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(54) **WASHING MACHINE**

(57) Disclosed is a washing machine, comprising: an outer tub (1) used for containing washing water; an air collection channel (17) enabling the inner rear wall of the outer tub (1) to be in communication with the outer circumferential wall of the outer tub (1) in an obliquely upward manner, wherein the air collection channel (17) comprises an air inlet (171) located in the rear wall of the outer tub (1) and an air outlet (172) located on the outer circumferential wall of the outer tub (1); an exhaust port

(411) located at the front end of the outer tub (1) and being in communication with the interior of the outer tub (1); and a drying air channel (41) enabling the air collection channel (17) to be in communication with the exhaust port (411) and located at the upper portion of the outer tub (1), wherein the drying air channel (41) is offset by a certain angle relative to the central axis of the outer tub (1) in the vertical direction; the washing machine simultaneously has a laundry washing function of a washing

machine and a drying function, such that the drying efficiency is effectively improved, the drying effect is ensured, and the user experience effect is improved.

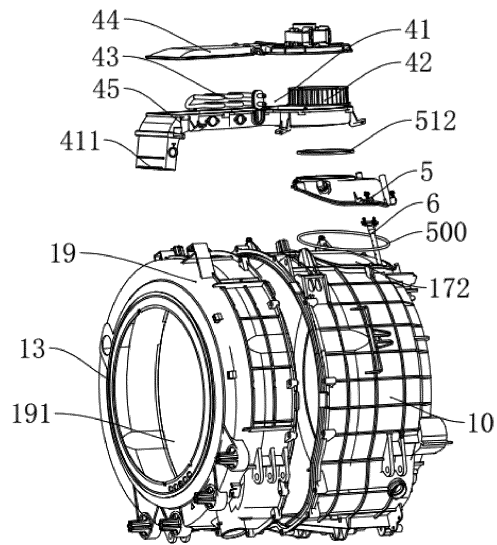


FIG. 1

## Description

**[0001]** This disclosure claims priority to Chinese Patent Application No. 201910673033.5, filed on July 24, 2019, titled "WASHING MACHINE", Chinese Patent Application No. 201910672164.1, filed on July 24, 2019, titled "WASHING MACHINE", Chinese Patent Application No. 201910672156.7, filed on July 24, 2019, titled "WASHING MACHINE", Chinese Patent Application No. 201910672158.6, filed on July 24, 2019, titled "WASHING MACHINE", Chinese Patent Application No. 201910672176.4, filed on July 24, 2019, titled "WASHING MACHINE", Chinese Patent Application No. 201910672153.3, filed on July 24, 2019, titled "WASHING MACHINE", and Chinese Patent Application No. 201910673006.8, filed on July 24, 2019, titled "METHOD FOR CLEANING TUB OF WASHING MACHINE", which are incorporated herein by reference in their entirety.

## TECHNICAL FIELD

**[0002]** The present disclosure relates to the field of washing machines, and in particular, to a washing machine having a drying function.

## BACKGROUND

**[0003]** At present, clothes treating apparatuses having a drying function are classified into specific drying apparatuses and washing-drying apparatuses. The specific drying apparatuses have only drying functions, whereas the washing-drying apparatuses combine the functions of washing and drying. According to structures and forms, the clothes treating apparatuses are also classified into front loading apparatuses and cabinet-type apparatuses. The front loading apparatus dries clothes by turning them over in a rotatable drum, and the cabinet-type apparatus dries clothes by hanging them up.

**[0004]** Generally, a conventional drying-washing apparatus includes an outer tub that accommodates washing water. A rotatable drum containing laundry is disposed in the outer tub. The drum is connected to a rotating shaft, and a motor is used, so that the rotating shaft rotates. The rotating shaft is supported by and rotates through a bearing block disposed on a rear wall of the outer tub. The outer tub is connected to a suspension, and vibrations of the drum and the outer tub are buffered by the suspension.

**[0005]** For the drying function, a drying duct and a condensed duct are included. The drying duct is located above the outer tub, with a hot air heater and a fan disposed inside. One end of the condensed duct is connected to the outer tub, and the other end of the condensed duct is connected to the drying duct. In order to condense moisture contained in moist air, cooling water is supplied to the interior of the condensed duct. The moist air flows through the condensed duct, and flows into the drying duct after being condensed when it is in contact with the

cooling water. In this way, hot air that returns to the drying duct is reheated by the hot air heater, and is supplied to the washing drum again.

## SUMMARY

**[0006]** In view of the above technical problems, a washing machine is proposed in the present disclosure.

**[0007]** In order to achieve the above purpose, the technical solutions adopted in the present disclosure are as follows.

**[0008]** A washing machine includes:

an outer tub used to contain washing water;  
an air collecting passage connected to an outer peripheral wall of the outer tub from an inner rear wall of the outer tub in an obliquely upward manner, and the air collecting passage including an air inlet located on a rear wall of the outer tub and an air outlet located on the outer peripheral wall of the outer tub; an exhaust port located at a front end of the outer tub and communicated with an interior of the outer tub; and  
a drying air passage communicated with the air collecting passage and the exhaust port and disposed on an upper part of the outer tub, and the drying air passage being offset by a certain angle relative to a vertical central axis of the outer tub.

**[0009]** Compared with the prior art, advantages and positive effects of the present disclosure lie in that: the present disclosure provides a washing machine, and the washing machine simultaneously has a laundry washing function of a washing machine and a drying function, such that a drying efficiency is effectively improved, a drying effect is ensured, and a user experience effect is improved.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0010]**

FIG. 1 is an exploded view of an outer tub and an air flow portion in a washing machine, in accordance with some embodiments of the present disclosure; FIG. 2 is a sectional view of an outer tub in a washing machine, in accordance with some embodiments of the present disclosure; FIG. 3 is a top view of an outer tub and a drying air passage in a washing machine, in accordance with some embodiments of the present disclosure; FIG. 4 is a first oblique view of an outer tub and a drying air passage in a washing machine, in accordance with some embodiments of the present disclosure; FIG. 5 is a first partial schematic diagram showing a connection structure between an outer tub and a drying air passage in a washing machine, in accordance

with some embodiments of the present disclosure;  
FIG. 6 is a second partial schematic diagram showing a connection structure between an outer tub and a drying air passage in a washing machine, in accordance with some embodiments of the present disclosure;

FIG. 7 is a third partial schematic diagram showing a connection structure between an outer tub and a drying air passage in a washing machine, in accordance with some embodiments of the present disclosure;

FIG. 8 is a top view of an outer tub in a washing machine, in accordance with some embodiments of the present disclosure;

FIG. 9 is a schematic diagram showing a structure of an adaptor in a washing machine, in accordance with some embodiments of the present disclosure;  
FIG. 10 is a schematic diagram showing a connection structure between an outer tub and an adaptor in a washing machine, in accordance with some embodiments of the present disclosure;

FIG. 11 is a schematic diagram showing a structure of an inner rear wall of an outer tub in a washing machine, in accordance with some embodiments of the present disclosure;

FIG. 12 is a second oblique view of an outer tub and a drying air passage in a washing machine, in accordance with some embodiments of the present disclosure;

FIG. 13 is a schematic diagram showing structures of an outer tub and a condensed water delivering device in a washing machine, in accordance with some embodiments of the present disclosure;

FIG. 14 is a first schematic diagram showing a structure of an adaptor in a washing machine, in accordance with some embodiments of the present disclosure;

FIG. 15 is a second schematic diagram showing a structure of an adaptor in a washing machine, in accordance with some embodiments of the present disclosure;

FIG. 16 is a schematic diagram showing structures of an outer tub and a condensed water delivering device in a washing machine, in accordance with some embodiments of the present disclosure;

FIG. 17 is a schematic diagram showing an assembly structure of a water diversion plate and an air collecting passage in a washing machine, in accordance with some embodiments of the present disclosure;

FIG. 18 is a schematic diagram showing an assembly structure of a filter screen and an outer tub in a washing machine, in accordance with an embodiment of the present disclosure;

FIG. 19 is a first schematic diagram showing an assembly structure of an adaptor and a dust filter nozzle in a washing machine, in accordance with some embodiments of the present disclosure;

FIG. 20 is a second schematic diagram showing an assembly structure of an adaptor and a dust filter nozzle in a washing machine, in accordance with some embodiments of the present disclosure;

FIG. 21 is a schematic diagram showing a structure of a dust filter nozzle in a washing machine, in accordance with some embodiments of the present disclosure;

FIG. 22 is a first schematic diagram showing a relative position between a dust filter nozzle and an air intake in a washing machine, in accordance with some embodiments of the present disclosure;

FIG. 23 is a second schematic diagram showing a relative position between a dust filter nozzle and an air intake in a washing machine, in accordance with some embodiments of the present disclosure;

FIG. 24 is a partial sectional view of a washing machine, in accordance with some embodiments of the present disclosure;

FIG. 25 is a first schematic diagram showing a structure of a dust filter nozzle in a washing machine, in accordance with some embodiments of the present disclosure;

FIG. 26 is a schematic diagram showing a connection structure between a dust filter nozzle and an adaptor in a washing machine, in accordance with some embodiments of the present disclosure;

FIG. 27 is a second schematic diagram showing a structure of a dust filter nozzle in a washing machine, in accordance with some embodiments of the present disclosure;

FIG. 28 is a second schematic diagram showing a connection structure between a dust filter nozzle and an adaptor in a washing machine, in accordance with some embodiments of the present disclosure; and  
FIG. 29 is a graph showing a tub cleaning process of a washing machine, in accordance with some embodiments of the present disclosure.

**[0011]** In the above figures: outer tub 1; inner rear wall 11; outer peripheral wall 12; front end portion 13; upper part 14; condensed water inlet column 15; condensed water inlet passage 151; depressed portion 16; air collecting passage 17; air inlet 171; air outlet 172; first fixing column 173; fixing hole 1731; fixing protrusion 18; second fixing column 181; convex block 182; front outer tub 19; input port 191; rear outer tub 10; front temperature sensor 31; temperature limiter 32; rear temperature sensor 33; drum 2; outer rear wall 21; water flow hole 22; air flow portion 4; drying air passage 41; exhaust port 411; fan 42; first fixing plate 412; first reinforcing plate 413; heater 43; upper air passage housing 44; lower air passage housing 45; adaptor 5; top wall 51; through hole 511; front side wall 52; connecting port 53; second fixing plate 531; connecting hole 5311; cleaning water inlet column 54; water diversion plate 50; cleaning water inlet passage 541; pipeline connection column 542; nozzle docking column 543; first screw column 55; second screw column

56; connecting plate 57; second reinforcing plate 58; screw 59; first sealing ring 512; second sealing ring 500; dust filter nozzle 6; fixed portion 60; soleplate 61; first screw hole 611; second screw hole 612; water spray rod 62; first water spray surface 622; second water spray surface 622; opening 63; first spout 631; first spout hole 6311; second spout hole 6312; third spout hole 6313; second spout 632; third spout 633; condensed water supply device 7; main pipeline 72; condensed water pipeline 721; clean water pipeline 722; three-way valve 73; guide rib 8; first guide rib 81; first branch rib 811; second branch rib 812; second guide rib 82; third branch rib 821; fourth branch rib 822; fifth branch rib 823; anti-suck-back rib 83; filter screen 9.

#### DETAILED DESCRIPTION

**[0012]** In the following, the present disclosure will be described in detail through exemplary embodiments. However, it will be understood that elements, structures and features in one embodiment may also be beneficially incorporated into other embodiments without further description.

**[0013]** In the description of the present disclosure, it will be noted that, orientations or positional relationships indicated by the terms such as "inner", "outer", "upper", "lower", "front", "rear", "left" and "right" are based on orientations or positional relationships shown in the accompanying drawings. These terms are merely to facilitate and simplify the description of the present disclosure, but not to indicate or imply that the referred devices or elements each must have a particular orientation, or must be constructed or operated in a particular orientation. Therefore, these terms should not be construed as limitations on the present disclosure. Besides, terms such as "first", "second" and "third" are only used for descriptive purposes and are not to be construed as indicating or implying the relative importance.

**[0014]** In a washing machine having a drying function in some embodiments of the present disclosure, as shown in FIGS. 1 to 13, the washing machine includes a housing (not shown in the figures). An outer tub 1 is disposed in the housing, and the outer tub 1 is supported in the housing in a fixed manner. A drum 2 is disposed in the outer tub 1, and the drum 2 is disposed in the outer tub 1 in a rotatable manner. A rotating shaft is disposed on an axis of the outer tub 1, and the rotating shaft passes through a rear of the outer tub 1 and is connected to the drum 2.

