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(54) **DRAINAGE STRUCTURE OF WASHING MACHINE AND DRAINAGE METHOD THEREFOR**

(57) The disclosure relates to a draining structure of a washing machine and a draining method, an inner drum (1) is installed in a housing (2) of the washing machine, the inner drum (1) is a tapered drum with a smaller diameter at one end and a larger diameter at the other end, and a draining flow passage (32) is arranged at a larger end of the inner drum (1); one end of the draining flow passage (32) is communicated with the larger end of the inner drum (1), and the other end of the draining flow passage (32) is penetrated out of the inner drum (1) and communicated with a drain pipe (31) of the washing machine. The inner drum (1) rotates at a certain rotating speed, and washing water in the inner drum (1) flows to the larger end of the inner drum (1) along the tapered inner wall under the action of centrifugal force, and washing water is drained out from the inner drum (1) through the draining flow passages (32) arranged at the larger

end when reaching to the larger end of the inner drum (1), and then drained out from the washing machine through the drain pipe (31) to realize the discharge of washing water in the inner drum (1) is drained out. In this way, the effect that during the rotating process of the inner drum (1), the inner drum (1) is sealed, and during drainage, the drain valve is opened to allow water in the inner drum (1) to be discharged normally is realized, and the purpose of normal drainage of the washing machine having dual effects that the inner drum (1) rotating and water holding is achieved; besides, the inner drum (1) does not have to be sleeved with an outer drum, thus increasing the volume of the inner drum (1) and improving the washing capacity of the washing machine.

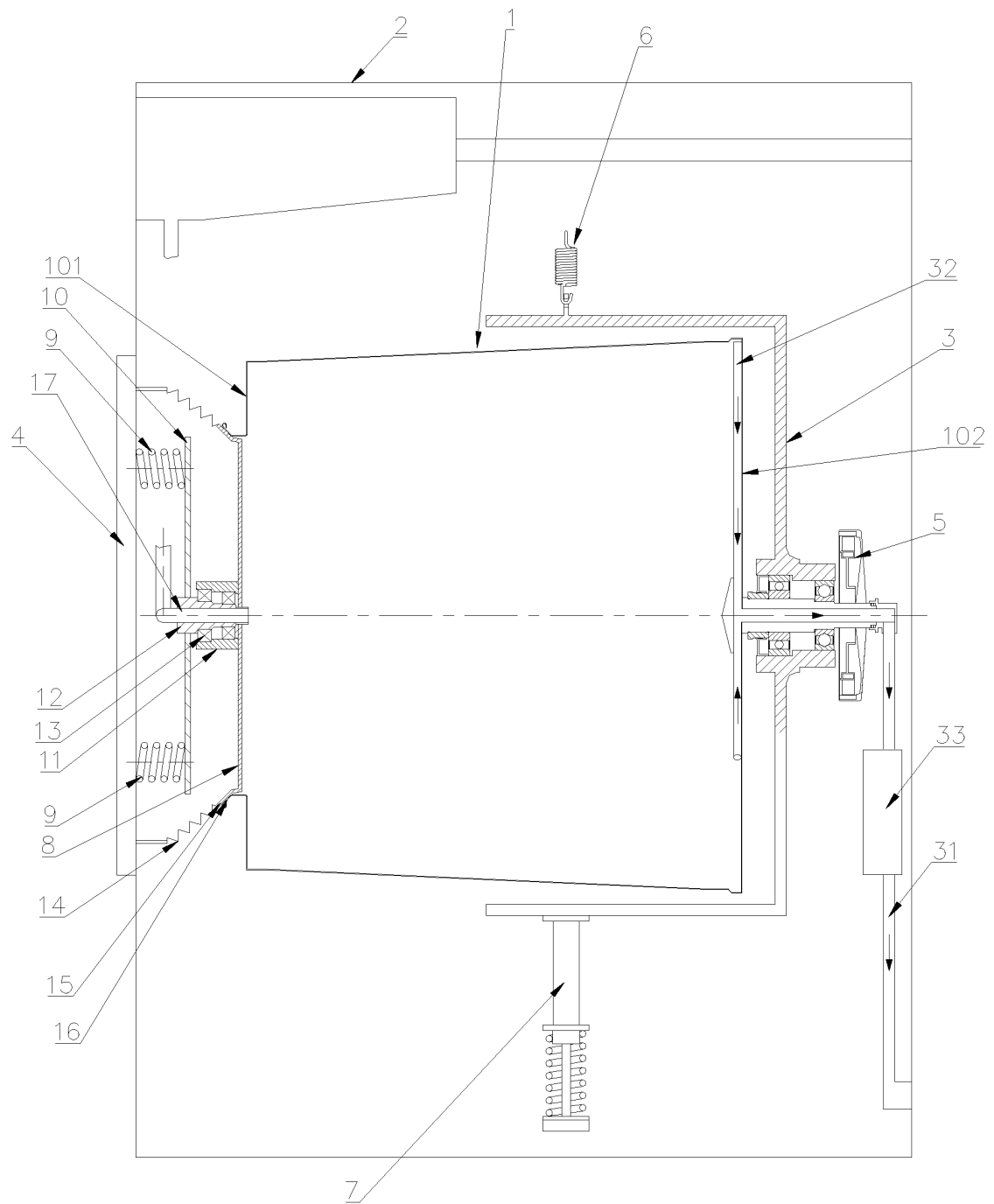


Fig. 1

Description

TECHNICAL FIELD

[0001] The disclosure belongs to the technical field of washing machines, in particular relates to a washing machine provided with only a rotatable inner drum capable of containing water, and more particularly relates to a draining structure of a washing machine and a draining method.

