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(54) WASHING MACHINE

(57) A washing machine, an inner drum (1) of the washing machine is a closed container during washing after an opening (101) is fastened by a lid (4). The inner drum (1) is provided with at least a hole (6), and the inner drum (1) is provided with a water guide channel (10) where water drained from the hole (6) is led to a water collection disk (7). The water guide channel (10) is provided with a centrifugal valve (9) for controlling on and off of the channel (10). The centrifugal valve (9) is provided in the water guide channel (10) to control the centrifugal valve (9) to open the water guide channel (10) after the rotational speed of the inner drum (1) reaches a set value so as to achieve the purpose of draining the washing machine. When the washing machine normally executes washing and rinsing procedures, due to the low rotational speed of the inner drum and the small centrifugal force on the centrifugal valve (9), the centrifugal valve (9) is enabled to accordingly close the water guide channel (10), and the inner drum (1) is enabled to contain water and normally execute washing and rinsing procedures, so that the clothes are only in contact with the washing water in the sealing inner drum (1) during washing, which prevents the washing water between inner and outer drums from flowing into the inner drum (1) and contaminating the clothes, and significantly improves the cleanliness of washing of the washing machine.

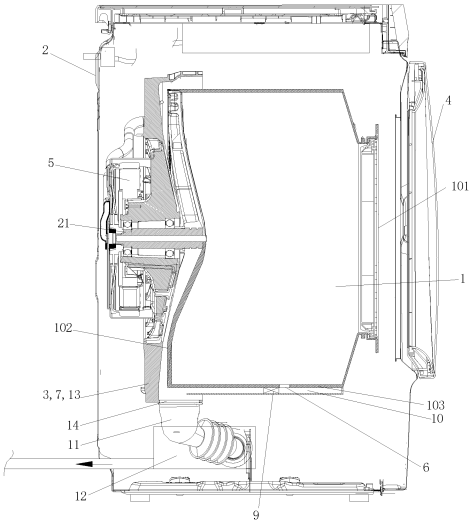

FIG. 1

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Description

TECHNICAL FIELD

[0001] The disclosure relates to the technical field of washing machines, and particularly herein relates to a washing machine with only rotatable inner drum that can hold water.

BACKGROUND

[0002] In the prior art, the drum washing machine generally includes an inner drum and an outer drum nested together, the outer drum is used to hold water, the inner drum is used to hold clothes, and the inner drum is rotated to beat and wash the clothes. Also, the inner drum is provided with dehydration holes so that the water in the outer drum flows into the inner drum through the dehydration holes to soak the clothes in the inner drum, and the water in the inner drum flows out to the outer drum through the dehydration holes, the moisture on the clothes in the inner drum is discharged to the outer drum through the dehydration holes when the inner drum rotates at a high speed to achieve the purpose of washing the clothes.

[0003] However, since the inner drum and the outer drum are nested together, dirt is likely to accumulate between the inner and outer drums during the use of the washing machine. Because the inner drum and the outer drum are nested together, users cannot clean the outer wall of the inner drum and the inner wall of the outer drum, which increases the bacteria inside the washing machine and reduces the washing efficiency of the washing machine and the cleanliness of the laundry after washing.

[0004] In the above-mentioned existing washing machines, since the inner drum is sheathed with an outer drum, the washing process of the washing machine is to beat and wash the clothes through the rotation of the inner drum, so that the washing capacity of the washing machine is depended on the inner drum, and the internal space usage rate of the washing machine is low, unable to expand the washing capacity of the washing machine on the existing basis.

[0005] In view of this, how to set up a washing machine to combine the inner and outer drums so that the inner drum is set as a sealed container, which can not only hold water and clothes, but also rotate and beat the clothes for washing. And, since the washing machine does not have an outer drum, or the outer drum is integrated with the shell of the washing machine, the inner drum of the washing machine can be expanded to expand the washing capacity of the washing machine, which has become a research and development hotspot.

[0006] However, since the inner drum is not only used to hold the washing water, but also rotates to wash the clothes of the drum, how to install a dehydration structure and a drainage structure suitable for the above-mentioned washing machine has become a problem that needs to be solved urgently.

[0007] In view of this, the disclosure is proposed.

SUMMARY

[0008] The technical problem to be solved by the disclosure is to overcome the shortcomings of the prior art and provide a washing machine. When the washing machine is in a drain or dehydration process, the inner drum is rotating at a high speed, so that the centrifugal valve in the inner drum water guide channel is opened by centrifugal force to solve the problem of the washing water in the inner drum being drained out.

[0009] In order to solve the technical problems and achieve the technical effects, the basic idea of the technical scheme adopted by the disclosure is:

A washing machine, and an inner drum of the washing machine is a closed container during washing after an opening is fastened by a lid, the inner drum is provided with at least a hole, the inner drum is provided with a water guide channel where the drainage from the hole is led to a water collection disk, the water guide channel is provided with a centrifugal valve for controlling on and off of the water guide channel.

[0010] Further, the centrifugal valve comprises a valve core which is movably installed in the water guide channel, and in the initial position, the valve core blocks the corresponding cross-section of the water guide channel; an elastic member which is clamped between the valve core and the water guide channel to limit the movement of the valve core and provide a force for the valve core to reset to the initial position.

[0011] Further, the water guide channel extends at least partially in a direction deviating from an axis of the inner drum, and the centrifugal valve is installed at an inclined part of the water guide channel; after the inner drum rotating at a set speed, the valve core of the centrifugal valve is driven by centrifugal force and moves along an inner wall of the inclined part of the water guide channel to open the water guide channel correspondingly.

[0012] Further, the water guide channel extends along a structural line of a side wall of the inner drum; an inner wall of the water guide channel away from the axis of the inner drum is an inclined surface; and the inclined surface is arranged obliquely away from the inner drum along a water flow direction of the water guide channel, so that the valve core is acted by the centrifugal force of the inner drum rotating to move along the inclined surface in the direction of a water outlet of the water guide channel.

[0013] Further, a radial width of the water guide channel is gradually increased along the water flow direction, so that after the valve core is moved toward the water outlet under the centrifugal force, a gap for the water flow passing through is formed between an outer periphery of the valve core and the inner wall of the water guide channel, and the water guide channel is opened.

[0014] Preferably, when the valve core is at the initial

position by the elastic member, at least one cross section of the valve core is correspondingly in contact with the inner wall of the water guide channel to block the water guide channel.

