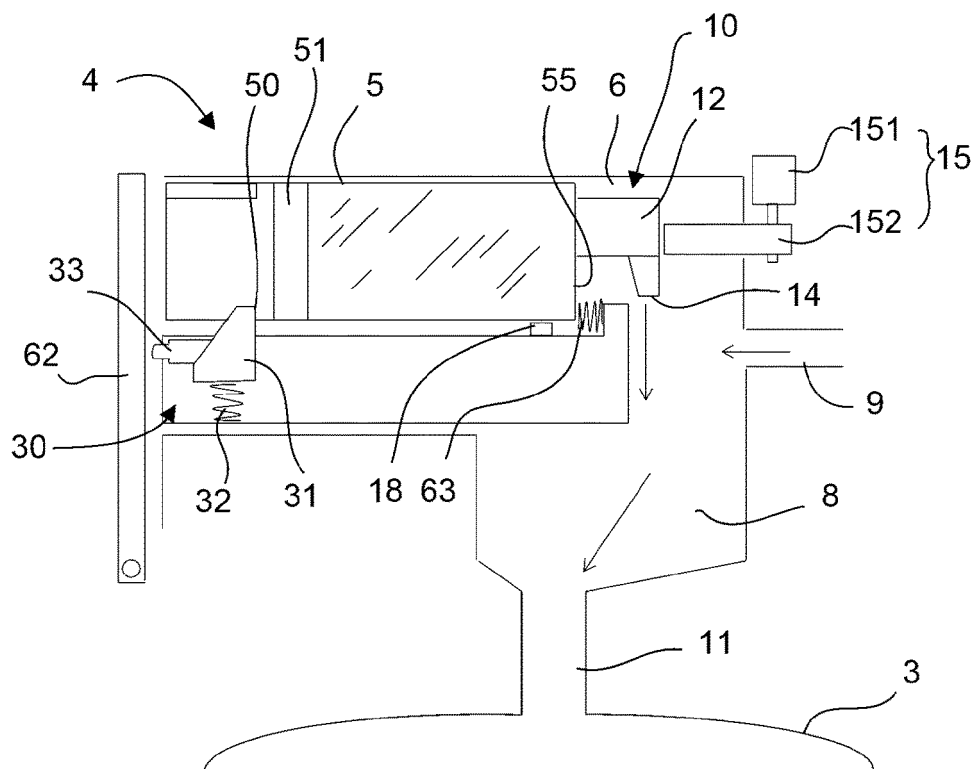


FIG. 2

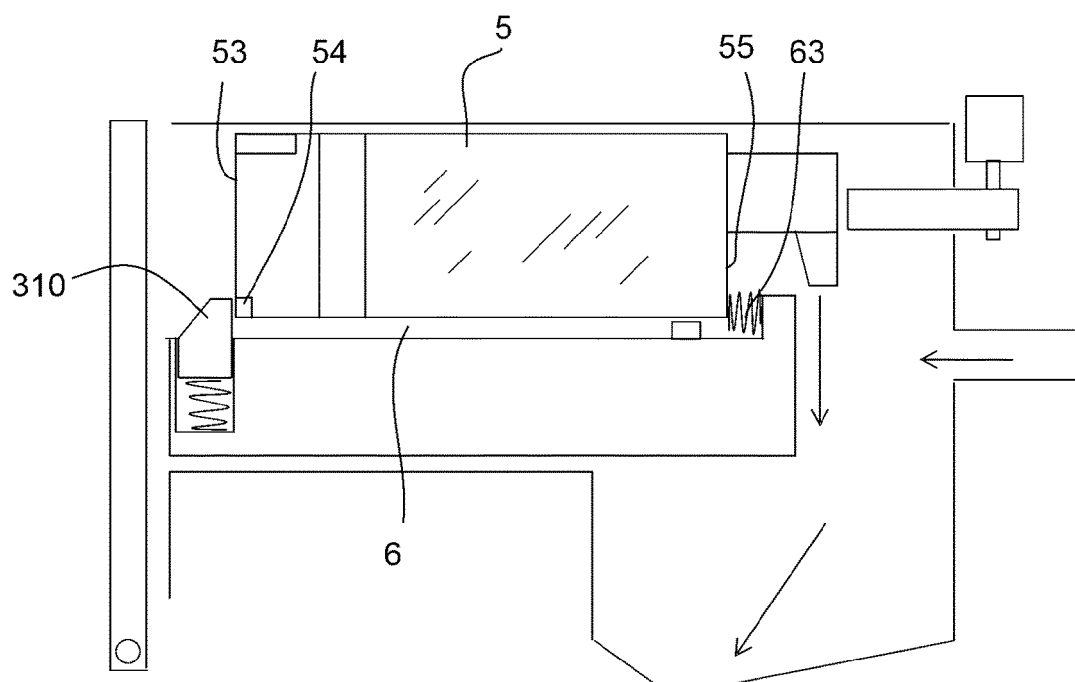


FIG. 3

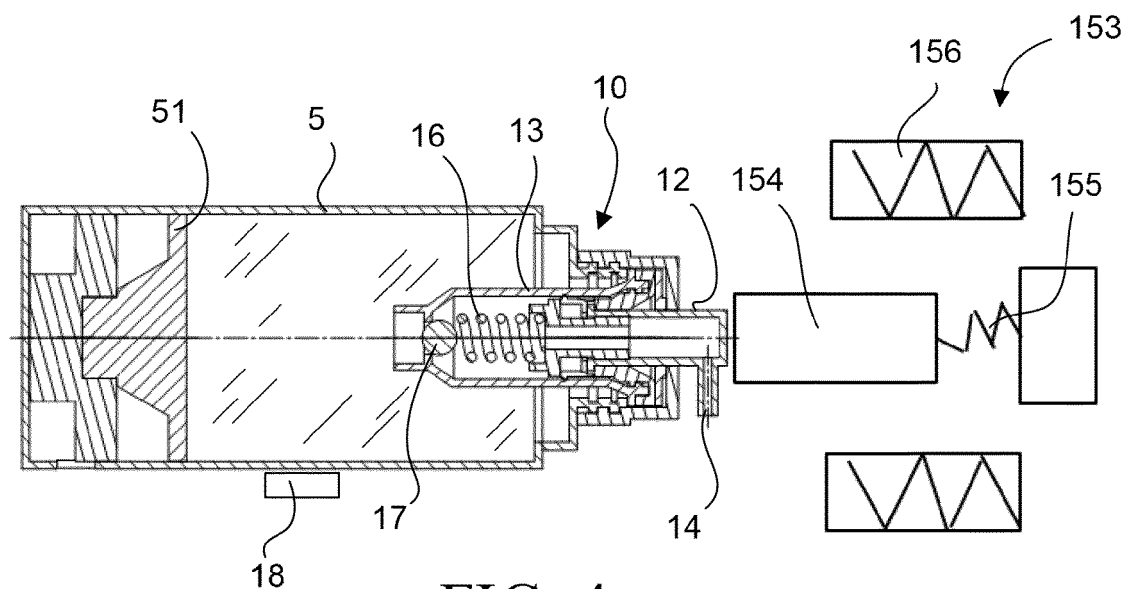


FIG. 4

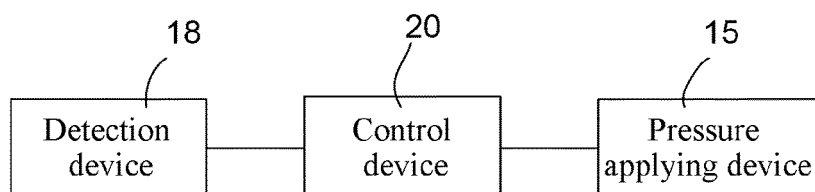


FIG. 5



## EUROPEAN SEARCH REPORT

Application Number

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| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                      |                                                            |                                         |
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| Category                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Citation of document with indication, where appropriate, of relevant passages        | Relevant to claim                                          | CLASSIFICATION OF THE APPLICATION (IPC) |
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|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | * paragraph [0099]; figure 39 *                                                      |                                                            |                                         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | -----                                                                                |                                                            |                                         |
| Y                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | KR 2010 0007472 U (.) 22 July 2010 (2010-07-22)                                      | 2-4                                                        | TECHNICAL FIELDS SEARCHED (IPC)         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | * abstract; figures *                                                                |                                                            | D06F<br>A47K<br>B05B                    |
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|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | -----                                                                                |                                                            |                                         |
| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                      |                                                            |                                         |
| Place of search<br><b>Munich</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                      | Date of completion of the search<br><b>14 January 2022</b> | Examiner<br><b>Sangiorgi, Massimo</b>   |
| CATEGORY OF CITED DOCUMENTS<br>X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document<br>T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>& : member of the same patent family, corresponding document |                                                                                      |                                                            |                                         |

# **ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO.**

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on  
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