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(54) LAUNDRY TREATMENT DEVICE

WÄSCHEBEHANDLUNGSVORRICHTUNG

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Description

TECHNICAL FIELD

[0001] The invention relates to the technical field of laundry washing and care, and in particular to a laundry treatment device.

BACKGROUND

[0002] In an existing washing machine, an inner tub and an outer tub are communicated with each other, the inner tub is used to hold clothes, the outer tub is used to hold water, a large number of water passing holes are arranged in the inner tub, so that the inner tub and the outer tub are communicated through the water passing holes, water in the outer tub enters the inner tub, injection and drainage of water is implemented through the outer tub. In this type of washing machine, dirt is easily accumulated between the inner tub and the outer tub, which breeds bacteria which are not easily cleaned. To this end, a washing machine with a single tub used for washing is present in the related art is different from existing washing modes in that the inner tub is a non-porous inner tub and is isolated from the outer tub, and the single tub is not only used to hold clothes and beat or stir the clothes, but also used to hold water. However, drainage and dewatering of the washing machine with a single tub used for washing is a difficult technology urgently to be overcome.

[0003] In the related art, a side wall of the inner tub is provided with a dewatering port and a dewatering valve, the dewatering valve is connected to the inner tub through a spring, and when dewatering is performed in the inner tub, the dewatering valve opens the dewatering port under an action of a centrifugal rotation force of the inner tub, and water in the inner tub may be discharged out of the inner tub through the dewatering port; and when washing is performed in the inner tub, the dewatering valve closes the dewatering port under an action of the spring.

[0004] In the above solution, the dewatering valve may be opened only when the inner tub rotates at a high speed. When a washing process in the inner tub is finished, a large amount of water is held in the inner tub, and a motor needs to drive the inner tub and water in the inner tub to rotate at a high speed to implement drainage. On one hand, drainage of water may not be implemented when the inner tub rotates at a low speed, and on the other hand, the motor may operate in an overload manner. CN 111 155 264 A relates to the technical field of electric appliance manufacturing, in particular to a washing machine. US 2020/263343 A1 relates to the technical field of a laundry equipment, specifically, relates to water-free washing machine between inner and outer barrels. US 2018/237977 A1 relates to the field of washing machines, and in particular relates to a discharge control mechanism for an inner tub of a washing machine and the washing machine. WO 2018/077280 A1 relates to a washing machine that can inhibit the generation of dirt or mold in and around a dehydrating tub. CN 111 118 806 A relates to washing machine equipment in household appliances, in particular to a top-opening type drum washing machine. CN 109 423 853 A relates to the washing machine technology fields, and in particular to ones where the rotatable inner cylinder can be filled with water.

SUMMARY

[0005] In view of this, it is desirable for embodiments of the application to provide a laundry treatment device which facilitates drainage. The present invention is defined by the appended independent claim 1 and preferred further features are defined by the dependent claims.

[0006] In the following, each of the described methods, apparatuses, embodiments, examples, and aspects, which do not fully correspond to the invention as defined in the claims is thus not according to the invention and is, as well as the whole following description, present for illustration purposes only or to highlight specific aspects or features of the claims. Embodiments not falling under the scope of the claims should be interpreted as examples useful for understanding the invention.

[0007] In order to achieve the above purpose, the invention provides a laundry treatment device, comprising an inner tub, a driving device and a drainage valve assembly. The inner tub is configured to hold water, and be provided with a drainage hole. The drainage valve assembly includes a valve core, a transmission rod mechanism, an elastic positioning member and an elastic reset member

[0008] The valve core has a sealing position for sealing the drainage hole and a drainage position for opening the drainage hole.

[0009] The transmission rod mechanism is connected to the inner tub, and has a rotation center line, a first end of the transmission rod mechanism drives the valve core to move, and during rotation of the inner tub, the driving device is operative to selectively toggle a second end of the transmission rod mechanism to drive the transmission rod mechanism to rotate around the rotation center line.

[0010] The elastic positioning member is operative to keeping the valve core at the sealing position or the drainage position, and the elastic reset member is operative to drive at least the second end of the transmission rod mechanism to idle to be reset.

[0011] According to the invention, the valve core has an intermediate critical position between the sealing position and the drainage position, and when the transmission rod mechanism drives the valve core to cross the intermediate critical position, the elastic positioning member is operative to drive the valve core to continue to move to the sealing position or the drainage position, and the elastic reset member is operative to drive at least the second end of the transmission rod mechanism to idle

to be reset.

[0012] According to the invention, the transmission rod mechanism comprises a transmission rod, a first shifting rod, and a reversal mechanism connected between the valve core and a first end of the transmission rod, the transmission rod mechanism drives the valve core to translate through the reversal mechanism, the first shifting rod is connected to a second end of the transmission rod, and the driving device selectively toggles the first shifting rod.

[0013] In some embodiments, the valve core may be provided with a sliding groove, the reversal mechanism includes a turntable and a protruding column. The protruding column protrudes from a side of the turntable, is eccentrically arranged relative to the rotation center line and extends into the sliding groove. The turntable is provided with a first driving groove comprising first driving surfaces on opposite sides along a rotation direction, the first end of the transmission rod is at least partially positioned in the first driving groove and slidable in the first driving groove, and the first end of the transmission rod is operative to be alternatively driving-fitted with one of the first driving surfaces to drive the reversal mechanism to rotate around the rotation center line.

[0014] In some embodiments, a through hole may be formed in the turntable, the first end of the transmission rod is arranged in the through hole and passes through the through hole, an inner wall of the through hole is provided with two rotationally symmetrical protrusions which divide a part of space of the through hole to form two first driving grooves distributed in a circumferential direction, the first end of the transmission rod is provided with a flat shaft portion positioned on the rotation center line, and opposite ends of the flat shaft portion in a radial direction of the through hole extend into their respective first driving grooves respectively.

[0015] In some embodiments, a through hole may be formed in the turntable, the first driving groove penetrates through a part of side wall corresponding to the through hole in a radial direction of the through hole, a bump is arranged on a surface of the transmission rod and positioned in the first driving groove, and the transmission rod is arranged in the through hole and passes through the through hole.

[0016] In some embodiments, the elastic reset member may be a first torsion spring sleeved on the transmission rod.

[0017] According to the invention, the elastic positioning member is a second torsion spring comprising a spiral body, a first rotation arm and a second rotation arm. The first rotation arm is fixed relative to the inner tub, the spiral body is suspended, and the second rotation arm is operative to moving along with the valve core or the transmission rod mechanism.

[0018] According to the invention, the second rotation arm is connected to the valve core, and when the valve core is positioned at the sealing position, an acting force applied by the second torsion spring to the valve core has at least a force component parallel to a movement direction of the valve core and facing toward the drainage hole, and when the valve core is positioned at the drainage position, an acting force applied by the second torsion spring to the valve core has at least a force component parallel to the movement direction of the valve core and away from the drainage hole, and when the valve core is positioned at the intermediate critical position, an acting force applied by the second torsion spring to the valve core has a direction perpendicular to the movement direction of the valve core.

[0019] In some embodiments, the second rotation arm may be connected to the reversal mechanism, and when the valve core is positioned at the sealing position, the second torsion spring applies a first torque around the rotation center line to the reversal mechanism, and when the valve core is positioned at the drainage position, the second torsion spring applies a second torque around the rotation center line to the reversal mechanism, the first torque has a direction opposite to the second torque, and when the valve core is positioned at the intermediate critical position, a torque applied by the second torsion spring to the reversal mechanism is zero.

[0020] In some embodiments, the drainage valve assembly may comprise a valve seat of which a side facing toward the drainage hole is opened, at least a part of the valve core and the reversal mechanism are arranged in the valve seat, and an end of the valve core is operative to extend out from the opened part of the valve seat; a side wall of the valve seat is provided with an avoidance groove, the transmission rod is arranged in the avoidance groove and passes through the avoidance groove, and the first shifting rod is positioned outside the valve seat.

[0021] In some embodiments, one of the valve seat or the valve core may be provided with a guide groove, the other of the valve seat or the valve core may be provided with a convex rib, and the convex rib is sliding-fitted with the guide groove.

[0022] In some embodiments, the drainage valve assembly may comprise a flexible sealing member sleeved on the opened side of the valve seat, the flexible sealing member and the valve seat enclose together to form a sealing cavity, and the valve core, the elastic positioning member, the elastic reset member and the reversal mechanism are positioned in the sealing cavity, and the valve core is connected to the flexible sealing member to drive the flexible sealing member to move.

[0023] In some embodiments, the valve core may comprise a valve plate and a valve column which are fixedly connected, the flexible sealing member includes a telescopic pipe, a supporting end plate and a flange. The flange is arranged at an axial end of the telescopic pipe and connected to the opened side of the valve seat, the supporting end plate closes the other axial end of the telescopic pipe, the valve plate is stacked on an inner surface of the supporting end plate, and when the valve core is positioned at the sealing position, the valve plate abuts the supporting end plate around the drainage hole.

[0024] In some embodiments, the valve core is provided with a second driving groove comprising second driving surfaces on opposite sides along a rotation direction respectively, a first end of the transmission rod is positioned in the second driving groove and slidable in the second driving groove, the transmission rod is operative to be alternatively driving-fitted with one of the second driving surfaces to drive the valve core to rotate, the first shifting rod is connected to a second end of the transmission rod, and the driving device selectively toggles the first shifting rod.

[0025] In some embodiments, the laundry treatment device may comprise a lifting rib in which the valve core, the elastic positioning member and the elastic reset member are arranged, the first end of the transmission rod is positioned in the lifting rib, the second end of the transmission rod extends outside an axial end of the inner tub, and the first shifting rod is positioned outside the axial end of the inner tub.

[0026] In some embodiments, the laundry treatment device may comprise an outer tub in which the inner tub is rotatably arranged, the driving device is arranged on the outer tub, the first shifting rod is positioned between the inner tub and the outer tub, the driving device includes a second shifting rod and a power unit driving the second shifting rod to selectively extend towards the shifting rod or retract, and in an extending state of the second shifting rod, the second shifting rod is operative to selectively toggle the first shifting rod to rotate forward or backward around the rotation center line.

[0027] According to the laundry treatment device provided by the embodiments of the application, regardless of a rotation speed of the inner tub, switching of the valve core between the sealing position and the drainage position may be implemented as long as the transmission rod mechanism may rotate, so that the laundry treatment device has a simple structure, facilitates drainage of the inner tub and has high reliability, and service life of the drainage valve assembly may be effectively prolonged. Furthermore, the elastic reset member drives at least the second end of the transmission rod mechanism to be reset, so that the driving device may conveniently toggle the second end of the transmission rod mechanism at the same position.

BRIEF DESCRIPTION OF THE DRAWINGS

[0028]

FIG. 1 is a schematic structural diagram of part of a laundry treatment device according to an embodiment of the application.

FIG. 2 is a cross-sectional view of the structure shown in FIG. 1, here, a valve core is positioned at a sealing position and a second shifting rod is retracted.

FIG. 3 is a schematic view of the structure shown in FIG. 2 after the second shifting rod extends out.

FIG. 4 is a schematic view of the structure shown in FIG. 2 in another state, here, the valve core is positioned at a drainage position and the second shifting rod is retracted.

FIG. 5 is a schematic view of movement of an inner tub, a first shifting rod and a second shifting rod according to an embodiment of the application, here, the first shifting rod begins to contact the first shifting rod.

FIG. 6 is a schematic view of the inner tub of FIG. 5 rotated clockwise by a certain angle.

FIG. 7 is a schematic structural diagram of a drainage valve assembly according to a first embodiment of the application.

FIG. 8 is a schematic exploded view of the structure shown in FIG. 7.

FIG. 9 is a schematic view from another perspective of FIG. 8.

FIG. 10 is a schematic view of the structure shown in FIG. 7 after a flexible sealing member, a valve cover and a valve plate are omitted.

FIG. 11 is a cross-sectional view of the drainage valve assembly shown in FIG. 7 along an A-A direction of FIG. 10, here, a valve core is positioned at a sealing position.

FIG. 12 is a schematic view of the structure shown in FIG. 11 in another state, here, the valve core is positioned at a drainage position.

FIG. 13 is a schematic structural diagram of a reversal mechanism shown in FIG. 8.

FIG. 14 is a schematic view of cooperation of a flat shaft portion and a reversal mechanism shown in FIG. 8, here, the flat shaft portion is positioned at an initial position, and at the position, the reversal mechanism enables a valve core to be positioned at a sealing position.

FIG. 15 is a schematic view of the structure shown in FIG. 14 in another state, here, the flat shaft portion drives the reversal mechanism to move by a certain angle in an arrow direction.

FIG. 16 is a schematic view of the structure shown in FIG. 15 in another state, here, the reversal mechanism continues to rotate by a certain angle in a coun-

terclockwise direction of FIG. 2, and at the position, the reversal mechanism enables the valve core to be positioned at a drainage position, and the flat shaft portion rotates by a certain angle in a clockwise direction of FIG. 2 to be reset to the initial position.

FIG. 17 is a schematic exploded view of a drainage valve assembly according to a second embodiment of the application.

FIG. 18 is a schematic view from another perspective of the structure shown in FIG. 17.

FIG. 19 is a schematic structural diagram of a reversal mechanism shown in FIG. 18.

FIG. 20 is a schematic view from another perspective of the structure shown in FIG. 17 after it is assembled, here, a flexible sealing member, a valve cover and a valve plate are omitted.

FIG. 21 is a cross-sectional view of the drainage valve assembly according to the second embodiment of the application taken along a B-B direction of FIG. 20.

DETAILED DESCRIPTION

[0029] It should be noted that embodiments of the application and technical features in the embodiments may be combined with each other without conflict, and detailed descriptions in specific embodiments should be understood as explanation and illustration of the purpose of the application, and should not be regarded as an improper limitation to the application.

[0030] In descriptions of the embodiments of the application, orientations or positional relationships such as "upper", "lower", "front", "rear" are based on an orientation or positional relationship shown in FIG. 2. In FIG. 2, an upper part is "upper", a lower part is "lower", a left part is "front", and a right part is "rear".

[0031] It should be understood that these orientation terms are merely intended to facilitate descriptions of the application and simplify the descriptions, rather than indicating or implying that a referred device or element must have a specific orientation, constructed and operated in a specific orientation, and thus cannot be understood as limitation to the application.

[0032] An embodiment of the application provides a laundry treatment device, with reference to FIG. 1 to FIG. 4, the laundry treatment device includes an inner tub 11, a drainage valve assembly 3, and a driving device 20. The inner tub 11 may hold water. That is, washing water is held in the inner tub 11 in a process of the laundry treatment device washing laundries, and the inner tub 11 may also be referred to as a non-porous inner tub 11, which may avoid the problem of accumulating dirt easily due to water accumulated in an outer tub 12 of the related art; and a drainage hole 11a is formed on the inner tub 11 (see FIG. 4).

[0033] With reference to FIG. 8, FIG. 9, FIG. 17 and FIG. 18, the drainage valve assembly 3 includes a valve core 31, an elastic positioning member, an elastic reset member, and a transmission rod mechanism 32 connected to the inner tub 11. That is, the transmission rod mechanism 32 may rotate along with the inner tub 11. With reference to FIG. 10 and FIG. 20, the transmission rod mechanism 32 has a rotation center line L, that is, the transmission rod mechanism 32 revolves around a rotation axis of the inner tub 11 while rotating around the rotation center line L.

[0034] The valve core 31 has a sealing position for sealing the drainage hole 11a (see FIG. 2) and a drainage position for opening the drainage hole 11a (see FIG. 4).