[0015] Further, the valve core is installed in the water guide channel; a downstream side of the valve core is connected with the elastic member extending in the water flow direction; another end of the elastic member is fixedly connected with the water guide channel and/or the inner drum;

preferably, the elastic member is a spring;

further preferably, a gap for water flowing through is formed between the elastic member and the inner wall of the water guide channel.

[0016] Further, a first side of the valve core is in contact with an outer wall surface of the side wall of the inner drum, and a second side of the valve core is in contact with a side of the water guide channel away from the inner drum. Preferably, the first side of the valve core and the side wall of the inner drum are parallel planes; and the second side of the valve core and the side of the water guide channel away from the inner drum are parallel slopes having a same slope.

[0017] Further, the water collection disk is arranged outside an end of the inner drum; the water collection disk includes a disc-shaped structure covering the end of the inner drum, and an outer circumference of the disc-shaped structure is provided with an annular flange extending to another end of the inner drum, and a gap is formed between an inner circumference of the annular flange and an outer wall of the inner drum; a water outlet end of the water guide channel extends into the gap between the inner circumference of the annular flange and the outer wall of the inner drum.

[0018] Preferably, the water outlet end of the water guide channel extends to the disc-shaped structure of the water collection disk, and a gap for water flowing through is formed between the water outlet end and the disc-shaped structure.

[0019] Further, the annular flange of the water collection disk is provided with an inner flange that bends and extends to the axis of the inner drum, and an end of the inner flange is close to or in contact with the outer wall of the inner drum;

preferably, a ring of dynamic seal is arranged between the inner flange and the outer wall of the inner drum to seal a junction of the water collection disk and the inner drum.

[0020] Further, a lowest part of the water collection disk is connected to a drain pipe of the washing machine;

preferably, a lowest part of the annular flange of the water collection disk is connected with the drain pipe, and the inner flange of the annular flange is arranged close to the opening of the inner drum relative to a connecting part of the drain pipe.

[0021] Further, the hole is located on the side wall of the inner drum, and the cross-sectional diameter of the side wall of the inner drum increases toward the direction of the cross section where the hole is located.

[0022] Compared with the prior art washing machine, the washing machine of the disclosure has the following beneficial effects:

By setting a water collection disk on the washing machine, all the drain water flowing from the hole from the inner drum can be collected into the water collection disk, and the purpose of smoothly draining the drain water when the hole is opened by centrifugal force.

[0023] By setting a water guide channel on the inner drum, the purpose of smoothly flowing the drainage water flowing out of the inner drum into the water collection disk along the water guide channel is realized, thereby avoiding the overflow effect of washing drainage.

[0024] The centrifugal valve is provided in the water guide channel to control the centrifugal valve to open the water guide channel after the rotational speed of the inner drum reaches a set value so as to achieve the purpose of draining the washing machine. At the same time, when the washing machine normally executes washing and rinsing procedures, due to the low rotational speed of the inner drum and the small centrifugal force on the centrifugal valve, the centrifugal valve is enabled to accordingly close the water guide channel, and the inner drum is enabled to contain water and normally execute washing and rinsing procedures, so that the clothes are only in contact with the washing water in the sealing inner drum during washing, which prevents the washing water between inner and outer drums from flowing into the inner drum and contaminating the clothes, and significantly improves the cleanliness of washing of the washing machine.

[0025] The centrifugal valve is arranged in the inclined portion of the water guide channel to ensure that the valve core of the centrifugal valve is driven by centrifugal force to move along the inclined portion of the water guide channel and the water outlet end of the water guide channel to correspondingly open the water guide channel.

[0026] At the same time, the disclosure has a simple structure, significant effects, and is suitable for popularization and use.

[0027] In order to make the design concept of the technical solution of the disclosure clearer and facilitate further understanding of the beneficial effects it brings, some specific implementations of the disclosure will be described in detail with reference to the attached figures.

BRIEF DESCRIPTION OF THE DRAWINGS

[0028] As a part of the disclosure, the attached drawings are used to provide a further understanding of the disclosure. The embodiments and descriptions of the disclosure are used to explain the disclosure and is not to be considered as improper limitation of the disclosure. Obviously, the following drawings are only some embod-

iments. For the person skilled in the art, other drawings can be obtained according to these drawings without any creative work. In the attached figures:

FIG 1 to 2 are schematic diagrams of the structure of the washing machine in different embodiments of the disclosure;

FIG 3 is an enlarged schematic diagram of the structure at A of FIG 2 in the embodiment of the disclosure.

[0029] In the drawings: 1, inner drum; 2, shell; 3, inner drum support; 4, lid; 5, drive motor; 6, hole;7, water collection disk; 9, centrifugal valve; 10, water guide channel; 11, drain pipe; 12, drainage device; 13, disc-shaped structure; 14, annular flange; 15, inner flange; 17, dynamic seal; 91, valve core; 92, elastic member; 21, inner drum shaft; 91, valve core; 92, elastic member; 101, inner drum opening; 102, inner drum bottom; 103, side wall of the inner drum.

[0030] It should be noted that these drawings and descriptions are not to limit the conception of the disclosure in any way, but to illustrate the concept of the disclosure for the person skilled in the art by referring to specific embodiments.

DETAILED DESCRIPTION

[0031] The technical scheme in the following embodiments will then be described clearly and completely with combination with the attached figures in order to make the purpose, technical scheme and advantages of the disclosure clearer. The following embodiments are used to illustrate the disclosure but are not used to limit the scope of the disclosure.

[0032] In the following description, it should be noted that the terms "up", "down", "front", "back", "left", "right", "vertical", "inside", "outside" and etc. are based on the directions or positions shown in the attached figures. They are used to simplify the description, rather than to indicate that the device or element referred must have a specific direction or to be constructed or operated in a specific direction.

[0033] And in the following description, it should be understood that the terms "installment" and "connection" should be treated according to generalized understanding. For example, they can be understood as fixed connection, detachable connection or integrated connection. Also, they can mean mechanical connection or electrical connection. They can also represent direct connection or indirect connection. The person skilled in the art are able to understand the specific meaning of the above terms in the disclosure according to the specific situation.

