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(54) **FRONT-LOADING WASHING MACHINE**

(57) A drum washing machine comprises a machine body (1), a container chamber (2) being formed in the machine body (1); a door body (3) being movably arranged on the machine body (1) for allowing the container chamber (2) to be opened and close; and a glass window (4) being arranged on the door body (3) for observing an inner drum (5) of the drum washing machine; a concave space (6) being formed by the glass window (4) being recessed towards the container chamber (2), and being provided with an opening outward; an additive chamber (7) is arranged in the concave space (6) of the glass window (4) for feeding additives into the additive chamber (7) from the opening outward, and the additive chamber (7) is a sealed chamber structure. The drum washing machine makes full use of a vacant structural space of a sealed glass door and window of an existing washing machine by providing a detergent feeding box, a softener feeding box and the like, so that a detergent box at an upper part of the drum washing machine is canceled and the integration of an operation panel is realized; and the appearance of the drum washing machine is improved, detergent replacement can be achieved conveniently and quickly, and customer experience is greatly improved.

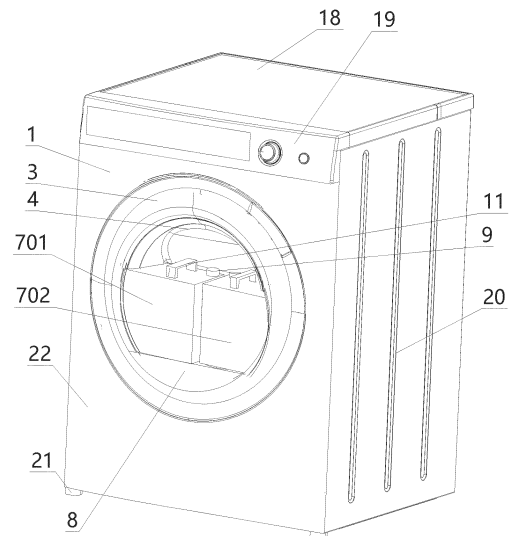


Fig. 1

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Description**TECHNICAL FIELD**

[0001] The disclosure belongs to the field of household appliances, and particularly relates to a drum washing machine.

BACKGROUND

[0002] Drum washing machines originated from Europe, a washing method of which is designed by imitating dummies beating clothes, that is, the clothes are lifted to a high position of a drum and fall to the water surface under gravity, and then the clothes are beaten by water so as to be cleaned. The drum washing machine consists of a stainless steel inner drum, a mechanical program controller, a housing which is protected through phosphating, electrophoresis and spraying, and a plurality of heavy cement blocks which are used for balancing the huge centrifugal force generated when the drum rotates. And the combined action of repeated movements of the inner drum, detergent and water, makes the clothes clean. At present, most drum washing machines in the market use individually designed feeding boxes to put detergent. Such a design, on the one hand, complicates the structure of the drum washing machines, making the number of parts too large, resulting in prolonged production cycle, and is not conducive to the maintenance of the drum washing machines in the future. On the other hand, consumers can not directly see the amount of the detergent put in the feeding boxes, making the amount of the detergent either too large or too small, and the washing effect is not guaranteed; and in addition, the individually designed detergent feeding boxes can cause damage to the articles to be washed, and after washing, a lot of washing foam may remain on door glass of the drum washing machines, which makes the washing machines look unclean.

[0003] The Chinese patent with an application number of CN201510123069.8 discloses a drum washing machine, a door glass of which is fixed in a front door of the drum washing machine through a door seal. The door glass is provided with a chamber used for storing detergent and having an opening in the top. The bottom of the chamber is provided with at least one discharge port used for discharging the detergent to a washing drum of the drum washing machine. A discharge component used for discharging the detergent is arranged at the discharge port in the chamber. A water inlet end of a water inlet pipe is communicated with a water inlet component of the drum washing machine, a water outlet end is communicated with the chamber. And a water guide port of the water outlet end and the discharge component are opposite in a staggered mode; and meanwhile, the disclosure also relates to a washing method of the drum washing machine.

[0004] With the progress of technology, the existing

washing machines start to have the automatic detergent adding function; that is, detergent and softener which can be used for many times of washing are poured into a detergent dispenser box at one time, and then is automatically added as needed during each time of washing. And the detergent in the detergent storage container is put into a washing drum through a feeding pump to participate in washing. However, since detergent packaged bought in containers with different sizes needs to be added to the dispenser, a lot of trouble may be caused to consumers. Besides, the amount of detergent left can not be observed in time in the washing process. Moreover, an additive chamber of the drum washing machine occupies the upper part of the washing machine, which is not only incongruous with an operation panel, affecting the attractiveness of the washing machine, but also is inconvenient for the consumers to use because it occupies a large space of the washing machine.

[0005] Therefore, in order to solve the above-mentioned problems, it is necessary to improve the deficiencies and defects of the prior art. The disclosure provides a washing machine which makes full use of the vacant structural space of a sealed glass door and window of an existing washing machine by providing a detergent feeding box, a softener feeding box and the like, so that an additive chamber at the upper part of the washing machine is canceled, the integration of an operation panel is realized, and side-by-side arrangement of the operation panel and the additive chamber is avoided. In this way, the attractiveness of the washing machine is greatly improved, detergent replacement can be achieved conveniently and quickly, operation is easy, and the former vacant space is well utilized; and after washing, a glass door remains clean, greatly improving consumer experience.

[0006] In view of this, the present disclosure is proposed.

SUMMARY

[0007] The technical problem to be solved by the present disclosure is to overcome the defects of the prior art, and to provide a drum washing machine which can overcome the above problems or at least partially solve the above problems.

[0008] In order to solve the above technical problems, the basic idea of the technical solution adopted by the disclosure is as follows:

a drum washing machine comprises a machine body, a container chamber being formed in the machine body; a door body being movably arranged on the machine body for allowing the container chamber to be opened and closed; a glass window being arranged on the door body for observing an inner drum of the drum washing machine, a concave space, being formed by the glass window being recessed towards the container chamber, and being provided with an opening outward, an additive chamber is arranged in the concave space of the glass

window for feeding additives into the additive chamber from opening outward, and the additive chamber is a sealed chamber structure.

[0009] A bottom of the additive chamber is provided with a water outlet for discharging the additives in the additive chamber, and the bottom of the additive chamber is also provided with a sealing gasket corresponding to the water outlet. By arranging the sealing gasket at the bottom of the additive chamber, the sealing effect of the additive chamber is improved, and after the additive chamber is installed on the washing machine body, the overall sealing performance is ensured.

[0010] In addition, a storage box base for installing the additive chamber is arranged on a side, close to a bottom of the drum washing machine, of the concave space. The storage box base supports the additive chamber, so that the additive chamber is more stable. In this way, the overall structure of the drum washing machine is more compact, and the electrical wiring and water pipe distribution in the drum washing machine are more reasonable and look neater; and meanwhile, through the downward flow arrangement, the utilization rate of detergent in the additive chamber is higher, and the use cost of consumers is reduced.

[0011] Further, the storage box base is provided with a one-way valve for discharging the additives corresponding to the water outlet of the additive chamber, the one-way valve is connected with a liquid outlet pipe, and the liquid outlet pipe transports the additives in the additive chamber into an outer drum in the machine body.

[0012] Further, the top of the one-way valve is in a shape easy to puncture or push away the sealing gasket, and preferably, the shape of the top of the one-way valve is tapered so that the additive chamber can be connected more conveniently when installed onto the storage box base.

[0013] Meanwhile, the sealing gasket is provided with a penetration port which allows the one-way valve to be inserted therein easily corresponding to the water outlet, and when an outlet of the additive chamber is separated from the one-way valve, the penetration port is self-sealed, so that when the additive chamber is taken out from the concave space of a glass frame, the additives in the additive chamber do not flow out from the penetration port.

[0014] A gap is arranged between the detergent additive chamber and the glass window, and further, the gap is provided with a heat insulating substance, such as foam and a vacuum barrier.