[0035] A first end of the transmission rod mechanism 32 drives the valve core 31 to move, and during rotation of the inner tub 11, the driving device 20 may selectively toggle a second end of the transmission rod mechanism 32 to drive the transmission rod mechanism 32 to rotate around the rotation center line L, that is, the driving device 20 provides a power source for the transmission rod mechanism 32.

[0036] The elastic positioning member may keep the valve core 31 at the sealing position or the drainage position, that is, when the valve core is positioned at the sealing position, the valve core 31 may be kept at the sealing position under an action of the elastic positioning member, and when the valve core is positioned at the drainage position, the valve core 31 may be kept at the drainage position under an action of the elastic positioning member. The elastic reset member may drive at least the second end of the transmission rod mechanism 32 to be reset. During washing or in other cases where drainage is not required, with reference to FIG. 2 and FIG. 3, the valve core 31 is positioned at the sealing position, the drainage hole 11a is blocked by the valve core 31, and water in the inner tub 11 does not flow out of the inner tub 11. When drainage or dewatering is required, with reference to FIG. 4, the valve core 31 is switched from the sealing position to the drainage position, the drainage hole 11a is opened, and water in the inner tub 11 is discharged from the inner tub 11 through the drainage hole 11a.

[0037] According to the laundry treatment device provided by the embodiments of the application, regardless of a rotation speed of the inner tub 11, switching of the valve core 31 between the sealing position and the drainage position may be implemented as long as the transmission rod mechanism 32 may rotate, so that the laundry treatment device has a simple structure, facilitates drainage of the inner tub 11 and has high reliability, and service life of the drainage valve assembly 3 may be effectively prolonged. Furthermore, the elastic reset member drives at least the second end of the transmission rod mechanism 32 to be reset, so that the driving device 20 may conveniently toggle the second end of the

transmission rod mechanism 32 at the same position.

[0038] It should be noted that resetting of the second end of the transmission rod mechanism 32 means that the second end of the transmission rod mechanism 32 returns to an initial position before it is toggled by the driving device 20.

[0039] It should be noted that the laundry treatment device discharges water through the drainage hole 11a during washing or after washing is finished, and may also discharges water through the drainage hole 11a during dewatering.

[0040] In an embodiment, the valve core 31 further has an intermediate critical position between the sealing position and the drainage position. It should be noted that the intermediate critical position between the sealing position and the drainage position refers to the intermediate critical position between the sealing position and the drainage position in a movement stroke of the valve core 31, that is, the valve core 31 passes through the intermediate critical position in a process of the valve core 31 moving from the sealing position to the drainage position, and also passes through the intermediate critical position in a process of the valve core 31 moving from the drainage position to the sealing position.

[0041] When the transmission rod mechanism 32 drives the valve core 31 to cross the intermediate critical position, the elastic positioning member may drive the valve core 31 to continue to move to the sealing position or the drainage position. Specifically, when the valve core 31 moves in a direction from the sealing position to the drainage position and crosses the intermediate critical position, the elastic positioning member may drive the valve core 31 to continue to move to the drainage position, that is, after the valve core 31 crosses the intermediate critical position, even though the transmission rod mechanism 32 stops driving the valve core 31, the valve core 31 may continue to move to the drainage position under an action of the elastic positioning member. When the valve core 31 moves from the drainage position to the sealing position and crosses the intermediate critical position, the elastic positioning member may drive the valve core 31 to continue to move to the sealing position, that is, after the valve core 31 crosses the intermediate critical position, even though the transmission rod mechanism 32 stops driving the valve core 31, the valve core 31 may continue to move to the sealing position under an action of the elastic positioning member

[0042] When the transmission rod mechanism 32 drives the valve core 31 to move to cross the intermediate critical position, the elastic reset member may drive at least the second end of the transmission rod mechanism 32 to idle to be reset. The elastic positioning member may drive the valve core 31 to continue to move to the sealing position or the drainage position, therefore, as long as the transmission rod mechanism 32 drives the valve core 31 to cross the intermediate critical position, even when the driving device 20 stops driving the transmission rod mechanism 32, at least the second end of the transmission rod mechanism 32 may idle to be reset under an action of the elastic reset member. In this way, when the driving device 20 needs to toggle the transmission rod mechanism 32 next time, the driving device 20 will toggle the second end of the transmission rod mechanism 32 at the same position, which may simplify driving and fitting structures of the transmission rod mechanism 32 and the driving device 20.

[0043] It should be noted that "idle" refers to that the transmission rod mechanism 32 does not form a driving force on the valve core 31 during idling.

[0044] In order to facilitate supporting and mounting the inner tub 11, with reference to FIG. 1 to FIG. 4, in an embodiment, the laundry treatment device includes an outer tub 12 in which the inner tub 11 is rotatably arranged, the outer tub 12 supports the inner tub 11. The laundry treatment device may discharge water through the outer tub 12, specifically, water discharged from the drainage hole 11a enters the outer tub 12, and the outer tub 12 discharges collected water out of the laundry treatment device.

[0045] The drainage hole 11a may be arranged at a suitable position of the inner tub 11, as long as water in the inner tub 11 may be discharged through the drainage hole 11a. The number and specific shape of the drainage hole 11a are not limited.

[0046] In the embodiment of the application, with reference to FIG. 4, the drainage hole 11a is formed in a circumferential direction of rotation of the inner tub 11, so that the inner tub 11 spins water out from the drainage hole 11a by a centrifugal force during dewatering.

[0047] It should be noted that a rotation axis L1 of the inner tub 11 may extend in a horizontal direction, or may extend in a vertical direction, or may extend in an oblique direction between the horizontal direction and the vertical direction, which is not limited here.

[0048] In an embodiment of the application, with reference to FIG. 2 to FIG. 4, the rotation axis L 1 of the inner tub 11 is approximately in the horizontal direction, and during rotation of the inner tub 11, the drainage hole 11a may circularly pass through a lowest point of a rotation trajectory of the inner tub 11, so that water in the inner tub 11 may be emptied without a dead angle. It should be noted that the transmission rod mechanism 32 may drive the valve core 31 to rotate, or may drive the valve core 31 to translate.

[0049] Specific structural forms of the transmission rod mechanism 32 are not limited. Exemplarily, in some embodiments, with reference to FIG. 8, FIG. 9, FIG. 17 and FIG. 18, the transmission rod mechanism 32 includes a transmission rod 321, a first shifting rod 322, and a reversal mechanism 323 connected between the valve core 31 and a first end of the transmission rod 321, the transmission rod mechanism 32 drives the valve core 31 to translate through the reversal mechanism 323, that is, the reversal mechanism 323 is configured to convert rotation of the transmission rod mechanism 32 into trans-

lation of the valve core 31. The first shifting rod 322 is connected to a second end of the transmission rod 321, and the driving device 20 selectively toggles the first shifting rod 322. Specifically, after the driving device 20 toggles the first shifting rod 322, since the transmission rod mechanism 32 rotates along with the inner tub 11, the first shifting rod 322 rotates under a combined action of the driving device 20 and the inner tub 11, and the first shifting rod 322 drives the transmission rod 321 to rotate synchronously.

[0050] In the embodiment, a movement mode of the valve core 31 is translation, so that a side of the valve core 31 used to close the drainage hole 11a always faces the drainage hole 11a, and when the valve core 31 is switched from the drainage position to the sealing position, the side of the valve core 31 used to close the drainage hole 11a may stably, reliably, directly or indirectly press against periphery of the drainage hole 11a, so that sealing reliability of the drainage hole 11a may be greatly improved, and sealing effect thereof is good.

[0051] Connection modes of the first shifting rod 322 and the transmission rod 321 are not limited, as long as the first shifting rod 322 and the transmission rod 321 may implement synchronous movement, for example, the first shifting rod 322 and the transmission rod 321 may be integrally formed, clamped, screwed, or the like with respect to each other, which is not limited here.

[0052] It may be understood that in order to facilitate connection between the first shifting rod 322 and the transmission rod 321, in some embodiments, with reference to FIG. 8 and FIG. 17, the first shifting rod 322 includes a rod portion 3221 and a barrel portion 3222 which are fixedly connected, the driving device 20 is in contact with the rod portion 3221, the barrel portion 3222 is connected to an end of the rod portion 3221 and is sleeved on the second end of the transmission rod 321.

[0053] In an embodiment, with reference to FIG. 9 and FIG. 21, the valve core 31 is provided with a sliding groove 31a, the reversal mechanism 323 includes a turntable 3231 and a protruding column 3232. The protruding column 3232 protrudes from a side of the turntable 3231, is eccentrically arranged relative to the rotation center line L, extends into the sliding groove 31a and may rotate in the sliding groove 31a. The reversal mechanism 323 is equivalent to a cam transmission mechanism, and when the reversal mechanism 323 rotates around the rotation center line L, the protruding column 3232 may drive the valve core 31 to translate.

[0054] With reference to FIG. 13 and FIG. 19, the turntable 3231 is provided with a first driving groove 3231a comprising first driving surfaces 3231b on opposite sides along a rotation direction, the first end of the transmission rod 321 is at least partially positioned in the first driving groove 3231a and slidable in the first driving groove 3231a, and the first end of the transmission rod 321 may be alternatively driving-fitted with one of the first driving surfaces 3231b to drive the reversal mechanism 323 to rotate around the rotation center line L.

[0055] It should be noted that a rotation direction of the transmission rod mechanism 32 is related to a rotation direction of the inner tub 11. For example, when the inner tub 11 rotates in a clockwise direction of FIG. 5, in case that the driving device 20 toggles the first shifting rod 322, the first shifting rod 322 only drives the transmission rod mechanism 32 to rotate around the rotation center line L in a counterclockwise direction of FIG. 5. When the inner tub 11 rotates in the counterclockwise direction of FIG. 5, in case that the driving device 20 toggles the first shifting rod 322, the first shifting rod 322 only drives the transmission rod mechanism 32 to rotate around the rotation center line L in the clockwise direction of FIG. 5.

[0056] Specifically, during washing of the laundry treatment device, the valve core 31 is positioned at the sealing position. Then, with reference to FIG. 14, a part of the first end of the transmission rod 321 is in contact with one of the first driving surfaces 3231b, and at this time, the inner tub 11 continues to rotate in the same direction. In case that the first shifting rod 322 is toggled due to misoperation of the driving device 20, then the first shifting rod 322 may drive the transmission rod mechanism 32 to rotate in a clockwise direction of FIG. 14, and the first end of the transmission rod 321 idles in the first driving groove 3231a, that is, the first shifting rod 322 and the transmission rod 321 generate an idle stroke. At this time, the transmission rod mechanism 32 does not drive the valve core 31 to move, and the valve core 31 may be still kept at the current sealing position, so that reliability of the laundry treatment device may be improved. When the inner tub 11 rotates reversely, the first end of the transmission rod 321 biases the first driving surface 3231b after the driving device 20 toggles the first shifting rod 322, so that the reversal mechanism 323 is forced to rotate in a counterclockwise direction of FIG. 14. When the reversal mechanism 323 rotates to a position shown in FIG. 15, the valve core 31 has crossed the intermediate critical position, and thereafter, in case that the driving device 20 no longer applies an acting force to the first shifting rod 322, the transmission rod 321 rotates backward in a clockwise direction of FIG. 15, the reversal mechanism 323 continues to rotate in a counterclockwise direction shown in FIG. 15 until the reversal mechanism 323 moves to a state shown in FIG. 16, in which the valve core 31 is successfully switched from the sealing position to the drainage position, the transmission rod 321 is also reset to the initial position, and at this time, the first end of the transmission rod 321 is in contact with the other of the first driving surfaces 3231b.

[0057] With reference to FIG. 16, when the inner tub 11 does not change its rotation direction, in case that the first shifting rod 322 is toggled due to misoperation of the driving device 20, then the first shifting rod 322 may drive the transmission rod mechanism 32 to rotate in a counterclockwise direction of FIG. 16, and the first end of the transmission rod 321 idles in the first driving groove 3231a, that is, the first shifting rod 322 and the transmission rod 321 generate an idle stroke, the transmission rod

mechanism 32 does not drive the valve core 31 to move, the valve core 31 may be still kept at the current drainage position, and after idling, the transmission rod 321 still returns to the initial position under an action of the elastic reset member, so that reliability of the laundry treatment device may be improved. When the inner tub 11 rotates reversely, the first end of the transmission rod 321 biases the other of the first driving surfaces 3231b after the driving device 20 toggles the first shifting rod 322, so that the reversal mechanism 323 is forced to rotate so as to drive the valve core 31 to translate, and drive the valve core 31 to switch from the drainage position to the sealing position.

[0058] Specific connection structures of the turntable 3231 and the transmission rod 321 are not limited.

[0059] Exemplarily, in an embodiment, with reference to FIG. 13, a through hole 3231c is formed in the turntable 3231, an inner wall of the through hole 3231c is provided with two rotationally symmetrical protrusions 32311 which divide a part of space of the through hole 3231c to form two first driving grooves 3231a distributed in a circumferential direction, and the first end of the transmission rod 321 is provided with a flat shaft portion 3211 positioned on the rotation center line L. With reference to FIG. 14 to FIG. 16, opposite ends of the flat shaft portion 3211 in a radial direction of the through hole 3231c extend into their respective first driving grooves 3231a respectively. In this way, on one hand, torque transmission of the turntable 3231 and the transmission rod 321 may be more stable, and on the other hand, two reaction forces applied by the turntable 3231 to the flat shaft portion 3211 may be balanced with respect to each other, thereby avoiding or reducing a shear force borne by the transmission rod 321 and improving stressing conditions of the transmission rod 321.

[0060] In another embodiment, with reference to FIG. 19, a through hole 3231c is formed in the turntable 3231, the first driving groove 3231a penetrates through a part of side wall corresponding to the through hole 3231c in a radial direction of the through hole 3231c, that is, the first driving groove 3231a is generally notch-shaped. With reference to FIG. 17 and FIG. 18, a bump 3212 is arranged on a surface of the transmission rod 321, the transmission rod 321 is arranged in the through hole 3231c and passes through the through hole 3231c, and the bump 3212 is positioned in the first driving groove 3231a. In the embodiment, torque transmission is implemented by driving cooperation of the bump 3212 and two first driving surfaces 3231b of the first driving groove 3231a. It should be noted that specific shapes of the bump 3212 are not limited.

[0061] Specific shape and type of the elastic reset member are not limited, as long as the elastic reset member may drive the transmission rod 321 to be reset. It should be noted that since the transmission rod 321 may rotate forward and backward relative to the initial position, the elastic reset member needs to drive the transmission rod 321 to be reset after the transmission rod 321 rotates forward, and also needs to drive the transmission rod 321 to be reset after the transmission rod 321 rotates backward.

[0062] It should be noted that in the embodiments of the application, forward rotation and backward rotation have opposite meanings, and definitions of forward rotation and backward rotation may be interchanged.

[0063] For example, in an embodiment, the elastic reset member includes a first cylindrical spring and a second cylindrical spring arranged on opposite lateral sides of the transmission rod 321. When the transmission rod 321 rotates forward, the first cylindrical spring is compressed, and then the first cylindrical spring may drive the transmission rod 321 to be reset, and when the transmission rod 321 rotates forward, the second cylindrical spring is compressed, and then the second cylindrical spring may drive the transmission rod 321 to be reset.

[0064] In another embodiment, with reference to FIG. 8, FIG. 9, FIG. 17 and FIG. 18, the elastic reset member is a first torsion spring 33 sleeved on the transmission rod 321. No matter the transmission rod 321 rotates forward or backward, the transmission rod 321 may force the first torsion spring 33 to be twisted to store torque potential energy, and then the first torsion spring 33 may drive the transmission rod 321 to be reset. In the embodiment, the transmission rod 321 may be driven to be reset by only one first torsion spring 33, which has a simple structure, is easy to implement mounting, and also saves mounting space.