[0034] As shown in FIG 1 to 3, an embodiment of the disclosure introduces a washing machine, the washing machine includes a shell 2 with an inner drum 1 inside the shell 2, and the axis of the inner drum 1 extends horizontally or gradually inclines downward from front to rear, the front end of the inner drum 1 is an inner drum opening 101 with an opening, and the rear end is an inner drum bottom 102 with a seal. The side wall of the inner drum 103 connects the inner drum opening 101 and the inner drum bottom 102 to form the inner drum 1; there is no through holes on the wall of the inner drum 1, so that the inside of the inner drum 1 constitutes a sealed container with only the front opening. A lid 4 that can be opened outwards is installed at the front end of the washing machine shell 2 to close the inner drum opening 101 after the lid 4 is closed, and to put clothes into the inner drum 1 from the inner drum opening 101 after the lid 4 is opened. The rear end of the inner drum 1 is installed in the washing machine shell 2 via the inner drum support 3, the inner drum support 3 is coaxially arranged with the rear end of the inner drum 1. The upper and lower ends of the inner drum support 3 are respectively bent to the direction of the front end of the inner drum 1, the bending portion extends to at least the middle of the inner drum 1, and the upper and lower bending portions are respectively connected to the washing machine shell 2 via a shock-absorbing suspension spring and a shock-absorbing support rod, to achieve the purpose that the inner drum support 3 can be vibrated and installed in the washing machine shell 2. The center of the inner drum bottom 102 is coaxially arranged with the motor shaft of the washing machine drive motor 5 to drive the inner drum 1 to rotate, the inner drum 1 and the drive motor 5 are both fixedly mounted on the inner drum support 3. Preferably, the inner drum bottom 102 and the drive motor 5 are respectively arranged on both sides of the inner drum support 3, and the drive motor 5 is fixedly connected to the inner drum support 3, the motor shaft of the drive motor 5 passes through the inner drum support 3 through a bearing and is coaxially fixedly connected with the inner drum bottom 102, and the motor shaft of the drive motor 5 can rotate relative to the inner drum support 3, in order to achieve the purpose of installing the inner drum 1 and the drive motor 5 on the inner drum support 3, and allowing the inner drum 1 to rotate independently under the action of the drive motor 5 to wash the inner clothes. Preferably, the motor shaft of the drive motor 5 directly constitutes the inner drum shaft 21, and the inner drum shaft 21 is coaxially fixedly connected with the inner drum bottom 102 of the inner drum 1.

[0035] In addition, the washing machine in the embodiment of the disclosure may be any washing machine in the prior art that has a lid that closes the opening of the inner drum and the inner drum forms a sealed container. When the washing machine executes the dehydration process, the inner drum is controlled to rotate at a high speed to smoothly discharge the water flow from the clothes in the inner drum out of the inner drum, so as to achieve the normal execution of the dehydration program for the non-porous inner drum washing machine. Therefore, the washing machine in the embodiment of the disclosure is not limited to the structure in the drawings, such as: with the existing ordinary washing machine, only

the inner drum 1 of the washing machine needs to be set as a washing machine without a dehydration hole and the lid 4 closes the inner drum opening 101 to form a sealed container.

[0036] At the same time, by setting the inner drum as the lid buckled, and the washing machine forms a sealed container during washing, which prevents the washing water between inner and outer drums from flowing into the inner drum 1 and contaminating the clothes, and significantly improves the cleanliness of washing of the washing machine. It avoids the incomplete washing of clothes caused by the washing water pollution between the inner and outer drums.

[0037] In the embodiment of the disclosure, in order to discharge the water flow from clothes in the inner drum 1 of the washing machine, and seal the inner drum 1 filled with water for normal washing during the working process of the washing machine, the following settings are made: The hole 6 is set on the inner drum, so that when the inner drum speed is lower than the set value during the normal washing and rinsing process of the inner drum, the hole 6 is closed, so that the inner drum directly constitutes the contain water tank for containing washing and rinsing water to use the washing and rinsing water stored in the inner drum to wash or rinse clothes. In the process of dehydration and drainage of the inner drum, when the rotation speed of the inner drum is higher than the set value, the hole 6 is opened, so that the water in the inner drum directly flows out through the hole 6.

[0038] In the embodiment of the disclosure, a water collection disk 7 is provided outside the inner drum 1 of the washing machine. The water collection disk 7 may be directly constituted by the inner drum support 3, or may be an independent piece installed on the inner drum support 3, and it may also be an independent piece provided independently of the inner drum support 3. The water collection disk 7 constitutes a chamber for the drain water flowing out of the inner drum, and the water collection disk 7 is connected with the drain pipe 11 of the washing machine, so that the drain water flows out from the hole 6 is collected by the water collection disk 7 into the drain pipe 11, and then out of the washing machine.

[0039] In the embodiment of the disclosure, a water guide channel 10 is provided on the inner drum 1 of the washing machine, the water inlet end of the water guide channel 10 is connected to the hole 6, and the water outlet end is connected to the water collection disk 7, and the drained water from the inner drum of the washing machine flows into the water collection disk 7 through the water guide channel 10.

[0040] In the embodiment of the disclosure, a centrifugal valve 9 that controls the on-off of the channel is provided on the water guide channel 10, after the rotation speed of the inner drum reaches a set value, the valve core 91 of the centrifugal valve 9 opens the water guide channel 10 under the action of centrifugal force.

[0041] The centrifugal valve is provided in the water guide channel to control the centrifugal valve to open the water guide channel after the rotational speed of the inner drum reaches a set value so as to achieve the purpose of draining the washing machine. At the same time, when the washing machine regularly executes washing and rinsing procedures, due to the low rotational speed of the inner drum and the small centrifugal force on the centrifugal valve, the centrifugal valve is enabled to accordingly close the water guide channel, and the inner drum is enabled to contain water and regularly execute washing and rinsing procedures, so that the clothes are only in contact with the washing water in the sealing inner drum during washing, which prevents the washing water between inner and outer drums from flowing into the inner drum and contaminating the clothes, and significantly improves the cleanliness of washing of the washing machine.

[0042] In the embodiment of the disclosure, the centrifugal valve 9 comprises a valve core 91, and the valve core 91 can be movably installed in the water guide channel 10, and in the initial position, the valve core 91 blocks corresponding cross-section of the water guide channel; an elastic member 92 which is clamped between the valve core 91 and the water guide channel 10 to limit the movement of the valve core 91 and provide a force to the valve core 91 to reset to the initial position. After the valve core 91 is reset to the initial position, at least one cross section of the valve core 91 corresponds to block the inner wall of the water guide channel 10 to close and block the water guide channel 10.