[0015] Besides, the top of the additive chamber is provided with a filling port for allowing liquid to be fed conveniently, and the filling port is provided with a sealing cover for preventing the liquid from flowing out. The arrangement of the filling port enables the consumers to add the detergent to the additive chamber more conveniently and quickly, which improves the washing efficiency and enhances consumer experience as well. The sealing cover is used for opening and closing the filling port of

the additive chamber, and ensures that detergent in the additive chamber does not flow to the outside along with the shaking or vibration of the additive chamber when the consumers move or install the additive chamber and during the operation of the drum washing machine.

[0016] In one embodiment, the additive chamber and the storage box base are made of transparent material so that the consumers can observe how much detergent is left from outside.

[0017] In one embodiment, the additive chamber is made of transparent material so that the consumers can observe how much detergent is left from outside.

[0018] In one embodiment, the storage box base is made of transparent material so that the consumers can observe how much detergent is left from outside.

[0019] In one embodiment, the storage base further comprises a feeding pump arranged at a bottom of a liquid storage box, one end of the feeding pump is communicated with the liquid outlet pipe, and the other end of the feeding pump is communicated with the outer drum of the washing machine through a feeding pipe. The detergent in the additive chamber is directly fed into the outer drum of the washing machine through the feeding pump, so that the feeding amount is strictly controlled, the washing efficiency is improved, the washing cost is reduced, the service life of washed clothes is prolonged, and consumer experience is improved.

[0020] In one embodiment, the liquid storage box further comprises a feeding pump arranged at the bottom of the liquid storage box, one end of the feeding pump is communicated with the liquid outlet pipe, the other end of the feeding pump is communicated with a mixing chamber, and the mixing chamber is communicated with the outer drum of the washing machine through a feeding pipe. The detergent in the additive chamber is fed into the mixing chamber through the feeding pump to be mixed first, and then fed into the outer drum of the washing machine, so that the detergent mixing degree is ensured, and the washing effect is further improved; and meanwhile, the feeding amount is strictly controlled, the washing efficiency is improved, the washing cost is reduced, the service life of washed clothes is prolonged, and consumer experience is improved.

[0021] After the technical solution is adopted, compared with the prior art, the disclosure has the following beneficial effects:

1. An operation panel is integrated and no longer arranged side by side with the additive chamber, thus looking neater.
2. The vacant structural space of an existing glass door and window is fully utilized, the arrangement of the additive chamber is effectively realized, and the satisfaction degree of the consumers is effectively improved.
3. The detachment or use of the additive chamber is more convenient, and it is also more convenient to add the detergent, and detach or clean the additive

chamber, which can be realized from the outside of the drum washing machine.

4. The additive chamber is arranged in the concave space of the glass window, so that the overall structure of the drum washing machine is more compact, the internal electrical wiring and water pipe distribution are more reasonable, the cost is reduced, and consumer experience is enhanced.

[0022] Specific embodiments of the present disclosure will be described in further detail with reference to the accompanying drawings below.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023] As a part of the present disclosure, the accompanying drawings are used to provide a further understanding of the present disclosure. The illustrative embodiments of the present disclosure and the description thereof are used to explain the present disclosure, but do not constitute an improper limitation of the present disclosure. Obviously, the drawings in the following description are only some embodiments. For those of ordinary skilled in the art, other drawings can be obtained according to these drawings without creative labor.

[0024] In the drawings:

Fig. 1 is an isometric view of a drum washing machine of the present disclosure;

Fig. 2 is another isometric view of the drum washing machine of the present disclosure;

Fig. 3 is a front view of the drum washing machine of the present disclosure;

Fig. 4 is a left section view of the drum washing machine of the present disclosure;

Fig. 5 is a partial enlarged view of the drum washing machine of the present disclosure;

Fig. 6 is a partial enlarged view of a one-way valve of the drum washing machine of the present disclosure; and

Fig. 7 is an enlarged view of a sealing gasket of the drum washing machine of the present disclosure.

In the drawings: 1. machine body; 2. container chamber; 3. door body; 4. glass window; 5. inner drum; 6. concave space; 7. additive chamber; 701. detergent storage box; 702. softener storage box; 8. storage box base; 9. filling port; 10. sealing cover; 11. box handle; 12. water outlet; 13. one-way valve; 14. liquid outlet pipe; 141. first liquid outlet pipe section; 142. second liquid outlet pipe section; 15. feeding pump; 16. feeding pipe; 17. mixing chamber; 18. upper panel; 19. control panel; 20. side panel; 21. foot; 22. front panel; 23. door handle; 24. sealing window cushion; 25. drain hose; 26. drain pump; 27. back panel; 28. transmission shaft; 29. motor; 30. outer drum; 31. power key; 32. knob; 33. display screen; 34. sealing gasket; 35. penetration port; 36. sealing unit; 361. first sealing unit part; 362. second sealing unit part.

[0025] It should be noted that the drawings and the written description are not intended to limit the scope of the inventive concept in any way, but to explain the inventive concept to those skilled in the art by referring to specific embodiments.

DETAILED DESCRIPTION

[0026] In order to make the purpose, technical solution and advantages of the embodiments of the present disclosure clearer, the technical solution in the embodiments will be clearly and completely described below with reference to the drawings in the embodiments of the present disclosure. The following embodiments are used to illustrate the present disclosure, but are not used to limit the scope of the present disclosure.

[0027] In the description of the present disclosure, it should be noted that the orientation or position relationship indicated by the terms such as "upper", "lower", "front", "rear", "left", "right", "vertical", "inner" and "outer" is based on the orientation or position relationship shown in the drawings, only for convenience of describing the present disclosure and simplifying the description, and does not indicate or imply that an indicated device or element must have a specific orientation, or be constructed and operated in a specific orientation, and therefore cannot be understood as a limitation of the present disclosure.

[0028] In the description of the present disclosure, it should be noted that the terms "install" and "connect" should be understood in a broad sense unless otherwise specified and defined. For example, it can be fixed connection, detachable connection or integrated connection; it can be mechanical connection or electrical connection; and it can be direct connection or indirect connection through intermediate media. For those of ordinary skilled in the art, the specific meaning of the above terms in the present disclosure can be understood in specific situations.

[0029] As shown in Figs. 1-7, a drum washing machine according to the present disclosure comprises a machine body 1, a container chamber 2 being formed in the machine body 1; a door body 3 being movably arranged on the machine body 1 for opening and closing the container chamber 2; and a glass window 4 being arranged on the door body 3 for observing an inner drum 5 of the drum washing machine. The glass window 4 is recessed towards the container chamber 2 to form a concave space 6, and the concave space 6 is provided with an opening outward. At least one additive chamber 7 is arranged in the concave space 6 of the glass window 4, additives are fed into the additive chamber 7 from the opening outward, and the additive chamber 7 is a sealed chamber structure.

[0030] The additive chamber 7 according to the present disclosure comprises a detergent storage box 701 and a softener storage box 702 which are used for containing liquid detergent and softener. Of course, those

skilled in the art can put in other liquid or washing products in other states, such as washing powder, according to daily family cleaning conditions. Furthermore, it is not limited to the detergent storage box 701 and the softener storage box 702. The additive chamber 7 and/or a storage box base 8 according to the present disclosure can also be made of transparent material to allow consumers to observe the amount of liquid stored in the additive chamber 7 from the outside, so as to realize timely replenishment.

[0031] In addition, the drum washing machine of the present disclosure further comprises a back panel 27, a side panel 20, a front panel 22, an upper panel 18 and a door handle 23 arranged on the washing machine door body 3, and feet 21 are arranged at the bottom of the washing machine to support the washing machine. A control panel 19 is arranged on the upper part of the front panel 22 of the washing machine, and the control panel 19 is provided with a power key 31 (not shown in the drawings), a knob 32 (not shown in the drawings) and a display screen 33 (not shown in the drawings), and a door is also arranged on the front panel 22 of the washing machine. A consumer can open the door to take out or put in clothes. An outer washing drum 30, the inner drum 5 and a motor 29 are coaxially arranged inside the drum washing machine, and the inner drum 5 and the motor 29 are connected through a transmission shaft 28, so that the motor 29 drives the inner drum 5 to rotate. The front panel 22 and the outer drum 30 are connected through a sealing window cushion 24, the door and the glass window 4 are fixedly connected into a whole, the glass window 4 presses the sealing window cushion 24 to realize sealing. A gap exists between the detergent additive chamber and the glass window; and further, the gap is provided with a heat insulating substance, such as foam and a vacuum barrier.

