



(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
19.09.2018 Bulletin 2018/38

(51) Int Cl.:
D06F 39/08^(2006.01) D06F 37/12^(2006.01)

(21) Application number: **16863542.3**

(86) International application number:
PCT/CN2016/103559

(22) Date of filing: **27.10.2016**

(87) International publication number:
WO 2017/080365 (18.05.2017 Gazette 2017/20)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA MD

- **YANG, Lin**
Qingdao
Shandong 266101 (CN)
- **ZHANG, Gangjin**
Qingdao
Shandong 266101 (CN)
- **TIAN, Yun**
Qingdao
Shandong 266101 (CN)
- **SHAO, Mingyan**
Qingdao
Shandong 266101 (CN)

(30) Priority: **12.11.2015 CN 201510775855**

(71) Applicant: **Qingdao Haier Washing Machine Co., Ltd.**
Qingdao, Shandong 266101 (CN)

(74) Representative: **Ziebig & Hengelhaupt**
Patentanwälte PartG mbB
Leipziger Straße 49
10117 Berlin (DE)

(72) Inventors:
• **LV, Peishi**
Qingdao
Shandong 266101 (CN)

(54) **WASHING MACHINE WITHOUT WATER BETWEEN BARRELS, AND CONTROL METHOD**

(57) A washing machine without water between barrels and control method are provided. The washing machine comprises an outer barrel (4), an inner barrel (1), an air chamber (7), and a pressure sensor (19) connected to the air chamber (7). A plurality of drainage holes (2) are arranged on the upper part near the edge of the inner barrel (1). At least one inner barrel drain outlet (3) is arranged at a bottom of the inner barrel (1). A telescopic drain valve capable of plugging the inner barrel drain outlet (3) is arranged at a bottom of the outer barrel (4). An outer barrel drain outlet (5) is arranged at the bottom of the outer barrel (4). A washing machine drainage pipeline (6) is arranged on the outer barrel drain outlet (5). The outer barrel (4) is provided with the air chamber (7) communicated with the inner barrel (1). An air chamber drain outlet (8) capable of discharging water in the air chamber (7) is arranged on the air chamber (7). The washing machine drains water thoroughly, there is no residue, and the drainage speed is fast. The water flow is prevented from staying between the inner barrel and outer barrel to prevent the dirt from staining on the inner wall of the outer barrel (4). The washing machine is accurate in water level

detection and simple in structure, furthermore, there is no residual water in the air chamber (7). This avoids the error in the reuse of the water level detection and prevents the residual water from breeding bacteria in the air chamber (7). The outer barrel is communicated with the inner barrel (1) by telescopic drain valve (10) to avoid the blockage caused by the thread scraps.

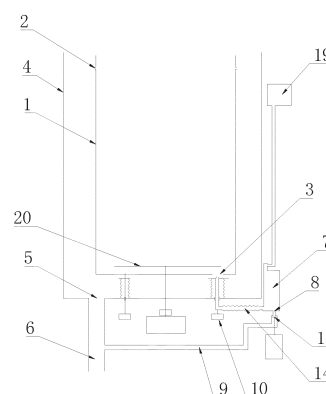


Fig.1

Description

TECHNICAL FIELD

[0001] The present disclosure relates to a field of the washing machine, especially, to a washing machine without water between barrels and a control method.

BACKGROUND

[0002] In the existing pulsator washing machine, the inner barrel is provided with the water holes. The inner barrel and the outer barrel are communicated with each other. The inner barrel is a washing tub, and the outer barrel is a water-carrying tub. The part of water between the sidewalls of the inner barrel and the outer barrel does not participate in the washing stage, while the water that really participates in the washing stage is only the part inside the inner barrel, which results in a greater waste of water resources. In addition, the excessive water between the inner barrel and the outer barrel will also reduce the concentration of the detergent/detergent power in the washing liquor. At the same time, due to the frequent inflow and outflow of water between the inner and outer barrels, the area between the sidewalls of the inner barrel and the outer barrel becomes a space for hiding dirt and dust due to continuous usage. The incrustation of the tap water, the free substance of the washing power, the cellulose of the clothes, the organic matter of the human body and the dust and bacteria brought by the clothes can be easily trapped between the sidewalls of the inner barrel and the outer barrel. These molds are bred due to a large amount of dirt accumulated in the washing machine used for a long time that cannot be removed effectively. If the dirt that the users cannot see is not removed, the bacteria would adhere to the clothes and be brought to the human body after the next washing to cause cross-infection problems.

[0003] Patent No.200420107890.8 relates to a full-automatic washing machine, which mainly comprises a cabinet, a washing and dewatering tub, a water-carrying tub and a driving device. The water-carrying tub is arranged outside the washing and dewatering tub and is fixedly connected with the cabinet. A sealing device is arranged between the bottom surface of the inner wall of the water-carrying tub and the bottom surface of the outer wall of the washing and dewatering tub, and a sealing cavity is formed inside the sealing device. The outer side wall of the washing and dewatering tub has no holes, and the bottom of the washing and dewatering tub is provided with the drainage holes communicated with the sealing cavity. The water-carrying tub is provided with a first draining water hole communicated with a drainage pipe, and the drainage pipe is provided with a drain valve. The water-carrying tub is fixedly connected with the cabinet through a suspender. One end of the suspender is connected with the inner wall of the upper of the cabinet, while other end of the suspender is connected with the

outer wall of the water-carrying tub. However, the long-term operation of the sealing structure will cause abrasion, it will result in abrasion and leakage of water after a long-term operation. If the water quality is poor and the sediment content is high, the service life of the sealing structure would be greatly shortened and it will not function properly. It is also unsuitable for using under a state where the washing capacity is large, and the reliability is poor.