[0043] In the embodiment of the disclosure, the water guide channel 10 extends at least partially in the direction deviating from the axis of the inner drum 1, and the centrifugal valve 9 is installed at the inclined part of the water guide channel 10. After the inner drum 1 reaches the set speed, the centrifugal valve 9 is driven by the centrifugal force and move to open the water guide channel 10 correspondingly. Preferably, the inclined part extends along the direction of the water flow in the water guide channel 10 and gradually extends to the side away from the axis of the inner drum, to ensure that the water flow in the water guide channel is driven by centrifugal force to flow at the outlet end of the water guide channel. It also can ensure that the valve core of the centrifugal valve is driven by centrifugal force to move along the inclined portion of the water guide channel and the water outlet end of the water guide channel to correspondingly open the water guide channel.

[0044] In the embodiment of the disclosure, the hole 6 is arranged on the side wall of the inner drum 103; preferably, the hole 6 is located on the side wall of the inner drum 103 near the side of the inner drum opening 101. The water guide channel 10 extends in the direction parallel to the axis of the inner drum 1, the end of the water guide channel 10 close to the inner drum opening 101 side is sealed, and the water guide channel 10 is set close to the end opening of the inner drum bottom 102 side. And the end of the water guide channel 10 close to the inner drum bottom 102 coincides with at least part of

the annular flange 14 of the water collection disk 7 in the vertical direction, so that the water outlet end of the water guide channel 10 extends into the water collection disk 7, so that the drainage flowing out of the water guide channel 10 can all flow into the water collection disk 7.

[0045] In the embodiment of the disclosure, the axis of the water outlet end of the water guide channel 10 is arranged parallel to the axis of the inner drum 1, so that the water flowing out of the water guide channel 10 can be sprayed in the horizontal direction, so that the water jet flowing into the water collection disk 7 is guided by the disc-shaped structure 14 flow down until it flows into the drain pipe 11 at the bottom end of the water collection disk 7.

[0046] As shown in FIG 2, in the embodiment of the disclosure, the water guide channel 10 may be provided on the outer wall of the side wall of the inner drum 103, and the water guide channel 10 is arranged protruding from the outer wall of the side wall of the inner drum 103, so that the water guide channel 10 is outside the inner drum. The water guide channel 10 extends along the structure line of the side wall of the inner drum 103, the side close to the inner drum opening 101 of the water guide channel 10 is sealed, and the side close to the inner drum bottom 102 is open. The side wall of the inner drum 103 is provided with a hole 6 communicating with the water guide channel 10, and the hole 6 is located at the middle of the inner drum 1 or close to the inner drum opening 101. There is a certain gap between the side of the water guide channel 10 away from the inner drum 1 and the annular flange 14 of the water collection disk 7, so as to ensure that the water guide channel 10 will not interfere with the water collection disk 7 during the rotation of the inner drum 1.

[0047] As shown in FIG 2, in the embodiment of the disclosure, the water guide channel 10 may be provided on the inner wall of the side wall of the inner drum 103, and the water guide channel 10 is arranged protruding from the inner wall of the side wall of the inner drum 103, so that the water guide channel 10 is inside the inner drum. The water guide channel 10 extends along the structure line of the side wall of the inner drum 103, and the side close to the inner drum opening 101 of the water guide channel 10 is sealed, and the side close to the inner drum bottom 102 is provided with a water outlet passing through the inner drum bottom 102. The side wall of the inner drum 103 is provided with the hole 6 communicating with the water guide channel 10, and the hole 6 is located at the middle of the inner drum 1 or close to the inner drum opening 101. The water outlet of the water guide channel 10 is located at the outer periphery of the inner drum bottom 102 and is arranged opposite to the disc-shaped structure of the water collection disk 7 to ensure that the washing drainage water jetted from the water outlet is blocked by the disc-shaped structure and flows downward.

[0048] In the embodiment of the disclosure, it is also possible to use the wall thickness of the side wall of the inner drum 103 to provide the water guide channel 10 inside the side wall of the inner drum 103, and it can also achieve the purpose of draining water from the hole 6 of the inner drum to flow into the water collection disk 7 along the water guide channel 10.

[0049] In the embodiment of the disclosure, the water guide channel 10 extends along the structural line of the side wall of the inner drum, the inner wall of the water guide channel 10 away from the axis of the inner drum 1 is inclined, and the inclined surface is arranged obliquely away from the inner drum 1 side along the water flow direction of the water guide channel 10, so that the valve core 91 is acted on by the centrifugal force of the rotating inner drum 1 to move along the inclined surface in the direction of the water outlet of the water guide channel 10.

[0050] In the embodiment of the disclosure, the radial width of the water guide channel 10 is gradually increased along the water flow direction, so that after the valve core 91 is moved toward the water outlet by the centrifugal force, a gap is constituted between the outer periphery of the valve core 91 and the inner wall of the water guide channel 10 which the water flow passes, so that the water guide channel 10 is opened for draining. Preferably, when the valve core 91 is held in the initial position by the action of the elastic member 92, at least one cross section of the valve core 91 is correspondingly in contact with the inner wall of the water guide channel 10 to block the water guide channel 10.

[0051] In the embodiment of the disclosure, the side of the water guide channel 10 away from the axis of the inner drum 1 is an inclined surface that gradually inclines away from the axis of the inner drum from the hole 6 toward the water collection disk 7, and to ensure that the drainage water flows into the water collection disk 7 along the inclined surface of the water guide channel 10.

[0052] In the embodiment of the disclosure, the water guide channel 10 is arranged at the outer wall of the side wall of the inner drum 103. The outer wall of the side wall of the inner drum 103 has extension ribs extending outward, and the extension ribs extend parallel to the axis of the inner drum 1, and the left and right sides of the extension ribs are respectively sealed and connected with the side wall of the inner drum 103, the end of the extension ribs close to the inner drum opening 101 is in sealed connection with the side wall of the inner drum 103, and the end close to the inner drum bottom 102 is spaced apart from the side wall of the inner drum 103, so that the extension ribs and the side wall of the inner drum 103 jointly enclose the water guide channel 10.

[0053] In the embodiment of the disclosure, the inner wall surface of the water guide channel 10 on the side away from the axis of the inner drum 1 is an inclined surface that gradually inclines downward from the inner drum opening 101 to the inner drum bottom 102, and to guide the washing water flowing into the water guide channel 10 to flow along the inclined surface of the water outlet end of the water guide channel 10 under the action of centrifugal force.

[0054] Similarly, when the water guide channel 10 is at the inner wall surface of the side wall of the inner drum 103, the inner wall of the side wall of the inner drum 103 has extension ribs extending inwardly, and the extension ribs extend parallel to the axis of the inner drum 1, the left and right sides of the extension ribs are respectively sealed and connected with the side wall of the inner drum 103, the end of the extension ribs close to the inner drum opening 101 is in sealed connection with the side wall of the inner drum 103, and the end close to the inner drum bottom 102 is spaced apart from the side wall of the inner drum 103, so that the extension ribs and the side wall of the inner drum 103 jointly enclose the water guide channel 10. And the inner drum bottom 102 is provided with through holes arranged opposite to the above interval, to ensure that the washing water in the water guide channel 10 can be discharged smoothly.