[0032] As shown in Figs. 1-7, according to the drum washing machine of the present disclosure, the bottom of the additive chamber 7 is provided with at least one water outlet 12 for discharging the additives in the additive chamber 7, and the bottom of the additive chamber 7 is also provided with a sealing gasket 34 corresponding to the water outlet 12. By arranging the sealing gasket 34 at the bottom of the additive chamber 7, the sealing effect of the additive chamber 7 is improved, and after the additive chamber is installed on the washing machine body, the overall sealing performance is ensured.

[0033] Further, the water outlet 12 is communicated with a liquid outlet pipe 14 through a sealing unit 36, the arrangement of the water outlet 12 and the liquid outlet pipe 14 enables the additives added to the additive chamber 7 to be diluted by adding water, thus ensuring that the additives can smoothly enter the outer drum 30 of the washing machine, and the arrangement of the sealing unit 36 ensures the overall sealing effect when the water is added to the additive chamber 7 or the additive chamber 7 is detached.

[0034] The concave space 6 is provided with the stor-

age box base 8 for installing the additive chamber 7 on the side close to the bottom of the washing machine, and the storage box base 8 supports the additive chamber 7, so that the additive chamber 7 is more stable. In this way, the overall structure of the drum washing machine is more compact, and the electrical wiring and water pipe distribution in the drum washing machine are more reasonable and look neater; and meanwhile, through the downward flow arrangement, the utilization rate of the detergent in the additive chamber 7 is higher, and the use cost of the consumers is reduced.

[0035] Further, the top of the additive chamber 7 is provided with a filling port 9 which allows the detergent to be fed conveniently, and the filling port 9 is provided with a sealing cover 10 for preventing the detergent from flowing out. The arrangement of the filling port 9 enables the consumers to add the detergent to the additive chamber 7 more conveniently and quickly, which improves the washing efficiency and enhances consumer experience as well. And the sealing cover 10 is used for opening and closing the filling port 9 of the additive chamber 7, and ensures that the detergent in the additive chamber 7 does not flow to the outside along with the shaking or vibration of the additive chamber 7 when the consumers move or install the additive chamber 7 and during the operation of the drum washing machine.

[0036] Further, the top of the additive chamber 7 is also provided with a handle for facilitating the installation and movement of the additive chamber 7, so that the additive chamber 7 is more stable during installation and movement, the consumers can hold the additive chamber 7 more conveniently, and the overall design becomes user-friendlier.

[0037] Further, the storage box base 8 is provided with a one-way valve 13 for discharging the additives corresponding to the water outlet 12 of the additive chamber 7. The one-way valve 13 is connected with a liquid outlet pipe 14, and the liquid outlet pipe 14 transports the additives in the additive chamber 7 into the outer drum 30 of the machine body 1.

[0038] Further, the liquid outlet pipe 14 comprises a first liquid outlet pipe section 141 fixedly arranged at the bottom of the additive chamber 7 and communicated with the water outlet 12 and a second liquid outlet pipe section 142 arranged inside the machine body 1. The first liquid outlet pipe section 141 and the second liquid outlet pipe section 142 are communicated through a positioning hole arranged in the bottom of a glass frame. By dividing the liquid outlet pipe 14 into two sections, opening and closing of the door body 3 are facilitated, complex pipe layout is avoided, the overall structure is more compact on the premise of ensuring the realization of functions, and the positioning of the additive chamber 7 is further ensured through the arrangement of the positioning hole.

[0039] Further, the sealing unit 36 comprises a first sealing unit part 361 arranged on the glass window 4 and a second sealing unit part 362 arranged on the second liquid outlet pipe section 142 and abutting the first sealing

unit part 361. The two parts of the sealing unit 36 enable the door body 3 and the machine body 1 to be effectively sealed when the water is added into the additive chamber 7.

[0040] In addition, the top of the one-way valve 13 is in a shape which can easily puncture or push away the sealing gasket 34, and preferably, the top of the one-way valve 13 is in a pointed cone shape so that the additive chamber 7 can be connected more conveniently when installed onto the storage box base 8.

[0041] Meanwhile, the sealing gasket 34 is provided with a penetration port 35 which allows the one-way valve 13 to be inserted therein easily corresponding to the water outlet 12, and when an outlet of the additive chamber 7 is separated from the one-way valve 13, the penetration port 35 is self-sealed. So that when the additive chamber 7 is taken out from the concave space 6 of the glass frame, the additives in the additive chamber 7 do not flow out from the penetration port 35.

[0042] Besides, the top of the additive chamber 7 is provided with a filling port 9 which allows liquid to be fed conveniently, and the filling port 9 is provided with a sealing cover 10 for preventing the liquid from flowing out. The arrangement of the filling port 9 enables the consumers to add the detergent to the additive chamber 7 more conveniently and quickly, which improves the washing efficiency and enhances consumer experience as well. The sealing cover 10 is used for opening and closing the filling port 9 of the additive chamber 7, and ensures that the detergent in the additive chamber 7 does not flow to the outside along with the shaking or vibration of the additive chamber 7 when the consumers move or install the additive chamber 7 and during the operation of the drum washing machine.

[0043] As shown in Fig. 4, according to the drum washing machine of the present disclosure, in one embodiment, the storage box base 8 further comprises a feeding pump 15 arranged at the bottom of a liquid storage box, the feeding pump 15 is one of Venturi pump, peristaltic pump, piston pump, gear pump and other types of feeding pumps 15. One end of the feeding pump 15 is communicated with the liquid outlet pipe 14, and the other end of the feeding pump is communicated with the outer drum 30 of the washing machine through a feeding pipe 16. The detergent in the additive chamber 7 is directly fed into the outer drum 30 of the washing machine through the feeding pump 15, so that the feeding amount is strictly controlled, the washing efficiency is improved, the washing cost is reduced, the service life of washed clothes is prolonged, and consumer experience is improved.

[0044] In one embodiment, the liquid storage box further comprises a feeding pump 15 arranged at the bottom of the liquid storage box. One end of the feeding pump 15 is communicated with the liquid outlet pipe 14, the other end of the feeding pump 15 is communicated with a mixing chamber 17, and the mixing chamber 17 is communicated with the outer drum 30 of the washing machine through a feeding pipe 16. The detergent in the additive

chamber 7 is fed into the mixing chamber 17 through the feeding pump 15 to be mixed first, and then fed into the outer drum 30 of the washing machine, so that the detergent mixing degree is ensured, and the washing effect is further improved; and meanwhile, the feeding amount is strictly controlled, the washing efficiency is improved, the washing cost is reduced, the service life of the washed clothes is prolonged, and consumer experience is improved.

[0045] Generally speaking, according to the present disclosure, the additive chamber 7 and clothes treatment agent boxes such as a softener box are arranged in the concave space 6 of the glass window 4, wherein the additive chamber 7 is detachably connected with the glass window 4. In addition, the glass window 4 and the additive chamber 7 are provided with the corresponding water outlet 12, and the water outlet 12 is hermetically connected with the liquid outlet pipe 14 and is connected with an electromagnetic valve to realize water inflow and impact the detergent placed by the consumers. And meanwhile, the glass window 4 and the additive chamber 7 are provided with a corresponding water drainage port through which water flows along with the detergent into a washing drum, the water drainage port is also sealed, the water drainage port is connected with a drain hose 25, and the drain hose 25 is connected with a drain pump 26.