BACKGROUND

[0002] In the prior art, a drum washing machine generally comprises an inner drum and an outer drum which are sleeved, the outer drum is sealed and used for containing water, and the inner drum is used for containing clothes and can rotate to beat and wash the clothes. Meanwhile, the inner drum is provided with draining holes, so that water in the outer drum flows into the inner drum through the draining holes to soak the clothes in the inner drum, the water in the inner drum flows out to the outer drum through the draining holes, and water in the clothes in the inner drum is discharged to the outer drum through the draining holes when the inner drum rotates at a high speed, so as to realize the purpose of washing clothes.

[0003] However, as the inner drum and the outer drum are mutually sleeved, dirt tends to be accumulated between the inner drum and the outer drum during the use of the washing machine. Besides, because the inner and outer drums are mutually sleeved, users cannot clean the outer wall of the inner drum and the inner wall of the outer drum, thus increasing bacteria in the washing machine and reducing the washing efficiency of the washing machine and the cleanliness of the washed clothes.

[0004] Meanwhile, in the existing washing machines, the inner drum is sleeved with the outer drum, the inner drum rotates to beat and wash clothes in the washing process, so the washing capacity of the washing machine is based on the inner drum, resulting in a low utilization rate of the inner space of the washing machine, and the washing capacity of the washing machine cannot be expanded on the existing basis.

[0005] In view of this, the current research and development hotspot is to provide a washing machine to combine the inner and outer drum and make the inner drum be a sealed container, which can not only contain water and clothes, but also rotate to beat and wash the clothes. Meanwhile, since the washing machine is not provided with an outer drum or the outer drum and a washing machine housing are integrally arranged, the inner drum of the washing machine can be expanded to improve the washing capacity of the washing machine.

[0006] However, since the inner drum not only contains washing water, but also rotates to beat and wash clothes in the drum, how to design a draining structure suitable for the washing machine has become an urgent problem

to be solved.

[0007] In view of the above technical defects, the present application is hereby submitted.

SUMMARY

[0008] The technical problem to be solved by the present disclosure is to overcome defects in the prior art and provide a draining structure of a washing machine. According to the draining structure of the washing machine, by arranging a draining flow passage capable of allowing water flow from the periphery to the center at a larger end of the inner drum, and the water in the inner drum converged and flowed to the larger end is drained out from the central of the larger end through the draining flow passages under the action of centrifugal force, so as to solve the problem of discharging washing water contained in the inner drum, and further realize the purposes of sealing an opening of the rotatable inner drum, preventing water from leaking out of the inner drum during the normal working process of the washing machine, and discharging washing water in the inner drum through the drain valve when the washing machine is in a draining state. Meanwhile, the inner drum and outer drum of a drum washing machine are combined to realize the purpose of improving the washing capacity of the washing machine.

[0009] In order to solve the technical problem and achieve the technical effect, the basic design idea of the technical solution adopted by the disclosure is as follows: A draining structure of a washing machine which comprises an inner drum installed in a housing of the washing machine, the inner drum is a tapered drum with a smaller diameter at one end and a larger diameter at the other end, and a draining flow passage is arranged at a larger end of the inner drum; one end of the draining flow passage is communicated with the larger end of the inner drum, and the other end of the draining flow passage is penetrated out of the inner drum and communicated with a drain pipe of the washing machine.

[0010] Further, a side wall of the inner drum is in a tapered shape, and the diameter of which gradually increases from an opening of the inner drum towards an bottom of the inner drum, and a center of the bottom of the inner drum is installed on an inner drum support via a rotating shaft; and the draining flow passage is arranged on an inner side surface of the bottom of the inner drum, and one end of the draining flow passage is arranged at an intersection of the bottom of the inner drum and a side wall of the inner drum, the other end of the draining flow passage is penetrated out of the center along a axis of the inner drum through a motor shaft and communicated with the drain pipe of the washing machine.

[0011] Further, the bottom of the inner drum is provided with a plurality of draining flow passages, one ends of the draining flow passages are uniformly distributed on a outer periphery of the bottom of the inner drum at an

equal interval angle and communicated with a inside of the inner drum, and the other ends of the draining flow passages are connected at the center of the bottom of the inner drum and penetrated out of the center of the bottom of the inner drum to communicate with the drain pipe of the washing machine.

[0012] Further, one end of at least one draining flow passage is arranged in the middle of the bottom of the inner drum and communicated with the inside of the inner drum, and the other end of at least one draining flow passage is penetrated out of the center of the bottom of the inner drum and communicated with the drain pipe of the washing machine.

[0013] Further, each draining flow passage is formed of hollow convex ribs protruding from an inner side surface of the bottom of the inner drum, and the hollow convex ribs lift and beat the water and clothes in the inner drum to wash the clothes during the rotation of the inner drum.

[0014] Further, the draining flow passage and/or the drain pipe is provided with a drain pump to apply pressure to the water flowing to the bottom of the inner drum of the washing machine, and the water is drained out of the washing machine through the draining flow passages and/or the drain pipe via the drain pump.

[0015] Another important object of the present disclosure is to provide a drainage method using the above-described washing machine to solve the problem of how to seal the washing machine with the water-filling and rotating inner drum and to drain the washing water in the inner drum.

[0016] In order to achieve the above object, the specific technical solutions adopted are as follows.

[0017] A draining method of a washing machine applied to the draining structure of the washing machine wherein the inner drum rotates at a certain rotating speed, and washing water in the inner drum flows to the larger end of the inner drum along the tapered inner wall under the action of centrifugal force, and washing water is drained out from the inner drum through the draining flow passages arranged at the larger end when reaching to the larger end of the inner drum, and then drained out from the washing machine through the drain pipe to realize the discharge of washing water in the inner drum is drained out.