[0055] In the embodiment of the disclosure, the valve core 91 is installed in the water guide channel 10, the downstream side of the valve core 91 is connected with an elastic member 92 extending in the direction of water flow, and the other end of the elastic member 92 is fixedly connected with the water guide channel 10 and/or the inner drum 1. Preferably, the elastic member 92 is a spring, and the spring extends along the axis of the water guide channel 10; one end of the spring is directly or indirectly fixedly connected to the inner wall of the water guide channel 10 through the bracket, and the other end is fixedly connected to the valve core 91, in order to open the water guide channel 10 after the valve core 91 is subjected to centrifugal force.

[0056] In the embodiment of the disclosure, there is a gap between the elastic member 92 and the inner wall of the water guide channel 10 to ensure the flowing of water, in order to ensure that the valve core is moved by centrifugal force to open the water guide channel 10, the water flows along the water guide channel, passes through the gap of the elastic member, and flows out from the water outlet end.

[0057] In the embodiment of the disclosure, the first side of the valve core 91 corresponds to the outer wall surface of the side wall of the inner drum 101, and the second side of the valve core 91 is in close contact with the side of the water guide channel 10 away from the inner drum. Thereby, the side of the valve core facing the axis of the inner drum is flush with the side wall of the inner drum. After the valve core correspondingly blocks the water guide channel, the first side is in close contact with the outer wall of the side wall of the inner drum to form a surface contact with better sealing performance, thereby improving the sealing performance of the centrifugal valve when blocking the water guide channel.

[0058] In the embodiment of the disclosure, in order to improve the smoothness of the movement of the valve core 91, the following settings can be made: the first side of the valve core 91 and the side wall of the inner drum 101 are parallel planes; and the second side of the valve core 91 and the side of the water guide channel 10 away from the inner drum have the same slope and parallel slopes. Therefore, when the valve core of the centrifugal valve is acted on by the centrifugal force of the inner drum rotation, the valve core slides smoothly along the second side where it meets the inner wall of the water guide channel. Since the second side of the valve core is parallel to the inner wall surface of the water guide channel, friction is reduced during the sliding process of the valve core and provides a guiding effect for the movement of the valve core.

[0059] In the embodiment of the disclosure, the side far away from the axis of the inner drum 1 can be set as a part, or a plurality of parts, or all of which are inclined planes that gradually incline away from the axis of the inner drum from the hole 6 to the water collection disk 7, and it can also achieve the purpose of smoothly draining the water flowing into the water guide channel.

[0060] In the embodiment of the disclosure, the above-mentioned centrifugal valve 9 is installed in each water guide channel 10 of the inner drum 1 in one-to-one correspondence, after the rotational speed of the inner drum 1 reaches the set value, the valve core 91 that controls each centrifugal valve 9 is acted by the rotating centrifugal force of the inner drum 1 to open the water guide channel 10.

[0061] In the embodiment of the disclosure, a water collection disk 7 is provided outside the inner drum 1 of the washing machine, and the water collection disk 7 is provided at one end of the inner drum 1. Preferably, the water collection disk 7 is arranged at the inner drum bottom 102.

[0062] In the embodiment of the disclosure, the water collection disk 7 includes a disc-shaped structure 13 covering the end of the inner drum, and the outer circumference of the disc-shaped structure 13 exceeds the outer circumference of the inner drum bottom 102; the outer circumference of the disc-shaped structure 13 is provided with an annular flange 14 extending to the other end of the inner drum, the annular flange 14 is at least partially overlapped with the side wall of the inner drum 103, and the gap between the inner circumference of the annular flange 14 and the outer wall of the side wall of the inner drum 103. As a result, the disc-shaped structure 13 and the annular flange 14 of the water collection disk 7 form a cavity that is opened toward the inner drum 1 and is used for the inner drum 1 to flow from the hole 6 to contain the water.

[0063] In the embodiment of the disclosure, the water collection disk 7 directly constitutes the inner drum support 3, the upper part of the water collection disk 7 is respectively connected to the washing machine shell 2 via the shock-absorbing suspension spring and the lower part through the shock-absorbing support rod, in order to install the water collection disk 7 in the washing machine shell 2 capable of generating vibration displacement. In this embodiment, the water collection disk 7 is coaxially installed on the inner drum bottom 102, and a

drive motor 5 is installed on the side of the water collection disk 7 away from the inner drum, the inner drum shaft 21 passes through the water collection disk 7, and one end is respectively coaxially connected with the inner drum bottom 102, and the other end is directly connected to the drive motor 5, or is connected to the drive motor 5 through a reduction clutch.

[0064] Preferably, in order to improve the washing efficiency of the washing machine, an auxiliary stirring device, such as a wave wheel, a stirring column, etc., can also be installed in the inner drum 1; the drive shaft of the auxiliary stirring device passes through the inner drum bottom 102, and then passes through the water collection disk 7 and is directly connected to the motor, or is connected to the drive motor 5 through the deceleration clutch.

[0065] In the embodiment of the disclosure, the water collection disk 7 is connected to the drain pipe 11, and the drain pipe 11 is provided with a control device 12 for controlling the water flow in the pipeline. The control device 12 may be a drain pump for draining the upper drain washing machine or a drain valve for draining the lower drain washing machine. Preferably, the lowest part of the annular flange 14 of the water collection disk 7 is connected with the drain pipe 11, in order to ensure that all the water flowing into the water collection disk 7 can flow out from the drain pipe 11.

[0066] At the same time, there is a certain gap between the inner drum bottom 102 and the disc-shaped structure 13 of the water collection disk 7, so that the drainage water flowing from the inner drum 1 into the water collection disk 7 can flow down along the gap, thereby ensuring smooth drainage.

[0067] In the embodiment of the disclosure, the end of the annular flange 14 of the water collection disk 7 is provided with a circle of inner flange 15 extending in the axial direction of the inner drum 1, and the inner flange 15 is in contact with or close to the outer wall surface of the side wall of the inner drum 103 to ensure the sealing of the chamber enclosed by the water collection disk 7, thereby avoiding the problem of water flowing into the water collection disk 7 from flowing out of the open opening.