[0065] It may be understood that in some embodiments, a plurality of first torsion springs 33 may also be provided simultaneously.

[0066] It should be noted that mounting modes of two rotation arms of the first torsion spring 33 are not limited, as long as the first torsion spring 33 may be twisted during rotation of the transmission rod 321.

[0067] Specific structural forms of the elastic positioning member are not limited.

[0068] Exemplarily, in an embodiment, with reference to FIG. 8, FIG. 9, FIG. 17 and FIG. 18, the elastic positioning member is a second torsion spring 34. With reference to FIG. 8, the second torsion spring 34 includes a spiral body 341, a first rotation arm 342 and a second rotation arm 343, position of the first rotation arm 342 is fixed relative to the inner tub 11, that is, the first rotation arm 342 does not move relative to the inner tub 11; the spiral body 341 is suspended, and the second rotation arm 343 may move along with the valve core 31 or the transmission rod mechanism 32. During movement of the second rotation arm 343 along with the valve core 31 or the transmission rod mechanism 32, the second rotation arm 343 drives the spiral body 341 to move therewith. When the second rotation arm 343 are positioned at different positions, direction of an acting force applied by the second rotation arm 343 to the valve core 31 directly or indirectly also changes, so that the second torsion spring 34 may drive the valve core 31 to translate

in a direction within a certain stroke range, and drive the valve core 31 to translate in a reverse direction within another stroke range.

[0069] In an embodiment, with reference to FIG. 8 to FIG. 12, the second rotation arm 343 is connected to the valve core 31. With reference to FIG. 11, when the valve core 31 is positioned at the sealing position, position of the second rotation arm 343 is positioned on a side of the first rotation arm 342 close to the drainage hole 11a. An acting force applied by the second torsion spring 34 to the valve core 31 has at least a force component parallel to a movement direction of the valve core 31 and facing toward the drainage hole 11a. Specifically, the acting force applied by the second torsion spring 34 to the valve core 31 has an upward force component in FIG. 11, and this force component abuts the valve core 31 around the drainage hole 11a.

[0070] With reference to FIG. 12, when the valve core 31 is positioned at the drainage position, position of the second rotation arm 343 is positioned on a side of the first rotation arm 342 away from the drainage hole 11a. An acting force applied by the second torsion spring 34 to the valve core 31 has at least a force component parallel to the movement direction of the valve core 31 and away from the drainage hole 11a. Specifically, the acting force applied by the second torsion spring 34 to the valve core 31 has a downward force component in FIG. 12, and this force component keeps the valve core 31 at the drainage position relatively stable.

[0071] When the valve core 31 is positioned at the intermediate critical position, an acting force applied by the second torsion spring 34 to the valve core 31 has a direction perpendicular to the movement direction of the valve core 31. Specifically, the acting force applied by the second torsion spring 34 to the valve core 31 is perpendicular to direction of a paper surface of FIG. 11 or FIG. 12, that is, at this time, the second torsion spring 34 does not drive the valve core 31 to move upward, and does not drive the valve core 31 to move downward.

[0072] It should be noted that the intermediate critical position is only a transition position, and the valve core 31 is not required to be kept at this position.

[0073] In another embodiment, with reference to FIG. 17, FIG. 18, FIG. 20 and FIG. 21, the second rotation arm 343 is connected to the reversal mechanism 323. With reference to FIG. 21, when the valve core 31 is positioned at the sealing position, the second torsion spring 34 applies a first torque around the rotation center line L to the reversal mechanism 323, and the reversal mechanism 323 abuts the valve core 31 around the drainage hole 11a under an action of the first torque, and specifically, direction of the first torque is a clockwise direction of FIG. 21. When the valve core 31 is positioned at the drainage position, the second torsion spring 34 applies a second torque around the rotation center line L to the reversal mechanism 323, and the reversal mechanism 323 keeps the valve core 31 at the drainage position under an action of the second torque, and the first torque has a direction opposite to the second torque. When the valve core 31 is positioned at the intermediate critical position, a torque applied by the second torsion spring 34 to the reversal mechanism 323 is zero.

[0074] In an embodiment, with reference to FIG. 8, FIG. 9, FIG. 17 and FIG. 18, the drainage valve assembly 3 includes a valve seat 35 of which a side facing toward the drainage hole 11a is opened, and at least a part of the valve core 31, the reversal mechanism 323, the elastic positioning member and the elastic reset member are arranged in the valve seat 35, and an end of the valve core 31 may extend out from the opened part of the valve seat 35. A side wall of the valve seat 35 is provided with an avoidance groove 35a, the transmission rod 321 is arranged in the avoidance groove 35a and passes through the avoidance groove 35a, and the first shifting rod 322 is positioned outside the valve seat 35. The valve seat 35 provides mounting support for the valve core 31 and the transmission rod mechanism 32, and also protects the valve core 31, the transmission rod mechanism 32, the elastic positioning member and the elastic reset member, thereby avoiding interference with other structures of the laundry treatment device and improving reliability of the drainage valve assembly 3.

[0075] In an embodiment, with reference to FIG. 9, FIG. 10, FIG. 17 and FIG. 20, one of the valve seat 35 or the valve core 31 is provided with a guide groove 35b, the other of the valve seat 35 or the valve core 31 is provided with a convex rib 3110, and the convex rib 3110 is sliding-fitted with the guide groove 35b. In this way, translation reliability of the valve core 31 may be improved, and the valve core 31 is prevented from biasing.

[0076] In an embodiment, with reference to FIG. 8, FIG. 9, FIG. 17 and FIG. 18, the drainage valve assembly 3 includes a flexible sealing member 36 sleeved on the opened side of the valve seat 35, the flexible sealing member 36 and the valve seat 35 enclose together to form a sealing cavity 3a, and the valve core 31, the elastic positioning member, the elastic reset member and the reversal mechanism 323 are positioned in the sealing cavity 3a, and the valve core 31 is connected to the flexible sealing member 36 to drive the flexible sealing member 36 to move.

[0077] The valve core 31, the reversal mechanism 323, the elastic reset member, the elastic sealing member, or the like may not in contact with washing water, since all of them are arranged in the sealing cavity 3a. On one hand, hairs and scraps in the washing water may not enter the sealing cavity 3a, therefore, hairs, scraps and other impurities are prevented from blocking or winding on the transmission rod mechanism 32 and the valve core 31, normal movement of the drainage valve may be guaranteed, working reliability and service life of the sealing valve assembly are improved. On the other hand, when the transmission rod mechanism 32 or the valve core 31 is made of a metal material, corrosion effect of the washing water on the metal material may also be prevented.

[0078] Specific structural forms of the flexible sealing

member 36 are not limited.

[0079] With reference to FIG. 8, the valve core 31 includes a valve plate 312 and a valve column 311 which are fixedly connected, the flexible sealing member 36 includes a telescopic pipe 361, a supporting end plate 362 and a flange 363. The supporting end plate 362 and the flange 363 are positioned at opposite ends of the telescopic pipe 361, the flange 363 is arranged at an axial end of the telescopic pipe 361 and connected to the opened side of the valve seat 35, the supporting end plate 362 closes the other end of the telescopic pipe 361, the valve plate 312 is stacked on an inner surface of the supporting end plate 362, and when the valve core 31 is positioned at the sealing position, the valve plate 312 abuts the supporting end plate 362 around the drainage hole 11a.

[0080] It should be noted that the flexible sealing member 36 may be an integrally formed structure to improve structural reliability of the flexible sealing member 36. Material of the flexible sealing member 36 is not limited, for example, includes but is not limited to: silica gel, rubber, or the like.

[0081] On one hand, the flexible sealing member 36 needs to reliably seal the drainage hole 11a when it is positioned at the sealing position, and may reliably elude the drainage hole 11a when it is positioned at the drainage position, to avoid a great movement acting force on the valve core 31, and improve movement reliability of the sealing valve. To this end, in an embodiment of the application, the telescopic pipe 361 is a corrugated tube, to be adapted to movement of the valve core 31 by stretching or folding of the corrugated tube itself, and does not have great elastic deformation resistance itself.

[0082] In order to facilitate reliable connection between the flange 363 and the valve seat 35, in some embodiments, with reference to FIG. 8, FIG. 9, FIG. 11, FIG. 12, FIG. 18 and FIG. 21, the drainage valve assembly 3 includes a valve cover 37, and with reference to FIG. 11, FIG. 12 and FIG. 21, the valve cover 37 is pressed against a side of the flange 363 away from the valve seat 35, the flange 363 is sandwiched between the valve cover 37 and an end surface of the opened side of the valve seat 35, and a screw passes through the valve cover 37 and the flange 363 and is screwed into the valve seat 35 to connect the flange 363 to the valve seat 35.

[0083] In some other embodiments, the transmission rod mechanism 32 drives the valve core 31 to rotate. Specifically, the transmission rod mechanism 32 includes a transmission rod 321 and a first shifting rod 322, the valve core 31 is provided with a second driving groove comprising second driving surfaces on opposite sides along a rotation direction respectively, a first end of the transmission rod 321 is positioned in the second driving groove and slidable in the second driving groove, the transmission rod 321 may be alternatively driving-fitted with one of the second driving surfaces to drive the valve core 31 to rotate, the first shifting rod 322 is connected to a second end of the transmission rod 321, and the driving device 20 selectively toggles the first shifting rod 322. In the embodiment, structures of the transmission rod 321 and the second shifting rod 22 may be the same as structures in any one of the above embodiments. The structure of the second driving groove may also be the same as the structure of the first driving groove in any one of the above embodiments. The principle of the first end of the transmission rod 321 fitting with the second driving groove may refer to the principle of the transmission rod 321 fitting and the first driving groove, which are not elaborated here.

[0084] In an embodiment, with reference to FIG. 2 to FIG. 4, the laundry treatment device includes a lifting rib 14 in which the valve core 31, the elastic positioning member and the elastic reset member are arranged, the first end of the transmission rod 321 is positioned in the lifting rib 14, the second end of the transmission rod 321 extends outside an axial end of the inner tub 11, and the first shifting rod 322 is positioned outside the axial end of the inner tub 11. It should be noted that in the embodiment of the drainage valve assembly 3 comprising the valve seat 35, the valve seat 35 is also arranged in the lifting rib 14, and the valve seat 35 is fixedly connected to the lifting rib 14.

[0085] In a process of the laundry treatment device washing laundries, the laundries are carried by the lifting rib 14 to rotate together with the lifting rib 14, and after the laundries are lifted to a certain height, the laundries fall into water again under an action of gravity of the laundries themselves, so that rod beating and falling effects are generated, achieving washing effect. On one hand, the lifting rib 14 protects the drainage valve assembly 3 and prevents the laundries from winding on the drainage valve assembly 3. On the other hand, existing structures of the laundry treatment device are fully utilized, space inside the lifting rib 14 is fully utilized, and capacity of the inner tub 11 used to wash laundries is not reduced.

[0086] Specific arrangement positions of the driving device 20 are not limited, as long as the driving device 20 may provide a mounting position, so that the driving device 20 does not rotate along with the inner tub 11.

[0087] In an embodiment, with reference to FIG. 2 to FIG. 4, the driving device 20 is arranged on the outer tub 12, the first shifting rod 322 is positioned between the inner tub 11 and the outer tub 12. The driving device 20 includes a second shifting rod 22 and a power unit 21 driving the second shifting rod 22 to selectively extend towards the shifting rod or retract, and in an extending state of the second shifting rod 22, the second shifting rod 22 may selectively toggle the first shifting rod 322 to rotate forward or backward around the rotation center line L.

[0088] Movement forms of the second shifting rod 22 are not limited, and may be linear movement or rotation.

[0089] Specific structures of the power unit 21 are not limited. For example, in an embodiment, the power unit 21 may be a linear motor driving the second shifting rod 22 to extend or retract along a length direction of the

second shifting rod 22. In another embodiment, the power unit 21 may be a rotation motor with a rotation shaft fixedly connected to the second shifting rod 22, and the rotation motor drives the second shifting rod 22 to rotate forward or backward, so as to extend or retract the second shifting rod 22.

[0090] The drainage valve assembly according to a plurality of specific embodiments of the application is described below with reference to the drawings.

First embodiment

[0091] With reference to FIG. 8 to FIG. 16, in the embodiment, the transmission rod mechanism 32 drives the valve core 31 assembly to translate.

[0092] The drainage valve assembly 3 includes the transmission rod mechanism 32, the valve seat 35, the valve core 31, the flexible sealing member 36, the reversal mechanism 323, the first torsion spring 33 and the second torsion spring 34 as described above.

[0093] The first torsion spring 33 is sleeved on the transmission rod 321. A first end of the transmission rod 321 is provided with a flat shaft portion 3211, and a second end of the transmission rod 321 is sleeved on the first shifting rod 322 so that synchronous rotation may be implemented.

[0094] The turntable 3231 is formed with a through hole 3231c, two rotationally symmetrical protrusions 32311 are arranged on an inner wall of the through hole 3231c and divide a part of space of the through hole 3231c to form two first driving grooves 3231a distributed in a circumferential direction, and opposite ends of the flat shaft portion 3211 along a radial direction of the through hole 3231c extend into their respective first driving grooves 3231a respectively.

[0095] The turntable 3231 is connected to a transverse side of the valve column 311, and the second rotation arm 343 of the second torsion spring 34 is connected to the other side of the valve column 311.

[0096] The first rotation arm 342 of the second torsion spring 34 is connected to the valve seat 35, and specifically, the valve seat 35 is provided with a first insertion hole, and the first rotation arm 342 is inserted into the first insertion hole and may rotate in the first insertion hole. The second rotation arm 343 of the second torsion spring 34 is connected to the valve column 311, and specifically, with reference to FIG. 8, a side of the valve column 311 is provided with a second insertion hole 31b, and the second rotation arm 343 is inserted into the second insertion hole 31b and may rotate in the second insertion hole 31b.

[0097] In order to limit movement amplitude of the second torsion spring 34, in an embodiment, with reference to FIG. 11 and FIG. 12, the valve seat 35 is provided with a first blocking rib 351 and a second blocking rib 352, and the second rotation arm 343 may move within a range defined by the first blocking rib 351 and the second blocking rib 352. Specifically, with reference to FIG. 11, when the valve core 31 is positioned at the sealing position, the second rotation arm 343 is in blocking-contact with the first blocking rib 351. With reference to FIG. 12, when the valve core 31 is positioned at the drainage position, the second rotation arm 343 is in blocking-contact with the second blocking rib 352. The first blocking rib 351 and the second blocking rib 352 may limit and block movement of the second rotation arm 343 to prevent excessive movement of the second rotation arm 343.

[0098] With reference to FIG. 10, convex ribs 3110 are arranged on opposite sides of the valve core 31 along the rotation center line L respectively and extend along the movement direction of the valve core 31, two guide grooves 35b arranged at an interval are arranged in the valve seat 35, the convex ribs 3110 extend into the guide grooves 35b in a sliding manner respectively, and specifically, the valve core 31 is sandwiched between the two guide grooves 35b.

Second embodiment

[0099] With reference to FIG. 17 to FIG. 21, most of the structures according to the embodiment of the application are substantially the same as those of the first embodiment, and differences there-between comprise structure of the second end of the transmission rod 321, structure of the reversal mechanism 323, and connection position of the second torsion spring 34.