[0046] The drum washing machine according to the present disclosure makes full use of the vacant structural space of a sealed glass door and window of an existing washing machine by providing a detergent feeding box, a softener feeding box and the like, so that the additive chamber 7 at the upper part of the washing machine is canceled, the integration of an operation panel is realized, and side-by-side arrangement of the operation panel and the additive chamber 7 is avoided. In this way, the attractiveness of the washing machine is greatly improved, detergent replacement can be achieved conveniently and quickly, operation is easy, and the former vacant space is well utilized; in the process of adding the detergent or replacing the additive chamber 7, the door body 3 does not need to be opened, and the operation can be completed from the outside while the washing machine door body 3 is closed; and after washing, a glass door remains clean, greatly improving consumer experience.

Embodiment 1

[0047] As shown in Figs. 1-7, a drum washing machine according to the present embodiment comprises a machine body 1, a container chamber 2 being formed in the machine body 1; a door body 3 being movably arranged on the machine body 1 for opening and closing the container chamber 2; and a glass window 4 being arranged on the door body 3 for observing an inner drum 5 of the drum washing machine. The glass window 4 is recessed towards the container chamber 2 to form a concave space 6, and the concave space 6 is provided with an

opening outward. At least one additive chamber 7 is arranged in the concave space 6 of the glass window 4, additives are fed into the additive chamber 7 from the outside opening, and the additive chamber 7 is of a sealed chamber structure. The bottom of the additive chamber 7 is provided with at least one water outlet 12 for discharging the additives in the additive chamber 7; and besides, the concave space 6 is provided with a storage box base 8 for installing the additive chamber 7 on the side close to the bottom of the drum washing machine, and the storage box base 8 supports the additive chamber 7, so that the additive chamber 7 is more stable.

[0048] The concave space 6 is provided with the storage box base 8 for installing the additive chamber 7 on the side close to the bottom of the washing machine, and the storage box base 8 supports the additive chamber 7, so that the additive chamber 7 is more stable. In this way, the overall structure of the drum washing machine is more compact, and the electrical wiring and water pipe distribution in the drum washing machine are more reasonable and look neater; and meanwhile, through the downward flow arrangement, the utilization rate of detergent in the additive chamber 7 is higher, and the use cost of consumers is reduced.

[0049] Further, the top of the additive chamber 7 is provided with a filling port 9 which allows the detergent to be fed conveniently, and the filling port 9 is provided with a sealing cover 10 for preventing the detergent from flowing out. The arrangement of the filling port 9 enables the consumers to add the detergent to the additive chamber 7 more conveniently and quickly, which improves the washing efficiency and enhances consumer experience as well. And the sealing cover 10 is used for opening and closing the filling port 9 of the additive chamber 7, and ensures that the detergent in the additive chamber 7 does not flow to the outside along with the shaking or vibration of the additive chamber 7 when the consumers move or install the additive chamber 7 and during the operation of the drum washing machine.

[0050] Further, the top of the additive chamber 7 is also provided with a handle for facilitating the installation and movement of the additive chamber 7, so that the additive chamber 7 is more stable during installation and movement, the consumers can hold the additive chamber 7 more conveniently, and the overall design becomes user-friendlier.

[0051] According to the drum washing machine in the present embodiment, the bottom of the additive chamber 7 is provided with a water outlet 12 for discharging the additives in the additive chamber 7, and the bottom of the additive chamber 7 is also provided with a sealing gasket 34 corresponding to the water outlet 12. By arranging the sealing gasket 34 at the bottom of the additive chamber 7, the sealing effect of the additive chamber 7 is improved, and after the additive chamber is installed on the washing machine body, the overall sealing performance is ensured.

[0052] Further, the water outlet 12 is communicated

with a liquid outlet pipe 14 through a sealing unit 36, the arrangement of the water outlet 12 and the liquid outlet pipe 14 enables the additives added to the additive chamber 7 to be diluted by adding water, thus ensuring that the additives can smoothly enter an outer drum 30 of the washing machine, and the arrangement of the sealing unit 36 ensures the overall sealing effect when the water is added to the additive chamber 7 or the additive chamber 7 is detached.

[0053] Besides, the storage box base 8 is provided with a one-way valve 13 for discharging the additives corresponding to the water outlet 12 of the additive chamber 7, the one-way valve 13 is connected with a liquid outlet pipe 14, and the liquid outlet pipe 14 transports the additives in the additive chamber 7 into the outer drum 30 of the machine body 1.

[0054] Further, the top of the one-way valve 13 is in a pointed cone shape so that the additive chamber 7 can be connected more conveniently when installed onto the storage box base 8.

[0055] Further, the liquid outlet pipe 14 comprises a first liquid outlet pipe section 141 fixedly arranged at the bottom of the additive chamber 7 and communicating with the water outlet 12 and a second liquid outlet pipe section 142 arranged inside the machine body 1. The first liquid outlet pipe section 141 and the second liquid outlet pipe section 142 are communicated through a positioning hole arranged in the bottom of a glass frame. By dividing the liquid outlet pipe 14 into two sections, opening and closing of the door body 3 are facilitated, complex pipe layout is avoided, the overall structure is more compact on the premise of ensuring the realization of functions, and the positioning of the additive chamber 7 is further ensured through the arrangement of the positioning hole.

[0056] Further, the sealing unit 36 comprises a first sealing unit part 361 arranged on the glass window 4 and a second sealing unit part 362 arranged on the second liquid outlet pipe section 142 and abutting the first sealing unit part 361. The two parts of the sealing unit 36 enable the door body 3 and the machine body 1 to be effectively sealed when the water is added into the additive chamber 7.

[0057] Meanwhile, the sealing gasket 34 is provided with a penetration port 35 which allows the one-way valve 13 to be inserted therein easily corresponding to the water outlet 12, and when an outlet of the additive chamber 7 is separated from the one-way valve 13, the penetration port 35 is self-sealed, so that when the additive chamber 7 is taken out from the concave space 6 of the glass frame, the additives in the additive chamber 7 do not flow out from the penetration port 35.

[0058] Besides, the top of the additive chamber 7 is provided with a filling port 9 which allows liquid to be fed conveniently, and the filling port 9 is provided with a sealing cover 10 for preventing the liquid from flowing out. The arrangement of the filling port 9 enables the consumers to add the detergent to the additive chamber 7

more conveniently and quickly, which improves the washing efficiency and enhances consumer experience as well. The sealing cover 10 is used for opening and closing the filling port 9 of the additive chamber 7, and ensures that the detergent in the additive chamber 7 does not flow to the outside along with the shaking or vibration of the additive chamber 7 when the consumers move or install the additive chamber 7 and during the operation of the drum washing machine.

[0059] The additive chamber 7 in the present embodiment is a detergent storage box 701 and a softener storage box 702 for containing the detergent and softener respectively. When a consumer is ready to use the washing machine to wash clothes, the detergent and softener prepared in advance are put into the detergent storage box 701 and the softener storage box 702 respectively through the filling port 9 first, and the sealing cover 10 is closed. And then, a power key 31 (not shown in the drawings) and a control knob 32 (not shown in the drawings) provided on a control panel 19 are activated to start the washing program of the washing machine. It is worth noting that the door body 3 of the washing machine can be in an open state or a closed state in this process. The adding of the detergent into the additive chamber 7 of the present disclosure can be achieved from the outside.

[0060] When the additive chamber 7 needs to be replaced or the consumer feels it is inconvenient to add the detergent, the additive chamber 7 can be taken out from the concave space 6 in the door body 3 through a box handle 11 arranged at the top of the additive chamber 7.

Embodiment 2

[0061] As shown in Figs. 1-7, the present embodiment is a further limitation of Embodiment 1. The additive chamber 7 and the storage box base 8 in the present embodiment are made of transparent material so that consumers can observe how much liquid is left in the additive chamber 7 from outside, and then decide whether to add more detergent before use each time, and can also add the detergent during use.

Embodiment 3

[0062] As shown in Figs. 1-7, the present embodiment is different from Embodiment 2 in that one of the additive chamber 7 and the storage box base 8 in the present embodiment is made of transparent material, so that consumers can observe how much liquid is left in the additive chamber 7 from outside, and then decide whether to add more detergent before use each time, and can also add the detergent during use.