**[0015]** A front plate with an opening for loading laundry is formed on the housing. The opening of the front plate is provided with a door, and the door is used to close the opening. The outer tub 1 includes a front outer tub 19 forming a front portion and a rear outer tub 10 forming a rear portion. The front outer tub 19 and the rear outer tub 10 are assembled with combinations such as screws, and a space for accommodating the drum 2 is formed in the front outer tub 19 and the rear outer tub 10. An end

of the front outer tub 19 proximate to a front side is a front end portion 19, and the front end portion 13 of the front outer tub 19 is formed with an input port 191 to load the laundry. The input port 191 is connected to the door. A front side of the drum 2 is provided with an inner tub opening corresponding to the input port 191. The drum 2 is provided with a water flow hole 22 to communicate the drum 2 and the outer tub 1. An inner peripheral surface of the input port 191 of the outer tub 1 is formed with a rim portion that protrudes toward a front of the outer tub 1. The rim portion is connected to an exhaust port 411 of a drying air passage 41. In addition, the rim portion has a gasket for maintaining airtightness between a rim and the opening on the front plate of the housing. The gasket also has a function of preventing foreign matters from flowing between the outer tub 1 and the drum 2.

**[0016]** In order to realize the drying function, the washing machine of the present disclosure is provided with an air flow portion 4, which is fixedly disposed outside the outer tub 1, and can heat the air and form air circulation with the interior of the outer tub 1. As shown in FIGS. 1 to 3, the air flow portion 4 includes an air collecting passage 17 and a drying air passage 41, and the drying air passage 41 is communicated with the air collecting passage 17. An inner wall surface of a rear wall of the outer tub 1 is an inner rear wall 11. A peripheral side wall of the outer tub 1 is an outer peripheral wall 12. The inner rear wall 11 of the outer tub 1 is provided with an air inlet 171, and the outer peripheral wall 12 of the outer tub 1 is provided with an air outlet 172. The air inlet 171 and the air outlet 172 are connected to form the air collecting passage 17. One end of the drying air passage 41 is connected to the air outlet 172 of the air collecting passage 17; and the other end of the drying air passage 41 is the exhaust port 411, and the exhaust port 411 is communicated with the interior of the outer tub 1. The air passing through the air collecting passage 17 enters the drying air passage 41 through the air outlet 172, and is heated in the drying air passage 41, and then is supplied to the interior of the outer tub 1 through the exhaust port 411.

**[0017]** The inner rear wall 11 of the rear outer tub 10 is provided with a depressed portion 16, and the depressed portion 16 is depressed rearwards. The air inlet 171 of the air collecting passage 17 is formed on the inner rear wall 11 of the rear outer tub 10, and the air outlet 172 of the air collecting passage 17 is formed on the outer peripheral wall 12 of the rear outer tub 10. The air in the outer tub 1 is first concentrated by the air collecting passage 17, and then enters the drying air passage 41 for drying due to action of the air flow portion 4. Offering the depressed portion 16 is beneficial to concentrate the air, moderate a flow rate of the air, and reduce noise, so as to realize mute drying and improve the user experience.

**[0018]** The outer peripheral wall 12 of the outer tub 1 is provided with fixing protrusions 18, and the fixing protrusion 18 is provided with a threaded hole. An edge of

the drying air passage 41 is provided with a plurality of first fixing plates 412. The first fixing plate 412 is provided with an opening. The first fixing plates 412 on the drying air passage 41 correspond to the fixing protrusions 18 disposed on the outer peripheral wall 12 of the outer tub 1, and the openings on the first fixing plates 412 correspond to the threaded holes on the fixing protrusions 18, and the drying air passage 41 is fixed on the outer peripheral wall 12 of the outer tub 1 by screws. The fixing protrusion 18 includes a second fixing column 181 and a convex block 182. The convex block 182 is disposed on the outer peripheral wall 12 of the outer tub 1 and is proximate to the rear wall. The second fixing columns 181 are disposed surrounding the edge of the drying air passage 41. The drying air passage 41 is provided with a first reinforcing plate 413, and the first reinforcing plate 413 connects the first fixing plate 412 and the drying air passage 41, so as to effectively reinforce a connection strength between the first fixing plate 412 and the drying air passage 41.

**[0019]** The drying air passage 41 is disposed on an upper part 14 of the outer tub 1. The air flow portion 4 circulates and heats the air inside the outer tub 1 when the washing machine performs a drying course. That is, the drying air passage 41 leads the airflow concentrated by the air collecting passage 17 out of the outer tub 1, and heats the airflow, and then makes the heated airflow flow into the outer tub 1 to dry the clothes.

**[0020]** The drying air passage 41 is fixed on the upper part 14 of the outer tub 1 and is offset from the top by an angle of  $8^{\circ}$  to  $25^{\circ}$ , inclusive. In this embodiment, the drying air passage 41 is fixed on the upper part 14 of the outer tub 1, and is located at a position inclined to the right at a certain angle. The above settings enable the drying air passage 41 to play a role of counterweight to reduce costs of the product, and balance a weight distribution of the washing machine to improve a stability of the washing machine. Furthermore, if the drying air passage 41 is fixed on the housing, there is a need to use a rubber tube to connect the outer tub 1 and the drying air passage 41. However, a movement of the rubber tube causes unstable changes of air pressures in the air passage and the drum. Since the outer tub 1 is a moving component, in the present disclosure, the drying air passage 41 is directly fixed on the outer tub 1, which can avoid use of the rubber tube to connect the outer tub 1 and the drying air passage 41, reduce the costs of the product, and prevent a vibration of the outer tub 1 from being transmitted to the housing which results in a risk of overall displacement of the washing machine. In addition, the drying air passage 41 in this embodiment is set to be linear, and the design of the linear air passage can minimize a resistance of the air passage, reduce the requirements for performances of a fan, and improve a drying efficiency.

**[0021]** The air flow portion 4 includes an upper air passage housing 44 and a lower air passage housing 45. The upper air passage housing 44 and the lower air pas-

sage housing 45 are connected by screws to form the drying air passage 41. A fan 42 is disposed in the drying air passage 41, and the fan 42 is disposed at a position proximate to the air outlet 172 of the air collecting passage 17. The fan 42 recovers and moves the air by virtue of the air collecting passage 17. A heater 43 is disposed in the drying air passage 41, and the heater 43 is located in a region where the fan 42 is proximate to a front side. The heater 43 heats the air which moves due to the fan 42, and the air heated by the heater 43 is led into the outer tub 1 through the exhaust port 411, thereby drying the clothes in the drum 2.

**[0022]** The drying air passage 41 and the air collecting passage 17 may be directly connected, or may be connected through an adaptor 5. One end of the adaptor 5 is sealedly connected to the air outlet 172 of the air collecting passage 17, and the other end of the adaptor 5 is fixedly connected to the drying air passage 41. Offering the adaptor 5 can effectively reduce a difficulty of connecting the drying air passage 41 and the air collecting passage 17, facilitate installation, and reduce a manufacturing difficulty of the drying air passage 41.

**[0023]** The adaptor 5 includes a top wall 51 and a side wall surrounding the top wall 51. The side wall of the adaptor 5 on a front side of the washing machine is a front side wall 52, and the top wall 51 of the adaptor 5 is provided with a through hole 511. A connecting port 53 is formed on an edge of the side wall surrounding the top wall 51 on the adaptor 5. The outer peripheral wall 12 of the outer tub 1 is provided with a plurality of first fixing columns 173 in a periphery of the air outlet 172. The first fixing column 173 is provided with a fixing hole 1731. A distribution path of the plurality of first fixing columns 173 is consistent with a shape of the connecting port 53 on the adaptor 5.

**[0024]** The edges of the connecting port 53 on the adaptor 5 are provided with second fixing plates 531, and the second fixing plate 531 is provided with a connecting hole 5311. The second fixing plate 531 corresponds to the first fixing column 173 on the outer peripheral wall 12 of the outer tub 1, and the connecting hole 5311 on the second fixing plate 531 corresponds to the fixing hole 1731 on the first fixing column 173. The adaptor 5 is fixedly connected to the outer peripheral wall 12 of the outer tub 1 by installing screws in the connecting holes 5311 and the fixing holes 1731. The connecting port 53 on the adaptor 5 surrounds the air outlet 172 of the air collecting passage 17. The through hole 511 on the adaptor 5 corresponds to an air passage opening of the drying air passage 41, and the top wall 51 of the adaptor 5 is fixedly connected to an end of the drying air passage 41. A first sealing ring 512 is disposed at a joint between the end of the drying air passage 41 and the top wall 51 of the adaptor 5. A second sealing ring 500 is disposed at a joint between the connecting port 53 on the adaptor 5 and the outer peripheral wall 12 of the outer tub 1. The first sealing ring 512 and the second sealing ring 500 are disposed to effectively seal the joints to avoid air leakage,

thereby improving the drying efficiency.

**[0025]** The air passing through the clothes in the washing machine is guided to the air collecting passage 17 due to the action of the fan 42 in the air flow portion 4. The air enters the air collecting passage 17 through the air inlet 171, enters the adaptor 5 through the air outlet 172, and then enters the drying air passage 41 through the through hole 511 on the top wall 51 of the adaptor 5. After being heated by the heater 43 in the drying air passage 41, the air enters the outer tub 1 through the exhaust port 411 to dry the clothes, so that a cycle is formed.

**[0026]** A condensed water supply device 7 is disposed on an inner upper part of the housing, and the condensed water supply device 7 includes a condensed water pipeline 721. The condensed water pipeline 721 is communicated with the interior of the outer tub 1 to supply condensed water to the interior of the outer tub 1. One end of the condensed water pipeline 721 is connected to a water supply valve, the other end of the condensed water pipeline 721 is connected to the outer tub 1, and the water supply valve is used to control the conveyance of the condensed water. In addition, a drainage portion (not shown in the figure) consisting of a drainage pipe and a drainage pump is disposed on an inner lower part of the housing, and the drainage portion drains the washing water used in processes of washing and rinsing, etc., or the condensed water in a drying process to the outside.

**[0027]** The upper part 14 of the rear outer tub 10 is provided with a condensed water inlet column 15, and the condensed water inlet column 15 is proximate to a rear wall of the rear outer tub 10. The condensed water inlet column 15 is provided with a condensed water inlet passage 151, and the condensed water inlet passage 151 communicates the interior and exterior of the outer tub 1 and can guide the condensed water to the inner rear wall 11 of the rear outer tub 10. The condensed water pipeline 721 of the condensed water supply device 7 is connected to the condensed water inlet column 15 of the upper part 14 of the rear outer tub 10, so as to supply the condensed water to the inner rear wall 11 of the rear outer tub 10 through the condensed water inlet passage 151.

**[0028]** The condensed water inlet column 15 is disposed at a center position of the rear upper part of the outer tub 1, and the center position of the rear upper part of the outer tub 1 is the highest position of the whole outer tub 1. The above arrangement can maximize a length of a flow path of the condensed water. In addition, the condensed water inlet column 15 is integrally formed with the outer tub 1.

**[0029]** Guide ribs 8 are disposed on the inner rear wall 11 of the rear outer tub 10 below the condensed water inlet passage 151, and the guide ribs 8 extend from top to bottom and are in a curved shape. The guide ribs 8 are divided into two parts, left and right, with a vertical centerline of the rear wall of the outer tub 1 as a boundary, so as to prolong residence time of the condensed water on the inner rear wall 11 of the outer tub 1 as much as

possible. The guide rib 8 diverts the condensed water entering from the condensed water inlet column 15, which can effectively prevent the condensed water from concentrating and flowing along a smallest path under its own gravity after entering the outer tub 1. The setting of the guide ribs 8 makes the condensed water have a relatively large contact area and surface tension, so that the condensed water flows along the designed guide ribs 8, and a relatively long flow path forms a cooling surface with a relatively large area, so that other regions of the inner rear wall 11 of the outer tub 1 except the air inlet 171 of the air collecting passage 17 become cooling wall surfaces of the moist air. The air inlet 171 of the air collecting passage 17 is disposed on the rear wall of the outer tub 1 instead of the side wall, so that the moist air must pass by the rear of the drum 2 and pass through the inner rear wall of the outer tub 1 before entering the air flow portion 4, which is more conducive to the heat exchange between the moist air and the inner rear wall 11 of the outer tub 1 on which the condensed water is applied. As a result, the air is dried in time to speed up the drying process and improve the drying efficiency.