[0100] Specifically, the turntable 3231 is formed with a through hole 3231c, and the first driving groove 3231a penetrates through a part of side wall corresponding to the through hole 3231c along a radial direction of the through hole 3231c, that is, the first driving groove 3231a is generally notch-shaped. A surface of the transmission rod 321 is provided with a bump 3212, the transmission rod 321 is arranged in the through hole 3231c and passes through the through hole 3231c, and the bump 3212 is positioned in the first driving groove 3231a.

[0101] The second torsion spring 34 and the reversal mechanism 323 are arranged on the same side of the valve core 31, and the second rotation arm 343 of the second torsion spring 34 is connected to the reversal mechanism 323. Specifically, with reference to FIG. 19, the reversal mechanism 323 is provided with a third insertion hole 3231d, and the second rotation arm 343 extends into the third insertion hole 3231d and may rotate in the third insertion hole 3231d.

[0102] The drainage principle of the laundry treatment device is described below.

[0103] With reference to FIG. 5, it is assumed that the inner tub 11 rotates in the clockwise direction of FIG. 5, the second shifting rod 22 extends towards the drainage valve assembly 3, there is relative movement between the second shifting rod 22 and the inner tub 11, and a trajectory of the second shifting rod 22 relative to the inner tub 11 is a circle I. The second shifting rod 22 is in contact with the first shifting rod 322 from a right side of the first shifting rod 322, and since the first shifting rod 322 continues to rotate along with the inner tub 11, with reference

to FIG. 6, the second shifting rod 22 forces the first shifting rod 322 to rotate counterclockwise, and the first shifting rod 322 drives the transmission rod 321 to rotate counterclockwise synchronously, so as to drive the valve core 31 to move. After the first shifting rod 322 is disengaged from the second shifting rod 22, the first shifting rod 322 rotates clockwise under an action of the elastic reset member to be reset to the position shown in FIG. 5. Since position of the valve core 31 has been switched, then the shifting rod is retracted, or the inner tub 11 rotates several circles and then the shifting rod is retracted.

[0104] Even though the second shifting rod 22 is not retracted, when the inner tub 11 rotates for a next circle, the second shifting rod 22 toggles the first shifting rod 322 again, and the first shifting rod 322 and the transmission rod 321 may idle counterclockwise in a direction of FIG. 5, without changing the position of the valve core 31. That is, in case that the position of the valve core 31 has been successfully switched, even though the second shifting rod 22 is not retracted, the second shifting rod 22 does not jam the first shifting rod 322, and thus, in subsequent rotation, the second shifting rod 22 does not affect rotation of the inner tub 11, and the second shifting rod 22 does not hold the inner tub 11 and does not mistakenly trigger change of the position of the valve core 31.

[0105] When the inner tub 11 rotates reversely, i.e., in the counterclockwise direction of FIG. 5, the second shifting rod 22 extends toward the drainage valve assembly 3, the second shifting rod 22 is in contact with the first shifting rod 322 from a left side of the first shifting rod 322 and forces the first shifting rod 322 to rotate clockwise, and the first shifting rod 322 drives the transmission rod 321 to rotate clockwise synchronously, so as to drive the valve core 31 to move. When the first shifting rod 322 is disengaged from the second shifting rod 22, the first shifting rod 322 rotates counterclockwise under an action of the elastic reset member to be reset to the position shown in FIG. 5. Since the position of the valve core 31 has been switched, then the shifting rod is retracted, or the inner tub 11 rotates several circles and then the shifting rod is retracted.

[0106] It should be noted that as long as a rotation angle of the first shifting rod 322 enables the valve core 31 to bypass the above intermediate critical position, after the valve core 31 crosses the critical position, the valve core 31 may continue to rotate under an action of the elastic positioning member, until the valve core 31 moves to the drainage position.

[0107] Various embodiments/embodiments provided in the application may be combined with each other without contradiction, the scope of protection being defined by the appended claim.

Claims

1. A laundry treatment device, comprising: an inner tub (11), configured to hold water, and be provided with a drainage hole (11a); a driving device (20); and a drainage valve assembly (3), comprising: a valve core (31), having a sealing position for sealing the drainage hole (11a) and a drainage position for opening the drainage hole (11a); a transmission rod mechanism (32), connected to the inner tub (11), and having a rotation center line, a first end of the transmission rod mechanism (32) driving the valve core (31) to move, and during rotation of the inner tub (11), the driving device (20) operative to selectively toggle a second end of the transmission rod mechanism (32) to drive the transmission rod mechanism (32) to rotate around the rotation center line;

characterised in that an elastic positioning member and an elastic reset member, the elastic positioning member operative to keep the valve core (31) at the sealing position or the drainage position, the elastic reset member operative to drive at least the second end of the transmission rod mechanism (32) to be reset;

wherein the transmission rod mechanism (32) comprises a transmission rod (321), a first shifting rod (322), and a reversal mechanism (323) connected between the valve core (31) and a first end of the transmission rod (321), the transmission rod mechanism (32) drives the valve core (31) to translate through the reversal mechanism (323), the first shifting rod (322) is connected to a second end of the transmission rod (321), and the driving device (20) selectively toggles the first shifting rod (322);

wherein the valve core (31) has an intermediate critical position between the sealing position and the drainage position, such that when the transmission rod mechanism (32) drives the valve core (31) to cross the intermediate critical position, the elastic positioning member is operative to drive the valve core (31) to continue to move to the sealing position or the drainage position, and the elastic reset member is operative to drive at least the second end of the transmission rod mechanism (32) to idle to be reset;

wherein the elastic positioning member is a second torsion spring (34) comprising a spiral body (341), a first rotation arm (342) and a second rotation arm (343), the first rotation arm (342) is fixed relative to the inner tub (11), the spiral body (341) is suspended, and the second rotation arm (343) is operative to move along with the valve core (31) or the transmission rod mechanism (32);

wherein the second rotation arm (343) is connected to the valve core (31), and when the valve core (31) is positioned at the sealing position, an acting force applied by the second torsion spring (34) to the valve core (31) has at least a force component parallel to a movement direction of

the valve core (31) and facing toward the drainage hole (11a), and when the valve core (31) is positioned at the drainage position, an acting force applied by the second torsion spring (34) to the valve core (31) has at least a force component parallel to the movement direction of the valve core (31) and away from the drainage hole (11a), and when the valve core (31) is positioned at the intermediate critical position, an acting force applied by the second torsion spring (34) to the valve core (31) has a direction perpendicular to the movement direction of the valve core (31).

2. The laundry treatment device of claim 1, wherein the valve core (31) is provided with a sliding groove (31a), the reversal mechanism (323) comprises a turntable (3231), and a protruding column (3232) protruding from a side of the turntable (3231), eccentrically arranged relative to the rotation center line and extending into the sliding groove (31a), the turntable (3231) is provided with a first driving groove (3231a) comprising first driving surfaces (3231b) on opposite sides along a rotation direction, the first end of the transmission rod (321) is at least partially positioned in the first driving groove (3231a) and slidable in the first driving groove (3231a), and the first end of the transmission rod (321) is operative to be alternatively driving-fitted with one of the first driving surfaces (3231b) to drive the reversal mechanism (323) to rotate around the rotation center line.

3. The laundry treatment device of claim 2, wherein a through hole (3231c) is formed in the turntable (3231), the first end of the transmission rod (321) is arranged in the through hole (3231c) and passes through the through hole (3231c), an inner wall of the through hole (3231c) is provided with two rotationally symmetrical protrusions which divide a part of space of the through hole (3231c) to form two first driving grooves (3231a) distributed in a circumferential direction, the first end of the transmission rod (321) is provided with a flat shaft portion (3211) positioned on the rotation center line, and opposite ends of the flat shaft portion (3211) in a radial direction of the through hole (3231c) extend into their respective first driving grooves (3231a) respectively.

4. The laundry treatment device of claim 2, wherein a through hole (3231c) is formed in the turntable (3231), the first driving groove (3231a) penetrates through a part of side wall corresponding to the through hole (3231c) in a radial direction of the through hole (3231c), a bump (3212) is arranged on a surface of the transmission rod (321) and positioned in the first driving groove (3231a), and the transmission rod (321) is arranged in the through hole (3231c) and passes through the through hole (3231c).

5. The laundry treatment device of claim 1, wherein the elastic reset member is a first torsion spring (33) sleeved on the transmission rod (321).

6. The laundry treatment device of claim 1, wherein the second rotation arm (343) is connected to the reversal mechanism (323), and when the valve core (31) is positioned at the sealing position, the second torsion spring (34) applies a first torque around the rotation center line to the reversal mechanism (323), and when the valve core (31) is positioned at the drainage position, the second torsion spring (34) applies a second torque around the rotation center line to the reversal mechanism (323), the first torque has a direction opposite to the second torque, and when the valve core (31) is positioned at the intermediate critical position, a torque applied by the second torsion spring (34) to the reversal mechanism (323) is zero.

7. The laundry treatment device of any one of claims 1 to 6, wherein the drainage valve assembly (3) comprises a valve seat (35) of which a side facing toward the drainage hole (11a) is opened, at least a part of the valve core (31) and the reversal mechanism (323) are arranged in the valve seat (35), and an end of the valve core (31) is operative to extend out from the opened part of the valve seat (35); a side wall of the valve seat (35) is provided with an avoidance groove (35a), the transmission rod (321) is arranged in the avoidance groove (35a) and passes through the avoidance groove (35a), and the first shifting rod (322) is positioned outside the valve seat (35).

8. The laundry treatment device of claim 7, wherein one of the valve seat (35) or the valve core (31) is provided with a guide groove (35b), the other of the valve seat (35) or the valve core (31) is provided with a convex rib (3110), and the convex rib (3110) is sliding-fitted with the guide groove (35b).

9. The laundry treatment device of claim 7, wherein the drainage valve assembly (3) comprises a flexible sealing member (36) sleeved on the opened side of the valve seat (35), the flexible sealing member (36) and the valve seat (35) enclose together to form a sealing cavity (3a), and the valve core (31), the elastic positioning member, the elastic reset member and the reversal mechanism (323) are positioned in the sealing cavity (3a), and the valve core (31) is connected to the flexible sealing member (36) to drive the flexible sealing member (36) to move, optionally, wherein the valve core (31) comprises a valve plate (312) and a valve column (311) which are

fixedly connected, the flexible sealing member (36) comprises a telescopic pipe (361), a supporting end plate (362) and a flange (363), the flange (363) is arranged at an axial end of the telescopic pipe (361) and connected to the opened side of the valve seat (35), the supporting end plate (362) closes the other axial end of the telescopic pipe (361), the valve plate (312) is stacked on an inner surface of the supporting end plate (362), and when the valve core (31) is positioned at the sealing position, the valve plate (312) abuts the supporting end plate (362) around the drainage hole (11a).

10. The laundry treatment device of claim 1, wherein the valve core (31) is provided with a second driving groove comprising second driving surfaces on opposite sides along a rotation direction respectively, a first end of the transmission rod (321) is positioned in the second driving groove and slidable in the second driving groove, the transmission rod (321) is operative to be alternatively driving-fitted with one of the second driving surfaces to drive the valve core (31) to rotate, the first shifting rod (322) is connected to a second end of the transmission rod (321), and the driving device (20) selectively toggles the first shifting rod (322).

11. The laundry treatment device of any one of claims 1 to 6 and 10, comprising a lifting rib (14) in which the valve core (31), the elastic positioning member and the elastic reset member are arranged, the first end of the transmission rod (321) is positioned in the lifting rib (14), the second end of the transmission rod (321) extends outside an axial end of the inner tub (11), and the first shifting rod (322) is positioned on outside the axial end of the inner tub (11), optionally, comprising an outer tub (12) in which the inner tub (11) is rotatably arranged, the driving device (20) is arranged on the outer tub (12), the first shifting rod (322) is positioned between the inner tub (11) and the outer tub (12), the driving device (20) comprises a second shifting rod (22) and a power unit (21) driving the second shifting rod (22) to selectively extend towards the shifting rod or retract, and in an extending state of the second shifting rod (22), the second shifting rod (22) is operative to selectively toggle the first shifting rod (322) to rotate forward or backward around the rotation center line.

Patentansprüche

1. Wäschebehandlungsvorrichtung, umfassend: einen inneren Bottich (11), der dafür gestaltet ist, Wasser zu halten, und mit einer Ablauföffnung (11a) versehen zu sein; eine Antriebsvorrichtung (20) und eine Ablaufventilanordnung (3), die Folgendes umfasst: einen Ventilkern (31), der eine Abdichtungsposition zum Abdichten der Ablauföffnung (11a) und eine Ablaufposition zum Öffnen der Ablauföffnung (11a) aufweist; einen Übertragungsstangenmechanismus (32), der mit dem inneren Bottich (11) verbunden ist und eine Rotationsmittellinie aufweist, wobei ein erstes Ende des Übertragungsstangenmechanismus (32) den Ventilkern (31) zur Bewegung antreibt und während der Rotation des inneren Bottichs (11) die Antriebsvorrichtung (20) funktionsfähig ist, wahlweise auf ein zweites Ende des Übertragungsstangenmechanismus (32) umzuschalten, um den Übertragungsstangenmechanismus (32) zur Rotation um die Rotationsmittellinie anzutreiben,

gekennzeichnet durch ein elastisches Positionierungselement und ein elastisches Rückstellelement, wobei das elastische Positionierungselement funktionsfähig ist, den Ventilkern (31) in der Abdichtungsposition oder der Ablaufposition zu halten, und das elastische Rückstellelement funktionsfähig ist, mindestens das zweite Ende des Übertragungsstangenmechanismus (32) zum Zurückstellen anzutreiben,
wobei der Übertragungsstangenmechanismus (32) eine Übertragungsstange (321), eine erste Verlagerungsstange (322) und einen Umkehrmechanismus (323) umfasst, der zwischen dem Ventilkern (31) und einem ersten Ende der Übertragungsstange (321) eingebunden ist, der Übertragungsstangenmechanismus (32) den Ventilkern (31) antreibt, sich durch den Umkehrmechanismus (323) zu verschieben, die erste Verlagerungsstange (322) mit einem zweiten Ende der Übertragungsstange (321) verbunden ist und die Antriebsvorrichtung (20) wahlweise die erste Verlagerungsstange (322) umschaltet, wobei der Ventilkern (31) eine kritische Zwischenposition zwischen der Abdichtungsposition und der Ablaufposition aufweist, so dass das elastische Positionierungselement funktionsfähig ist, den Ventilkern (31) zur fortgesetzten Bewegung zu der Abdichtungsposition oder der Ablaufposition anzutreiben und das elastische Rückstellelement funktionsfähig ist, mindestens das zweite Ende des Übertragungsstangenmechanismus (32) zwecks Zurückstellung in den Leerlauf anzutreiben, wenn der Übertragungsstangenmechanismus (32) den Ventilkern (31) zur Durchquerung der kritischen Zwischenposition antreibt,

wobei das elastische Positionierungsele-

ment eine zweite Torsionsfeder (34) ist, die einen Spiralkörper (341), einen ersten Rotationsarm (342) und einen zweiten Rotationsarm (343) umfasst, wobei der erste Rotationsarm (342) relativ zu dem inneren Bottich (11) feststehend ist, der Spiralkörper (341) aufgehängt ist und der zweite Rotationsarm (343) funktionsfähig ist, sich zusammen mit dem Ventilkern (31) oder dem Übertragungsstangenmechanismus (32) zu bewegen,
wobei der zweite Rotationsarm (343) mit dem Ventilkern (31) verbunden ist, und wenn der Ventilkern (31) in der Abdichtungsposition positioniert ist, eine wirkende Kraft, die durch die zweite Torsionsfeder (34) auf den Ventilkern (31) ausgeübt wird, mindestens eine Kraftkomponente parallel zu einer Bewegungsrichtung des Ventilkerns (31) und hin zu der Ablauföffnung (11a) weisend aufweist, und wenn der Ventilkern (31) in der Ablaufposition positioniert ist, eine wirkende Kraft, die durch die zweite Torsionsfeder (34) auf den Ventilkern (31) ausgeübt wird, mindestens eine Kraftkomponente parallel zu der Bewegungsrichtung des Ventilkerns (31) und weg von der Ablauföffnung (11a) aufweist, und wenn der Ventilkern (31) in der kritischen Zwischenposition positioniert ist, eine wirkende Kraft, die durch die zweite Torsionsfeder (34) auf den Ventilkern (31) ausgeübt wird, eine Richtung senkrecht zu der Bewegungsrichtung des Ventilkerns (31) aufweist.