[0068] In the embodiment of the disclosure, the water guide channel 10 can be provided at the outer wall surface of the side wall of the inner drum 103, the water guide channel 10 is at least partially arranged to coincide with the annular flange 14 of the water collection disk 7 in the vertical direction, so that the water outlet of the water guide channel 10 extends into the water collection disk 7. The annular flange 14 of the water collection disk 7 is provided with an inner flange extending in the radial direction of the inner drum 1 and in the axial direction of the inner drum 1 on the side close to the inner drum opening 101, the extension end of the inner flange 15 and the side of the water guide channel 10 away from the inner drum 1 are close to, or arranged in close contact with each other, to ensure that the water flowing into the water collection disk 7 will not flow out from the side of the water collection disk 7 near the inner drum opening 101.

[0069] In the embodiment of the disclosure, the water guide channel 10 can also be arranged at the inner side of the side wall of the inner drum 103 or inside the side wall of the inner drum 103, the annular flange 14 of the water collection disk 7 is provided with an inner flange 15 near the end of the inner drum opening 101 side, and the extension end of the inner flange 15 is close to or in close contact with the outer wall of the side wall of the inner drum 103, and it can also ensure that the water flowing into the water collection disk 7 will not flow out from the water collection disk 7 near the opening side of the inner drum.

[0070] In order to further improve the tightness of the water collection disk 7, a ring of dynamic seal 17 is provided between the inner flange 15 and the side wall of the inner drum 103 of the inner drum, to seal the junction between the inner flange 15 and the side wall of the inner drum 103, and in order to realize the sealing treatment of the chamber enclosed by the water collection disk 7, it is further ensured that the water flowing into the water collection disk 7 and will not leak.

[0071] In the embodiment of the disclosure, the inner drum shaft 21 passes through the water collection disk 7, and the penetrating end of the inner drum shaft 21 is directly connected to the drive motor or via a transmission device. The inner drum shaft 2 is composed of a sleeve with a hollow inside, and the inner hollow part forms a channel communicating with the inside of the inner drum 1; one end of the inner drum shaft 21 passing through the water collection disk 7 communicates with the water intake structure of the washing machine, and make the washing machine water enter the inner drum 1 through the flow channel formed by the hollow part of the inner drum shaft 21.

[0072] In the embodiment of the disclosure, a drive motor 5 composed of a direct drive motor is installed on the water collection disk 7; the direct drive motor is coaxially arranged with the inner drum 1. The direct drive motor includes a rotor and a stator that are coaxially arranged, and both the rotor and the stator are arranged coaxially with the inner drum 1, to ensure that the center of gravity of the direct drive motor is on the axis of the inner drum 1, thereby ensuring the stability of the washing machine during operation. Or, a motor connected to the transmission device is installed on the water collection disk 7, and the transmission device can be any existing transmission structure such as pulleys, gear sets, etc.

[0073] The above description is just used to illustrate some more practical embodiments of the disclosure but is not the limitation of the disclosure in any way. Although the disclosure has been enclosed as the above embodiments, they are not used to limit the disclosure. Within the technical scheme of the disclosure, any person skilled in the art should be able to make some changes or modifications based on the above techniques to obtain other embodiments with equal benefits. But any simple chang-

es, equivalent changes or modifications, made to the above embodiments according to the technical substance within the technical scheme of the disclosure, still belong to the protection range of the disclosure.

Claims

1. A washing machine, **characterized in that**,

   an inner drum of the washing machine is a closed container during washing after an opening is fastened by a lid;
   the inner drum is provided with at least a hole, and the inner drum is provided with a water guide channel where water drained from the hole is led to a water collection disk;
   the water guide channel is provided with a centrifugal valve for controlling on and off of the water guide channel.

2. The washing machine according to claim 1, **characterized in that**,

   the centrifugal valve comprises
   a valve core being movably installed in the water guide channel, and blocking a cross-section of the water guide channel correspondingly in an initial position; and
   an elastic member being clamped between the valve core and the water guide channel to limit movement of the valve core and providing a force for the valve core to reset to the initial position.

3. The washing machine according to claim 2, **characterized in that**,

   the water guide channel extends at least partially in a direction deviating from an axis of the inner drum, and the centrifugal valve is installed at an inclined part of the water guide channel;
   after the inner drum rotating at a set speed, the valve core of the centrifugal valve is driven by centrifugal force and moves along an inner wall of the inclined part of the water guide channel to open the water guide channel correspondingly.

4. The washing machine according to claim 3, **characterized in that**,

   the water guide channel extends along a structural line of a side wall of the inner drum;
   an inner wall of the water guide channel away from the axis of the inner drum is an inclined surface;
   and the inclined surface is arranged obliquely away from the inner drum along a water flow direction of the water guide channel, so that the valve core is acted by the centrifugal force of the inner drum rotating to move along the inclined surface in the direction of a water outlet of the water guide channel.

5. The washing machine according to claim 4, **characterized in that**,

   a radial width of the water guide channel is gradually increased along the water flow direction, so that after the valve core is moved toward the water outlet under the centrifugal force, a gap for the water flow passing through is formed between an outer periphery of the valve core and the inner wall of the water guide channel, and the water guide channel is opened;
   preferably, when the valve core is at the initial position by the elastic member, at least one cross section of the valve core is correspondingly in contact with the inner wall of the water guide channel to block the water guide channel.

6. The washing machine according to claim 5, **characterized in that**,

   the valve core is installed in the water guide channel;
   a downstream side of the valve core is connected with the elastic member extending in the water flow direction;
   another end of the elastic member is fixedly connected with the water guide channel and/or the inner drum;
   preferably, the elastic member is a spring;
   further preferably, a gap for water flowing through is formed between the elastic member and the inner wall of the water guide channel.

7. The washing machine according to claim 4, **characterized in that**,

   a first side of the valve core is in contact with an outer wall surface of the side wall of the inner drum, and a second side of the valve core is in contact with a side of the water guide channel away from the inner drum;
   preferably, the first side of the valve core and the side wall of the inner drum are parallel planes; and the second side of the valve core and the side of the water guide channel away from the inner drum are parallel slopes having a same slope.

8. The washing machine according to any one of claims 1 to 7, **characterized in that**,

the water collection disk is arranged outside an end of the inner drum;
the water collection disk includes a disc-shaped structure covering the end of the inner drum, and an outer circumference of the disc-shaped structure is provided with an annular flange extending to another end of the inner drum, and a gap is formed between an inner circumference of the annular flange and an outer wall of the inner drum;
a water outlet end of the water guide channel extends into the gap between the inner circumference of the annular flange and the outer wall of the inner drum;
preferably, the water outlet end of the water guide channel extends to the disc-shaped structure of the water collection disk, and a gap for water flowing through is formed between the water outlet end and the disc-shaped structure.