[0018] Further, the draining method comprises the following specific steps:

Step 1, the inner drum of the washing machine is rotated at the certain rotating speed, and the water in the inner drum flows to the side wall of the inner drum under the action of centrifugal force;
Step 2, the water in the inner drum flows to the bottom of the inner drum with the larger diameter under the action of the tapered inner drum, since the water adhering to the side wall of the inner drum is guided by the side wall of the inner drum and subjected to the centrifugal force generated in the rotating proc-

ess of the inner drum;

Step 3, the water flows into the draining flow passages arranged on the bottom of the inner drum when reaching the bottom of the inner drum, and is drained out of the inner drum from the center of the inner drum through the draining flow passage, and then discharged out of the washing machine through the drain pipe.

[0019] Further, in the above-mentioned Step 3, the drain pump on the draining flow passages and/or the drain pipe is controlled to start to apply pressure to the water flowing to the bottom of the inner drum of the washing machine, and the water is drained out of the washing machine through the draining flow passages and/or the drain pipe via the drain pump.

[0020] Further, during the draining process of the washing machine, the inner drum rotates at a medium speed or high speed, and the water in the inner drum adheres to the side wall of the inner drum under the action of centrifugal force and flows to the larger end of the inner drum.

[0021] Compared with the washing machines in the prior art, the washing machine of the present disclosure has the following beneficial effects:

Through the above structure and method, the water in the inner drum is not subject to the centrifugal force and not converged and flowed to the larger end during the washing process of the washing machine; the water is subjected to centrifugal force generated from the high-speed rotation of the inner drum and converged and flowed to the larger end for being drained out during draining process the washing machine. The effect, that during the rotating process of the inner drum, the inner drum is sealed, and during drainage, water is subjected to centrifugal force generated from the high-speed rotation of the inner drum and converged and flowed to the larger end for being drained out, is realized, and the purpose of normal drainage of the washing machine having dual effects that the inner drum rotating and water holding is achieved; besides, the inner drum does not have to be sleeved with an outer drum, thus increasing the volume of the inner drum and improving the washing capacity of the washing machine.

[0022] In order to make the design concept of the technical solution of the present disclosure clearer and facilitate further understanding of its beneficial effects, some specific embodiments of the present disclosure will be described in detail below with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023] As part of the present disclosure, the accompanying drawings are used for providing a further understanding of the present disclosure. The exemplary embodiments of the present disclosure and descriptions thereof are used to explain the present disclosure, but

do not constitute improper limitations of the present disclosure. Obviously, the drawings in the following description are only some embodiments, and other drawings can be obtained according to these drawings without creative labor for those skilled in the art. In the drawings:

Fig. 1 is a structural diagram of the washing machine according to an embodiment of the present disclosure.

[0024] Reference numerals in the figures: 1. inner drum, 2. housing, 3. inner drum support, 4. door cover, 5. drive motor, 6. damping suspension spring, 7. damping support rod, 31. drain pipe, 32. draining flow passage, 33. drain pump, 101. opening of the inner drum, 102. bottom of the inner drum.

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

DETAILED DESCRIPTION

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

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

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

[0029] As shown in Fig. 1, the embodiment of the present disclosure provides a washing machine; the washing machine comprises a housing 2, an inner drum

1 is arranged in the housing 2. The axis of the inner drum 1 extends horizontally or is inclined downwards gradually from front to back. The front end of the inner drum 1 is provided with an opening of the inner drum 101, and the rear end is provided with an bottom of the inner drum 102 in a sealed mode. And there is no through hole in the drum wall of the inner drum 1, so that a sealed container with only a front opening is formed in the inner drum 1. Meanwhile, the front end of the housing 2 of the washing machine is provided with a door cover 4 which can be opened outwards for the purpose of blocking the opening of the inner drum 101 after the door cover 4 is closed and putting clothes into the inner drum 1 via the opening of the inner drum 101 after the door cover 4 is opened. The rear end of the inner drum 1 is installed in the housing 2 of the washing machine through an inner drum support 3; the inner drum support 3 and the rear end of the inner drum 1 are coaxially arranged. The upper end and lower end of the inner drum support 3 are both bent to the direction of the drum opening at the front end of the inner drum 1. The bent parts extend to at least the middle of the inner drum 1, and the upper and lower bent parts are respectively connected with the housing 2 of the washing machine through a damping suspension spring 6 and a damping support rod 7, so as to realize the purpose that the inner drum support 3 can be installed in the washing machine housing 2 in a vibrating manner. Meanwhile, the center of the bottom of the inner drum 102 and a motor shaft of a washing machine drive motor 5 are coaxially arranged to drive the inner drum 1 to rotate, and the inner drum 1 and the drive motor 5 are both fixedly installed on the inner drum support 3. Preferably, the bottom of the inner drum 102 and the drive motor 5 are respectively arranged on the two sides of the inner drum support 3, 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 and fixedly connected with the bottom of the inner drum 102, and the shaft of the drive motor 5 can rotate relative to the inner drum support 3, so as to realize the purpose that the inner drum 1 and the drive motor 5 are installed on the inner drum support 3 and the inner drum 1 can rotate alone to wash clothes inside under the action of the drive motor 5.

[0030] In the present disclosure, in order to discharge the water in the inner drum of the washing machine after clothes are removed, and to realize sealing the inner drum and containing water and normal washing in the working process of the washing machine, the following settings are made:

A draining structure of a washing machine is provided, the inner drum 1 is installed in the housing 2, the inner drum 1 is a tapered drum with a smaller diameter at one end and a larger diameter at the other end, and a draining flow passage 32 is arranged at a larger end of the inner drum 1. One end of the draining flow passage 32 communicates with the larger end of the inner drum 1, and the other end of the draining flow passage 32 penetrates

out of the inner drum 1 through the center of the larger end and communicates with the washing machine drain pipe 31.

[0031] The disclosure also introduces a draining method of the washing machine. The inner drum rotates at a certain rotating speed, and washing water in the inner drum flows to the larger end of the inner drum along the tapered inner wall under the action of centrifugal force, and washing water is drained out from the inner drum through the draining flow passages arranged at the larger end when reaching to the larger end of the inner drum, and then drained out from the washing machine through the drain pipe, therefore, the washing water in the inner drum is drained out.