**[0030]** The guide ribs 8 include a first guide rib 81, a second guide rib 82, and an anti-suck-back rib 83. The anti-suck-back rib 83 is disposed at the air inlet 171 of the air collecting passage 17, and is located on a side of the air inlet 171 proximate to the condensed water inlet column 15. The anti-suck-back rib 83 is disposed along an edge of the air inlet 171 and a shape thereof is consistent with a shape of the air inlet 171. The anti-suck-back rib 83 can effectively prevent the condensed water from being sucked into the air collecting passage 17 during the drying process, resulting in secondary wetting of the clothes.

**[0031]** The first guide rib 81 includes a first branch rib 811 and a second branch rib 812 that are connected at one end and separated at the other end. The first branch rib 811 and the second branch rib 812 extend from a joint to both sides of a radial line where the joint between the first branch rib 811 and the second branch rib 812 on the bottom wall of the outer tub is located, respectively, that is, the first branch rib 811 and the second branch rib 812 are disposed in a "herringbone" shape. In this embodiment, the joint between the first branch rib 811 and the second branch rib 812 is located on a perpendicular bisector of the bottom wall of the outer tub 1, and the first branch rib 811 and the second branch rib 812 extend to the left and the right, respectively. The joint between the first branch rib 811 and the second branch rib 812 corresponds to the condensed water inlet passage 151 on the condensed water inlet column 15 disposed on the outer peripheral wall of the outer tub 1, so as to be the one first carry and divert the condensed water introduced by the condensed water inlet passage 151. The first branch rib 811 and the second branch rib 812 are separated from the joint to extend to opposite sides, and in this embodiment, they extend to the left and right sides. The first branch rib 811 is curved and extends to a lower

part of the outer tub 1 to guide the condensed water to the drainage portion; and the second branch rib 812 extends for some length toward a side proximate to the anti-suck-back rib 83, and is separated from the anti-suck-back rib 83.

**[0032]** The second guide rib 82 includes a third branch rib 821, a fourth branch rib 822, and a fifth branch rib 823; and the third branch rib 821 and the fourth branch rib 822 are connected at one end and separated at the other end. A joint between the third branch rib 821 and the fourth branch rib 822 corresponds to the joint between the first branch rib 811 and the second branch rib 812. That is, the joint between the third branch rib 821 and the fourth branch rib 822, the joint between the first branch rib 811 and the second branch rib 812, and an outlet of the condensed water inlet passage 151 are located on a same straight line. That is, the joint between the third branch rib 821 and the fourth branch rib 822 is located under the joint between the first branch rib 811 and the second branch rib 812. A shape of the third branch rib 821 is consistent with a shape of the first branch rib 811, and a shape of the fourth branch rib 822 is consistent with a shape of the second branch rib 812. The third branch rib 821 and the fourth branch rib 822 extend downward for a certain distance, and the fifth branch rib 823 is located below the fourth branch rib 822. Preferably, in a vertical direction, an upper end of the fifth branch rib 823 and a lower end of the fourth branch rib 822 at least partially overlap. Optionally, the upper end of the fifth branch rib 823 and a lower end of the second branch rib 812 also at least partially overlap in the vertical direction, so that the fifth branch rib 823 can carry the condensed water guided by the second branch rib 812 and the fourth branch rib 822. As a result, the flow path of the condensed water guided by the second branch rib 812 and the fourth branch rib 822 is prolonged.

**[0033]** The fifth branch rib 823 evades the air inlet 171 and extends downward to the lower part of the outer tub 1, so as to guide the condensed water to the drainage portion. The segmented arrangements of the fifth branch rib 823, the second branch rib 812, and the fourth branch rib 822 can not only effectively guide a flow direction of the condensed water to lead it to the drainage portion, but also can evade the air inlet 171 and prolong the flow path of the condensed water at the same time. On a horizontal projection, a projection of the lower end of the second guide rib 82 is located between a projection of the lower end of the fourth branch rib 822 and a projection of the condensed water inlet column 15. Water diverted by the second guide rib 82 is downward and first carried by the fourth branch rib 822, and then is guided to the fifth branch rib 823 through the fourth branch rib 822. The condensed water supply device 7 supplies cold water to the inner rear wall 11 of the outer tub 1. When the washing machine performs the drying course, as the condensed water supply device 7 supplies the cold water, the supplied cold water flows along an inner surface of the outer tub 1. Meanwhile, the moist air after the laundry is dried

moves toward the air collecting passage 17, thereby the condensed water is formed at a condensation surface (inner rear wall) of the outer tub 1 by which the cold water flows. Compared with an existing structure using a condensing pipe to generate the condensed water, a structure using the inner surface of the outer tub 1 to generate the condensed water can fully utilize an existing structure of the washing machine and reduce a thickness increase due to additional structures. In addition, since the condensed water can be generated using a relatively large area, a generation efficiency of the condensed water can be improved.

**[0034]** In addition, with the driving of the fan 42, the air inside the outer tub 1 flows into the drying air passage 41, and moves toward the heater 43. The heater 43 heats the air moved by the fan 42 to generate hot air. The air heated in the heater 43 is supplied to the interior of the outer tub 1 through the exhaust port 411 to dry the laundry.

**[0035]** In this embodiment, a front temperature sensor 31 is disposed at a position where the front end of the outer tub 1 is proximate to the drying air passage 41, so as to detect the temperature of the heated air. A temperature limiter 32 is disposed on a side wall of the drying air passage 41 corresponding to a position of the heater 43, so as to limit the heating temperature. A rear temperature sensor 33 is disposed on the adaptor 5 to detect the air temperature in the air collecting passage 17. The temperature sensors are disposed to effectively detect temperatures of the parts to control the drying course, so as to improve the drying efficiency and a drying effect, and reduce damages to the laundry.

**[0036]** In the washing machine having the drying function in some embodiments of the present disclosure, the top wall 51 of the adaptor 5 is provided with a cleaning water inlet column 54, and the cleaning water inlet column 54 is provided with a cleaning water inlet passage 541. One end of the cleaning water inlet column 54 located outside the adaptor 5 is a pipeline connection column 54, that is, the pipeline connection column 54 and the side wall of the adaptor 5 are located on both sides of the top wall 51, respectively. The cleaning water inlet column 54 is connected to a clean water pipeline 722, and the clean water pipeline 722 is connected to the condensed water supply device 7. The condensed water supply device 7 supplies the condensed water to the clean water pipeline 722.

**[0037]** The clean water pipeline 722 is connected to the cleaning water inlet column 54 on the top wall 51, so as to guide the water from the condensed water supply device 7 into the depressed portion 16 which is used for forming the air collecting passage 17. The water guided into the air collecting passage 17 through the clean water pipeline 722 rinses the air collecting passage 17 and supplies the condensed water to the inner rear wall of the outer tub.

**[0038]** The air collecting passage 17 is provided with the depressed portion 16 to communicate the inner rear



wall 11 of the outer tub 1 and the outer peripheral wall 12 of the outer tub 1. Fibers, hair, chips, etc., are easy to accumulate at the depressed portion 16, although a setting of the depressed portion 16 is beneficial to collect air, resulting in blocking of the air collecting passage 17. In this embodiment, the cleaning water inlet column 54 is disposed on the adaptor 5 to guide the condensed water into the air collecting passage 17, and the air collecting passage 17 is washed to remove the fibers, hair, chips, etc., accumulated in the air collecting passage 17, which avoids the blocking of the air collecting passage 17 due to the long-term accumulation of the hair and chips, effectively ensures unblocking of the air collecting passage 17, and avoids breeding of bacteria due to the accumulation of the hair and chips.

**[0039]** In the washing machine having the drying function in some embodiments of the present disclosure, as shown in FIGS. 13 to 16, the condensed water supply device 7 in this embodiment includes a main pipeline 72, and the other end of the main pipeline 72 is provided with a three-way valve 73. The other two connectors of the three-way valve 73 are respectively connected to the condensed water pipeline 721 and the clean water pipeline 722. The condensed water supply device 7 supplies the condensed water to the main pipeline 72, and the condensed water is led out from the main pipeline 72, and is diverted into the condensed water pipeline 721 and the clean water pipeline 722 through the three-way valve 73, and enters the outer tub through the condensed water inlet passage 151 and the cleaning water inlet passage 541 in sequence. The condensed water introduced by the condensed water pipeline 721 is directly sprayed on the inner rear wall of the outer tub 1 to cool the inner rear wall of the outer tub with a large area. The condensed water introduced by the cleaning water inlet passage 541 enters the air collecting passage, and then flows from the air collecting passage to the inner rear wall of the outer tub to cool the inner rear wall of the outer tub proximate to an air intake. In this embodiment, two condensed water waterways are disposed, which effectively increases a contact area between the condensed water and the inner rear wall of the outer tub, so that a condensation heat exchange effect is maximized. Meanwhile, the condensed water introduced by the cleaning water inlet passage 541 can also clean the air collecting passage.

**[0040]** In the washing machine having the drying function in some embodiments of the present disclosure, as shown in FIG. 17, a water diversion plate 50 is disposed in the air collecting passage 17, and the water diversion plate 50 corresponds to the cleaning water inlet passage 541 of the cleaning water inlet column 54, and is located below the cleaning water inlet passage 541. The water diversion plate 50 diverts the condensed water entering from the cleaning water inlet passage 541, and the condensed water can rinse the air collecting passage 17 in multiple directions, and increase a coverage area of the condensed water. On the one hand, the condensation heat exchange effect is increased; and on the other hand,

a flow rate of the water diverted by the diversion plate 50 is increased, and an impact force is increased, so that the air collecting passage 17 can be effectively rinsed, a rinsing effect is good, and a rinsing efficiency and the rinsing effect are effectively improved.

**[0041]** In the washing machine having the drying function in some embodiments of the present disclosure, as shown in FIG. 17, a filter screen 9 is disposed at the air inlet 171 of the air collecting passage 17 that is located on the inner rear wall 11 of the outer tub 1. The filter screen 9 covers the air inlet 171 to filter the air entering the air collecting passage 17. The filter screen 9 filters the air passing through the clothes to filter out the fibers, hair, chips, and the like. In this case, the water flow introduced by the cleaning water inlet column 54 disposed on the top wall 51 of the adaptor 5 in the embodiment can wash the filter screen 9, so that the fibers, hair, chips, and the like filtered by the filter screen 9 are removed by spraying clean water, which avoids blocking of the air inlet 171 of the air collecting passage 17 due to blocking of the filter screen 9, and avoids the breeding of bacteria due to the accumulation of hair and chips.

**[0042]** In the washing machine having the drying function in some embodiments of the present disclosure, as shown in FIGS. 19 to 24, the air collecting passage 17 is provided with a dust filter nozzle 6, and the dust filter nozzle 6 corresponds to the air inlet 171 and is connected to the cleaning water inlet column 54. Since the drying air passage 41 is disposed at a position which is offset by a certain angle from the top of the outer tub 1, the dust filter nozzle 6 in this embodiment is vertically downward and corresponds to the air inlet 171, and the cleaning water can move downwards by effectively using its own gravity. A part of the of the cleaning water inlet column 54 located inside the adaptor 5 is a nozzle docking column 543. Both sides of the nozzle docking column 543 are respectively provided with a first screw column 55 and a second screw column 56. The first screw column 55, the nozzle docking column 543, and the second screw column 56 are collinear. Connecting plates 57 are disposed between the first screw column 55 and the nozzle docking column 543, and between the second screw column 56 and the nozzle docking column 543, so as to connect the first screw column 55, the nozzle docking column 543, and the second screw column 56 as a whole, which effectively improves an overall strength. A second reinforcing plate 58 is disposed between the nozzle docking column 543 and the top wall 51. The second reinforcing plate 58 connects the nozzle docking column 543 and the top wall 51 as a whole, which effectively reinforces a strength of the nozzle docking column 543.

**[0043]** The dust filter nozzle 6 includes a fixed portion 60 and a water spray rod 62. The fixed portion 60 is communicated with the water spray rod 62, and the fixed portion 60 is connected to the nozzle docking column 543. The dust filter nozzle 6 is downward in the vertical direction. The water spray rod 62 is provided with a plurality of openings 63, and the openings 63 are used for spray-

ing clean water. A surface of the dust filter nozzle 6 facing the air inlet 171 of the air collecting passage 17 is a first water spray surface 621. One end of the fixed portion 60 away from the water spray rod 62 is provided with a soleplate 61, a part of the soleplate 61 located on a side of the fixed portion 60 is provided with a first screw hole 611, and another part of the soleplate 61 located on another side of the fixed portion 60 is provided with a second screw hole 612. The first screw hole 611 corresponds to the first screw column 55 on the adaptor 5, and the second screw hole 612 corresponds to the second screw column 56 on the adaptor 5. The soleplate 61 is fixedly connected to the first screw column 55 and the second screw column 56 through screws 59, that is, the dust filter nozzle 6 is fixedly connected to the nozzle docking column 543 through the screws 59. The condensed water passing through the nozzle docking column 543 enters the water spray rod 62 through the fixed portion 60 and is ejected out through the openings 63.