2. Wäschebehandlungsvorrichtung nach Anspruch 1, wobei der Ventilkern (31) mit einer Gleitrille (31a) versehen ist, der Umkehrmechanismus (323) einen Drehteller (3231) und eine hervorstehende Nase (3232) umfasst, die aus einer Seite des Drehtellers (3231) hervorsteht, im Verhältnis zu einer Rotationsmittellinie exzentrisch angeordnet ist und sich in die Gleitrille (31a) erstreckt, wobei der Drehteller (3231) mit einer ersten Antriebsrille (3231a) versehen ist, die erste Antriebsflächen (3231b) an in einer Rotationsrichtung gegenüberliegenden Seiten umfasst, wobei das erste Ende der Übertragungsstange (321) zumindest teilweise in der ersten Antriebsrille (3231a) positioniert und in der ersten Antriebsrille (3231a) gleitfähig ist, und wobei das erste Ende der Übertragungsstange (321) funktionsfähig ist, abwechselnd in eine antreibende Passung mit einer der ersten Antriebsflächen (3231b) zu gelangen, um den Umkehrmechanismus (323) zur Rotation um die Rotationsmittellinie anzutreiben.

3. Wäschebehandlungsvorrichtung nach Anspruch 2, wobei in dem Drehteller (3231) eine Durchgangsöffnung (3231c) gebildet ist, das erste Ende der Übertragungsstange (321) in der Durchgangsöffnung (3231c) angeordnet ist und durch die Durchgangsöffnung (3231c) verläuft, eine Innenwand der Durchgangsöffnung (3231c) mit zwei rotationssymmetrischen Vorsprüngen versehen ist, die einen Teil des Raumes der Durchgangsöffnung (3231c) teilen, um zwei erste Antriebsrillen (3231a) zu bilden, die in einer Umlaufrichtung verteilt sind, das erste Ende der Übertragungsstange (321) mit einem ebenen Wellenabschnitt (3211) versehen ist, der auf der Rotationsmittellinie positioniert ist, und sich gegenüberliegende Enden des ebenen Wellenabschnitts (3211) in radialer Richtung der Durchgangsöffnung (3231c) jeweils in ihre jeweilige erste Antriebsrille (3231a) erstrecken.

4. Wäschebehandlungsvorrichtung nach Anspruch 2, wobei in dem Drehteller (3231) eine Durchgangsöffnung (3231c) gebildet ist, die erste Antriebsrille (3231a) in einer radialen Richtung der Durchgangsöffnung (3231c) einen Teil der Seitenwand entsprechend der Durchgangsöffnung (3231c) durchdringt, auf einer Oberfläche der Übertragungsstange (321) eine Erhebung (3212) angeordnet und in der ersten Antriebsrille (3231a) positioniert ist und die Übertragungsstange (321) in der Durchgangsöffnung (3231c) angeordnet ist und durch die Durchgangsöffnung (3231c) verläuft.

5. Wäschebehandlungsvorrichtung nach Anspruch 1, wobei das elastische Rückstellelement eine erste Torsionsfeder (33) ist, die auf die Übertragungsstange (321) aufgesetzt ist.

6. Wäschebehandlungsvorrichtung nach Anspruch 1, wobei der zweite Rotationsarm (343) mit dem Umkehrmechanismus (323) verbunden ist und, wenn der Ventilkern (31) in der Abdichtungsposition positioniert ist, die zweite Torsionsfeder (34) rings um die Rotationsmittellinie ein erstes Moment auf den Umkehrmechanismus (323) ausübt und, wenn der Ventilkern (31) in der Ablaufposition positioniert ist, die zweite Torsionsfeder (34) rings um die Rotationsmittellinie ein zweites Moment auf den Umkehrmechanismus (323) ausübt, wobei das erste Moment eine Richtung aufweist, die dem zweiten Moment entgegengesetzt ist, und, wenn der Ventilkern (31) in der kritischen Zwischenposition positioniert ist, ein Moment, das durch die zweite Torsionsfeder (34) auf den Umkehrmechanismus (323) ausgeübt wird, null beträgt.

7. Wäschebehandlungsvorrichtung nach einem der Ansprüche 1 bis 6, wobei die Ablaufventilanordnung (3) einen Ventilsitz (35) umfasst, dessen eine Seite, die zu der Ablauföffnung (11a) weist, offen ist, mindestens ein Teil des Ventilkerns (31) und der Um-

kehrmechanismus (323) in dem Ventilsitz (35) angeordnet sind und ein Ende des Ventilkerns (31) funktionsfähig ist, sich aus dem offenen Teil des Ventilsitzes (35) heraus zu erstrecken, eine Seitenwand des Ventilsitzes (35) mit einer Vermeidungsrille (35a) versehen ist, die Übertragungsstange (321) in der Vermeidungsrille (35a) angeordnet ist und durch die Vermeidungsrille (35a) verlauft und die erste Verlagerungsstange (322) außerhalb des Ventilsitzes (35) positioniert ist.

8. Wäschebehandlungsvorrichtung nach Anspruch 7, wobei einer von Ventilsitz (35) oder Ventilkern (31) mit einer Führungsrille (35b) versehen ist, der andere von Ventilsitz (35) oder Ventilkern (31) mit einer konvexen Rippe (3110) versehen ist und die konvexe Rippe (3110) gleitfähig in die Führungsrille (35b) eingepasst ist.

9. Wäschebehandlungsvorrichtung nach Anspruch 7, wobei die Ablaufventilanordnung (3) ein flexibles Dichtungselement (36) umfasst, das auf die offene Seite des Ventilsitzes (35) aufgesetzt ist, das flexible Dichtungselement (36) und der Ventilsitz (35) einander umschließen, um einen Dichtungshohlraum (3a) zu bilden, und der Ventilkern (31), das elastische Positionierungselement, das elastische Rückstellelement und der Umkehrmechanismus (323) in dem Dichtungshohlraum (3a) positioniert sind, und der Ventilkern (31) mit dem flexiblen Dichtungselement (36) verbunden ist, um das flexible Dichtungselement (36) zur Bewegung anzutreiben, wobei der Ventilkern (31) optional eine Ventilplatte (312) und eine Ventilsäule (311) umfasst, die fest verbunden sind, das flexible Dichtungselement (36) ein Teleskoprohr (361), eine tragende Endplatte (362) und einen Flansch (363) umfasst, der Flansch (363) an einem axialen Ende des Teleskoprohrs (361) angeordnet und mit der offenen Seite des Ventilsitzes (35) verbunden ist, die tragende Endplatte (362) das andere axiale Ende des Teleskoprohrs (361) verschließt, die Ventilplatte (312) auf eine Innenfläche der tragenden Endplatte (362) gestapelt ist und, wenn der Ventilkern (31) in der Dichtungsposition positioniert ist, die Ventilplatte (312) rings um die Ablauföffnung (11a) an der tragenden Endplatte (362) anliegt.

10. Wäschebehandlungsvorrichtung nach Anspruch 1, wobei der Ventilkern (31) mit einer zweiten Antriebsrille versehen ist, die zweite Antriebsflächen an in einer Drehrichtung gegenüberliegenden Seiten umfasst, ein erstes Ende der Übertragungsstange (321) in der zweiten Antriebsrille positioniert und gleitfähig in der zweiten Antriebsrille ist, die Übertragungsstange (321) funktionsfähig ist, um abwechselnd in eine antreibende Passung mit einer der zweiten Antriebsflächen zu gelangen, um den Ventilkern (31) zum Rotieren anzutreiben, die erste Verlagerungsstange (322) mit einem zweiten Ende der Übertragungsstange (321) verbunden ist und die Antriebsvorrichtung (20) wahlweise die erste Verlagerungsstange (322) umschaltet.

11. Wäschebehandlungsvorrichtung nach einem der Ansprüche 1 bis 6 und 10, eine Heberippe (14) umfassend, in der der Ventilkern (31), das elastische Positionierungselement und das elastische Rückstellelement angeordnet sind, das erste Ende der Übertragungsstange (321) in der Heberippe (14) positioniert ist, sich das zweite Ende der Übertragungsstange (321) außerhalb eines axialen Endes des inneren Bottichs (11) erstreckt und die erste Verlagerungsstange (322) außerhalb des axialen Endes des inneren Bottichs (11) positioniert ist, optional einen äußeren Bottich (12) umfassend, in dem der innere Bottich (11) rotationsfähig angeordnet ist, die Antriebsvorrichtung (20) an dem äußeren Bottich (12) angeordnet ist, die erste Verlagerungsstange (322) zwischen dem inneren Bottich (11) und dem äußeren Bottich (12) angeordnet ist, die Antriebsvorrichtung (20) eine zweite Verlagerungsstange (22) und eine Energieeinheit (21) umfasst, welche die zweite Verlagerungsstange (22) antreibt, wahlweise hin zur Verlagerungsstange auszufahren oder sich zurückzuziehen, und die zweite Verlagerungsstange (22) in einem ausgefahrenen Zustand der zweiten Verlagerungsstange (22) funktionsfähig ist, wahlweise die erste Verlagerungsstange (322) umzuschalten, vorwärts oder rückwärts um die Rotationsmittellinie zu rotieren.

Revendications

1. Dispositif de traitement de linge, comportant : une cuve intérieure (11), configurée pour contenir de l'eau, et être dotée d'un trou de drainage (11a) ; un dispositif d'entraînement (20) ; et un ensemble formant soupape de drainage (3), comportant : un noyau de soupape (31), ayant une position d'étanchéité servant à boucher hermétiquement le trou de drainage (11a) et une position de drainage servant à ouvrir le trou de drainage (11a) ; un mécanisme à tige de transmission (32), relié à la cuve intérieure (11), et ayant un axe de rotation, une première extrémité du mécanisme à tige de transmission (32) entraînant le noyau de soupape (31) à des fins de déplacement, et pendant la rotation de la cuve intérieure (11), le dispositif d'entraînement (20) ayant pour fonction de faire basculer de manière sélective une deuxième extrémité du mécanisme à tige de transmission (32) afin d'entraîner le mécanisme à tige de transmission (32) à des fins de rotation autour de l'axe de rotation ;

caractérisé par un élément de positionnement

élastique et un élément de réinitialisation élastique, l'élément de positionnement élastique ayant pour fonction de maintenir le noyau de soupape (31) sur la position d'étanchéité ou sur la position de drainage, l'élément de réinitialisation élastique ayant pour fonction d'entraîner au moins la deuxième extrémité du mécanisme à tige de transmission (32) à des fins de réinitialisation ;

dans lequel le mécanisme à tige de transmission (32) comporte une tige de transmission (321), une première tige de changement de vitesse (322) et un mécanisme de changement de marche (323) relié entre le noyau de soupape (31) et une première extrémité de la tige de transmission (321), le mécanisme à tige de transmission (32) entraîne le noyau de soupape (31) à des fins de translation au travers du mécanisme de changement de marche (323), la première tige de changement de vitesse (322) est reliée à une deuxième extrémité de la tige de transmission (321), et le dispositif d'entraînement (20) fait basculer de manière sélective la première tige de changement de vitesse (322) ;

dans lequel le noyau de soupape (31) a une position critique intermédiaire entre la position d'étanchéité et la position de drainage, de telle sorte que, quand le mécanisme à tige de transmission (32) entraîne le noyau de soupape (31) à traverser la position critique intermédiaire, l'élément de positionnement élastique a pour fonction d'entraîner le noyau de soupape (31) à continuer à se déplacer jusque sur la position d'étanchéité ou sur la position de drainage, et l'élément de réinitialisation élastique a pour fonction d'entraîner au moins la deuxième extrémité du mécanisme à tige de transmission (32) à se mettre au ralenti à des fins de réinitialisation ;

dans lequel l'élément de positionnement élastique est un deuxième ressort de torsion (34) comportant un corps en spirale (341), un premier bras de rotation (342) et un deuxième bras de rotation (343), le premier bras de rotation (342) est fixe par rapport à la cuve intérieure (11), le corps en spirale (341) est suspendu, et le deuxième bras de rotation (343) a pour fonction de se déplacer en même temps que le noyau de soupape (31) ou le mécanisme à tige de transmission (32) ;

dans lequel le deuxième bras de rotation (343) est relié au noyau de soupape (31), et quand le noyau de soupape (31) est positionné sur la position d'étanchéité, une force d'action appliquée par le deuxième ressort de torsion (34) sur le noyau de soupape (31) a au moins une composante de force parallèle à une direction de déplacement du noyau de soupape (31) et orientée vers le trou de drainage (11a), et quand le noyau de soupape (31) est positionné sur la position de drainage, une force d'action appliquée par le deuxième ressort de torsion (34) sur le noyau de soupape (31) a au moins une composante de force parallèle à la direction de déplacement du noyau de soupape (31) et allant à l'opposé du trou de drainage (11a), et quand le noyau de soupape (31) est positionné sur la position critique intermédiaire, une force d'action appliquée par le deuxième ressort de torsion (34) sur le noyau de soupape (31) a une direction perpendiculaire à la direction de déplacement du noyau de soupape (31).

2. Dispositif de traitement de linge selon la revendication 1, dans lequel le noyau de soupape (31) est doté d'une rainure coulissante (31a), le mécanisme de changement de marche (323) comporte un plateau tournant (3231) et une colonne saillante (3232) faisant saillie depuis un côté du plateau tournant (3231), agencée de manière excentrique par rapport à l'axe de rotation et s'étendant jusque dans la rainure coulissante (31a), le plateau tournant (3231) est doté d'une première rainure d'entraînement (3231a) comportant des premières surfaces d'entraînement (3231b) sur des côtés opposés le long d'une direction allant dans le sens de la rotation, la première extrémité de la tige de transmission (321) est au moins partiellement positionnée dans la première rainure d'entraînement (3231a) et est en mesure de coulisser dans la première rainure d'entraînement (3231a), et la première extrémité de la tige de transmission (321) a pour fonction, selon une variante, de s'adapter par entraînement par rapport à l'une des premières surfaces d'entraînement (3231b) afin d'entraîner le mécanisme de changement de marche (323) à des fins de rotation autour de l'axe de rotation.

3. Dispositif de traitement de linge selon la revendication 2, dans lequel un trou traversant (3231c) est formé dans le plateau tournant (3231), la première extrémité de la tige de transmission (321) est agencée dans le trou traversant (3231c) et traverse le trou traversant (3231c), une paroi intérieure du trou traversant (3231c) est dotée de deux parties saillantes symétriques en rotation qui divisent une partie de l'espace du trou traversant (3231c) pour former deux premières rainures d'entraînement (3231a) réparties dans une direction circonférentielle, la première extrémité de la tige de transmission (321) est dotée d'une partie formant arbre plat (3211) positionnée sur l'axe de rotation, et les extrémités opposées de la partie formant arbre plat (3211) dans une direction radiale du trou traversant (3231c) s'étendent dans leurs premières rainures d'entraînement respectives (3231a) respectivement.