[0032] During the normal washing process of the drum washing machine, the inner drum 1 generally rotates at a low speed, and water in the inner drum 1 is not subjected to too much centrifugal force, so that clothes and water in the inner drum 1 will experience a beating washing effect along with the low-speed rotation of the inner drum. In this way, the water in the inner drum 1 does not converge towards the larger end and will not be discharged out of the washing machine. However, during the draining process of the drum washing machine, the inner drum 1 rotates at a medium-high speed, and water separated from the clothes in the inner drum 1 is subjected to the rotation centrifugal force of the inner drum, so that the water in the inner drum 1 converges towards the larger end of the inner drum along the inner drum wall, flows into the draining flow passages 36 arranged at the larger end of the inner drum, and flows out of the inner drum 1 through the center of the larger end of the inner drum 1, and is discharged out of the washing machine through the drain pipe 31.

[0033] In this way, water in the inner drum is not subjected to centrifugal force and does not converge towards the larger end of the inner drum in the normal washing state of the washing machine, and water in the inner drum rotating at a high speed is subjected to centrifugal force in the draining state of the washing machine, flows towards the draining flow passages at the larger end of the inner drum and is discharged. Thus, the water contained in the inner drum does not flow out from the drain port when the inner drum rotates normally, further, the effect that during the rotating process of the inner drum, the inner drum is sealed, and during drainage, the drain valve is opened to allow water separated from clothes in the inner drum to be discharged normally is realized, and the purpose of normal draining of the washing machine with the inner drum having both a rotating function and a water containing function is realized. Besides, the inner drum does not have to be sleeved with an outer drum, thus increasing the volume of the inner drum and improving the washing capacity of the washing machine.

Embodiment 1

[0034] As shown in Fig. 1, a draining structure of a

washing machine is provided, the inner drum 1 is installed in the housing 2, the inner drum 1 is a tapered drum with a smaller diameter at one end and a larger diameter at the other end, and a draining flow passage 32 is arranged at a larger end of the inner drum 1. One end of the draining flow passage 32 communicates with the larger end of the inner drum 1, and the other end of the draining flow passage 32 penetrates out of the inner drum 1 through the center of the larger end and communicates with the washing machine drain pipe 31.

[0035] In the present embodiment, the front end of the inner drum 1 is provided with the opening of the inner drum 101, the rear end is provided with the bottom of the inner drum 102, and the opening of the inner drum 101 and the bottom of the inner drum 102 are connected through the inner drum side wall. The side wall of the inner drum is in a tapered shape, and the diameter of which gradually increases from the opening of the inner drum 101 towards the bottom of the inner drum 102, so as to form the tapered inner drum 1, and the center of the bottom of the inner drum 102 is installed on the inner drum support 3 via the rotating shaft. And the draining flow passage 32 is arranged on the inner side surface of the bottom of the inner drum 101, one end of the draining flow passage 32 is arranged at an intersection of the bottom of the inner drum 101 and the side wall of the inner drum, the other end of the draining flow passage penetrates out through the center of the bottom of the inner drum 101 and passes through a motor shaft along the axis, and the penetrating end of the draining flow passage 32 communicates with the washing machine drain pipe 31.

[0036] In the present embodiment, the bottom of the inner drum 102 is provided with a plurality of draining flow passages 36, one ends of the draining flow passages 36 are uniformly distributed on the outer periphery of the bottom of the inner drum 102 at an equal interval angle and communicate with the inside of the inner drum 1, and the other ends meet at the center of the bottom of the inner drum 102 and penetrate out of the center of the bottom of the inner drum 102 to communicate with the washing machine drain pipe 31.

[0037] In the present embodiment, one end of at least one draining flow passage 32 is arranged in the middle of the bottom of the inner drum 102 and communicates with the inside of the inner drum 1, and the other end penetrates out of the center of the bottom of the inner drum 102 and communicates with the washing machine drain pipe 31. Preferably, the ends of the adjacent draining flow passages 36 are alternately arranged at the middle or outer periphery of the bottom of the inner drum 102. By arranging the plurality of draining flow passages which are uniformly distributed on the bottom of the inner drum with the ends respectively arranged at the middle or outer periphery so as to adsorb and discharge the water at each part of the bottom of the inner drum, the draining efficiency in the inner drum is improved.

[0038] In the present embodiment, each draining flow

passage 32 is formed of hollow convex ribs protruding from an inner side surface of the bottom of the inner drum 102. And during the rotation of the inner drum 1, the hollow convex ribs lift and beat the water and clothes in the inner drum 1 to wash the clothes, so that the inwardly protruding draining flow passages 36 have the auxiliary lifting rib function that is, lifting, beating and washing the clothes in the inner drum 1.

[0039] In the present embodiment, the draining flow passages 36 and/or the drain pipe 31 is provided with a drain pump 33 to apply pressure to the water flowing to the bottom of the inner drum 102 of the washing machine, so as to discharge the water out of the washing machine along the draining flow passages 36 and the drain pipe 31; and the drain pump 33 does not work when the drum washing machine is in a normal washing state and is opened when the drum washing machine executes a draining program, so as to control the water discharge of the inner drum of the washing machine and provide a water flow driving force.

Embodiment 2

[0040] The present embodiment provides a draining method is based on the washing machine described in Embodiment 1, the inner drum rotates at a certain rotating speed, and washing water in the inner drum flows to the larger end of the inner drum along the tapered inner wall under the action of centrifugal force, and washing water is drained out from the inner drum through the draining flow passages arranged at the larger end when reaching to the larger end of the inner drum, and then drained out from the washing machine through the drain pipe, therefore, the washing water in the inner drum is drained out.