**[0044]** The openings 63 include first spouts 631, and the first spouts 631 are disposed on the first water spray surface 621 of the dust filter nozzle 6. The first spout 631 includes a first spout hole 6311. A plurality of first spout holes 6311 are disposed in the middle of the first water spray surface 621 and are distributed in an axis direction of the water spray rod 62. The first spout hole 6311 sprays water in a direction perpendicular to the first water spray surface 621, so as to clean a region, on the filtering screen 9, directly facing the first spout 631. The first water spray surface 621 is provided with second spout holes 6312, the second spout holes 6312 are disposed at the edges of the first water spray surface 621, and are disposed in two rows on both sides of the first spout holes 6311. The second spout holes 6312 spray water at a preset angle to fully clean the filter screen 9 in a wide cleaning range with a relatively large radius. An end of the water spray rod 62 away from the fixed portion 60 is provided with a third spout hole 6313, and the third spout hole 6313 is strip-shaped, which effectively ensures an amount of water ejected and a range of the water ejected at the end of the dust filter nozzle 6. The above settings effectively ensure the cleaning range and ensure a pressure of the water ejected at the same time, so as to effectively clean the filter screen 9 and improve a cleaning efficiency. In addition, the first spout holes 6311 and the second spout holes 6312 within adjacent columns are arranged in a relatively staggered manner, so as to reduce interference of spraying water with each other and ensure the cleaning effect.

**[0045]** In addition, the number of spouts may be increased or decreased proportionally according to an area of the filter screen 9. The number, bore diameters, bore pitches, etc., of the spouts may be changed in various forms, and therefore, the number, bore diameters, bore pitches, etc., of the spouts in the present disclosure are not limited.

**[0046]** In the washing machine having the drying function in some embodiments of the present disclosure, as

shown in FIGS. 25 to 28, a second spout 632 is disposed on a side of a top position of the dust filter nozzle 6 facing away from the air inlet 171. A surface of the dust filter nozzle 6 facing away from the air inlet 171 is a second water spray surface 622. A part of the fixed portion 60 which is located on the second water spray surface 622 is provided with the second spout 632. The second spout 632 faces a rear part of the outer tub 1, so as to clean the lint accumulated in an air path turning region of the air collecting passage 17. The second spout 632 is strip-shaped, so as to enhance the cleaning of the rear wall of the outer tub 1. The second spout 632 extends downwards along a circumferential surface of the fixed portion 60.

**[0047]** A part of the fixed portion 60 which is located on the first water spray surface 621 is provided with a third spout 633, and the third spout 633 faces the front side wall 52 of the adaptor 5 to clean up the lint, etc., accumulated in the adaptor 5 during the drying process. The second spout 632 is strip-shaped, so as to enhance the cleaning of the front side wall 52 of the adaptor 5. The third spout 633 extends downwards along the circumferential surface of the fixed portion 60.

**[0048]** The above arrangements of the second spout 632 and the third spout 633 effectively prevent the accumulated lint, etc., from blocking the air collecting passage 17, otherwise the air quantity will be decreased significantly and the drying effect will become poor until the drying process cannot be carried out. Meanwhile, when the rear temperature sensor 33 is disposed in the adaptor 5, lint and the like are likely to accumulate on a surface of the rear temperature sensor in the adaptor 5, resulting in distortion of detection of the temperature by the rear temperature sensor 33 and affecting the judgment of the drying process.

**[0049]** The dust filter nozzle 6 is disposed at the air inlet 171 of the air collecting passage 17, which may rinse the inner rear wall 11 of the outer tub 1 and an outer rear wall 21 of the drum 2 during the washing and drying processes. During a rinsing process of the washing and drying processes, the drum 2 is controlled to rotate at a certain speed, so that water directly hitting and splashed may cover regions at the rear of the drum 2 and the outer tub 1 to clean these regions.

**[0050]** The washing machine in the present disclosure simultaneously has a laundry washing function of a washing machine and a drying function, and the drying efficiency is effectively improved, the drying effect is ensured, and a user experience effect is improved.

**[0051]** Based on a structure of the above washing machine, this embodiment provides a tub cleaning method of the washing machine. The tub includes an inner tub and an outer tub of the washing machine, and the outer tub and the inner tub are cleaned by controlling water supplied to the dust filter nozzle. Specifically, when the user selects a washing and drying course, a cleaning step of the tub may be performed before the laundry is rinsed, so as to remove the lint between the inner tub

and the outer tub. This is because, when the tub is washed, lint separated from the outer rear wall of the inner tub and the inner rear wall of the outer tub may be discharged together with the rinsing water supplied for rinsing. When the user chooses that the drying course is performed solely, the cleaning step of the tub is carried out before the drying is started, so as to remove the lint between the inner tub and the outer tub. A drainage action may be performed to discharge the lint separated from the outer rear wall of the inner tub and the inner rear wall of the outer tub.

**[0052]** The tub cleaning method will be described in detail below.

**[0053]** The tub cleaning method of the washing machine includes: a tub cleaning course. The tub cleaning course includes an interval washing step of controlling interval opening and closing of a cleaning water valve to provide cleaning water for the dust filter nozzle, and a continuous washing step of controlling the cleaning water valve to continue to open after the interval washing step.

**[0054]** The tub cleaning course is specifically as follows: controlling the cleaning water valve to open and close intermittently for 1 to 2 seconds(s), respectively, and after the accumulated time is 16 s to 32 s, opening the cleaning water valve, and keeping it open for 5 s to 20 s before closing it. The tub cleaning course may be circulated twice or three times.

**[0055]** Further, while the interval washing step is performed, the inner tub is controlled to rotate positively and negatively, and the fan is started, so that a suction of the fan is used to clean the drying air passage. After the interval washing step is finished, the fan is controlled to continue to run for a predetermined time, and the heater is turned on at the same time, so as to heat and evaporate the moisture remained in the drying air passage.

**[0056]** As shown in FIG. 29, specific contents of the tub cleaning course are as follows.

**[0057]** When the user selects the washing and drying course, the tub cleaning course is performed before the rinsing process is started, the cleaning water valve is opened and closed at intervals, so that the cleaning water is supplied to the cleaning water inlet column at intervals, and is sprayed between the inner tub and the outer tub through the dust filter nozzle. After the cleaning water valve intermittently supplies the cleaning water for a certain period of time, the cleaning water valve is continuously open for continuous cleaning for a certain period of time.

**[0058]** The reason why the cleaning water is supplied intermittently is that when a pressure of the supplied cleaning water is low, compared with a case where the cleaning water is continuously supplied, a case where the cleaning water is intermittently supplied may make an injection pressure of the cleaning water temporarily high. That is, by closing the cleaning water valve, the pressure of the supplied cleaning water controlled by the cleaning water valve can be temporarily increased, and as the pressure of the cleaning water intermittently sup-

plied increases, the cleaning water supplied from the condensed water supply device is ejected at a pressure slightly higher than a supply pressure.

**[0059]** For example, the cleaning water is supplied to the dust filter nozzle at intervals of approximately 1 second. That is, the cleaning water valve is open for 1 second to supply the cleaning water, and then the cleaning water valve is closed for 1 second to stop supplying the cleaning water. This process is repeated. Such a process of intermittently supplying the cleaning water is referred to as "interval washing". Preferably, a duration of the interval washing is 16 s to 32 s. In this embodiment, it is set that the cleaning water valve is controlled to open and close intermittently for 1 s respectively, and execution time of the interval washing is 20 s, that is, the opening and closing of the cleaning water valve are repeated 10 times. The interval washing can exert an impact force on the lint clinging on the outer rear wall of the inner tub and the inner rear wall of the outer tub, so that the lint has fluidity.

**[0060]** In addition, when the cleaning water valve is opened for the first time, the fan is started, and the suction of the fan is used to clean the lint existing on surfaces of fan blades and the air passage.

**[0061]** Then, after the interval washing with the cleaning water is completed, the cleaning water valve is open for a predetermined time, and the cleaning water is continuously supplied. In this case, the time for continuously supplying the cleaning water is approximately 5 s to 20 s. Here, a process of continuously supplying the cleaning water is referred to as "continuous washing". In this embodiment, execution time of the continuous washing is 10 s, so that the outer rear wall of the inner tub and the inner rear wall of the outer tub are thoroughly cleaned. The continuous washing described above can separate the lint with the fluidity from the outer rear wall of the inner tub and the inner rear wall of the outer tub.

**[0062]** When the cleaning water valve is opened for continuous washing, the inner tub keeps a rotation speed within a range of 40 rpm to 60 rpm for forward and reverse rotation to drive the water to move, so that the water directly hitting or splashed may wash and cover a region of the outer rear wall of the inner tub and a region of the inner rear wall of the outer tub.

**[0063]** During the above cleaning process, the drainage pump does not operate, that is, it remains closed.

**[0064]** The above tub cleaning course is circulated twice or three times according to needs.

**[0065]** After cleaning, the fan continues to operate for a certain period of time, and the heater is turned on simultaneously to heat and evaporate the moisture remained in the air passage, so as to keep the drying air passage free of accumulation of water and avoid corrosion to the drying air passage.

**[0066]** Preferably, the cleaning course is not performed simultaneously with the supply of water for rinsing or other water. That is, in a case where the supply pressure of the cleaning water is lower than a general pressure, if the cleaning water are supplied simultaneously

with the water for rinsing or other water, the pressure of the supplied cleaning water will become lower.

**[0067]** For the time and number of opening and closing of the cleaning water valve in the above interval washing and the time and number of continuous washing, the user is allowed to customize selection and matching according to needs, so that a good cleaning effect is achieved.

**[0068]** When the user chooses that the drying course is performed solely, the tub cleaning course is performed before the drying course is started, and the cleaning water valve is opened and closed at intervals, so that the cleaning water is supplied to the cleaning water inlet column at intervals, and is sprayed between the inner tub and the outer tub through the dust filter nozzle. The cleaning water valve supplies the cleaning water intermittently for a certain period of time, and then the cleaning water valve is continuously open for continuous cleaning for a certain period of time.

**[0069]** The reason why the cleaning water is supplied intermittently is that when the pressure of the supplied cleaning water is relatively low, compared with a case where the cleaning water is continuously supplied, a case where the cleaning water is intermittently supplied may make the injection pressure of the cleaning water temporarily high. That is, by closing the cleaning water valve, the pressure of the supplied cleaning water controlled by the cleaning water valve can be temporarily increased, and as the pressure of the cleaning water intermittently supplied increases, the cleaning water supplied from the condensed water supply device is ejected at a pressure slightly higher than the supply pressure.

**[0070]** For example, the cleaning water is supplied to the dust filter nozzle at intervals of approximately 1 second. That is, the cleaning water valve is open for 1 second to supply the cleaning water, and then the cleaning water valve is closed for 1 second to stop supplying the cleaning water. This process is repeated. Such a process of intermittently supplying the cleaning water is referred to as "interval washing". Preferably, a duration of the interval washing is 16 s to 32 s. In this embodiment, it is set that the cleaning water valve is controlled to open and close intermittently for 1 s respectively, and execution time of the interval washing is 20 s, that is, the opening and closing of the cleaning water valve are repeated 10 times. The interval washing can exert an impact force on the lint clinging on the outer rear wall of the inner tub and the inner rear wall of the outer tub, so that the lint has fluidity.

**[0071]** In addition, when the cleaning water valve is opened for the first time, the fan is started, and the suction of the fan is used to clean the lint existing on the surfaces of the fan blades and the air passage.

**[0072]** Then, after the interval washing with the cleaning water is completed, the cleaning water valve is opened for a predetermined time, and the cleaning water is continuously supplied. In this case, the time for continuously supplying the cleaning water is approximately 5 s to 20 s. Here, the process of continuously supplying the cleaning water is referred to as "continuous washing".

In this embodiment, execution time of the continuous washing is 10 s, so that the outer rear wall of the inner tub and the inner rear wall of the outer tub are thoroughly cleaned. The continuous washing described above can separate the lint with fluidity from the outer rear wall of the inner tub and the inner rear wall of the outer tub.

**[0073]** When the cleaning water valve is opened for the continuous washing, the inner tub keeps the rotation speed within the range of 40 rpm to 60 rpm for forward and reverse rotation to drive the water to move, so that the water directly hitting or splashed may wash and cover the region of the outer rear wall of the inner tub and the region of the inner rear wall of the outer tub.