4. Dispositif de traitement de linge selon la revendication 2, dans lequel un trou traversant (3231c) est formé dans le plateau tournant (3231), la première rainure d'entraînement (3231a) pénètre au travers d'une partie de la paroi latérale correspondant au trou traversant (3231c) dans une direction radiale du trou traversant (3231c), une bosse (3212) est agencée sur une surface de la tige de transmission (321) et est positionnée dans la première rainure d'entraînement (3231a), et la tige de transmission (321) est agencée dans le trou traversant (3231c) et traverse le trou traversant (3231c).

5. Dispositif de traitement de linge selon la revendication 1, dans lequel l'élément de réinitialisation élastique est un premier ressort de torsion (33) emmanché sur la tige de transmission (321).

6. Dispositif de traitement de linge selon la revendication 1, dans lequel le deuxième bras de rotation (343) est relié au mécanisme de changement de marche (323), et quand le noyau de soupape (31) est positionné sur la position d'étanchéité, le deuxième ressort de torsion (34) applique un premier couple autour de l'axe de rotation au mécanisme de changement de marche (323), et quand le noyau de soupape (31) est positionné sur la position de drainage, le deuxième ressort de torsion (34) applique un deuxième couple autour de l'axe de rotation au mécanisme de changement de marche (323), le premier couple ayant une direction opposée au deuxième couple, et quand le noyau de soupape (31) est positionné sur la position critique intermédiaire, un couple appliqué par le deuxième ressort de torsion (34) au mécanisme de changement de marche (323) est nul.

7. Dispositif de traitement de linge selon l'une quelconque des revendications 1 à 6, dans lequel l'ensemble formant soupape de drainage (3) comporte un siège de soupape (35) dont un côté orienté vers le trou de drainage (11a) est ouvert, au moins une partie du noyau de soupape (31) et le mécanisme de changement de marche (323) sont agencés dans le siège de soupape (35), et une extrémité du noyau de soupape (31) a pour fonction de s'étendre hors de la partie ouverte du siège de soupape (35) ; une paroi latérale du siège de soupape (35) est dotée d'une rainure d'évitement (35a), la tige de transmission (321) est agencée dans la rainure d'évitement (35a) et traverse la rainure d'évitement (35a), et la première tige de changement de vitesse (322) est positionnée à l'extérieur du siège de soupape (35).

8. Dispositif de traitement de linge selon la revendication 7, dans lequel l'un parmi le siège de soupape (35) ou le noyau de soupape (31) est doté d'une rainure de guidage (35b), l'autre parmi le siège de soupape (35) ou le noyau de soupape (31) est doté d'une nervure convexe (3110), et la nervure convexe (3110) est adaptée de manière coulissante par rapport à la rainure de guidage (35b).

9. Dispositif de traitement de linge selon la revendication 7, dans lequel l'ensemble formant soupape de drainage (3) comporte un élément d'étanchéité souple (36) emmanché sur le côté ouvert du siège de soupape (35), l'élément d'étanchéité souple (36) et le siège de soupape (35) se referment ensemble pour former une cavité d'étanchéité (3a), et le noyau de soupape (31), l'élément de positionnement élastique, l'élément de réinitialisation élastique et le mécanisme de changement de marche (323) sont positionnés dans la cavité d'étanchéité (3a), et le noyau de soupape (31) est relié à l'élément d'étanchéité souple (36) afin d'entraîner l'élément d'étanchéité souple (36) à se déplacer, éventuellement, dans lequel le noyau de soupape (31) comporte une plaque porte-soupape (312) et une colonne de soupape (311) qui sont reliées de manière fixe, l'élément d'étanchéité souple (36) comporte un tube télescopique (361), une plaque d'extrémité de support (362) et une bride (363), la bride (363) est agencée à une extrémité axiale du tube télescopique (361) et est reliée au côté ouvert du siège de soupape (35), la plaque d'extrémité de support (362) ferme l'autre extrémité axiale du tube télescopique (361), la plaque porte-soupape (312) est empilée sur une surface intérieure de la plaque d'extrémité de support (362), et quand le noyau de soupape (31) est positionné sur la position d'étanchéité, la plaque porte-soupape (312) vient buter contre la plaque d'extrémité de support (362) autour du trou de drainage (11a).

10. Dispositif de traitement de linge selon la revendication 1, dans lequel le noyau de soupape (31) est doté d'une deuxième rainure d'entraînement comportant des deuxièmes surfaces d'entraînement sur des côtés opposés le long d'une direction allant dans le sens de la rotation respectivement, une première extrémité de la tige de transmission (321) est positionnée dans la deuxième rainure d'entraînement et est en mesure de coulisser dans la deuxième rainure d'entraînement, la tige de transmission (321) a pour fonction, selon une variante, de s'adapter par entraînement par rapport à l'une des deuxièmes surfaces d'entraînement afin d'entraîner le noyau de soupape (31) à des fins de rotation, la première tige de changement de vitesse (322) est reliée à une deuxième extrémité de la tige de transmission (321), et le dispositif d'entraînement (20) fait basculer de manière sélective la première tige de changement de vitesse (322).

11. Dispositif de traitement de linge selon l'une quel-

conque des revendications 1 à 6 et 10, comportant une nervure de levage (14) dans laquelle le noyau de soupape (31), l'élément de positionnement élastique et l'élément de réinitialisation élastique sont agencés, la première extrémité de la tige de transmission (321) est positionnée dans la nervure de levage (14), la deuxième extrémité de la tige de transmission (321) s'étend à l'extérieur d'une extrémité axiale de la cuve intérieure (11), et la première tige de changement de vitesse (322) est positionnée à l'extérieur de l'extrémité axiale de la cuve intérieure (11), éventuellement, comportant une cuve extérieure (12) dans laquelle la cuve intérieure (11) est agencée de manière rotative, le dispositif d'entraînement (20) est agencé sur la cuve extérieure (12), la première tige de changement de vitesse (322) est positionnée entre la cuve intérieure (11) et la cuve extérieure (12), le dispositif d'entraînement (20) comporte une deuxième tige de changement de vitesse (22) et un bloc d'alimentation (21) entraînant la deuxième tige de changement de vitesse (22) de manière à s'étendre de manière sélective vers la tige de changement de vitesse ou à se rétracter, et dans un état d'extension de la deuxième tige de changement de vitesse (22), la deuxième tige de changement de vitesse (22) a pour fonction de faire basculer de manière sélective la première tige de changement de vitesse (322) à des fins de rotation vers l'avant ou vers l'arrière autour de l'axe de rotation.