[0041] In this way, water in the inner drum is not subjected to centrifugal force and does not converge towards the larger end of the inner drum in the normal washing state of the washing machine, and water in the inner drum rotating at a high speed is subjected to centrifugal force in the draining state of the washing machine, flows towards the draining flow passages at the larger end of the inner drum and is discharged, so that the water contained in the inner drum does not flow out from the drain port when the inner drum rotates normally, further, the effect that during the rotating process of the inner drum, the inner drum is sealed, and during drainage, the drain valve is opened to allow water contained in the inner drum to be discharged normally is realized, and the purpose of normal draining of the washing machine with the inner drum having both a rotating function and a water containing function is realized.

[0042] In the present embodiment, the draining method of the washing machine comprises the following specific steps:

Step 1, the inner drum of the washing machine is rotated at the certain rotating speed, and the water in the inner drum flows to the side wall of the inner

drum under the action of centrifugal force;

Step 2, the water in the inner drum flows to the bottom of the inner drum with the larger diameter under the action of the tapered inner drum, since the water adhering to the side wall of the inner drum is guided by the side wall of the inner drum and subjected to the centrifugal force generated in the rotating process of the inner drum;

Step 3, the water flows into the draining flow passage arranged on the bottom of the inner drum when reaching the bottom of the inner drum, and is drained out of the inner drum from the center of the inner drum through the draining flow passage, and then discharged out of the washing machine through the drain pipe.

[0043] In the present embodiment, in the above-mentioned Step 3, the drain pump 33 on the draining flow passages and/or the drain pipe starts to work to apply pressure to the water flowing to the bottom of the inner drum, so that the water flows along the draining flow passages and the drain pipe and is discharged out of the washing machine. When the washing machine executes other programs, the drain pump 33 on the draining flow passages and/or the drain pipe does not work, so that the water in the inner drum will not be adhered by the drain pump 33 to be discharged, the water in the inner drum is retained and the clothes are normally washed.

[0044] In the present embodiment, during the draining process of the washing machine, the inner drum rotates at a medium-high speed, so that the water in the inner drum adheres to the side wall of the inner drum under the action of centrifugal force and flows to the larger end of the inner drum.

Embodiment 3

[0045] In the present embodiment, in order to realize the sealing at the opening of the inner drum 101 when the washing machine runs, the following settings are made:

As shown in Fig. 1, a washing machine is provided. A door cover 4 is installed on a housing 2 of the washing machine, and the door cover 4 is rotatably connected with an inner drum cover 8 through an elastic mechanism, and after the door cover 4 is closed, the elastic mechanism provides a locking elastic force to the inner drum cover 8 to make the inner drum cover 8 be in sealing contact with the opening of the inner drum 101, and make the inner drum cover 8 rotate together with the inner drum 1, so as to realize the purpose of sealing the inner drum 1 after the inner drum cover 8 is fastened to the opening of the inner drum 101 when the door cover 4 is closed.

[0046] In this way, the opening of the inner drum is sealed by the inner drum cover tightly pressed by elastic force. The inner drum cover is in sealing contact with the opening of the inner drum and rotates together with the opening of the inner drum in the washing process of the

washing machine, so that the purpose of dynamic sealing of the drum opening when the inner drum rotates is realized, and the inner drum can both rotate and contain water. Besides, the inner drum does not have to be sleeved with an outer drum, thus increasing the volume of the inner drum and improving the washing capacity of the washing machine.

[0047] In the present embodiment, the door cover 4 and the inner drum cover 8 are coaxially arranged, and the door cover 4 and the inner drum cover 8 are connected through the elastic mechanism, and the inner drum cover 8 is pressed against the opening of the inner drum 101 under the action of the elastic mechanism in a compressed state after the door cover 4 is closed.

[0048] In the present embodiment, the inner drum cover 8 is fixedly connected with the door cover 4, so that the inner drum cover 8 moves together with the opening and closing of the door cover 4, thereby realizing the purpose that the inner drum cover 8 opens and closes the opening of the inner drum 101. Meanwhile, the inner drum cover 8 and the door cover 4 can relatively rotate around the central axis, so that the inner drum cover 8 is hermetically and fixedly connected with the inner drum 1 and the inner drum cover 8 can rotate together with the inner drum 1 after the washing machine is closed.

[0049] Preferably, in the present embodiment, in order to increase the sealing performance between the inner drum cover 8 and the opening of the inner drum 101 after the inner drum cover 8 is closed, the inner drum cover 8 and the opening of the inner drum 101 can be elastically clamped, so that the inner drum cover and the opening of the inner drum 101 can be fixedly clamped after the door cover 4 is closed, and the inner drum cover moves together with the door cover 4 and is separated from the opening of the inner drum 101 after the door cover 4 is opened. And clamping fixation at the position of sealing contact between the inner drum cover 8 and the opening of the inner drum 101 is realized, so as to enhance the sealing performance of the opening of the inner drum 101.

[0050] In the present embodiment, a center of the inner drum cover 8 is connected with a rotating shaft 12 extending to the outside of the inner drum in the axial direction of the inner drum 1. The inner drum cover 8 can rotate around the rotating shaft. One end of the rotating shaft 12 is rotatably connected with the inner drum cover 8, and the other end of the rotating shaft 12 is connected with the door cover 4 through an elastic mechanism; and the elastic mechanism applies an elastic force to the inner drum cover 8 to drive the inner drum cover 8 to move towards the opening of the inner drum 101, so that the inner drum cover 8 is fastened to the opening of the inner drum 101 in a sealing mode to realize the sealing of the opening of the inner drum 101.