**[0074]** During the execution of the tub cleaning course and the drying course, the drainage pump is kept on for 15 s to 25 s within the first 2 minutes to drain water, and the cleaned lint and the like separated from the outer rear wall of the inner tub and the inner rear wall of the outer tub are discharged.

**[0075]** The above tub cleaning course is circulated twice or three times according to needs.

**[0076]** After cleaning, the fan continues to operate for a certain period of time, and the heater is turned on simultaneously to heat and evaporate the moisture remained in the air passage, so as to keep the drying air passage free of accumulation of water and avoid corrosion to the drying air passage.

**[0077]** Preferably, the above cleaning course is not performed simultaneously with the supply of water for rinsing or other water. That is, in a case where the supply pressure of the cleaning water is lower than the general pressure, if the water for rinsing or other water and the cleaning water are supplied simultaneously, the pressure of the supplied cleaning water will become lower.

**[0078]** For the time and number of opening and closing of the cleaning water valve in the above interval washing and the time and number of continuous washing, the user is allowed to customize selection and matching according to needs, so that a good cleaning effect is achieved.

**[0079]** The tub cleaning method of the washing machine provided in the present disclosure can remove the lint, etc., remained between the inner tub and the outer tub, so as to prevent the lint, etc., from easily entering the gaps. As a result, a continuously good performance of the washing machine is kept, bacteria is effectively prevented from breeding, and the user experience is improved.

**[0080]** The forgoing descriptions are merely preferred embodiments of the present disclosure, and are not intended to limit the present disclosure in other forms. Any person skilled in the art may use the technical content disclosed above to make changes or modifications to the equivalents of equivalent changes, and the equivalents are applied to other fields, but any simple modifications, equivalent changes and variations 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 still

belong to the protection scope of the technical solutions of the present disclosure.

## Claims

### 1. A washing machine, **characterized by** comprising:

an outer tub (1) used to contain washing water; an air collecting passage (17) connected to an outer peripheral wall of the outer tub (1) from an inner rear wall of the outer tub (1) in an obliquely upward manner, and the air collecting passage (17) including an air inlet (171) located on a rear wall of the outer tub (1) and an air outlet (172) located on the outer peripheral wall of the outer tub (1); an exhaust port (411) located at a front end of the outer tub (1), and communicated with an interior of the outer tub (1); and a drying air passage (41) communicated with the air collecting passage (17) and the exhaust port (411), and disposed on an upper part of the outer tub (1), and the drying air passage (41) being offset by a certain angle relative to a vertical central axis of the outer tub (1).

### 2. The washing machine according to claim 1, **characterized in that**: fixing protrusions (18) are disposed on the outer peripheral wall of the outer tub (1), and threaded holes are disposed in the fixing protrusion (18); a plurality of first fixing plates (412) are disposed on an edge of the drying air passage (41), and openings are disposed on the first fixing plates (412); and the first fixing plates (412) correspond to the fixing protrusions (18), and the openings on the first fixing plates (412) correspond to the threaded holes on the fixing protrusions (18), and the drying air passage (41) is fixedly connect to the outer tub (1) by screws.

### 3. The washing machine according to claim 2, **characterized in that**: the washing machine comprises an adaptor (5), the adaptor (5) is connected between the drying air passage (41) and the air collecting passage (17), and a cleaning water inlet column (54) is disposed on the adaptor (5).

### 4. The washing machine according to claim 3, **characterized in that**: a water diversion plate (50) is disposed in the air collecting passage (17), and the water diversion plate (50) corresponds to the cleaning water inlet column (54), so as to divert clean water flowing from the cleaning water inlet column (54) into the air collecting passage (17).

### 5. The washing machine according to claim 3, **characterized in that**: an end of the cleaning water inlet column (54) located in the air collecting passage (17)

is connected to a dust filter nozzle (6), and the dust filter nozzle (6) is provided with an opening (63) that is communicated with the cleaning water inlet column (54).

### 6. The washing machine according to claim 5, **characterized in that**: the dust filter nozzle (6) includes a fixed portion (60) and a water spray rod (62), the fixed portion (60) is communicated with the water spray rod (62), and the fixed portion (60) is connected to the cleaning water inlet column (54).

### 7. The washing machine according to claim 6, **characterized in that**: the opening (63) includes a first spout (631), and a plurality of first spouts (631) are located on the water spray rod (62) facing the air inlet (171), and distributed in an axis direction of the water spray rod (62).

### 8. The washing machine according to claim 7, **characterized in that**: the opening (63) includes a second spout (632), the second spout (632) is disposed on the fixed portion (60), and the second spout (632) is located on a surface of the fixed portion (60) facing away from the air inlet (171).

### 9. The washing machine according to claim 8, **characterized in that**: the opening (63) includes a third spout (633), the third spout (633) is disposed on the fixed portion (60), and the third spout (633) is located on a surface of the fixed portion (60) facing the air inlet (171).

### 10. The washing machine according to claim 4 or 9, **characterized in that**: a filter screen (9) is disposed at the air inlet (171) of the air collecting passage (17) that is located on the inner rear wall of the outer tub (1).

### 11. The washing machine according to claim 1, **characterized by** further comprising:

a condensed water inlet column (15) fixed at an upper center position of a rear side of the outer tub (1), and configured to spray condensed water toward the inner rear wall (11) of the outer tub (1); and

guide ribs (8) disposed on the inner rear wall (11) of the outer tub (1), and configured to guide a flow path of the condensed water, so as to increase a flow area of the condensed water on the inner rear wall of the outer tub (1).

### 12. The washing machine according to claim 11, **characterized in that**: the guide ribs (8) include an anti-suck-back rib (83), and the anti-suck-back rib (83) is disposed along an edge of a side of the air inlet (171) proximate to the condensed water inlet column (15).

13. The washing machine according to claim 12, **characterized in that:** the guide ribs (8) include a first guide rib (81), the first guide rib (81) includes a first branch rib (811) and a second branch rib (812) that are connected at an end and separated at another end, and a joint between the first branch rib (811) and the second branch rib (812) corresponds to the condensed water inlet column (15) disposed on the outer peripheral wall of the outer tub (1). 5 10
14. The washing machine according to claim 13, **characterized in that:** the first branch rib (811) is curved and extends to a lower part of the outer tub (1).
15. The washing machine according to claim 13 or 14, **characterized in that:** the second branch rib (812) extends to a side proximate to the anti-suck-back rib (83), and is separated from the anti-suck-back rib (83). 15 20
16. The washing machine according to claim 3, **characterized in that:** the washing machine comprises a condensed water supply device (7), the condensed water supply device (7) includes a cleaning water pipeline (722), and the cleaning water pipeline (722) is communicated with the cleaning water inlet column (54). 25
17. The washing machine according to claim 3, **characterized in that:** the adaptor (5) includes a top wall (51) and a side wall disposed around the top wall (51), the top wall (51) of the adaptor (5) is provided with a through hole (511), and an edge of the side wall of the adaptor (5) forms a connecting port (53). 30 35
18. The washing machine according to claim 17, **characterized in that:** the outer peripheral wall (12) of the outer tub (1) is provided with a plurality of first fixing columns (173) in a periphery of the air outlet (172), and the first fixing column (173) is provided with a fixing hole (1731); an edge of the connecting port (53) on the adaptor (5) is provided with second fixing plates (531), and the second fixing plate (531) is provided with a connecting hole (5311); and the second fixing plates (531) correspond to the first fixing columns (173), the connecting holes (5311) correspond to the fixing holes (1731), and the adaptor (5) is fixedly connected to the outer peripheral wall (12) of the outer tub (1) by screws. 40 45 50