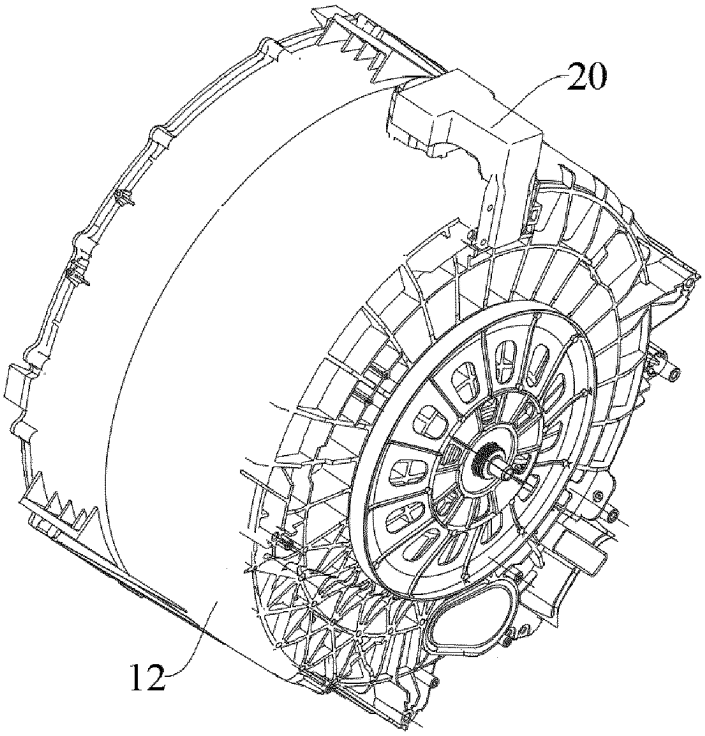


FIG. 1

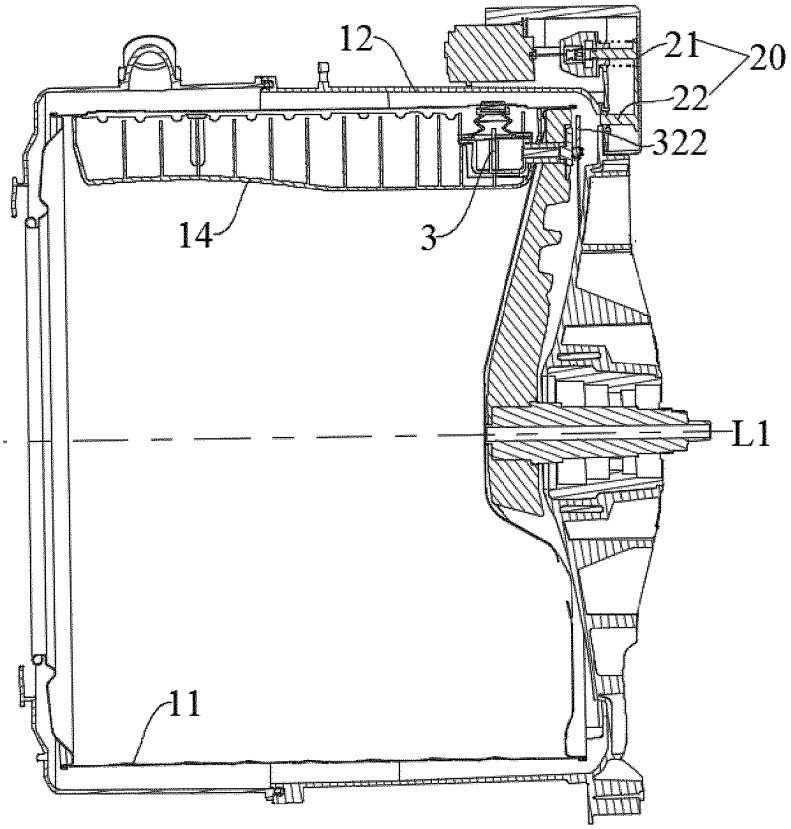


FIG. 2

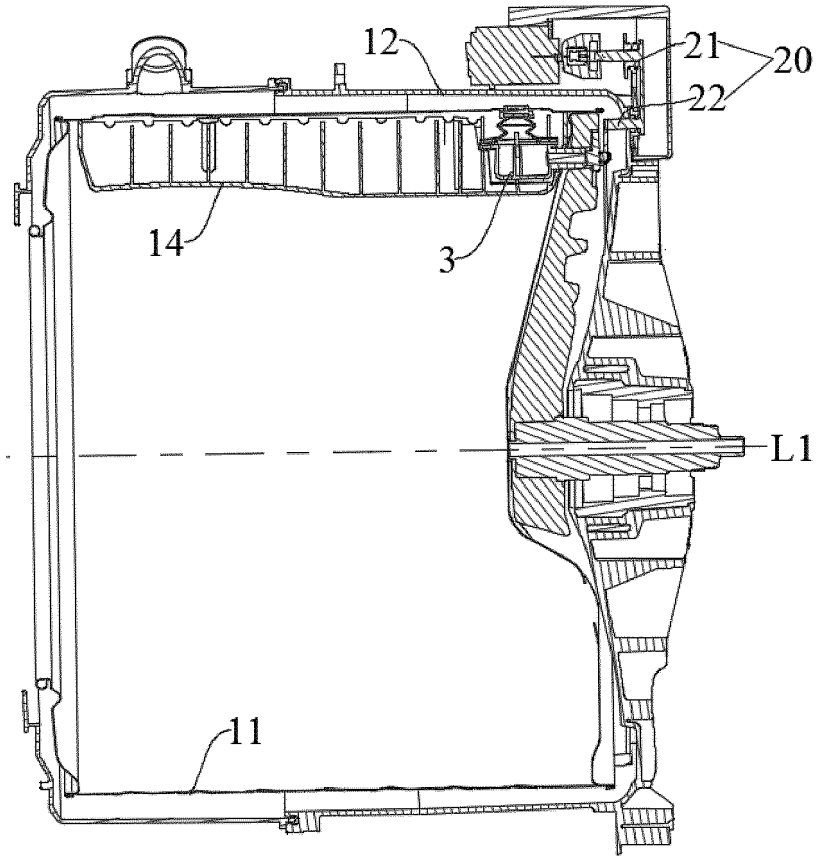


FIG. 3

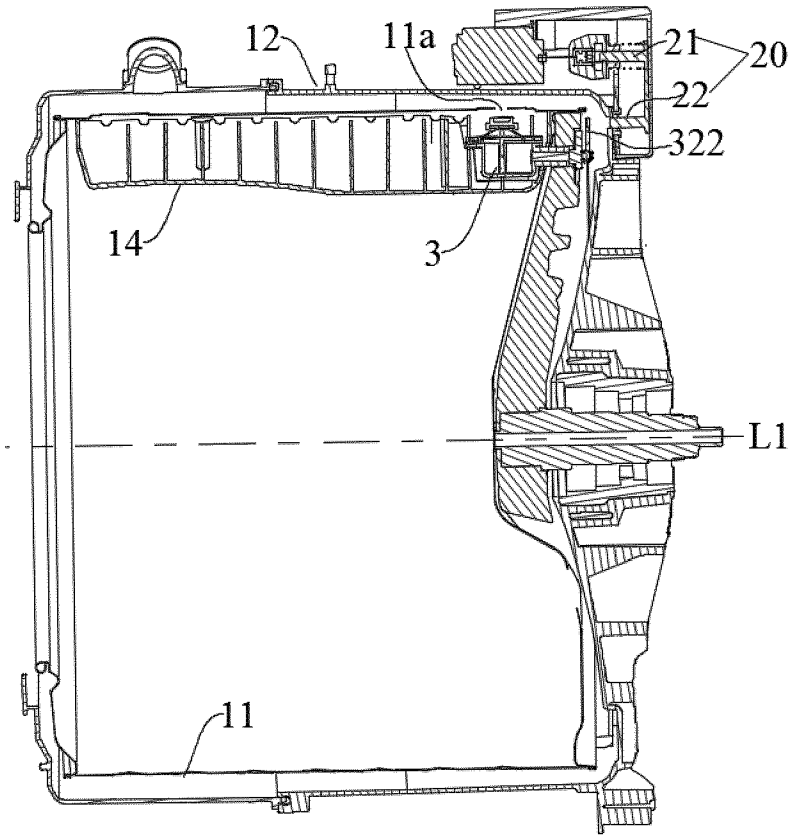


FIG. 4

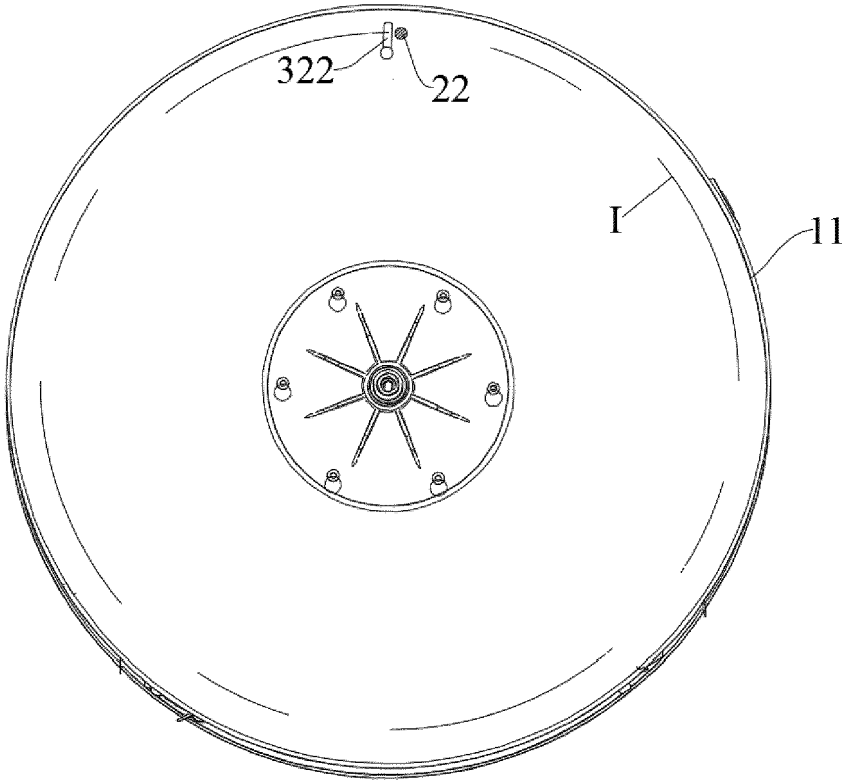


FIG. 5

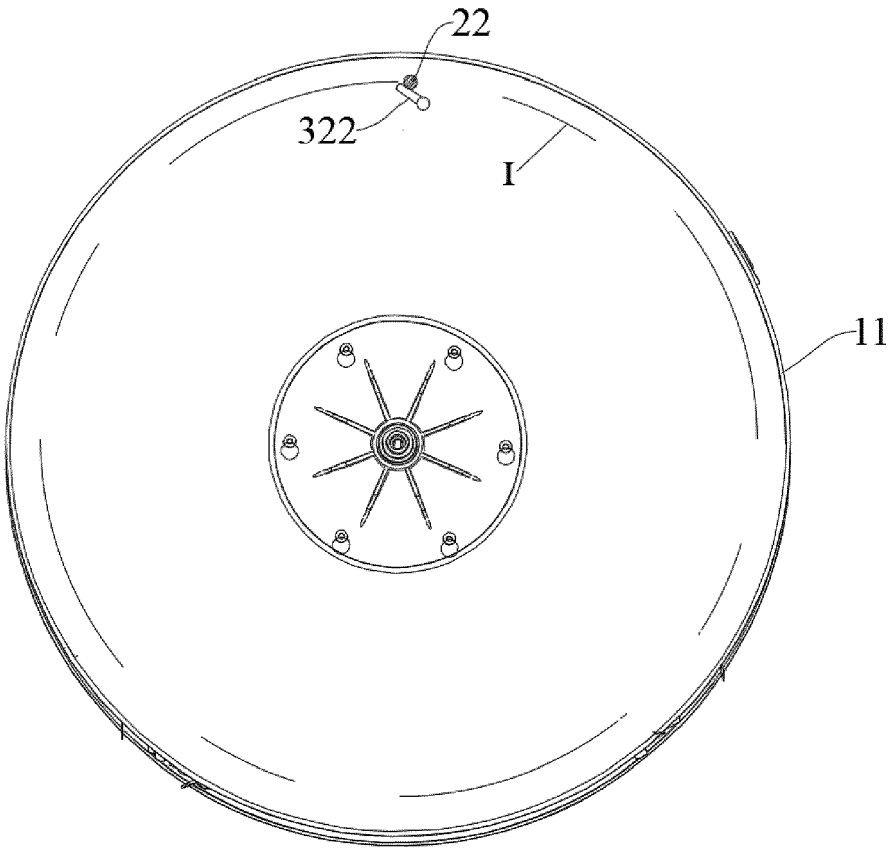


FIG. 6

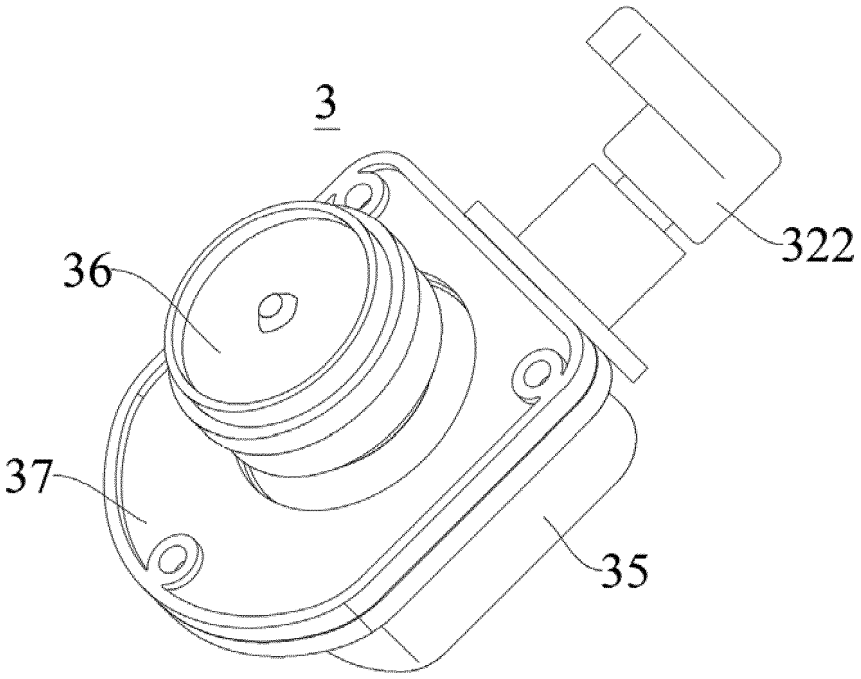
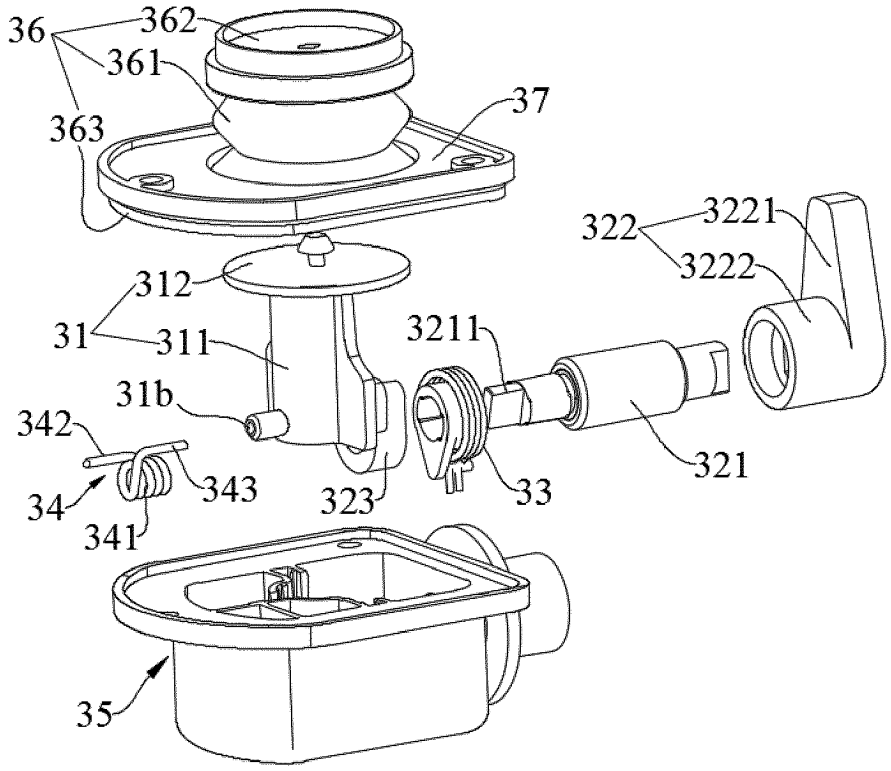


FIG. 7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362
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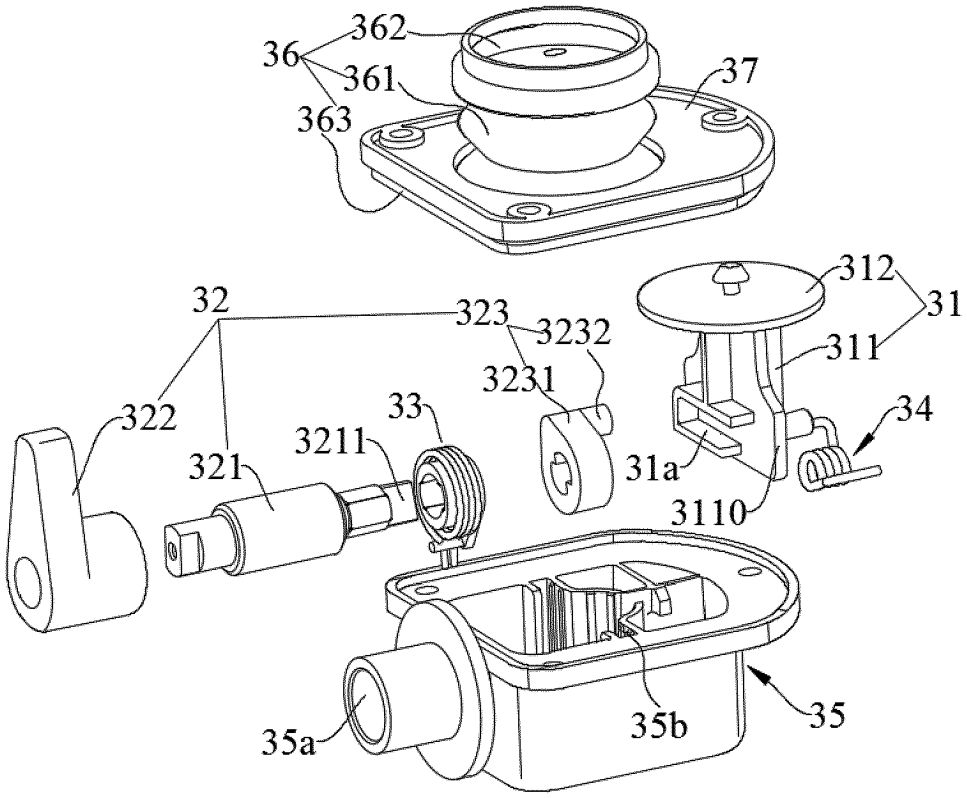
FIG. 8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3110
35a
35b
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FIG. 9

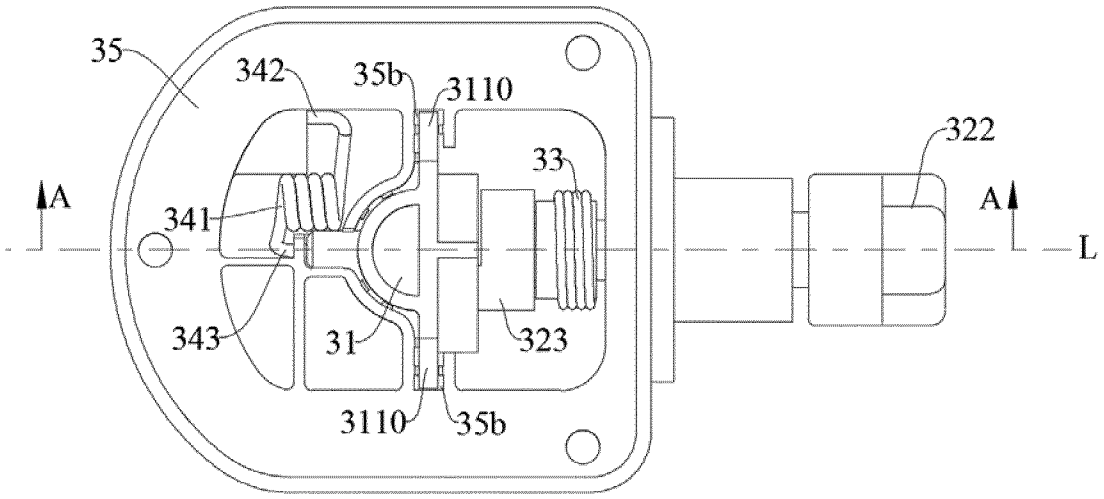
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FIG. 10

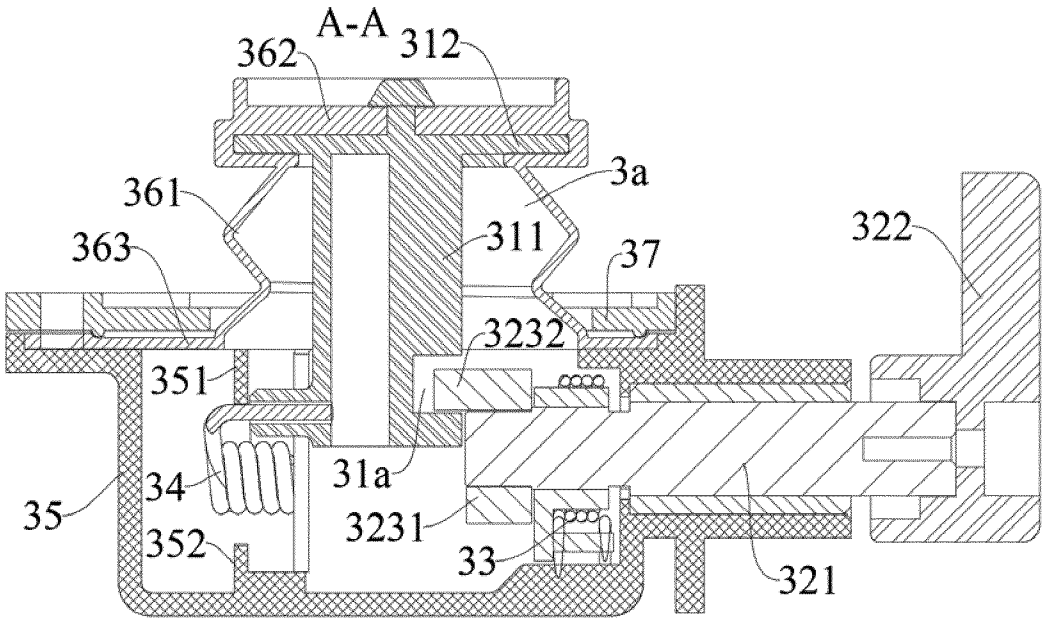
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FIG. 11

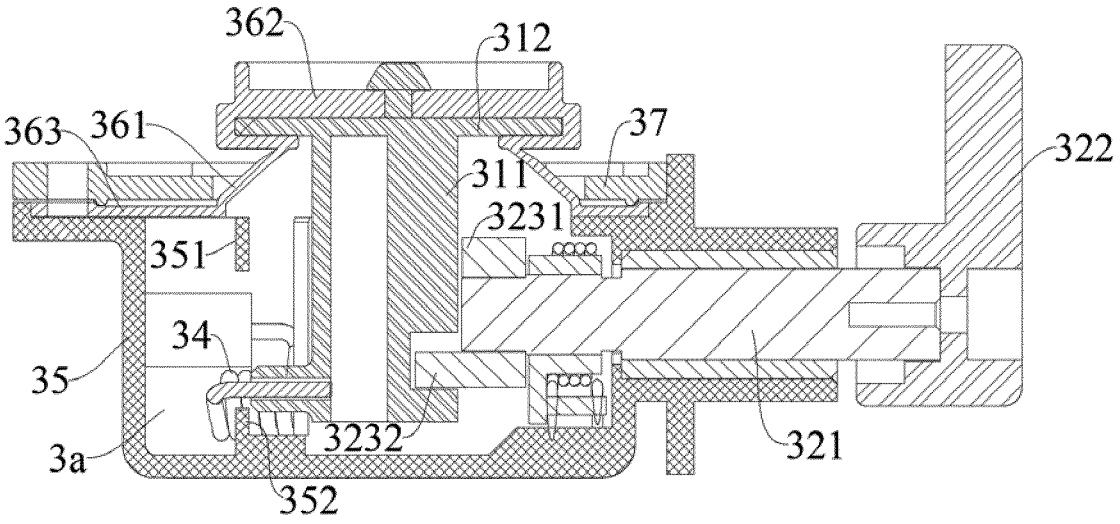
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FIG. 12