[0051] In the present embodiment, a center of an outer side of the inner drum cover 8 is provided with an installation groove 11 extending outwards. The rotating shaft 12 is mounted in the installation groove 1 by a bearing,

and the rotating shaft 12 extends in the axial direction of the inner drum 1, so that the inner drum cover 8 can relatively rotate around the rotating shaft 12. And the end of the rotating shaft 12 is fixedly connected with the door cover 4 by springs 9, so that the springs 9 are in a compressed state after the door cover 4 is closed, and the inner drum cover is in sealing contact with the opening of the inner drum 101, and the inner drum cover 8 rotates around the rotating shaft relative to the door cover 4. Preferably, an insertion end of the rotating shaft 12 inserted into the installation groove 11 of the inner drum cover 8 is provided with a protruding portion protruding outwards in the radial direction for being engaged with the installation groove 11 of the inner drum cover 8, and the rotating shaft 12 and the inner drum cover 8 are fixed in the axial direction.

[0052] In the present embodiment, in order to improve the pressing force of the springs and the stability of the inner drum cover after being fastened, the following settings are made:

As shown in Fig. 1, the center of the outer side of the inner drum cover 8 is provided with the installation groove 11 extending outwards, the rotating shaft 12 is mounted in the installation groove 1 by the bearing. The rotating shaft 12 extends in the axial direction of the inner drum 1, and the inner drum cover 8 can relatively rotate around the rotating shaft 12. And an end of the rotating shaft 12 is provided with a support plate 10 perpendicular to the axis of the rotating shaft 12, and an outer periphery of the support plate 10 is fixedly connected with the door cover 4 through the plurality of springs 9.

[0053] In the present embodiment, a diameter of the support plate 10 is greater than or equal to a diameter of the opening of the inner drum 101, the support plate 10 is coaxial with the inner drum 1. The springs 9 are arranged on the outer periphery of the support plate 10 symmetrically relative to the axis of the inner drum 1, and each spring 9 is arranged in a direction parallel to the axis of the inner drum 1.

[0054] The inner drum cover is subjected to limiting elastic force of different springs in a plurality of directions by adding the support plate connected with the rotating shaft between the door cover and the inner drum cover of the washing machine, and connecting the support plate to the door cover via a plurality of springs uniformly distributed on the outer periphery of the support plate. Thus, the inner drum cover can be stably in sealing contact with the opening of the inner drum without deflection, thus improving the sealing reliability at the opening of the inner drum of the washing machine.

[0055] By connecting the inner drum cover with the door cover through the rotating shaft provided with the springs, the inner drum cover contacts with the opening of the inner drum to compress the springs after the door cover is closed. The springs provide an elastic force for the inner drum cover to move towards the inner drum, and the inner drum cover and the opening of the inner drum are jointed in a sealed mode, thereby realizing the

purposes of limiting the inner drum cover and allowing the inner drum cover and the opening of the inner drum to be in sealing contact after the door cover is closed. Meanwhile, as the inner drum cover and the rotating shaft can rotate relatively, when the inner drum rotates under the driving of the washing machine drive motor, the inner drum cover can rotate together with the inner drum under the friction force, so as to realize the purpose of sealing the opening of the inner drum. In addition, as the front end of the inner drum is connected with the door cover through the inner drum cover, the rotating shaft, and the springs, the front end of the inner drum can be elastically installed in the housing in a vibrating manner, so that the front end of the inner drum and the washing machine housing are installed in a mutually supporting mode. Thus, the supporting action point of the inner drum is improved, and the stability of the inner drum in the operation process is enhanced.

[0056] In the present embodiment, a water inlet pipe 17 is coaxially installed at the rotating shaft 12, one end of the water inlet pipe 17 penetrates into the inner drum 1 through the inner drum cover 8, and the other end penetrates the rotating shaft 12 and is bent upwards to extend to communicate with a water inlet structure of the washing machine, so that the inlet water of the washing machine flows into the inner drum 1 through the center of the opening of the inner drum 101. And the purpose of the water input of the inner drum 1 from the center of the front inner drum cover 8 is realized. Preferably, a water seal is arranged at the position where the inner drum cover 8 and the rotating shaft 12 are hinged together to ensure the tightness of the inner drum 1.

[0057] In the present embodiment, the outer periphery of the inner drum cover 8 is provided with an inclining portion 15 inclined outward, and the inclining portion 15 is a tapered surface, and the diameter of which gradually increases from the outer periphery of the inner drum 1 to the door cover 4. A circular of fixing portion 16 in jointing contact with the inclining portion 15 is arranged at the opening of the inner drum 101. Preferably, an outer end of the fixing portion 16 is provided with an outward bent chamfer to guide the inner drum cover 8 to slide into the opening of the inner drum 101, so that the fixing portion 16 and the inclining portion 15 are correspondingly attached to realize sealing.

[0058] More preferably, the outer periphery of the inner drum cover 8 is provided with two sections of tapered surfaces with different curvatures and gradually increasing diameters towards the door cover 4. And both sides of a first tapered surface are respectively connected with an outer periphery of the door cover 4 and one side of the second tapered surface. The first tapered surface corresponds to a horizontal bending surface of the opening of the inner drum 101, the horizontal bending surface is a cylindrical surface horizontally bent from the opening of the inner drum 101 to the outside of the inner drum 1. An inner diameter of the horizontal bending surface is equal to or slightly smaller than a maximum diameter of

the first tapered surface. And an end of the horizontal bending surface is gradually inclined outwards to form the fixing portion 16 of tapered, and the second tapered surface forms the inclining portion 15 and is in jointing contact with the fixing portion 16.

[0059] In the present embodiment, a sealing pipe 14 of tubular is also arranged between the inner drum cover 8 and the door cover 4, which can expand and contract in the radial direction. One end of the sealing pipe 14 is hermetically connected with the outer periphery of the door cover 4, and the other end of the sealing pipe 14 is fixedly connected with the door cover 4, so that the elastic mechanism is hermetically installed inside the sealing pipe 14, and the inner drum cover 8 can move relative to the door cover 4 along with the expansion and contraction of the sealing pipe 14. And the sealing pipe 14 is made of bellows made of elastic rubber. Preferably, the end of the sealing pipe 14 and the door cover 4 are in sleeve connection in a manner of rotating relatively around the axis of the inner drum 1, so that the sealing pipe 14 does not rotate along when the door cover 4 rotates together with the inner drum 1.