10 [0004] In view of this, the present disclosure is proposed.

SUMMARY

15 [0005] An object of the present disclosure is to overcome the shortcomings of the prior art, and to provide a washing machine without water between barrels and a control method.

[0006] In order to achieve such object, the technical scheme is adopted by the present disclosure as follows: a washing machine without water between barrels comprises an outer barrel, an inner barrel, an air chamber and a pressure sensor connected to the air chamber. A plurality of drainage holes are arranged on the upper part near the edge of the inner barrel. At least one inner barrel drain outlet is arranged at a bottom of the inner barrel. A telescopic drain valve capable of plugging the inner barrel drain outlet is arranged at a bottom of the outer barrel. An outer barrel drain outlet is arranged at the bottom of the outer barrel. A washing machine drainage pipeline is arranged on the outer barrel drain outlet, the outer barrel is provided with the air chamber communicated with the inner barrel. An air chamber drain outlet capable of discharging water in the air chamber is arranged on the air chamber.

[0007] The outer barrel and the inner barrel are concentrically arranged. A distance from a center of the inner barrel drain outlet to a center of the inner barrel is less than or equal to a distance from a center of the outer barrel drain outlet to a center of the outer barrel.

[0008] Preferably, the distance from the center of the inner barrel drain outlet to the center of the inner barrel is equal to the distance from the center of the outer barrel drain outlet to the center of the outer barrel.

45 [0009] Preferably, a diameter of the outer barrel drain outlet is larger than that of the inner barrel drain outlet.

[0010] The air chamber drain outlet is communicated with the washing machine drainage pipeline through a first pipeline. A control valve capable of controlling the opening and closing of the first pipeline is arranged at the air chamber drain outlet or in the first pipeline.

[0011] Preferably, the first pipeline is connected with the washing machine drainage pipeline through a three-way joint.

55 [0012] Preferably, the air chamber drain outlet is located at the bottom of the air chamber.

[0013] The control valve is provided with a traction motor, and the traction motor is arranged at the bottom of

the outer barrel.

[0014] Or the control valve is connected with a traction motor of the telescopic drain valve.

[0015] The air chamber is communicated with the inner barrel through the telescopic drain valve. The telescopic drain valve is a hollow structure, and an upper part of the telescopic drain valve is provided with a water inlet, and a lower part of the telescopic drain valve is provided with a water outlet. The water outlet is connected with the air chamber through a elastic pipe.

[0016] Preferably, the elastic pipe is a hose or a bellows.

[0017] The telescopic drain valve at least comprises a telescopic valve plug, and the telescopic valve plug comprises a telescopic valve rod and a elastic sealing cover sleeved on the valve rod and expanding and retracting with the valve rod. An inner of the valve rod is a hollow structure, and an upper part of the valve rod is provided with a water inlet, and a lower part of the valve rod is provided with a water outlet. The water inlet is provided with a gland. The upper part of the sealing sleeve extends into the water inlet. The gland and the valve rod is connected and the sealing sleeve is pressed between the gland and the valve rod. A top part of the gland is a hollow-out structure.

[0018] Preferably, the top part of the gland is a grid structure, and a gap between the grids forms a water holes.

[0019] The top part of the gland protrudes upwards and has a hemispherical arc surface, a middle portion of the hemispherical arc surface is higher and a surrounding portion of the hemispherical arc surface is lower.

[0020] When the telescopic drain valve plugs the inner barrel drain outlet, the top of the gland is higher than the bottom of the inner barrel. When the telescopic drain valve enables the inner barrel drain outlet to be open, the top of the gland is higher than the bottom of the outer barrel.

[0021] The sealing sleeve is provided with a ring of elastic convex rib around the gland, and a diameter of the elastic convex rib is larger than that of the inner barrel drain outlet.

[0022] A control method of the washing machine without water between barrels, comprising:

1) locking the inner barrel, controlling the telescopic drain valve to plug the inner barrel drain outlet, feeding the water into the inner barrel of the washing machine, and the water inside the inner barrel entering into the air chamber and compressing the air inside the air chamber, and detecting the air pressure of the air chamber to obtain the water level of the inner barrel;

2) controlling the telescopic drain valve to enables the inner barrel drain outlet to be open, and the water inside the inner barrel being drained into the outer barrel;

Preferably, after controlling the telescopic drain valve to enable the inner barrel drain outlet to be open, unlocking the inner barrel, controlling the inner barrel to rotate until the inner barrel drain outlet directly faces to the outer barrel drain outlet. The water inside the inner barrel being directly drained into the outer barrel drain outlet;

3) controlling the air chamber drain outlet to open, and the water inside the air chamber being drained away.

[0023] By adopting the technical solutions of the present disclosure, the following beneficial effects are as following.

1. The drainage structure of the washing machine of the present disclosure drains water thoroughly, and there is no residue, and the drainage speed is fast. The water flow is prevented from staying between the inner barrel and the outer barrel to prevent the dirt from staining on the inner wall of the outer barrel.

2. The washing machine of the present disclosure is accurate in water level detection and simple in structure. Furthermore, there is no residual water in the air chamber. This avoids the error in the reuse of the water level detection and prevents the residual water from breeding bacteria in the air chamber. The outer barrel is communicated with the inner barrel by telescopic drain valve to avoid the blockage caused by the thread scarps.

[0024] The following is further described in details with embodiments of the present disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025]

Fig.1 is a schematic diagram of a wahing machine without water between barrels of the present disclosure;

Fig.2 is a structure diagram of the wahing machine without water between barrels of the present disclosure;

Fig.3 is a sectional view of the wahing machine without water between barrels of the present disclosure;

Fig.4 is an enlarged view of part A in Fig.3;

Fig.5 is a structure diagram of a telescopic drain valve of the present disclosure;

Fig.6 is a sectional view of the telescopic drain valve of the present disclosure.