Embodiment 4

[0063] As shown in Figs. 1-7, the present embodiment is a further limitation of any one of Embodiments 1-3 described above. A detergent storage box 701 and a softener storage box 702 in the present embodiment are of an integrally formed structure, and one additive chamber 7 is divided into two chambers, namely, the detergent storage box 701 and the softener storage box 702.

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Embodiment 5

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[0064] As shown in Figs. 1-7, the present embodiment is a further limitation of any one of Embodiments 1-3 described above. A detergent storage box 701 and a softener storage box 702 in the present embodiment are two detachable parts, and the detergent storage box 701 and the softener storage box 702 are connected by a clip into one integral additive chamber 7.

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Embodiment 6

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[0065] As shown in Figs. 1-7, the present embodiment is a further limitation of any one of Embodiments 1-5 described above. The height of an additive chamber 7 in the present embodiment is smaller than the radius of a glass window 4 so that the additive chamber 7 can be taken out from a concave space 6 of the glass window 4, thus ensuring the installation convenience of the additive chamber 7, facilitating the use of consumers and improving consumer experience.

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Embodiment 7

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[0066] As shown in Figs. 1-7, the present embodiment is different from Embodiment 6 in that the height of an additive chamber 7 in the present embodiment is equal to the radius of a glass window 4.

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Embodiment 8

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[0067] As shown in Figs. 1-7, the present embodiment is a further limitation of any one of Embodiments 1-7 described above. A storage box base 8 further comprises a feeding pump 15 arranged at the bottom of a liquid storage box. One end of the feeding pump 15 is communicated with a liquid outlet pipe 14, and the other end is communicated with an outer drum 30 of a washing machine through a feeding pipe 16. Detergent in an additive chamber 7 is directly fed into the outer drum 30 of the washing machine through the feeding pump 15, so that the feeding amount is strictly controlled, the washing efficiency is improved, the washing cost is reduced, the service life of washed clothes is prolonged, and consumer experience is improved.

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Embodiment 9

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[0068] As shown in Figs. 1-7, the present embodiment is a further limitation of any one of Embodiments 1-7 described above. A liquid storage box further comprises a feeding pump 15 arranged at the bottom of the liquid storage box, one end of the feeding pump 15 is commu-

nicated with a liquid outlet pipe 14, the other end is communicated with a mixing chamber 17, and the mixing chamber 17 is communicated with an outer drum 30 of a washing machine through a feeding pipe 16. Detergent in an additive chamber 7 is fed into the mixing chamber 17 through the feeding pump 15 to be mixed first, and then fed into the outer drum 30 of the washing machine, so that the detergent mixing degree is ensured, and the washing effect is further improved; and meanwhile, the feeding amount is strictly controlled, the washing efficiency is improved, the washing cost is reduced, the service life of washed clothes is prolonged, and consumer experience is improved.

Embodiment 10

[0069] As shown in Figs. 1-7, the present embodiment is a further limitation of any one of Embodiments 1-9 described above. A drum washing machine described in the present embodiment further comprises a remote control terminal, which can operate the washing machine without touching the washing machine.

[0070] In the specification provided herein, numerous specific details are set forth. However, it should be understood that embodiments of the present disclosure may be practiced without these specific details. In some instances, well-known methods, structures, and techniques have not been shown in detail so as not to obscure the understanding of the specification.

[0071] Similarly, it should be understood that in the above description of exemplary embodiments of the present disclosure, various features of the present disclosure are sometimes grouped together into a single embodiment, figure, or description thereof in order to streamline the present disclosure and help understand one or more of the various inventive aspects. However, the disclosed method should not be interpreted as reflecting the following intention that the claimed disclosure requires more features than are expressly recited in each claim. Rather, as the following claims reflect, inventive aspects lie in less than all features of a single foregoing disclosed embodiment. Thus, the claims following the detailed description are hereby expressly incorporated into this detailed description, with each claim standing on its own as a separate embodiment of this disclosure.

[0072] Except that at least some of such features and/or processes or elements are mutually exclusive, all features disclosed in this specification (including accompanying claims, abstract and drawings) and all processes or elements of any method or apparatus so disclosed may be combined in any combination. Unless explicitly stated otherwise, each feature disclosed in this specification (including accompanying claims, abstract and drawings) may be replaced by alternative features that provide the same, equivalent or similar purpose.

[0073] In addition, those skilled in the art can understand that although some embodiments described herein include some features included in other embodiments

rather than other features, combinations of features of different embodiments are meant to be within the scope of the present disclosure and form different embodiments. For example, in the following claims, any one of the claimed embodiments can be used in any combination.

[0074] It should be noted that the above-mentioned embodiments illustrate rather than limit the disclosure, and that those skilled in the art can design alternative embodiments without departing from the scope of the appended claims. In the claims, any reference signs placed between parentheses shall not be constructed as limiting the claims. The word "comprise" does not exclude the presence of elements or steps not listed in a claim.

The word "a" or "an" preceding an element does not exclude the presence of a plurality of such elements. In a unit claim enumerating several means, several of these means may be specifically embodied by one and the same item of hardware. The use of words first, second, third, etc. does not indicate any order. These words can be interpreted as names.

[0075] The above description is only preferred embodiments of the present disclosure, and is not intended to limit the present disclosure in any way. Although the present disclosure has been disclosed in the preferred embodiments, it is not intended to limit the present disclosure. Any technician familiar with this patent can make some changes or modifications to equivalent embodiments with equivalent changes by using the above-mentioned suggestive technical contents without departing from the scope of the technical solution of the present disclosure. However, any simple amendments, equivalent changes and modifications made to the above embodiments according to the technical essence of the present disclosure without departing from the contents of the technical solution of the present disclosure are still within the scope of the solution of the present disclosure.

40 Claims

1. A drum washing machine, comprising a machine body (1), a container chamber (2) being formed in the machine body (1);
 a door body (3), being movably arranged on the machine body (1) for allowing the container chamber (2) to be open and close;
 a glass window (4), being arranged on the door body (3) for observing an inner drum (5) of the drum washing machine,
 a concave space (6), being formed by the glass window (4) being recessed towards the container chamber (2), and being provided with an opening outward;
characterized in that,
 an additive chamber (7) is arranged in the concave space (6) of the glass window (4) for feeding additives into the additive chamber (7) from the opening outward, and the additive chamber (7) is a sealed

chamber structure.

2. The drum washing machine according to claim 1, wherein: a bottom of the additive chamber (7) is provided with a water outlet (12) for discharging the additives in the additive chamber (7), and the bottom of the additive chamber (7) is also provided with a sealing gasket (34) corresponding to the water outlet (12). 5
3. The drum washing machine according to claim 1 or 2, wherein: a storage box base (8) for installing the additive chamber (7) is arranged on a side, close to a bottom of the drum washing machine, of the concave space (6). 10
4. The drum washing machine according to claim 3, wherein: the storage box base (8) is provided with a one-way valve (13) for discharging the additives corresponding to the water outlet (12) of the additive chamber (7), the one-way valve (13) is connected with a liquid outlet pipe (14) for transporting the additives in the additive chamber (7) into an outer drum (30) in the machine body (1). 15
5. The drum washing machine according to claim 4, wherein: a top of the one-way valve (13) is in a shape easy to puncture or push away the sealing gasket (34); preferably, the shape of the top of the one-way valve (13) is tapered. 20
6. The drum washing machine according to any one of claims 1-5, wherein: a gap is arranged between the additive chamber (7) and the glass window, and the gap is provided with a heat insulating substance. 25
7. The drum washing machine according to any one of claims 1-6, wherein: a top of the additive chamber (7) is provided with a filling port (9) for allowing liquid to be fed, and the filling port (9) is provided with a sealing cover (10) for preventing the liquid from flowing out. 30
8. The drum washing machine according to any one of claims 1-7, wherein: the additive chamber (7) and/or the storage box base (8) are/is made of transparent material for observing liquid in the additive chamber (7) and/or the storage box base (8) from the outside. 35
9. The drum washing machine according to any one of claims 1-8, wherein: the storage base comprises a feeding pump (15) arranged at a bottom of a liquid storage box, one end of the feeding pump (15) is communicated with the liquid outlet pipe (14), and another end of the feeding pump (15) is communicated with the outer drum of the drum washing machine through a feeding pipe (16). 40
10. The drum washing machine according to any one of claims 1-8, wherein: the liquid storage box comprises a feeding pump (15) arranged at a bottom of the liquid storage box, one end of the feeding pump (15) is communicated with the liquid outlet pipe (14), another end of the feeding pump (15) is communicated with a mixing chamber (17), and the mixing chamber (17) is communicated with the outer drum of the drum washing machine through a feeding pipe (16). 45