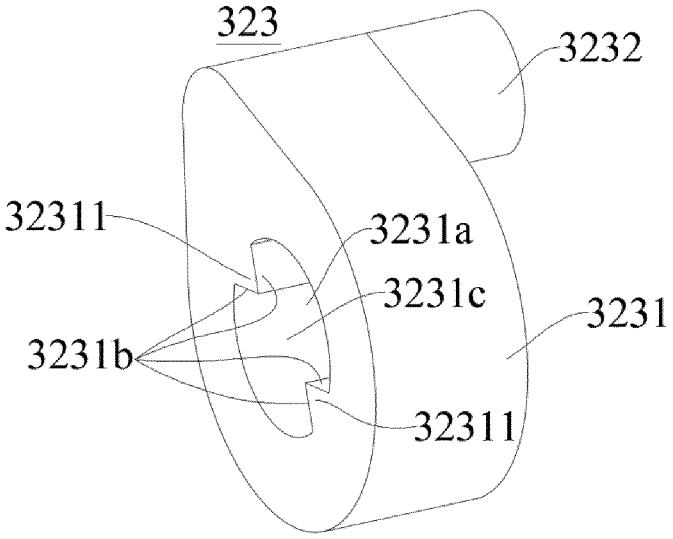
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FIG. 13

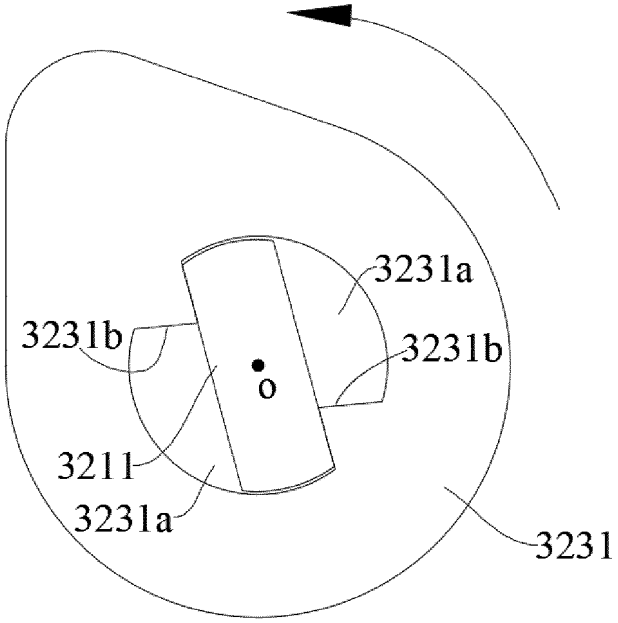

FIG. 14

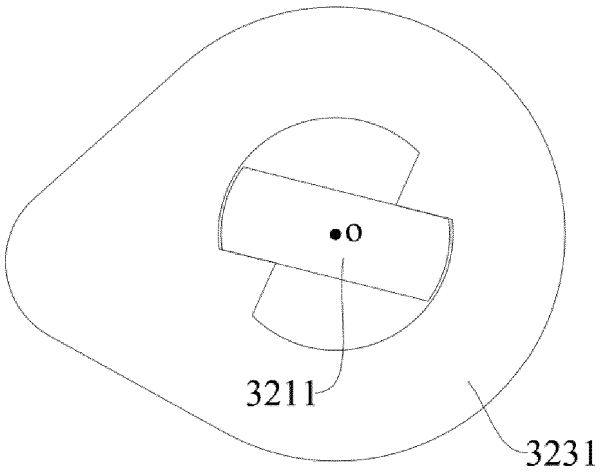

FIG. 15

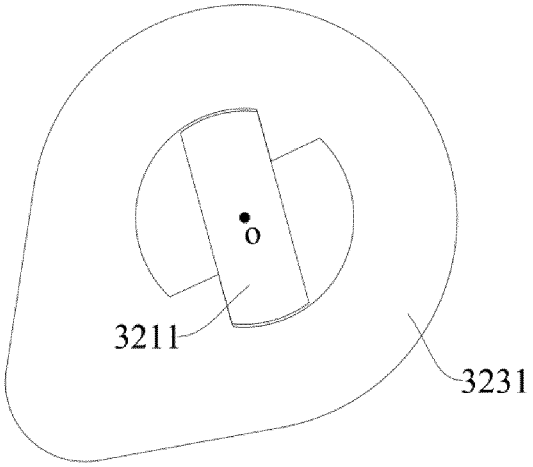
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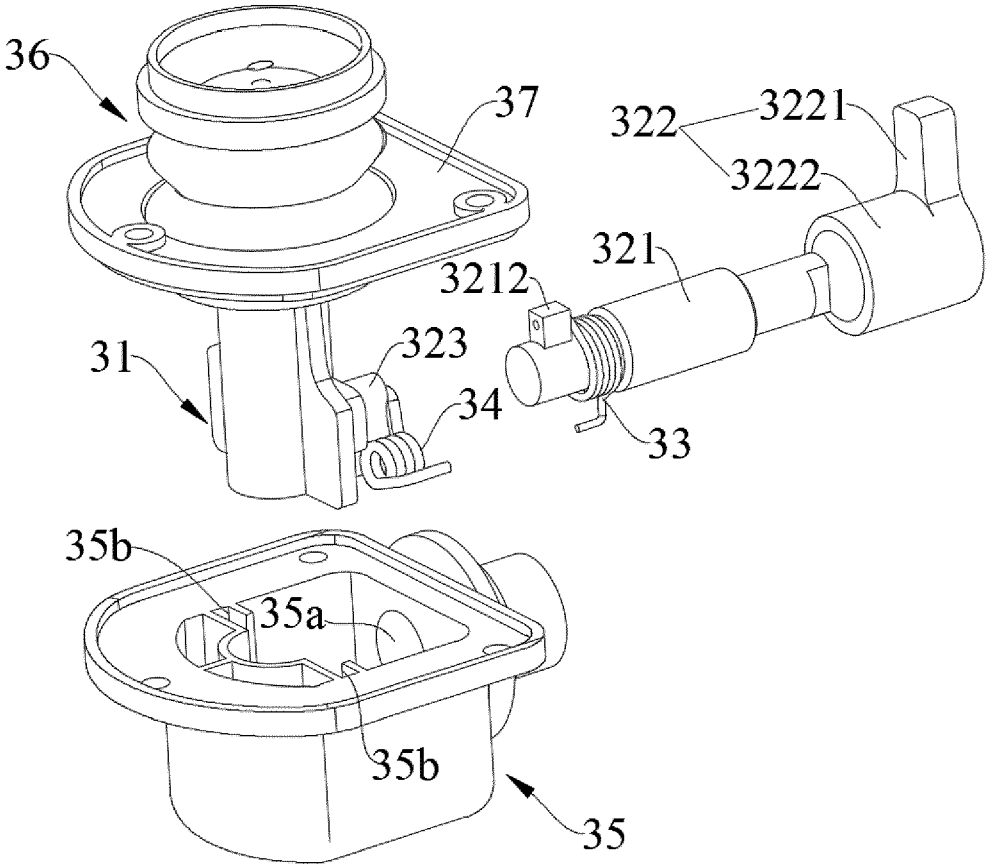
FIG. 16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35b
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FIG. 17

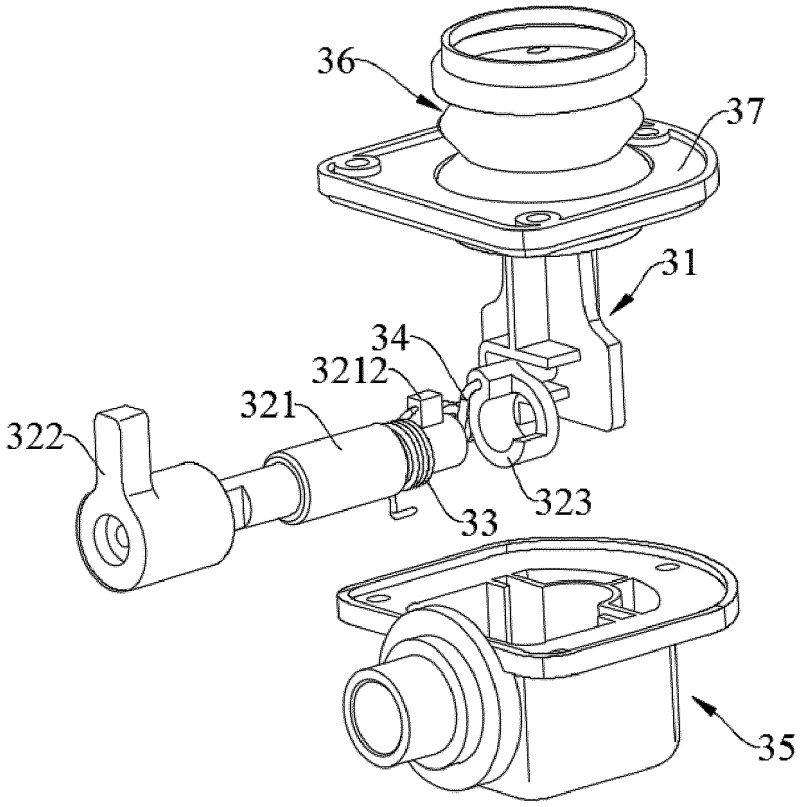
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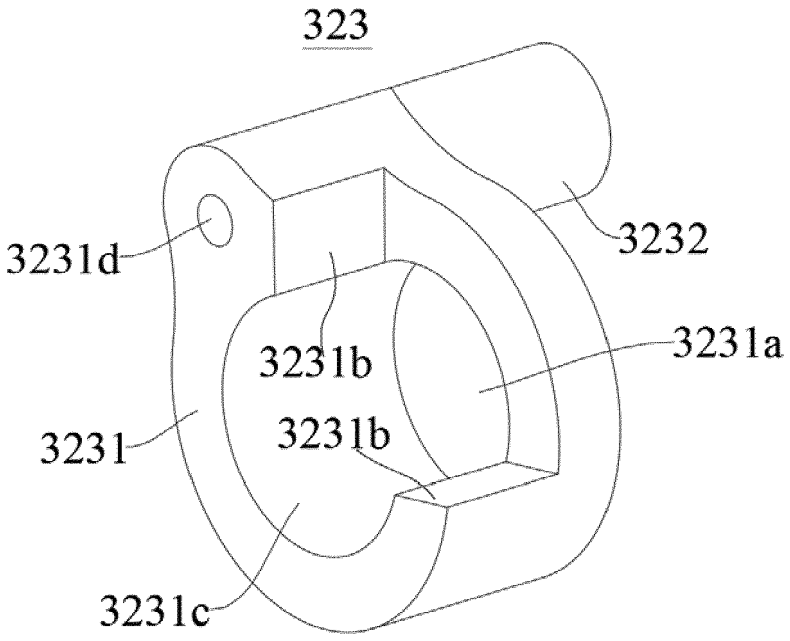
FIG. 18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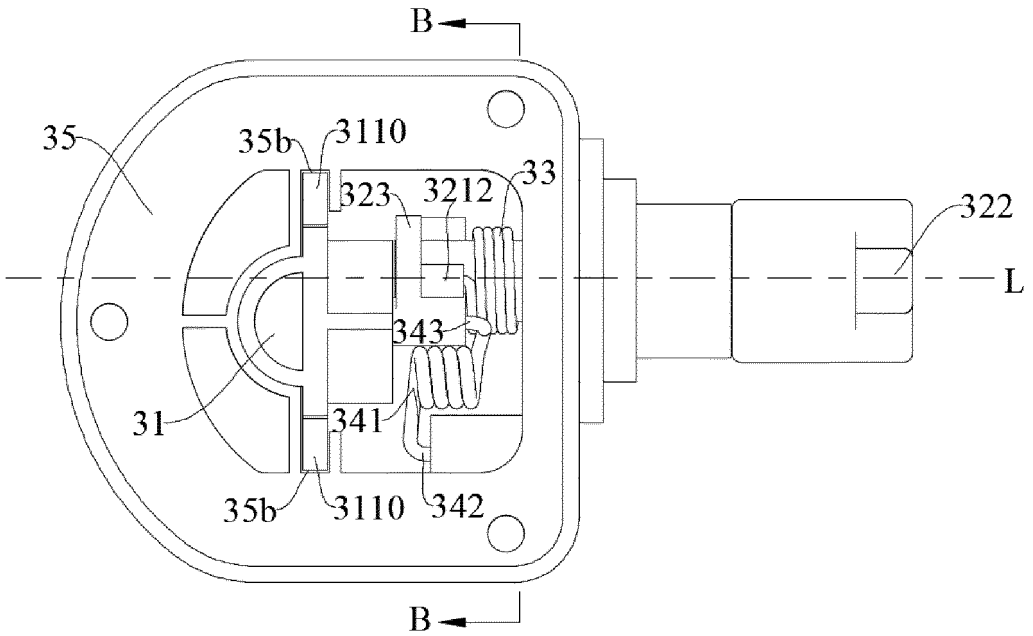
3231c

FIG. 19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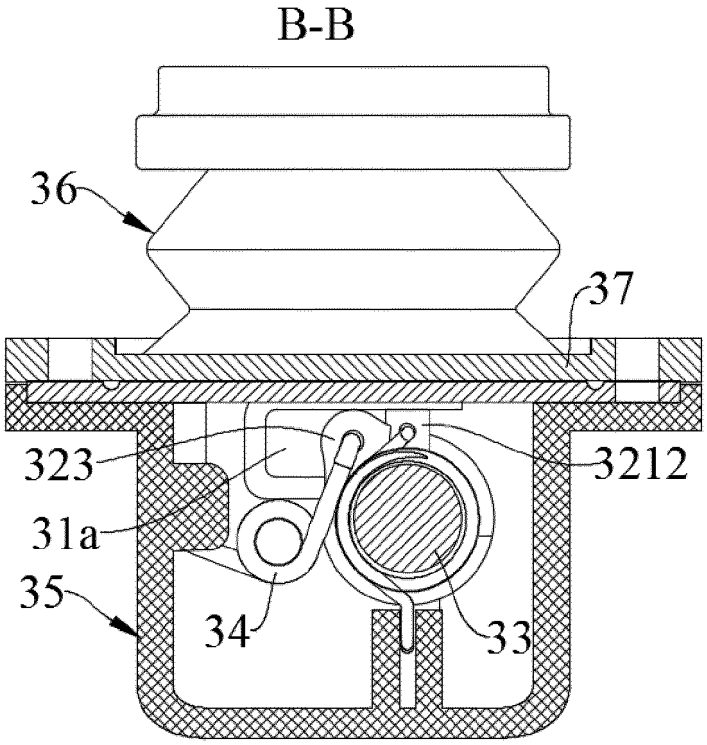
B

FIG. 20


B-B
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31a
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FIG. 21

REFERENCES CITED IN THE DESCRIPTION

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