[0026] Wherein: 1. inner barrel, 2. drainage holes, 3. inner barrel drain outlet, 4. outer barrel, 5. outer barrel drain outlet, 6. washing machine drainage pipeline, 7. air chamber, 8. air chamber drain outlet, 9. first pipeline, 10. telescopic drain valve, 11. control valve, 12. water inlet, 13. water outlet, 14. elastic pipe, 15. valve rod, 16. sealing cover, 17. gland, 18. elastic convex rib, 19. pressure sensor, 20. pulsator.

DETAILED DESCRIPTION

[0027] As shown in Fig.1 and Fig.2, a washing machine without water between barrels of the present disclosure comprises an inner barrel 1, an outer barrel 4. A plurality of drainage holes 2 are arranged on the upper part near the upper edge of the inner barrel 1. At least one inner barrel drain outlet 3 is arranged at the bottom of the inner barrel 1. A telescopic drain valve 10 capable of plugging the inner barrel water outlet is arranged at the bottom of the outer barrel 4. An outer barrel drain outlet 5 is arranged at the bottom of the outer barrel 4. A washing machine drainage pipeline 6 is arranged on the outer barrel drain outlet 5.

[0028] During washing process, the inner barrel is locked, and the inner barrel drain outlet 3 is plugged by the telescopic drain valve 10. There is water in the inner barrel 1, and there is no water between barrels. During drainage process, the inner barrel drain outlet is opened by the telescopic drain valve 10. Most water in the inner barrel 1 is drained out from the inner barrel 1 through the inner barrel drain outlet 3, and then the water is drained out through the outer barrel drain outlet 5 and the washing machine drainage pipeline 6. During dehydration process, the inner barrel 1 is unlocked and carries out dehydrating. The water thrown out during dehydration stage is moved upward under the centrifugal force, and is drained out from the inner barrel through the drainage holes 2, and is drained to the space between the inner barrel and the outer barrel, and then is drained out through the outer barrel drain outlet 5 and the washing machine drainage pipeline 6.

[0029] The outer barrel 4 and the inner barrel 1 are concentrically arranged, and the distance from the center of the inner barrel drain outlet 3 to the center of the inner barrel 1 is the same as the center of the outer barrel drain outlet 5 to the center of the center of the outer barrel 4. When the inner barrel is draining water, the inner barrel drain outlet 3 is facing to the outer barrel drain outlet 5, and the water flows out from the inner barrel 1 directly through the outer barrel drain outlet 5 into the washing machine drainage pipeline 6 for discharge. The drainage is smooth, and the time for water staying between the inner barrel and outer barrel is short, and there is no required for water to being firstly drained into the space between the inner barrel and the outer barrel and then drained into the outer barrel drain outlet 5. Preferably, the diameter of the outer barrel drain outlet 5 is larger than that of the inner barrel drain outlet 3 to prevent the

water flow from staying between the inner barrel and the outer barrel, and prevent the dirt from staining on the inner wall of the outer barrel.

[0030] When the washing machine is performing washing process, there is no water between the inner barrel and the outer barrel. It can save the washing water, and about 20% of the washing water can be saved each time. During draining water, most of the water is drained away through the lower drain outlet. The thread scraps and the mud are discharged with the water, and will not accumulate in the inner barrel. At the same time, during dehydration and washing process, there is no relative movement between the inner barrel and the plugging structure (telescopic drain valve) for plugging the inner barrel drain outlet to avoid the abrasion.

[0031] The outer barrel 4 is provided with an air chamber 7, and the air chamber 7 can be arranged on at the interior or the exterior of the outer barrel 4. In the present invention, it is preferable that the air chamber 7 is disposed outside the outer barrel 4 so as not to affect the installation of the inner barrel 1 so as to increase the capacity of the inner barrel 1 as much as possible. The air chamber 7 is communicated with the inner barrel through the second pipeline. When there is water inside the inner barrel 1, the water is able to enter the air chamber 7. A pressure sensor 19 is connected to the air chamber 7, and the water level of the inner barrel is detected by the pressure sensor 19 detecting the air pressure inside the air chamber 7. This detection method detects the water level, and the structure is simple, and the detection result is accurate.

[0032] As shown in Fig.3 and Fig.4, in the present disclosure, the air chamber 7 is communicated with the inner barrel 7 through the telescopic drain valve 10. The telescopic drain valve 10 is of a hollow structure, and the upper part of the telescopic drain valve is provided with a water inlet 12, and the lower part of the telescopic drain valve is provided with a water outlet 13. The water outlet 13 is communicated with the air chamber 7 through an elastic pipe 14. When the inner barrel drain outlet 3 is plugged by the telescopic drain valve 10, the water of the inner barrel 1 is unable to enter the space between the inner barrel 1 and outer barrel 4, however it can enter the air chamber 7 through the hollow structure inside the telescopic drain valve 10 and compress the air inside the air chamber. The pressure sensor 19 detects the air pressure inside the air chamber 7 to obtain the water level of the inner barrel to realize the detection and control of the water level. As the telescopic drain valve is reciprocated up and down telescopically and the lower water outlet is movable, the elastic pipe 14 is arranged between the water outlet and the air chamber to achieve the connection between the fixed air chamber 7 and the movable lower water outlet. Preferably, the elastic pipe 14 is a hose or a bellows. The second pipeline comprises a hollow portion of the telescopic drain valve and the elastic pipe.