55

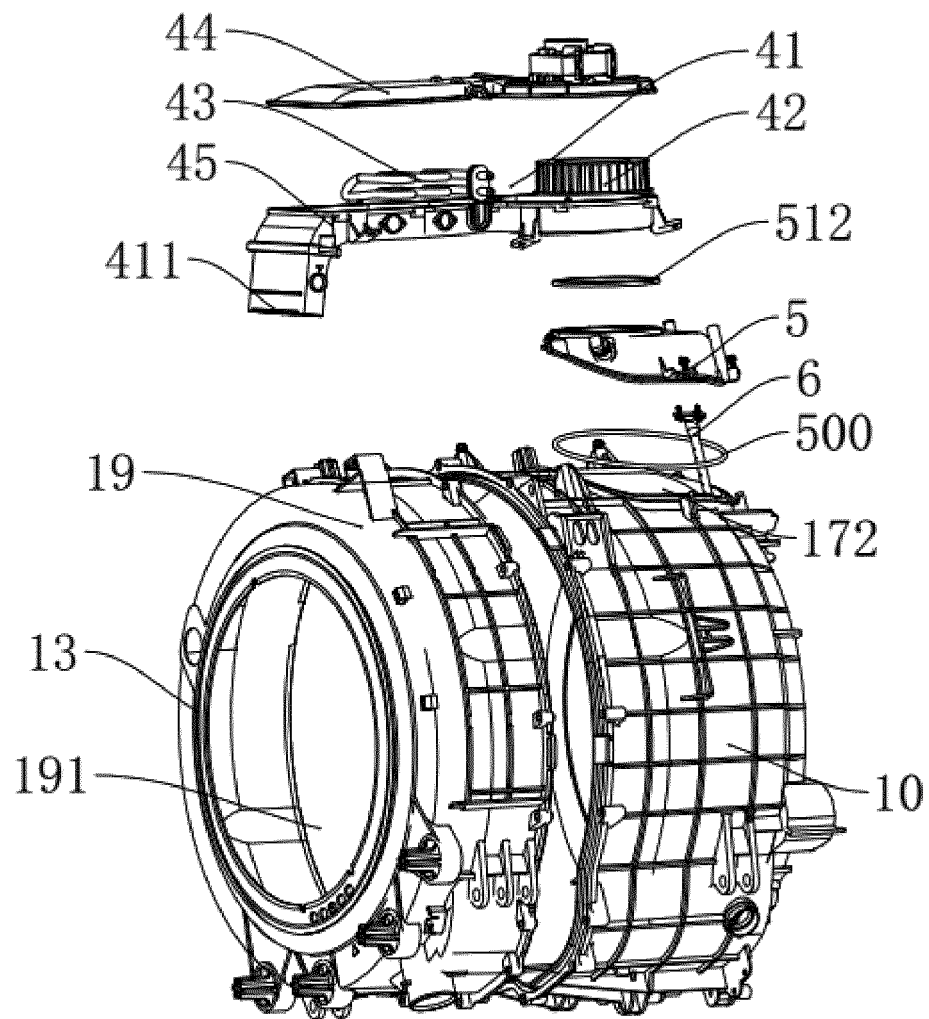


FIG. 1

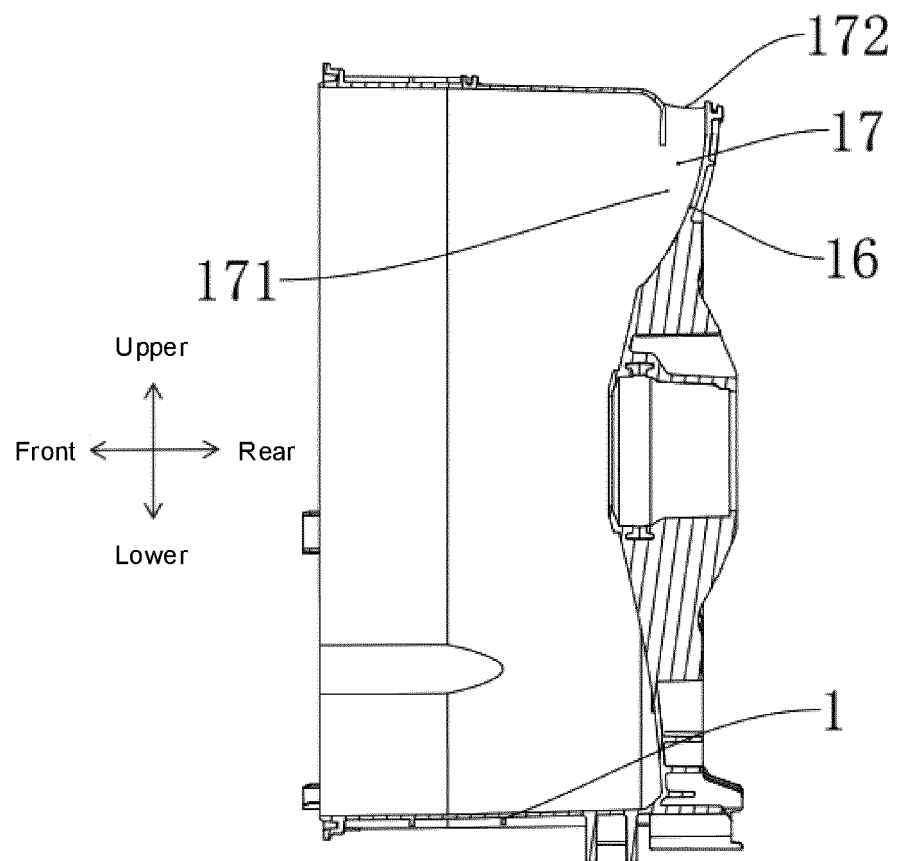


FIG. 2



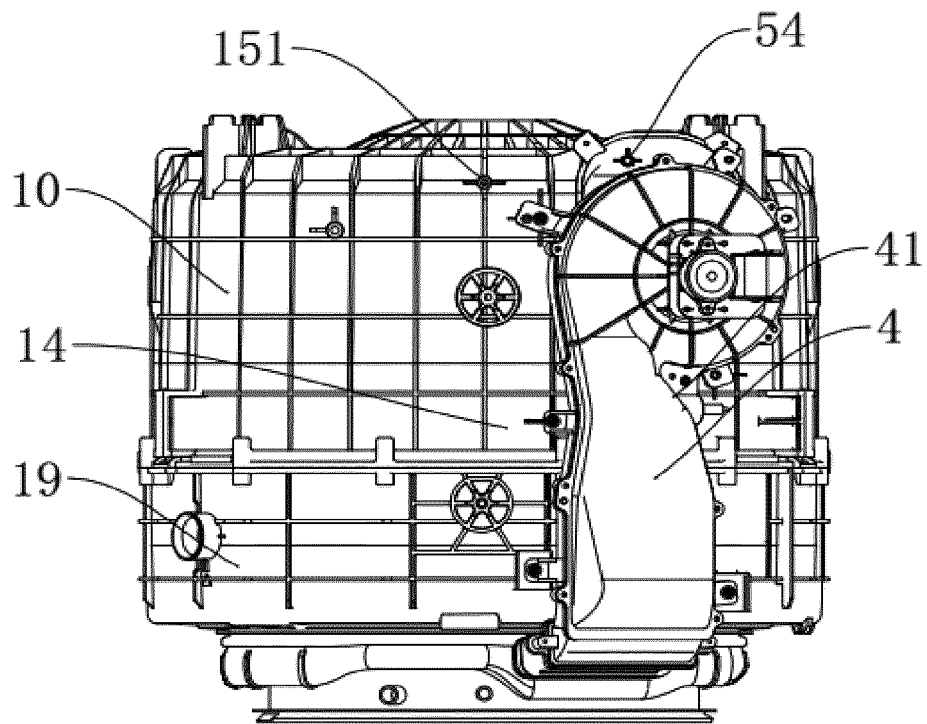


FIG. 3

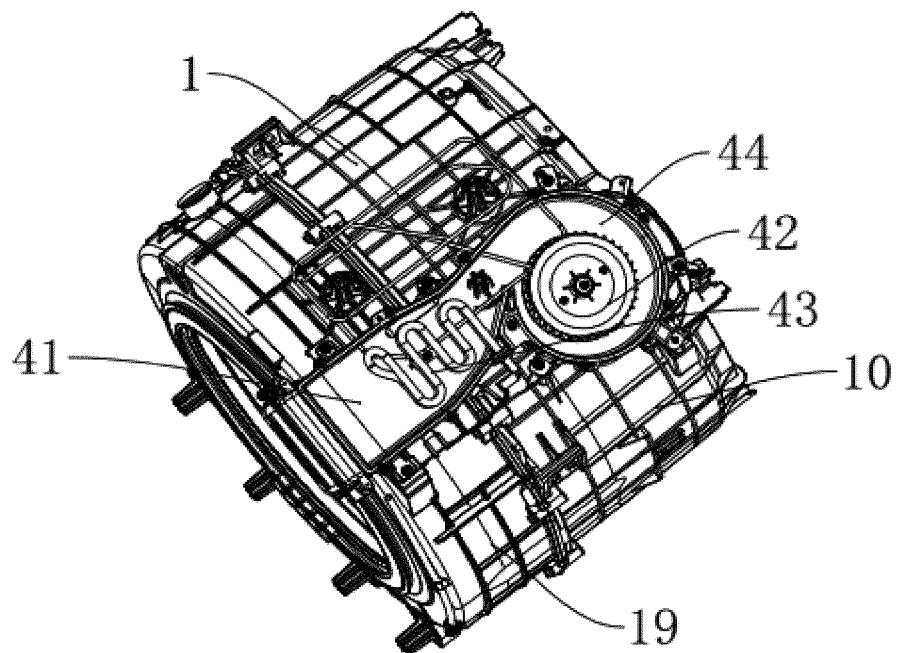


FIG. 4

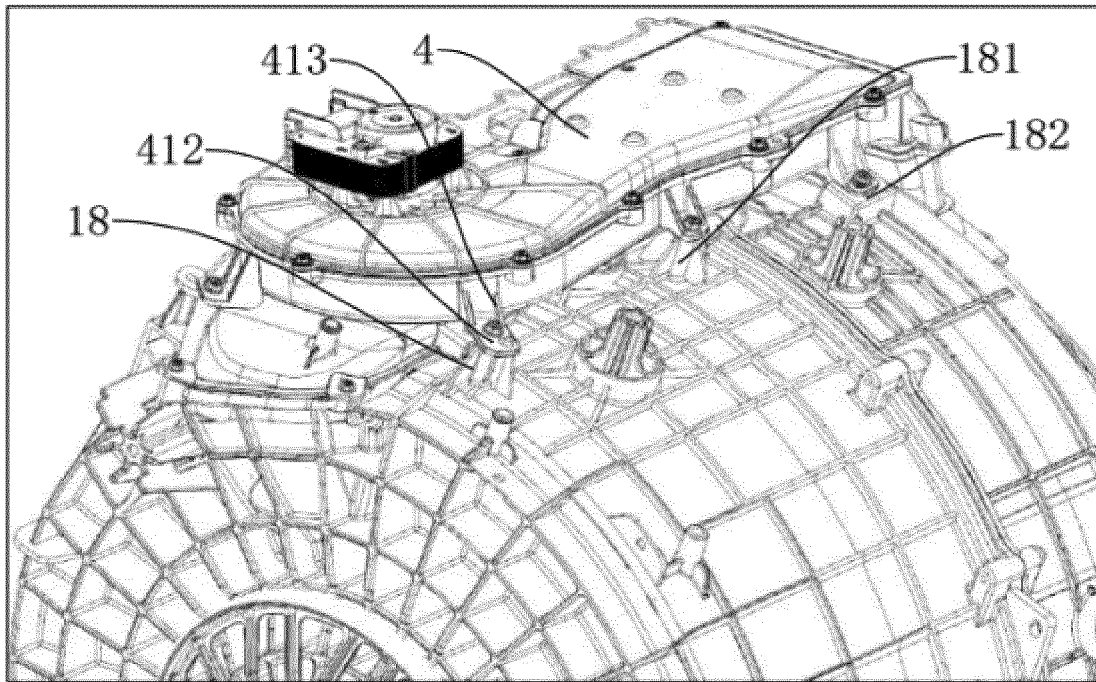


FIG. 5

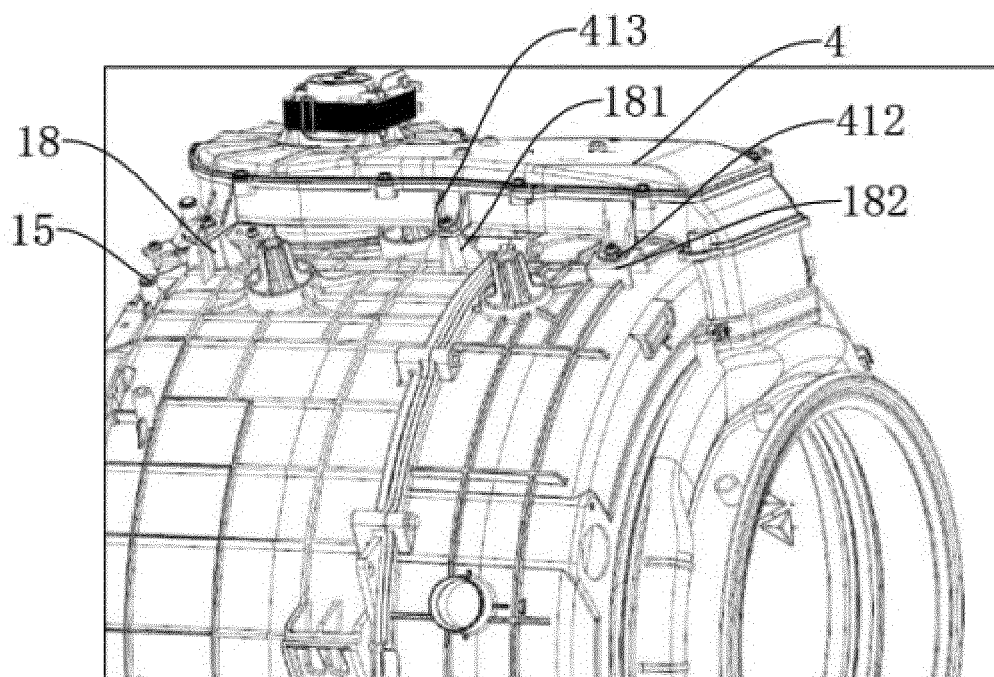


FIG. 6