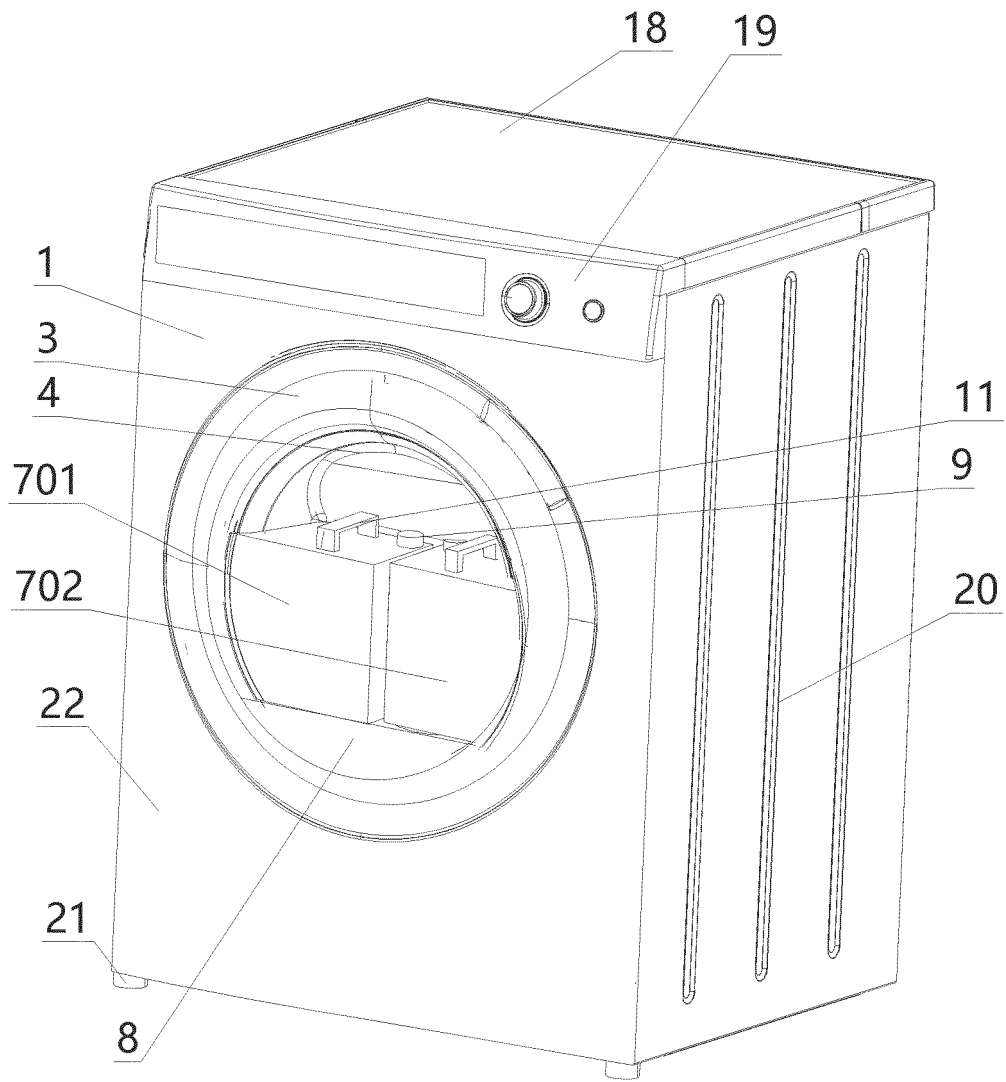


Fig. 1

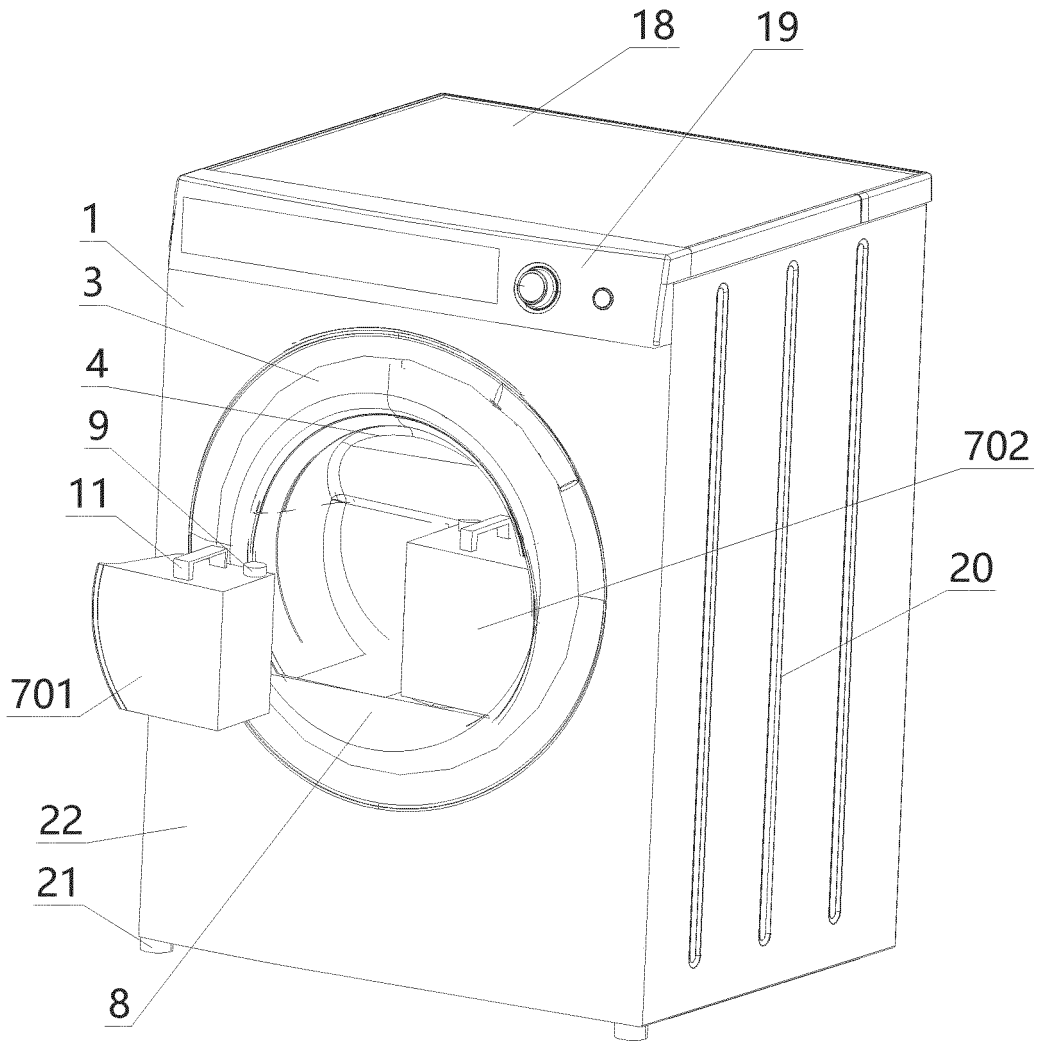


Fig. 2

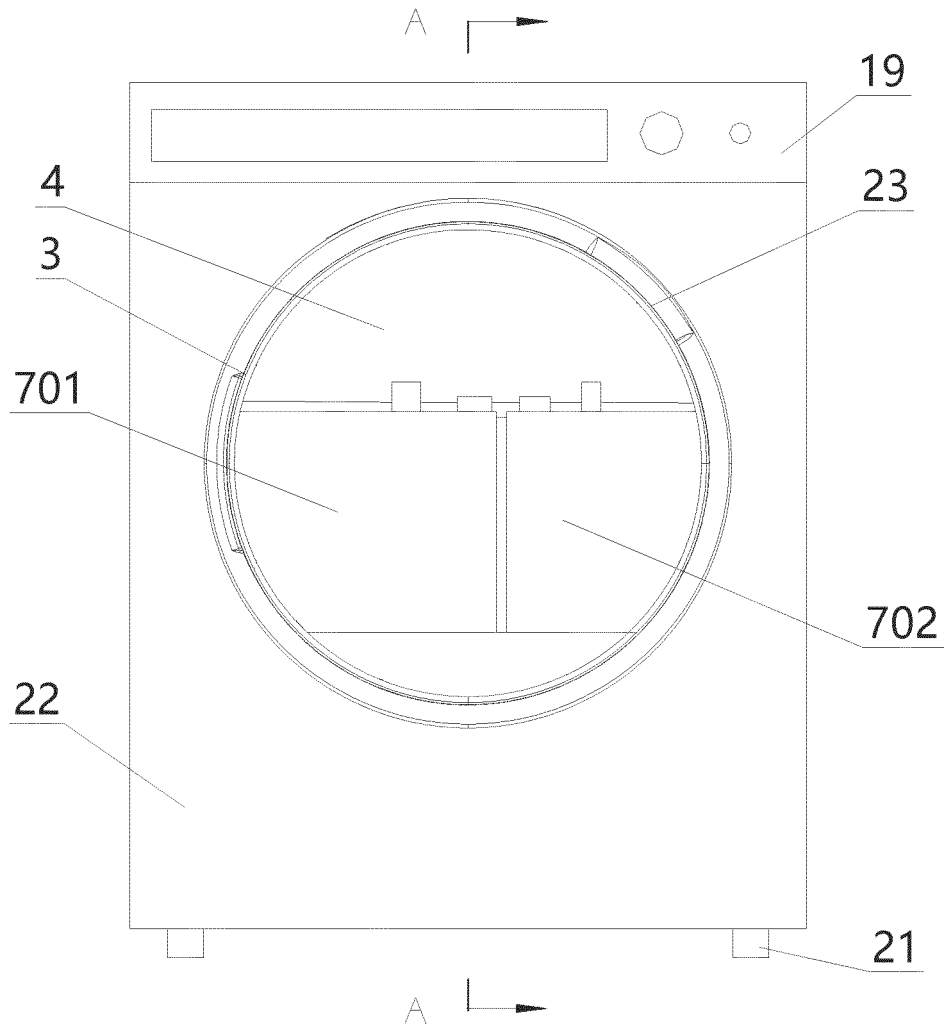


Fig. 3

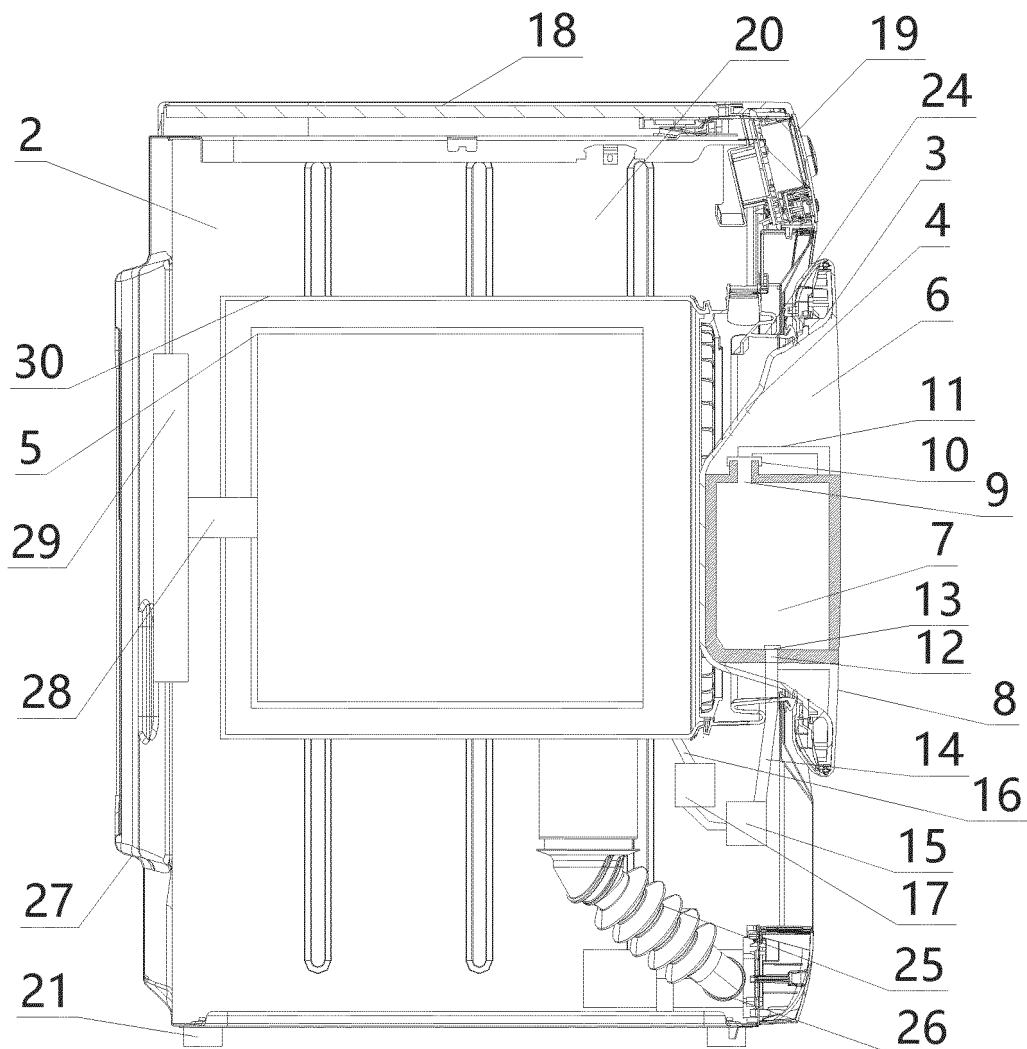


Fig. 4

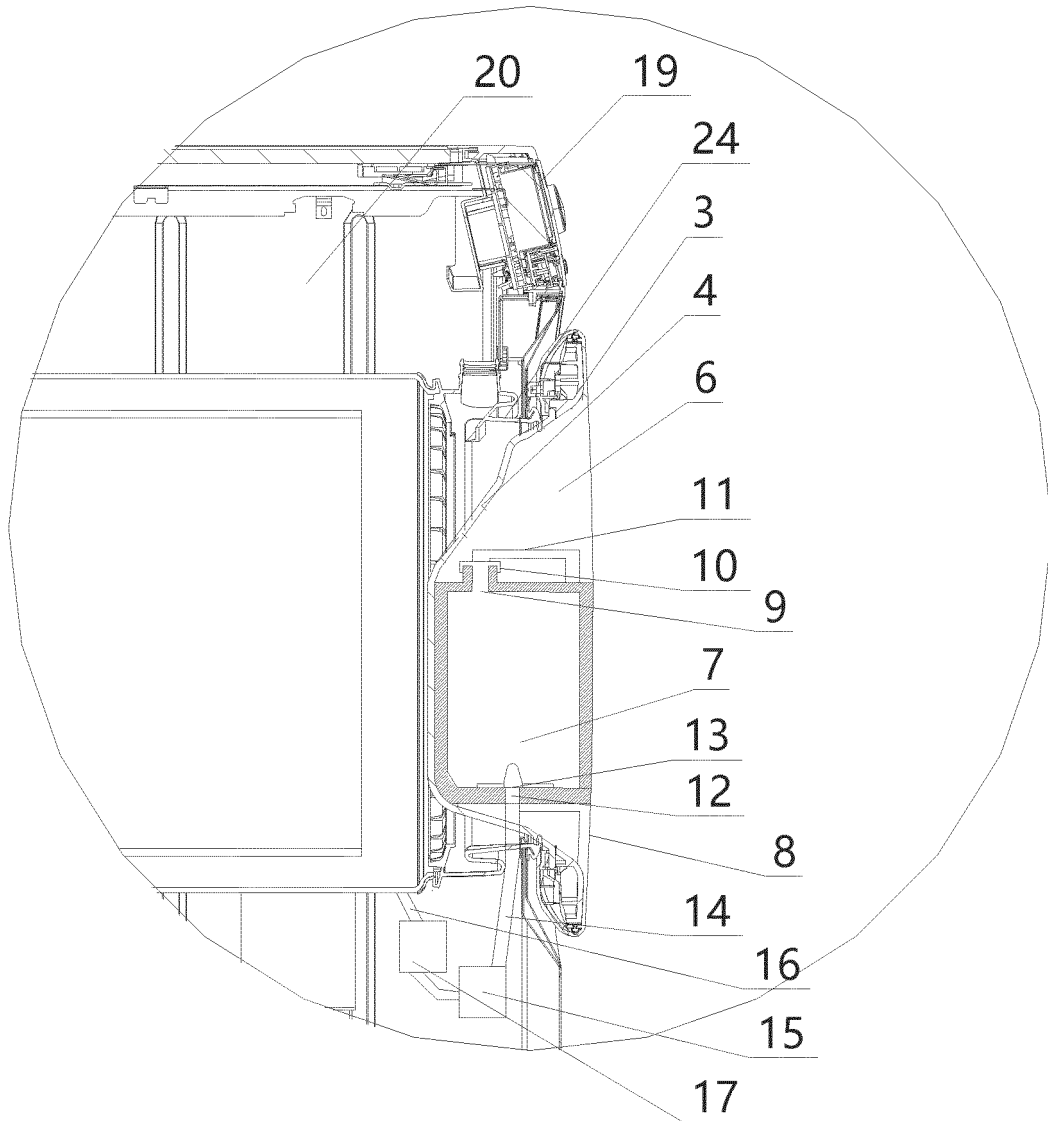


Fig. 5

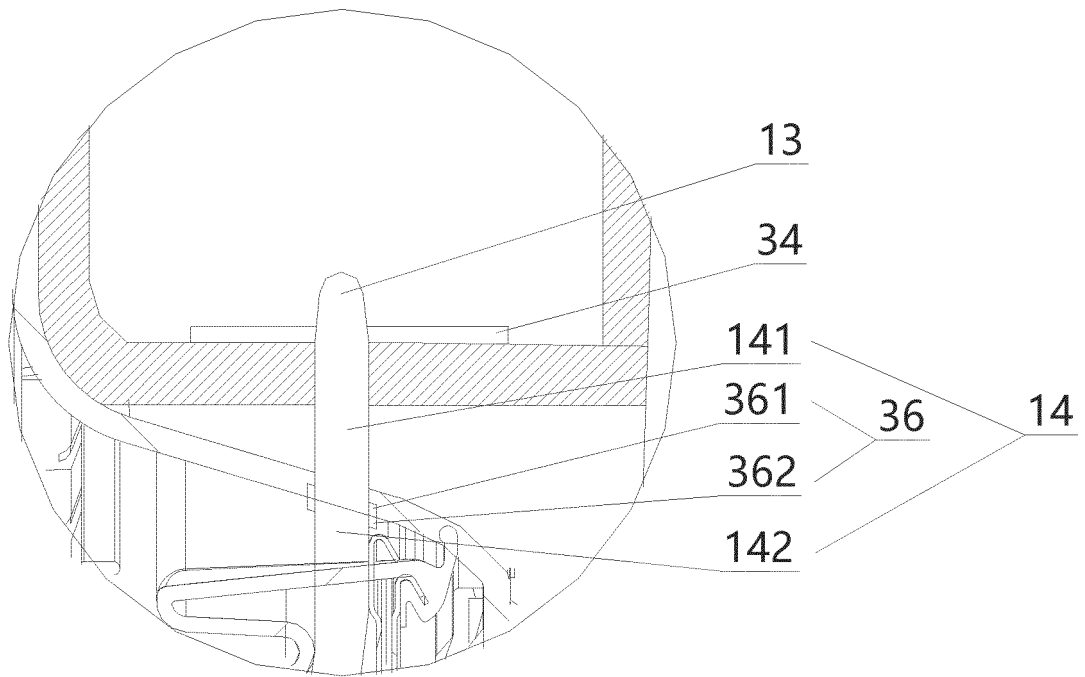


Fig. 6

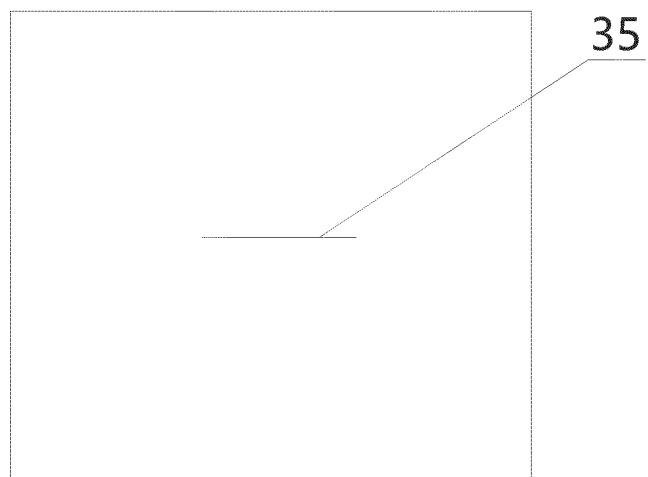


Fig. 7

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2018/095559

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A. CLASSIFICATION OF SUBJECT MATTER
D06F 39/02(2006.01)i

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

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B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
D06F

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

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Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
WPI, EWPI, EPODOC, CNPAT, CNKI: 洗衣机, 投放, 洗涤, 抽, 拉, 密封, washer, washing machine, laund+, insert+, drawer, seal