[0033] As shown in Fig.5 and Fig.6, the telescopic drain

valve 10 at least comprises a telescopic valve plug. The valve plug comprises a telescopic valve rod 15 and an elastic sealing cover 16 sleeved on the valve rod 15 and can expand and retract with the expansion of the valve rod 15. The inner of the valve rod 15 is of a hollow structure, and the upper part of the valve rod is provided with the water inlet 12, and the lower part the valve rod is provided with the water outlet 13. The water inlet 12 is provided with a gland. The upper part of the sealing sleeve 16 extends into the water inlet 12. The gland 17 is connected with the valve rod 15 and the sealing sleeve 16 is pressed between the gland 17 and the valve rod 15. The lower water outlet is provided with the hose or the bellows connected to the air chamber. The second pipeline comprises the hollow portion of the telescopic valve rod and the hose or the bellows. The top part of the gland 17 is of a hollow-out structure. The water in the inner barrel can enter the interior of the valve rod 15 through the hollow structure and then flow into the air chamber 17.

[0034] The top of the gland 17 is provided with a plurality of water holes, or the top of the gland is of a grid structure, and the gap between the grids forms the water holes. The water holes can block the thread scraps and other debris from entering the air chamber.

[0035] The top of the gland 17 protrudes is convex upwards, and has a hemispherical arc surface. A middle portion of the hemispherical arc surface is higher and a surrounding portion of the hemispherical arc surface is lower, which is high in the middle and low on all sides. The convex structure and the hemispherical arc surface can prevent the thread scraps and other debris from staying and accumulating on the top of the gland to block the water holes of the gland. The gland can connect the valve rod 15 and the sealing sleeve 16, and can also play a role in preventing the accumulation of the lint.

[0036] When the telescopic drain valve 10 plugs the inner barrel drain outlet 3, the top of the gland 17 is higher than the bottom of the inner barrel. When the telescopic drain valve 10 enables the inner barrel drain outlet 3 to be open, the top of gland 17 is higher than the bottom of the outer barrel to further prevent the thread scraps and other debris from staying and accumulating on the top of the gland to block the water holes of the gland.

[0037] The sealing sleeve 16 is provided with a ring of elastic convex rib 18 located around the gland 17. The diameter of the elastic convex rib 18 is larger than that of the inner barrel drain outlet 3. When the telescopic drain valve 10 plugs the inner barrel drain outlet 3, the elastic convex rib 18 is located at the bottom of the inner barrel of at the outer periphery of the inner barrel drain outlet, and is pressed to realize sealing. The gland 17 extends into the inner barrel drain outlet 3, and the top of the gland 17 is higher than the bottom of the inner barrel. When the telescopic drain valve 10 enables the inner barrel drain outlet 3 to be open, the elastic convex rib 18 can prevent the lint and other debris from being flushed to the top of the gland 17. At the same time, the

top of the gland is higher than the bottom of the outer barrel to prevent the thread scraps and other debris from staying and accumulating on the top of the gland to block the water holes of the gland.

[0038] The telescopic drain valve 10 is fixed at the bottom of the outside of the outer barrel 4, and extends upwards to the bottom of the inner barrel to plug the inner barrel drain outlet 3. The elastic pipe 14 is arranged at the bottom of the outside of the outer barrel 4, and is respectively connected with the lower water outlet of the telescopic drain valve 10 and the air chamber. The water inside the washing machine is drained through the outer barrel drain outlet 5, therefore when the washing machine is draining water, the water inside the air chamber 7 cannot be thoroughly drained away resulting in some residual water in the air chamber 7, which will cause bacteria to grow in the air chamber for a long time. The air chamber of the present disclosure is provided with an air chamber drain outlet 8 capable of discharging water in the air chamber 7. The air chamber drain outlet 8 is opened periodically or every time after the drainage of the washing machine is finished to prevent the water from remaining in the air chamber.

[0039] Preferably, the air chamber drain outlet 8 is located at the very bottom of the air chamber, to ensure that all water inside the air chamber is drained from the air chamber. A control valve 11 is arranged at the air chamber drain outlet 8. The control valve 11 is closed when the washing machine is in the water-inlet state and in the washing process. The control valve 11 is opened periodically or after the washing machine finishes the drainage to discharge the water inside the air chamber.

[0040] The air chamber drain outlet 8 is communicated with the washing machine drainage pipeline to discharge the water inside the air chamber through the washing machine drainage pipeline 6. The air chamber drain outlet 8 is communicated with the washing machine drainage pipeline 6 through a first pipeline 9. The first pipeline 9 is provided with the control valve 11 capable of controlling the opening and closing of the first pipeline. The first pipeline 9 is connected with the washing machine drainage pipeline 8 through a three-way joint.

[0041] The control valve 11 is provided with a traction motor, and the opening and closing of the control valve is controlled by the traction motor. The traction motor is arranged at the bottom of the outer barrel. Or the control valve is connected with a traction motor of the telescopic drain valve 10, namely, the telescopic drain valve and the control valve share the same traction motor to save the number of parts and save cost.

[0042] When the washing machine is subjected to carrying out washing process, the inner barrel is locked, and the telescopic drain valve is controlled to plug the inner barrel drain outlet. The water is fed into the inner barrel of the washing machine, and the water inside the inner barrel enters the air chamber and compresses the air inside the air chamber is compressed. The water level of the inner barrel is obtained by detecting the air pres-

sure of the air chamber. There is no water between the inner barrel 1 and the outer barrel 4. During the drainage stage, the telescopic drain valve is controlled to enable the inner barrel drain outlet to be open, and the water inside the inner barrel is drained into the outer barrel. Preferably, after the telescopic drain valve is controlled to enable the inner barrel drain outlet to be open, the inner barrel is unlocked. The inner barrel is controlled to rotate until the inner barrel drain outlet is directly facing to the outer barrel drain outlet, and most of the water inside of the inner barrel 1 is drained out through the lower inner barrel drain outlet 3. During dehydration stage, a minority of water is drained through the upper drainage holes 2. After being drained into the space between the inner barrel 1 and the outer barrel 4, the minority of water is drained through the outer barrel drain outlet 5 and the washing machine drainage pipeline 6. The air chamber 7 is provided with the air chamber drain outlet 8. The air chamber drain outlet 8 is provided with the first pipeline 9 connected with the washing machine drainage pipeline 6. Residual water inside the air chamber 7 is drained through the air chamber drain outlet 8, the first pipeline 9 and the washing machine drainage pipeline 6.