9. The washing machine according to claim 8, **characterized in that**,

the annular flange of the water collection disk is provided with an inner flange that bends and extends to the axis of the inner drum, and an end of the inner flange is close to or in contact with the outer wall of the inner drum;
preferably, a ring of dynamic seal is arranged between the inner flange and the outer wall of the inner drum to seal a junction of the water collection disk and the inner drum.

10. The washing machine according to claim 9, **characterized in that**,

a lowest part of the water collection disk is connected to a drain pipe of the washing machine;
preferably, a lowest part of the annular flange of the water collection disk is connected with the drain pipe, and the inner flange of the annular flange is arranged close to the opening of the inner drum relative to a connecting part of the drain pipe.

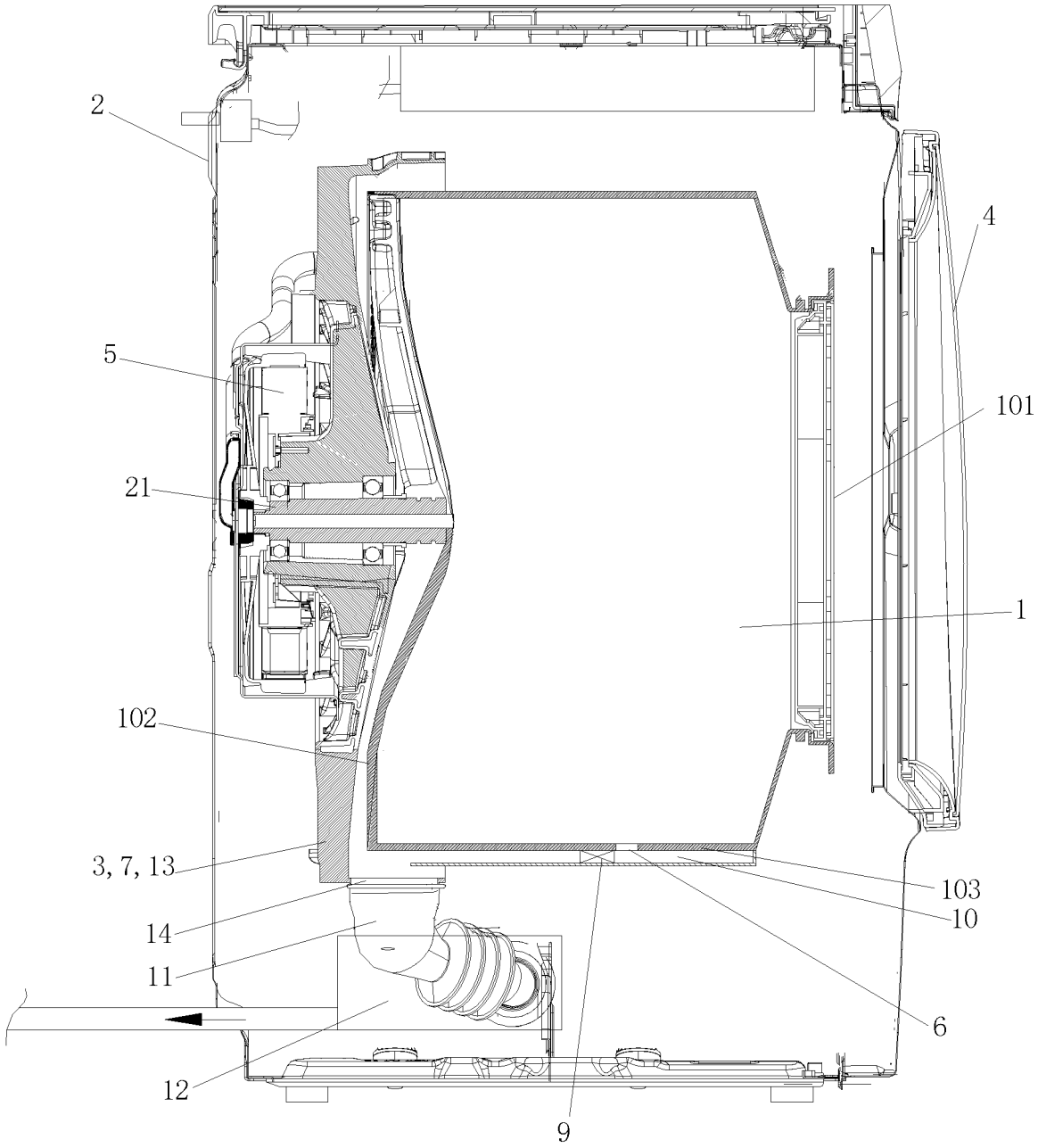

FIG. 1

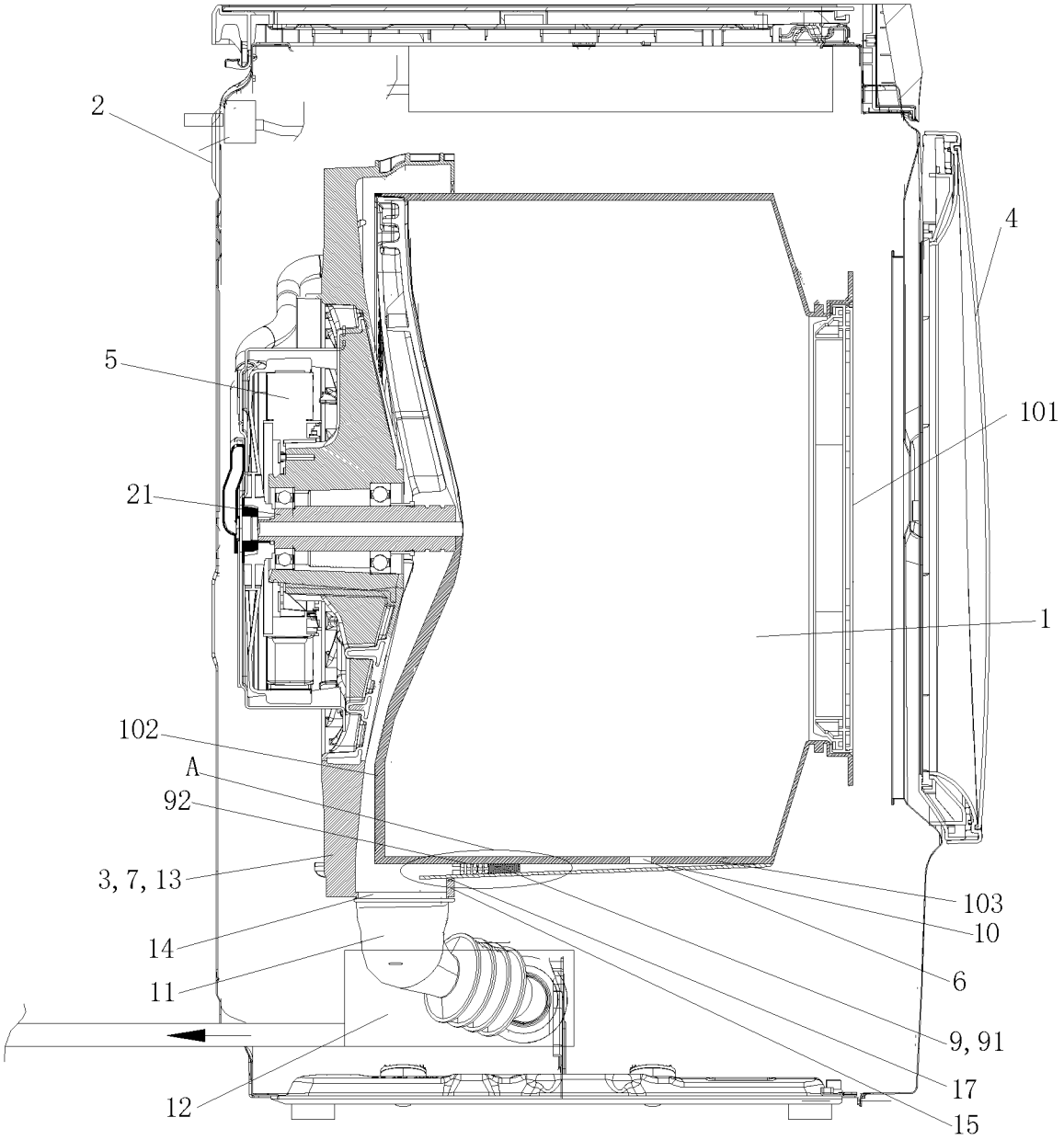

FIG. 2

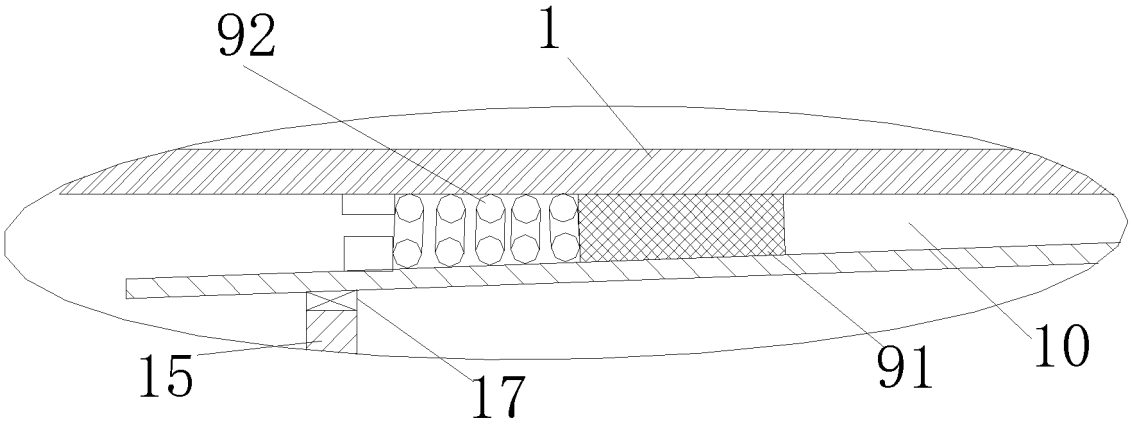

FIG. 3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2020/089760

A. CLASSIFICATION OF SUBJECT MATTER

D06F 39/08(2006.01)i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

D06F

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

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

EPODOC, WPI, CNPAT, CNKI: 海尔, 内筒, 内桶, 无孔, 外筒, 外桶, 离心, 阀, 排水, 脱水, 导水, 斜, inner, tub, drum, outer, hole?, without, holeless, centrifugal, valve, drain+, dehydrat+, guid+, discharg+, inclin+, tilt+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 108796995 A (QINGDAO HAIER WASHING MACHINE CO., LTD. et al.) 13 November 2018 (2018-11-13) description, paragraphs [0043] and [0064]-[0076], and figures 1-4	1, 2, 8-10
X	CN 108796994 A (QINGDAO HAIER WASHING MACHINE CO., LTD. et al.) 13 November 2018 (2018-11-13) description, paragraphs [0037]-[0052], and figures 1-4	1, 2, 8-10