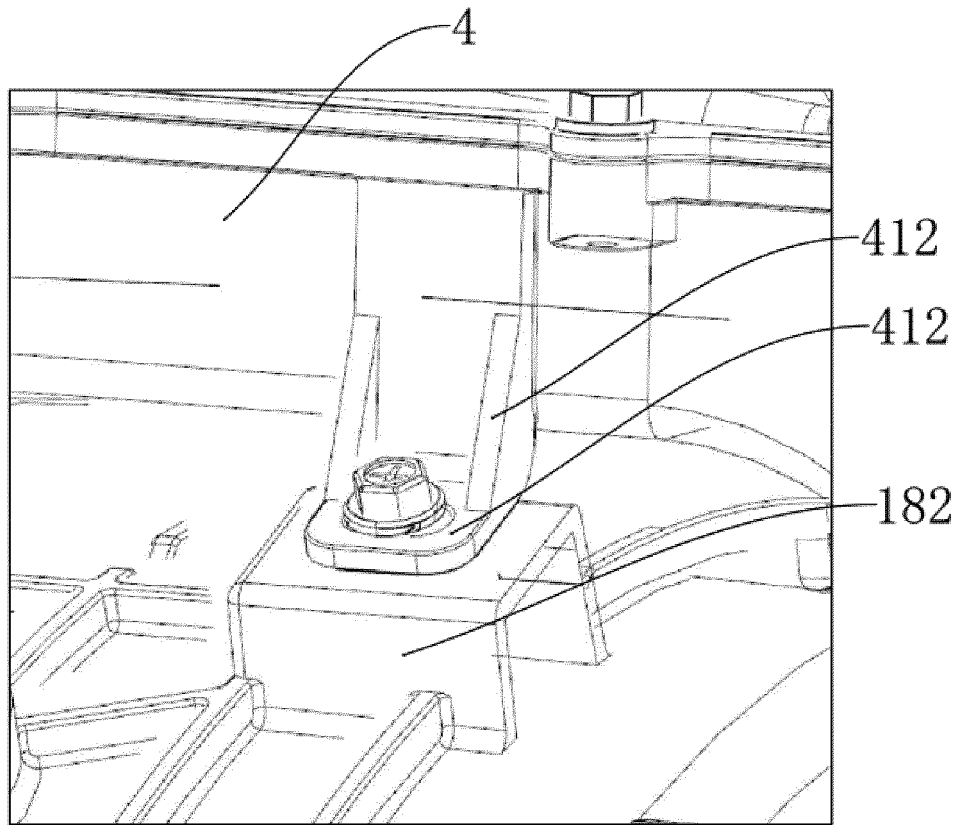


FIG. 7

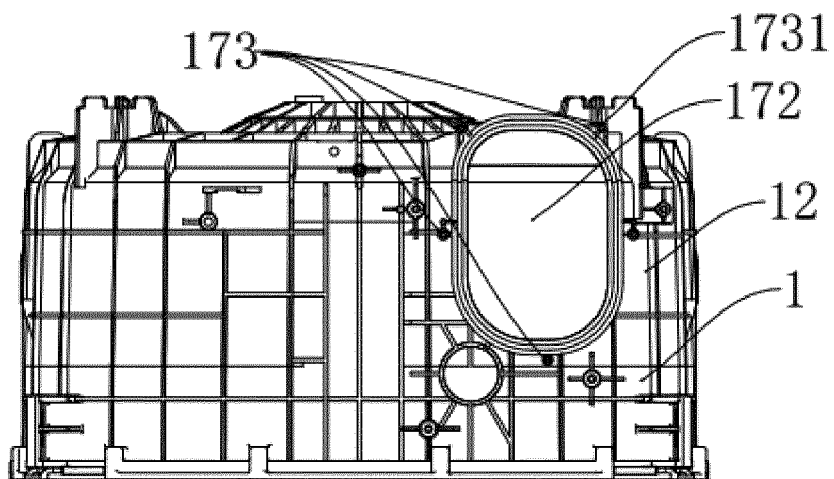


FIG. 8

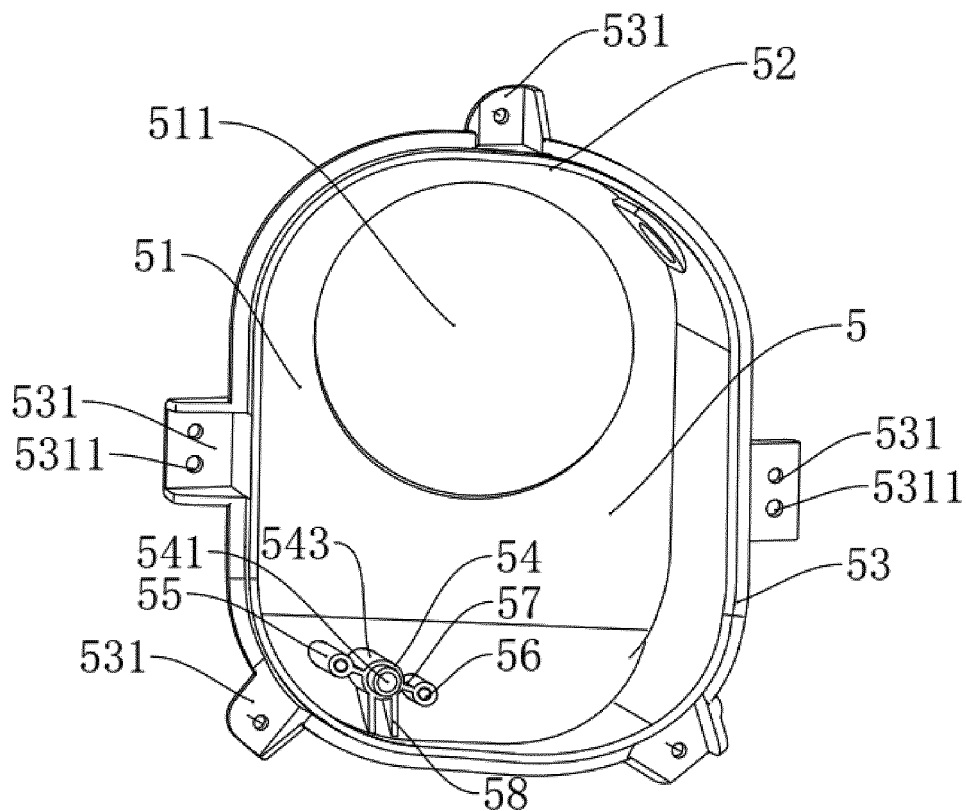


FIG. 9

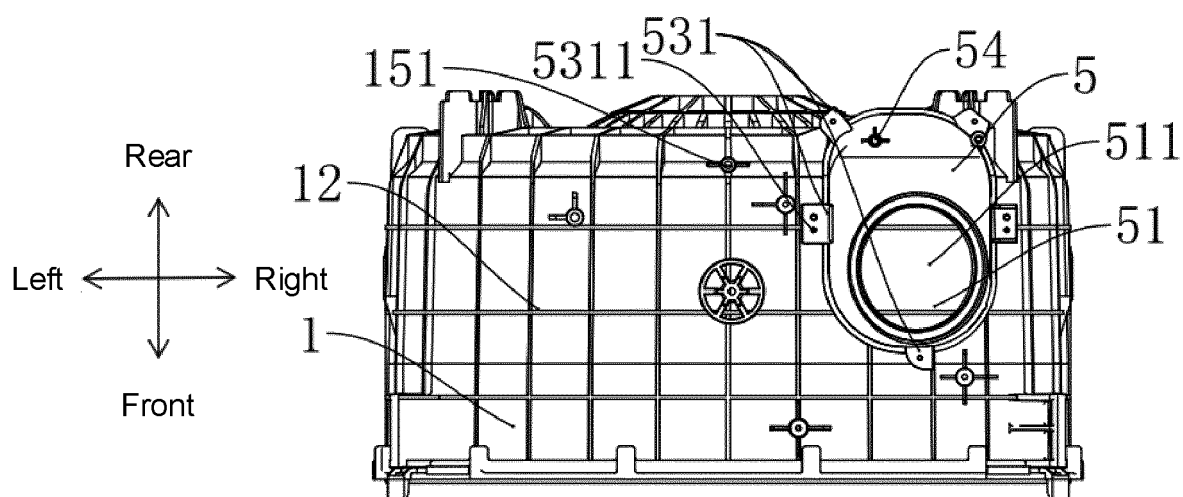


FIG. 10

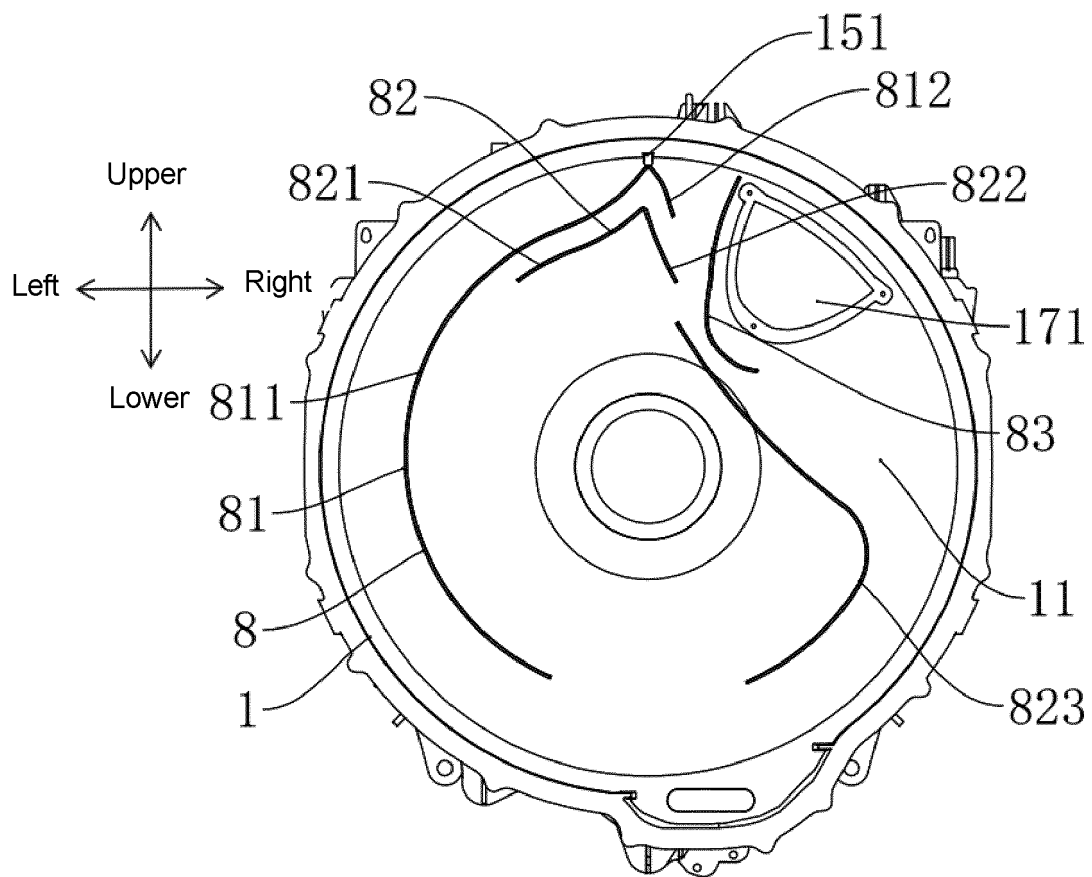


FIG. 11

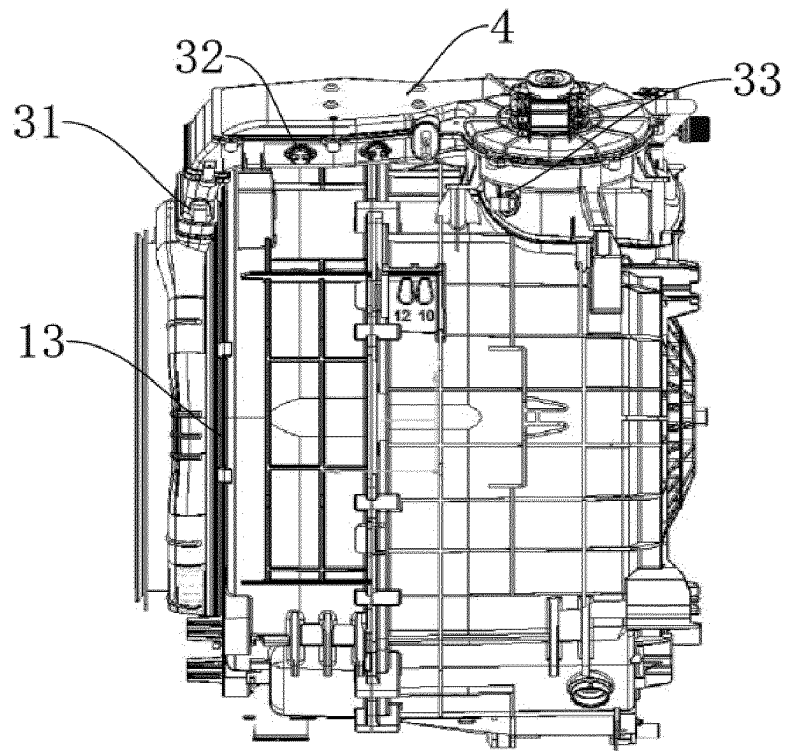


FIG. 12