[0043] The air chamber 7 is communicated with the inner barrel through the second pipeline, and the water of the inner barrel 1 enters the air chamber 7. The air chamber 7 is connected with the pressure sensor 19, and the water level of the inner barrel is detected by the pressure sensor 19 detecting the air pressure of the air chamber.

[0044] While there has been shown several and alternate embodiments of the present disclosure, it is to be understood that various of variants and improvement can be made as would known to one skilled in the art without departing from the underlying scope of the present invention as is discussed and set forth above and below including claims.

Claims

1. A washing machine without water between barrels, comprising an outer barrel, an inner barrel, an air chamber and a pressure sensor connected to the air chamber, wherein:

a plurality of drainage holes are arranged on the upper part near the edge of the inner barrel, at least one inner barrel drain outlet is arranged at a bottom of the inner barrel,
a telescopic drain valve capable of plugging the inner barrel drain outlet is arranged at a bottom of the outer barrel, an outer barrel drain outlet is arranged at the bottom of the outer barrel,
a washing machine drainage pipeline is arranged on the outer barrel drain outlet, the outer barrel is provided with the air chamber commu-

nicated with the inner barrel, an air chamber drain outlet capable of discharging water in the air chamber is arranged on the air chamber.

2. The washing machine without water between barrels according to claim 1, wherein the outer barrel and the inner barrel are concentrically arranged, a distance from a center of the inner barrel drain outlet to a center of the inner barrel is less than or equal to a distance from a center of the outer barrel drain outlet to a center of the outer barrel,
preferably, the distance from the center of the inner barrel drain outlet to the center of the inner barrel is equal to the distance from the center of the outer barrel drain outlet to the center of the outer barrel, preferably, a diameter of the outer barrel drain outlet is larger than that of the inner barrel drain outlet.
3. The washing machine without water between barrels according to claim 1, wherein the air chamber drain outlet is communicated with the washing machine drainage pipeline through a first pipeline, a control valve capable of controlling the opening and closing of the first pipeline is arranged at the air chamber drain outlet or in the first pipeline,
preferably, the first pipeline is connected with the washing machine drainage pipeline through a three-way joint,
preferably, the air chamber drain outlet is located at a bottom of the air chamber.
4. The washing machine without water between barrels according to claim 1, wherein the control valve is provided with a traction motor, and the traction motor is arranged at the bottom of the outer barrel, or the control valve is connected with a traction motor of the telescopic drain valve.
5. The washing machine without water between barrels according to claim 1, wherein the air chamber is communicated with the inner barrel through the telescopic drain valve,
the telescopic drain valve is a hollow structure, an upper part of the telescopic drain valve is provided with a water inlet, a lower part of the telescopic drain valve is provided with a water outlet, the water outlet is connected with the air chamber through a elastic pipe,
preferably, the elastic pipe is a hose or a bellows.
6. The washing machine without water between barrels according to claim 1, wherein the telescopic drain valve at least comprises a telescopic valve plug, the telescopic valve plug comprises a telescopic valve rod and a sealing sleeve of elastic sleeved on the valve rod and expanding and retracting with the valve rod,
an inner of the valve rod is a hollow structure, an

upper part of the valve rod is provided with a water inlet, a lower part of the valve rod is provided with a water outlet, the water inlet is provided with a gland, an upper part of the sealing sleeve extends into the water inlet, the gland and the valve rod are connected and the sealing sleeve is pressed between the gland and the valve rod, a top part of the gland is a hollow-out structure, preferably, the top part of the gland is a grid structure, a gap between the grids forms a water hole.

drained away.

7. The washing machine without water between barrels according to claim 1, wherein the top part of the gland protrudes upwards and has a hemispherical arc surface, a middle portion of the hemispherical arc surface is higher and a surrounding portion of the hemispherical arc surface is lower.
8. The washing machine without water between barrels according to claim 1, wherein when the telescopic drain valve plugs the inner barrel drain outlet, the top of the gland is higher than the bottom of the inner barrel, when the telescopic drain valve enables the inner barrel drain outlet to be open, the top of the gland is higher than the bottom of the outer barrel.
9. The washing machine without water between barrels according to claim 1, wherein the sealing sleeve is provided with a ring of elastic convex rib around the gland, a diameter of the elastic convex rib is larger than that of the inner barrel drain outlet.
10. A control method of the washing machine without water between barrels according to any of claims from 1 to 9, comprising:
 - 1) locking the inner barrel, controlling the telescopic drain valve to plug the inner barrel drain outlet, feeding water into the inner barrel of the washing machine, and the water inside the inner barrel entering into the air chamber and compressing the air inside the air chamber, detecting the air pressure of the air chamber to obtain the water level of the inner barrel;
 - 2) controlling the telescopic drain valve to enable the inner barrel drain outlet to be open, and the water inside the inner barrel being drained into the outer barrel; preferably, after controlling the telescopic drain valve to enable the inner barrel drain outlet to be open, unlocking the inner barrel, controlling the inner barrel to rotate until the inner barrel drain outlet directly faces to the outer barrel drain outlet, the water inside the inner barrel being directly drained into the outer barrel drain outlet;
 - 3) controlling the air chamber drain outlet to open, the water inside the air chamber being