Embodiment 4

[0060] The difference between this embodiment and the above embodiment 1 and 2 is that the above mentioned drainage structure and drainage method is adopt to drain out the water removed from clothing during the dehydration process of the washing machine, and then the purpose of dewatering the clothes in the inner drum without holes is realized.

[0061] The above descriptions are merely preferred embodiments of the present disclosure, and are not intended to limit the present disclosure in any form. Although the present disclosure has been disclosed above through the preferred embodiments, the embodiments are not intended to limit the present disclosure. A person skilled in the art can make some equivalent variations, alterations or modifications to the above-disclosed technical content without departing from the scope of the technical solutions of the present disclosure to obtain equivalent embodiments. Any simple alteration, equivalent change or modification made to the above embodiments according to the technical essence of the present disclosure without departing from the content of the technical solutions of the present disclosure shall fall within the scope of the technical solutions of the present disclosure.

Claims

1. A draining structure of a washing machine, **characterized in that** the washing machine comprises an inner drum installed in a housing of the washing machine, the inner drum is a tapered drum with a smaller diameter at one end and a larger diameter at the other

- end, and
a draining flow passage is arranged at the end with
larger diameter of the inner drum;
one end of the draining flow passage is communi-
cated with the inner drum, and the other end of the
draining flow passage penetrates the inner drum and
is communicated with a drain pipe of the washing
machine.
2. The draining structure of the washing machine ac-
cording to claim 1, **characterized in that** the inner
drum is the tapered drum that gradually increases in
diameter from an opening of the inner drum to a bot-
tom of the inner drum, and
a center of the bottom of the inner drum is installed
on an inner drum support via a rotating shaft; and
the draining flow passage is arranged on an inner
side surface of the bottom of the inner drum, and
one end of the draining flow passage is arranged at
an intersection of the bottom of the inner drum and
a side wall of the inner drum, the other end of the
draining flow passage is penetrates the center of the
bottom of the inner drum and passes through a motor
shaft along a axis of the inner drum;
the end of the draining flow passage penetrating the
bottom of the inner drum is communicated with the
drain pipe of the washing machine.
3. The draining structure of the washing machine ac-
cording to claim 2, **characterized in that** a plurality
of the draining flow passages are provided on the
bottom of the inner drum,
one ends of the draining flow passages are uniformly
distributed on an outer periphery of the bottom of the
inner drum at an equal interval angle and are com-
municated with an inside of the inner drum, and
the other ends of the draining flow passages are
communicated and met at the center of the bottom
of the inner drum and penetrate the center of the
bottom of the inner drum to communicate with the
drain pipe of the washing machine.
4. The draining structure of the washing machine ac-
cording to claim 3, **characterized in that** one end
of at least one draining flow passage is arranged at
a middle part of the bottom of the inner drum and
communicated with the inside of the inner drum, and
the other end of the one draining flow passage pen-
etrates the center of the bottom of the inner drum
and communicated with the drain pipe of the washing
machine.
5. The draining structure of the washing machine ac-
cording to claim 3, **characterized in that** each of the
draining flow passages is formed of a hollow convex
rib protruding from the inner side surface of the bot-
tom of the inner drum, and
the hollow convex rib lifts and beats clothes in the
inner drum to wash the clothes during a rotation of
the inner drum.
6. The draining structure of the washing machine ac-
cording to any of claims 1-5, **characterized in that**
the draining flow passage and/or the drain pipe is
provided with a drain pump to apply pressure to water
flowing to the bottom of the inner drum of the washing
machine, and
the water is drained out of the washing machine
through the draining flow passage and the drain pipe.
7. A draining method of a washing machine applied to
the draining structure of the washing machine ac-
cording to any of claims 1-6, **characterized in that**
the inner drum rotates at a certain rotating speed,
and
washing water in the inner drum flows to the end with
larger diameter of the inner drum along the tapered
inner wall under action of a centrifugal force, and
washing water is drained out from the inner drum
through the draining flow passage arranged at the
end with larger diameter of the inner drum when
reaches the end with larger diameter of the inner
drum, and then drained out from the washing ma-
chine through the drain pipe,
the washing water in the inner drum is drained out.
8. The draining method of the washing machine ac-
cording to claim 7, comprising:

Step 1, the inner drum of the washing machine
rotating at the certain rotating speed, and the
water in the inner drum flowing to the side wall
of the inner drum under the action of centrifugal
force;
Step 2, the water in the inner drum flowing to
the bottom of the inner drum with larger diameter
along the side wall of the inner drum under the
action of the centrifugal force generated in a ro-
tating of the inner drum;
Step 3, the water flowing into the draining flow
passage arranged on the bottom of the inner
drum when reaching the bottom of the inner
drum, and being drained out of the inner drum
from the center of the inner drum through the
draining flow passage, and then being dis-
charged out of the washing machine through the
drain pipe.
9. The draining method of the washing machine ac-
cording to claim 8, **characterized in that** in the
above-mentioned Step 3,
the drain pump on the draining flow passage and/or
the drain pipe is controlled to start to apply pressure
to the water flowing to the bottom of the inner drum
of the washing machine, and
the water is drained out of the washing machine

through the draining flow passages and the drain pipe.

10. The draining method of the washing machine according to any of claims 7-9, **characterized in that** 5
during a draining process of the washing machine, the inner drum rotates at a medium speed or a high speed, and
the water in the inner drum adheres to the side wall of the inner drum under the action of centrifugal force 10
and flows to the end with larger diameter of the inner drum.