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 204401308 U (NINGBO WANAI APPLIANCE CO., LTD.) 17 June 2015 (2015-06-17) description, paragraphs [0019]-[0029], and figures 1-4	1-3, 6-8
Y	CN 204401308 U (NINGBO WANAI APPLIANCE CO., LTD.) 17 June 2015 (2015-06-17) description, paragraphs [0019]-[0029], and figures 1-4	4-10
Y	CN 105483980 A (LI, JIAHAI) 13 April 2016 (2016-04-13) description, paragraphs [0001]-[0018]	4-10
A	CN 1904189 A (SAMSUNG ELECTRONICS CO., LTD.) 31 January 2007 (2007-01-31) entire document	1-10
A	CN 1746413 A (LG ELECTRONICS INC.) 15 March 2006 (2006-03-15) entire document	1-10
A	WO 2008068559 A1 (INDESIT COMPANY S.P.A.) 12 June 2008 (2008-06-12) entire document	1-10

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Further documents are listed in the continuation of Box C. See patent family annex.

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* Special categories of cited documents:

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“O” document referring to an oral disclosure, use, exhibition or other means

“P” document published prior to the international filing date but later than the priority date claimed

“T” later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

“X” document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

“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

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Date of the actual completion of the international search 08 September 2018	Date of mailing of the international search report 25 September 2018
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Facsimile No. (86-10)62019451	Telephone No.

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2018/095559

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CN 204401308 U	17 June 2015	None	
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REFERENCES CITED IN THE DESCRIPTION

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- CN 201510123069 [0003]