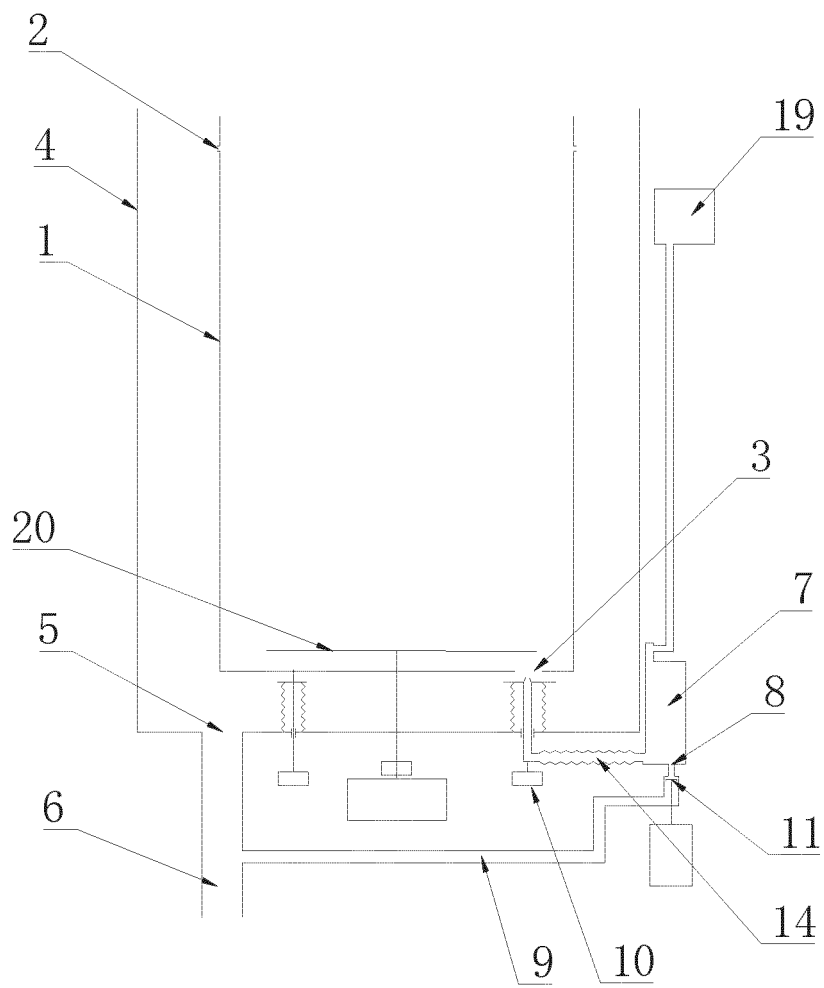


Fig.1

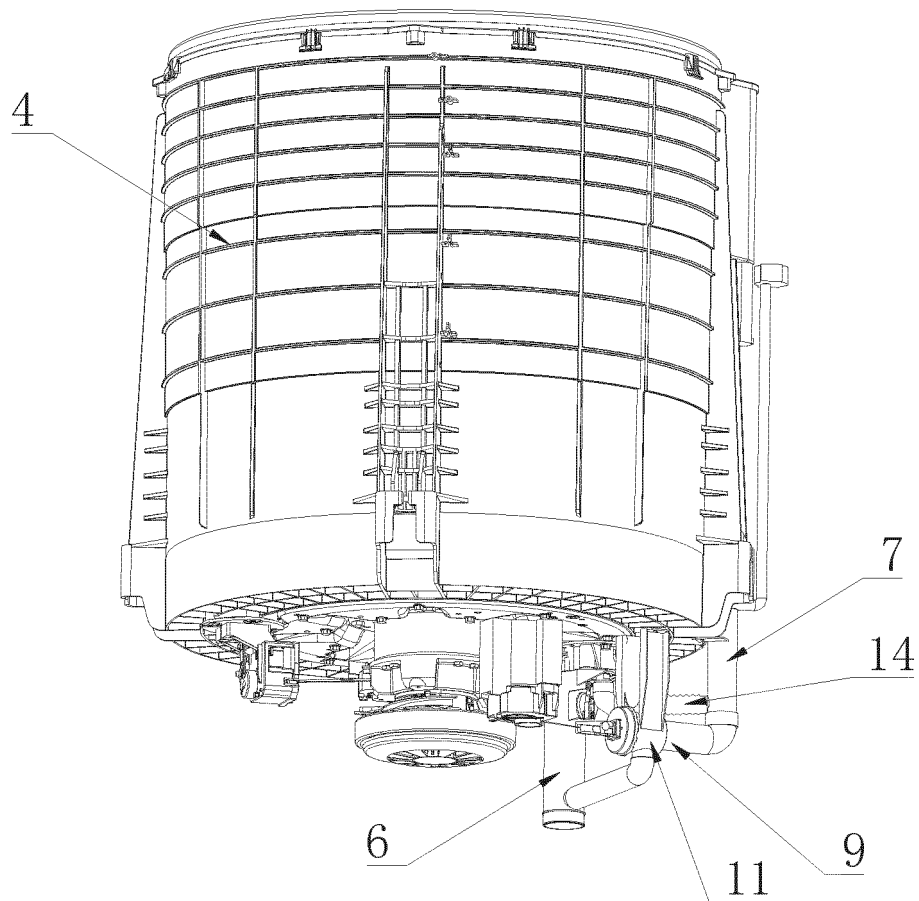


Fig.2

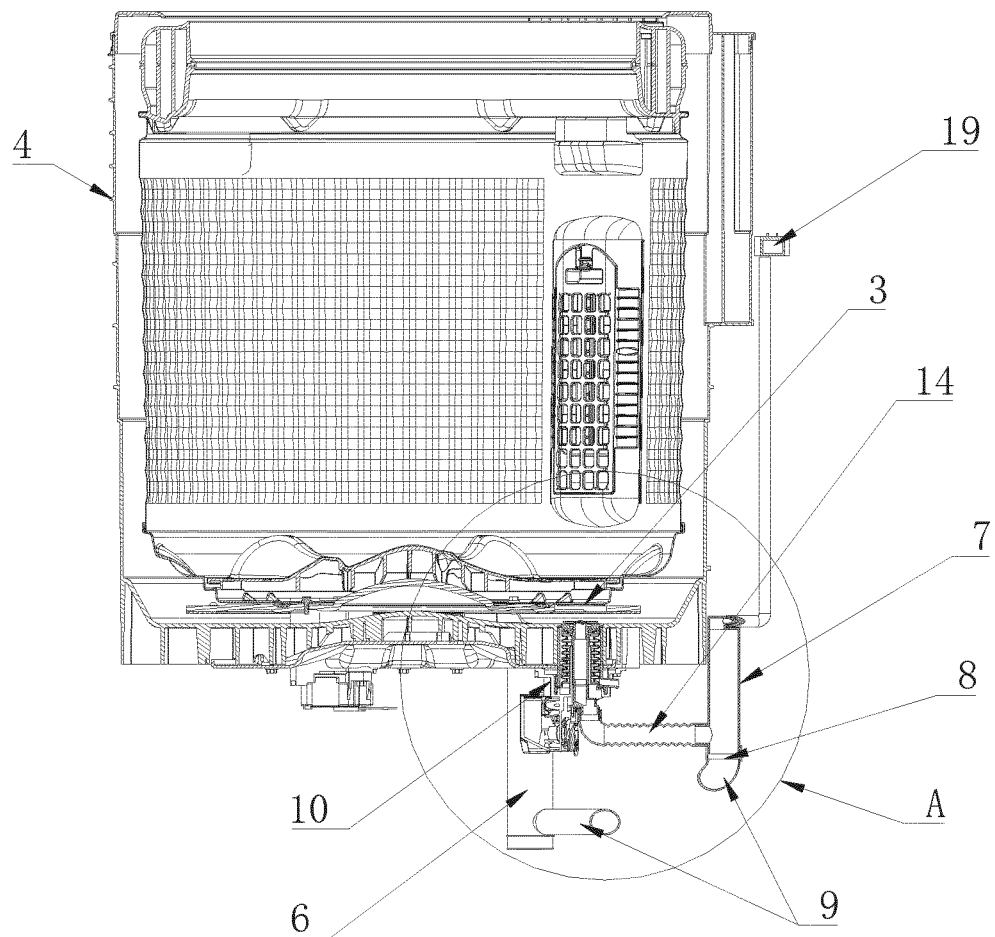


Fig.3

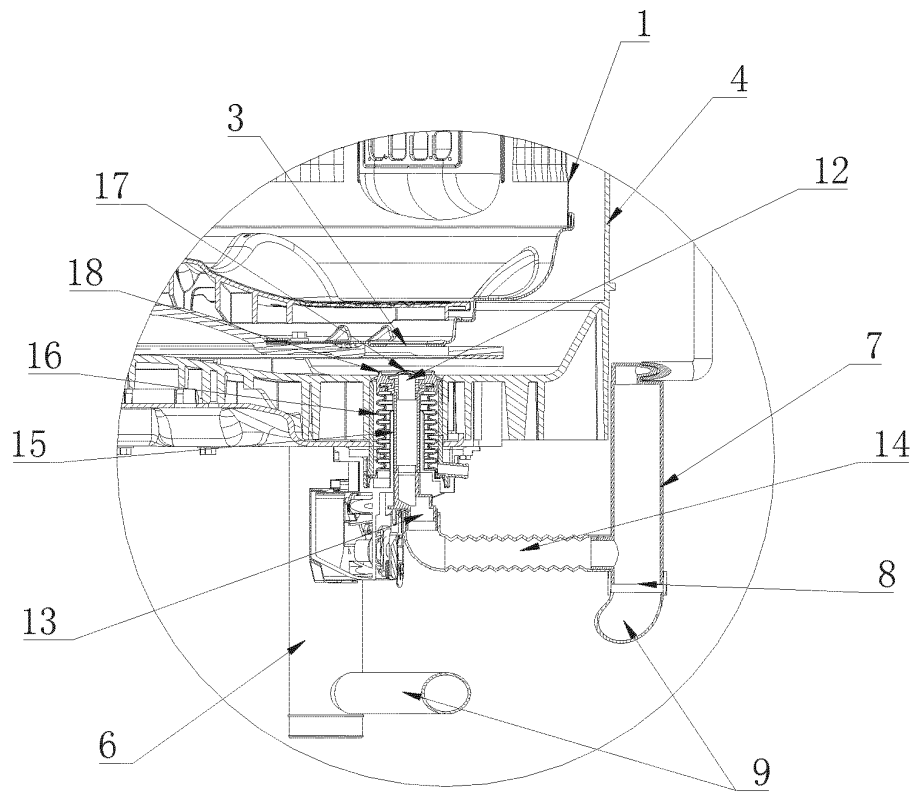


Fig.4

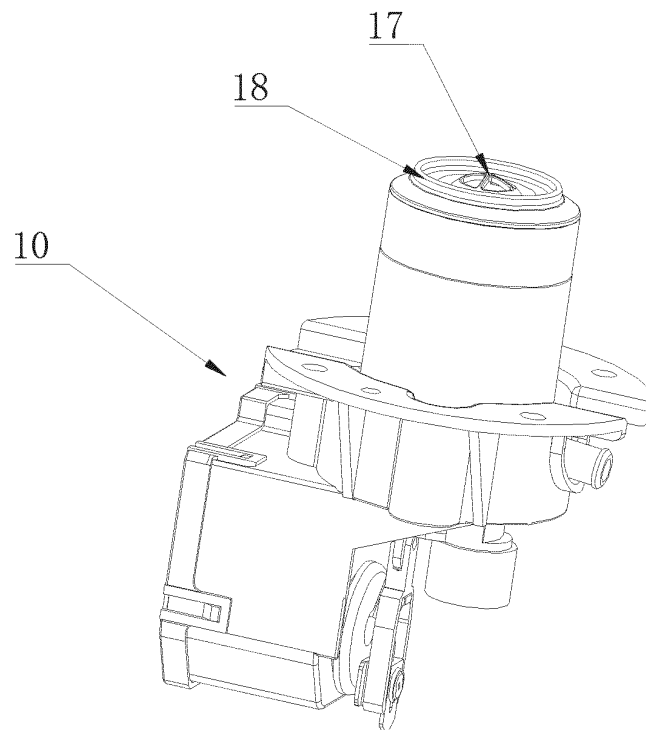


Fig.5

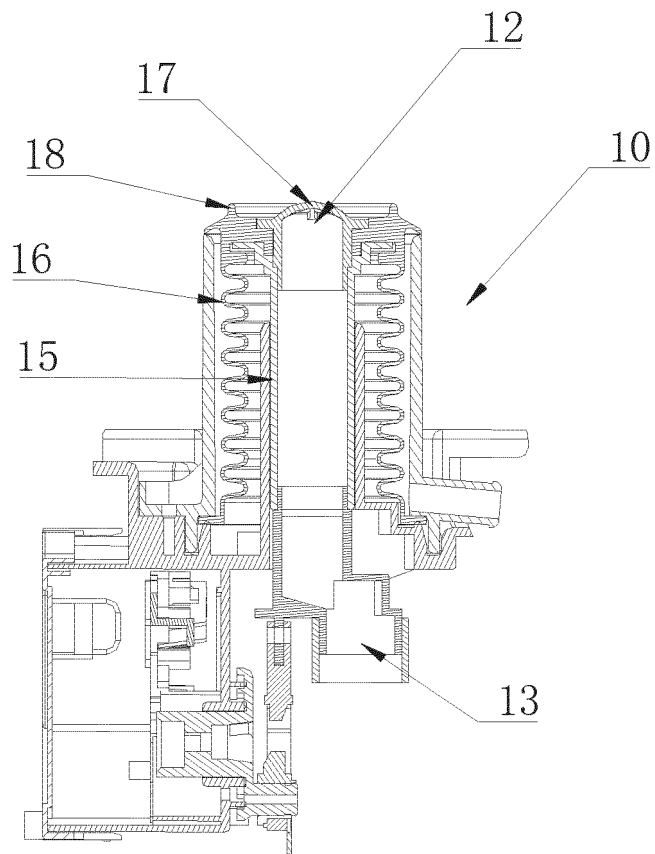


Fig.6

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2016/103559

A. CLASSIFICATION OF SUBJECT MATTER

D06F 39/08 (2006.01) i; D06F 37/12 (2006.01) i
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

D06F

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNXTX; CNABS; DWPI; SIPOABS; HAIER; groove, lock, seal, closed, save, water saving, water level sensor, pressure sensor, water pressure, water level, liquid level, fluid volume, water volume, water surface, perception, induction, air chamber, without, lower, hole, arc, cover, opening, hollow, arch, location, ball, circle, transducer, lower, container, tub, level, inductor, quantity, measur+, valve, water, drum, barrel, bottom, cask, sensor, liquid, buffer, tumble, cylinder, monitor, detect+, roller, tank, sens+, basket, press+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CN 