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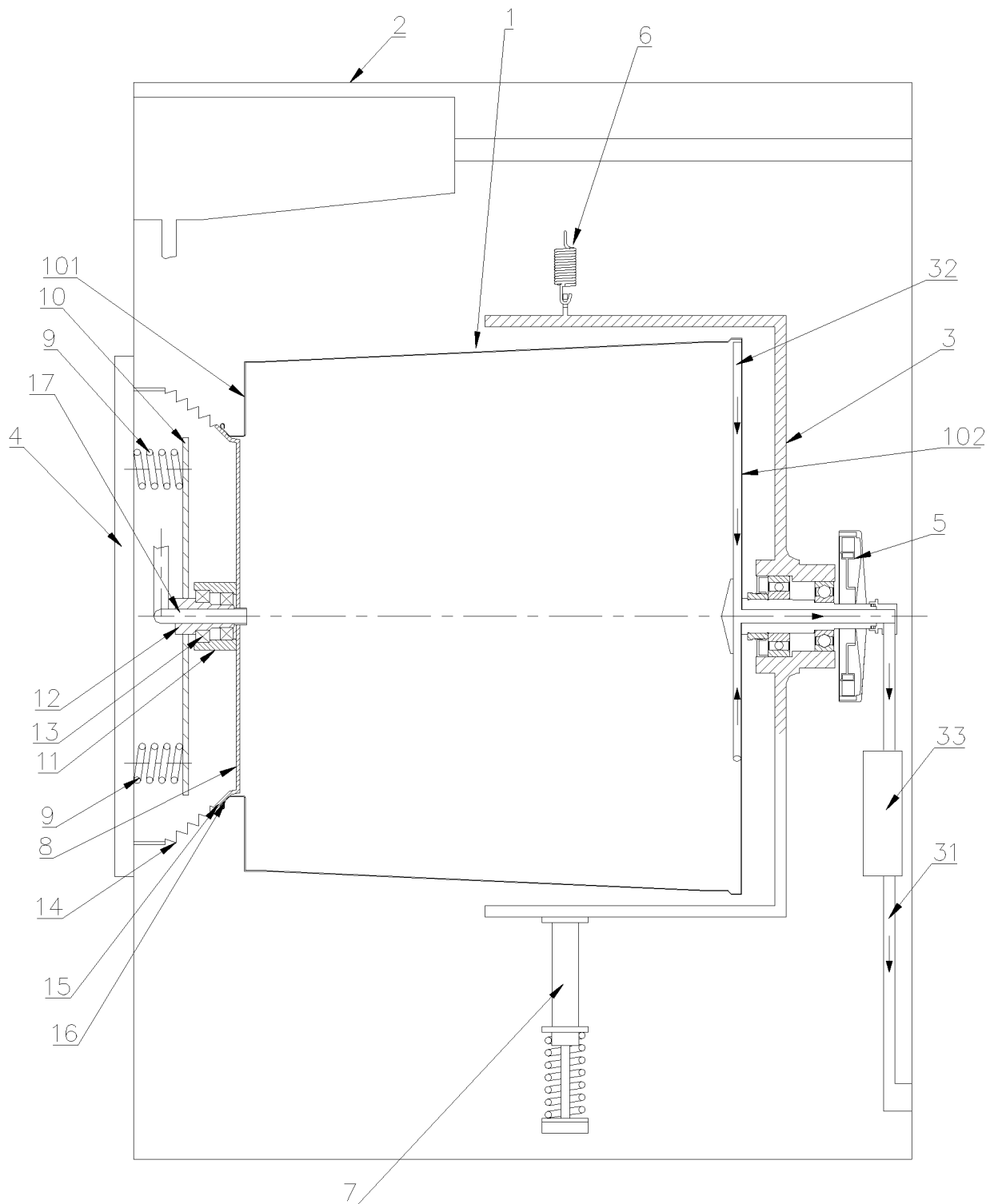


Fig. 1

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2018/084808

A. CLASSIFICATION OF SUBJECT MATTER

D06F 37/04 (2006.01) i; D06F 23/02 (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)

CNPAT, CNKI, WPI, EPODOC: 洗衣机, 排水, 筒, 桶, 锥, 直径, 内径, wash+, machine, drain+, spin+, water, frustum+, diameter

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 104727075 A (DONGBU DAEWOO ELECTRONICS CORPORATION) 24 June 2015 (24.06.2015), description, paragraphs [0031]-[0066], and figures 1-6	1-6
Y	CN 104727075 A (DONGBU DAEWOO ELECTRONICS CORPORATION) 24 June 2015 (24.06.2015), description, paragraphs [0031]-[0066], and figures 1-6	7-10
Y	US 4941333 A (LEVI STRAUSS & CO.) 17 July 1990 (17.07.1990), description, column 4, lines 16-59, column 6, lines 9-42, column 8, line 29 to column 10, line 3, and figures 1-6	7-10
A	CN 1509359 A (SANYO ELECTRIC CO., LTD.) 30 June 2014 (30.06.2014), entire document	1-10
A	CN 106381633 A (WUXI LITTLE SWAN CO., LTD.) 08 February 2017 (08.02.2017), entire document	1-10

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

* Special categories of cited documents:	"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
"A" document defining the general state of the art which is not considered to be of particular relevance	
"E" earlier application or patent but published on or after the international filing date	"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
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"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
"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	"&" document member of the same patent family

Date of the actual completion of the international search 07 June 2018	Date of mailing of the international search report 27 June 2018
Name and mailing address of the ISA State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No. (86-10) 62019451	Authorized officer LIU, Hao Telephone No. (86-10) 53961490

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2018/084808

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Form PCT/ISA/210 (continuation of second sheet) (July 2009)

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 International application No.
 PCT/CN2018/084808

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