X	CN 108796973 A (QINGDAO HAIER WASHING MACHINE CO., LTD. et al.) 13 November 2018 (2018-11-13) description, paragraphs [0050] and [0071]-[0083], and figures 1-3, 7 and 8	1, 2, 8-10
PX	CN 109868614 A (QINGDAO HAIER WASHING MACHINE CO., LTD. et al.) 11 June 2019 (2019-06-11) description, paragraphs [0033]-[0041], and figures 1 and 2	1, 2, 8-10
PX	CN 109868615 A (QINGDAO HAIER WASHING MACHINE CO., LTD. et al.) 11 June 2019 (2019-06-11) description, paragraphs [0032]-[0040], and figures 1 and 2	1, 2, 8-10
A	CN 103603168 A (ZHANG, Anda) 26 February 2014 (2014-02-26) entire document	1-10

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

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
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"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
04 August 2020	**21 August 2020**
Name and mailing address of the ISA/CN **China National Intellectual Property Administration (ISA/CN)** **No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088** **China**	Authorized officer
Facsimile No. **(86-10)62019451**	Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2020/089760

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	KR 20000055203 A (LG ELECTRONICS INC.) 05 September 2000 (2000-09-05) entire document	1-10
A	JP 2013128539 A (PANASONIC CORP.) 04 July 2013 (2013-07-04) entire document	1-10

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2020/089760

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
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CN 108796973 A	13 November 2018	None	
CN 109868614 A	11 June 2019	None	
CN 109868615 A	11 June 2019	None	
CN 103603168 A	26 February 2014	None	
KR 20000055203 A	05 September 2000	KR 100315772 B1	12 December 2001
JP 2013128539 A	04 July 2013	None	

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