204474981 A (HEFEI GOOLU TECHNOLOGY WASHER CO., LTD.), 15 July 2015 (15.07.2015), description, paragraphs [0020]-[0032], and figures 1-5	1-10
Y	CN 102628207 A (SAMSUNG SDI CO., LTD.), 08 August 2012 (08.08.2012), claims 1-2, and figures 1-5	1-10
PY	CN 105986405 A (HEFEI GOOLU TECHNOLOGY WASHER CO., LTD.), 05 October 2016 (05.10.2016), description, paragraphs [0014]-[0026], and figures 1-5	1-10
A	JP 2008295531 A (SHARP KK), 11 December 2008 (11.12.2008), the whole document	1-10

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

* Special categories of cited documents:

“A” document defining the general state of the art which is not considered to be of particular relevance

“E” earlier application or patent but published on or after the international filing date

“L” document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

“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

Date of the actual completion of the international search
10 January 2017 (10.01.2017)

Date of mailing of the international search report
20 January 2017 (20.01.2017)

Name and mailing address of the ISA/CN:
State Intellectual Property Office of the P. R. China
No. 6, Xitucheng Road, Jimenqiao
Haidian District, Beijing 100088, China
Facsimile No.: (86-10) 62019451

Authorized officer

BAI, YingTelephone No.: (86-10) **62084625**

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2016/103559

5	Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
	CN 204474981 U	15 July 2015	None	
10	CN 102628207 A	08 August 2012	US 2013025329 A1	31 January 2013
			KR 20120089098 A	09 August 2012
	CN 105986405 A	05 October 2016	None	
	JP 2008295531 A	11 December 2008	JP 4789863 B2	12 October 2011
15				
20				
25				
30				
35				
40				
45				
50				
55				

Form PCT/ISA/210 (patent family annex) (July 2009)

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- WO 200420107890 A [0003]