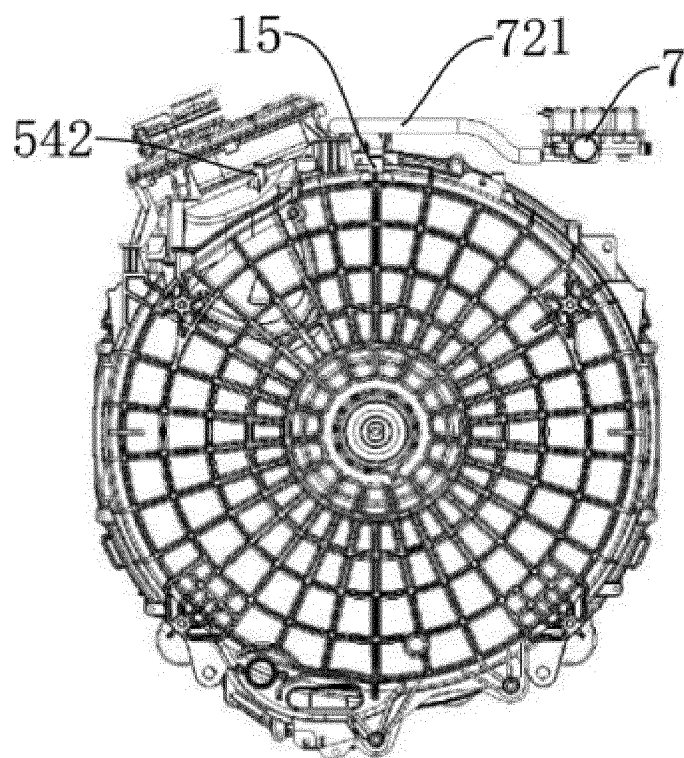


FIG. 13

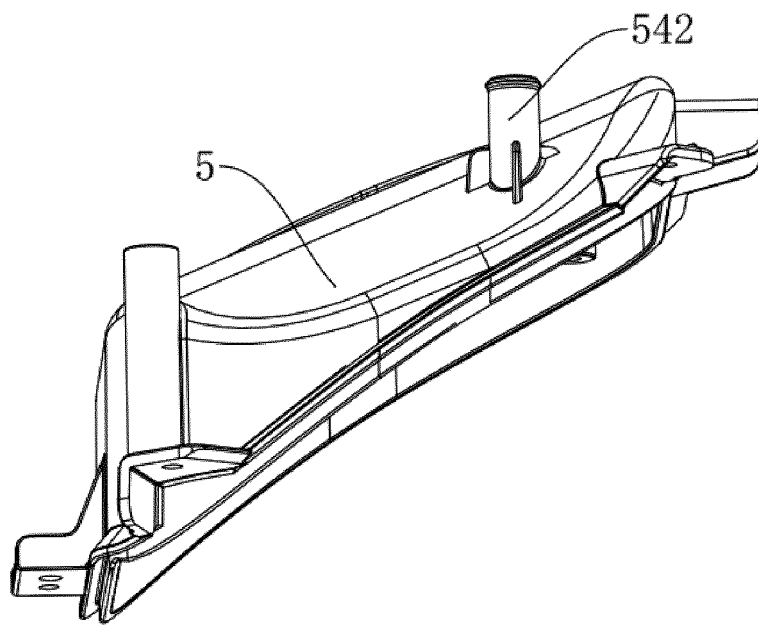


FIG. 14

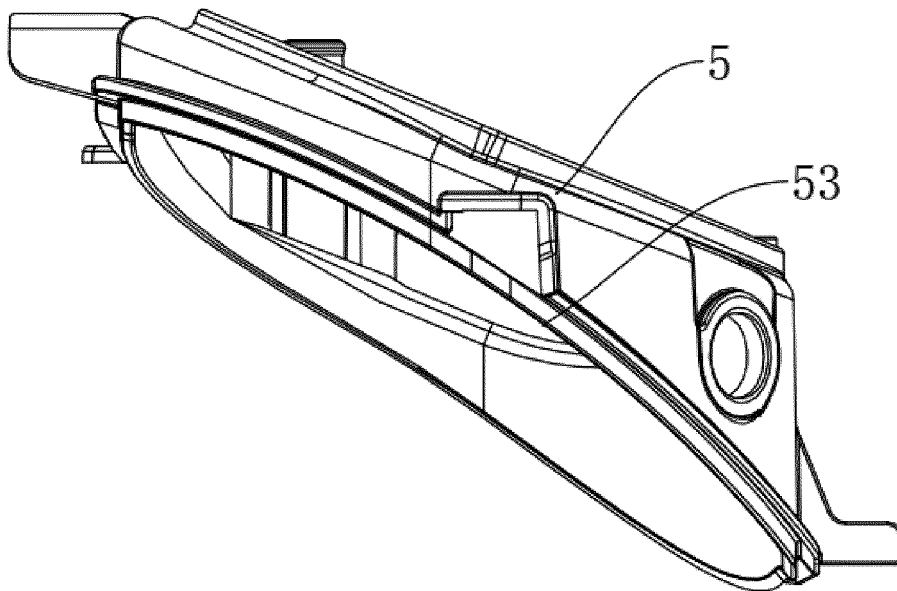


FIG. 15

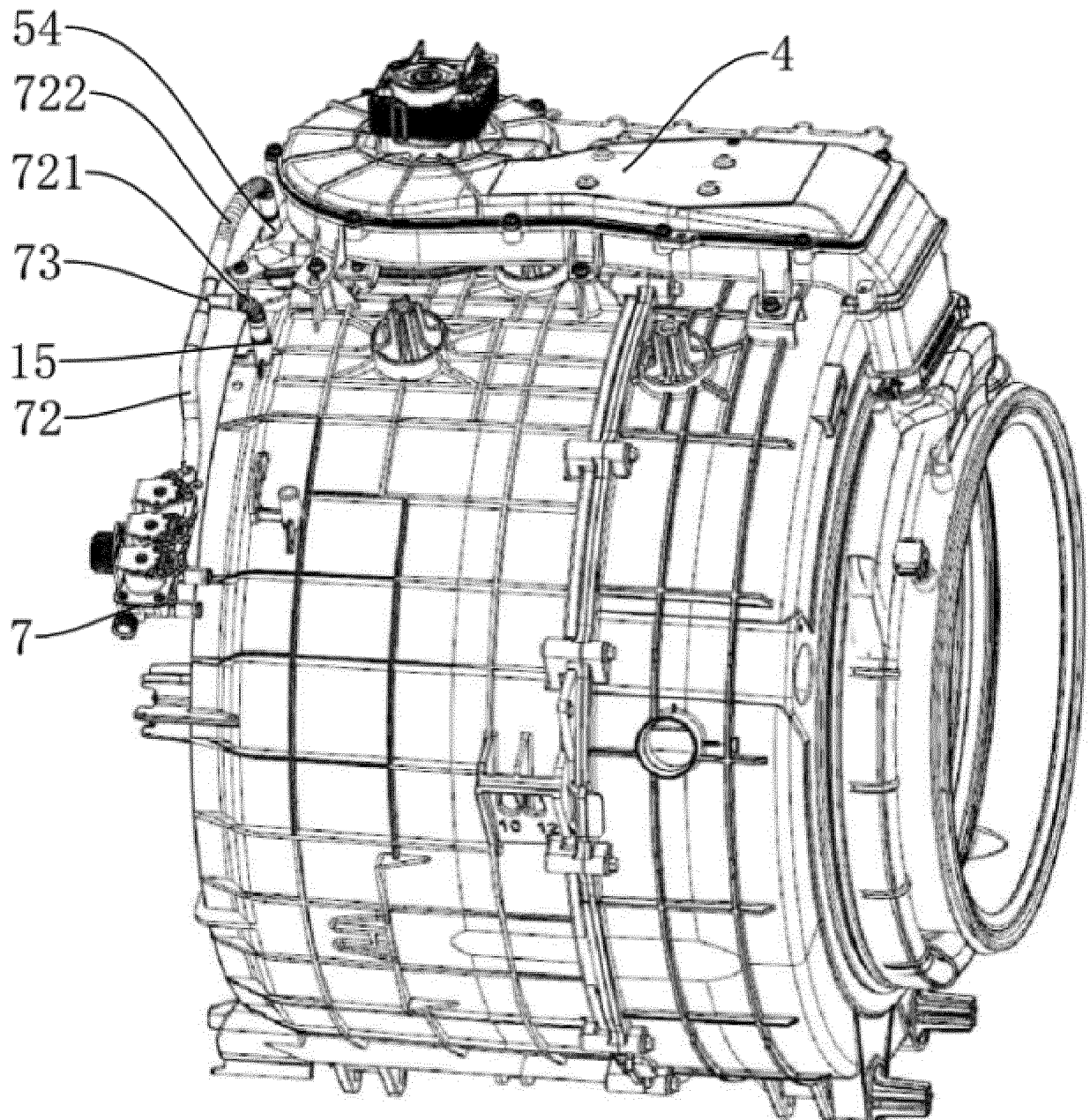


FIG. 16



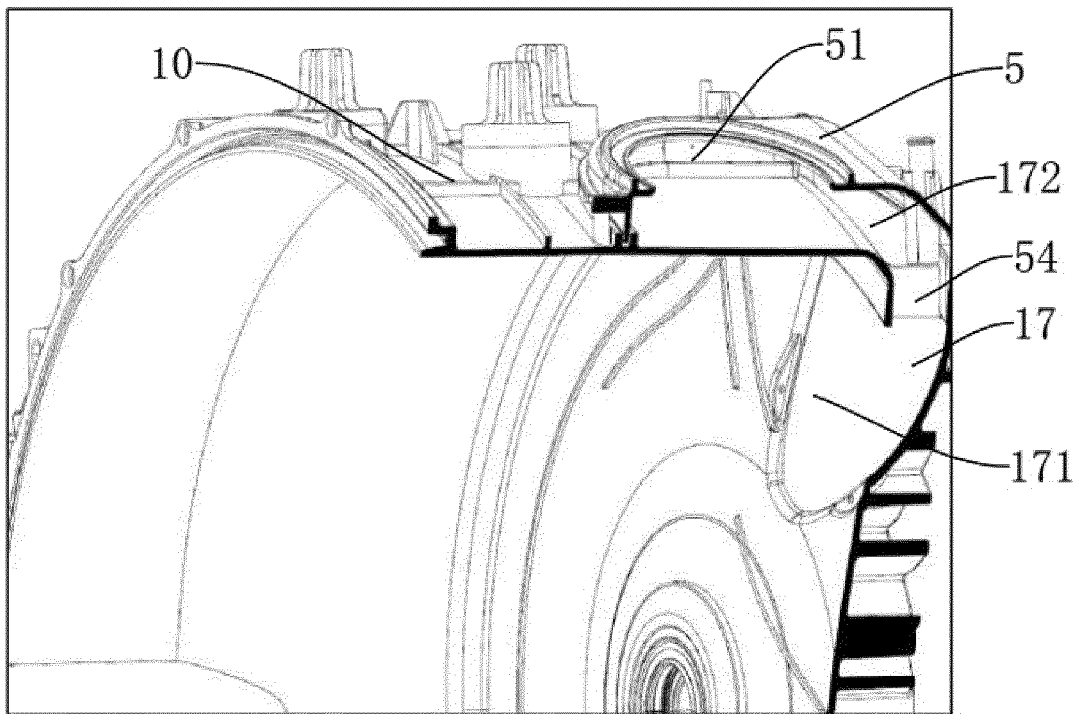


FIG. 17

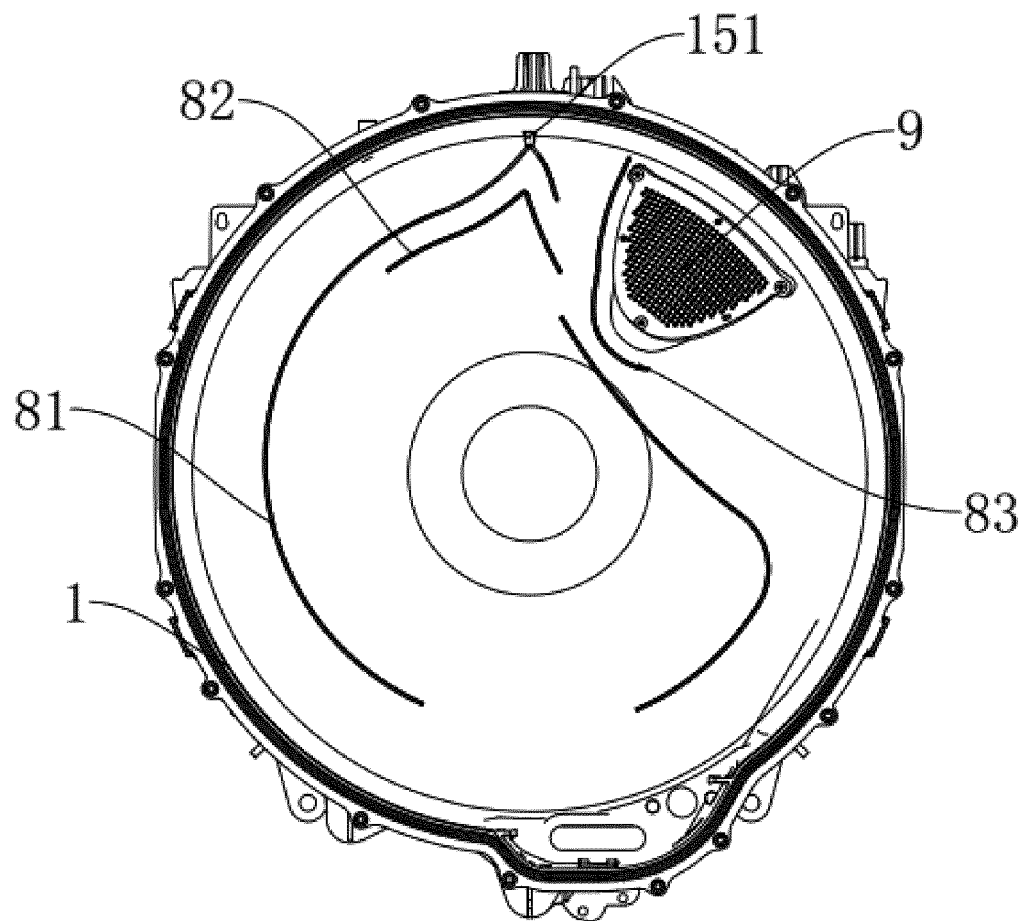


FIG. 18

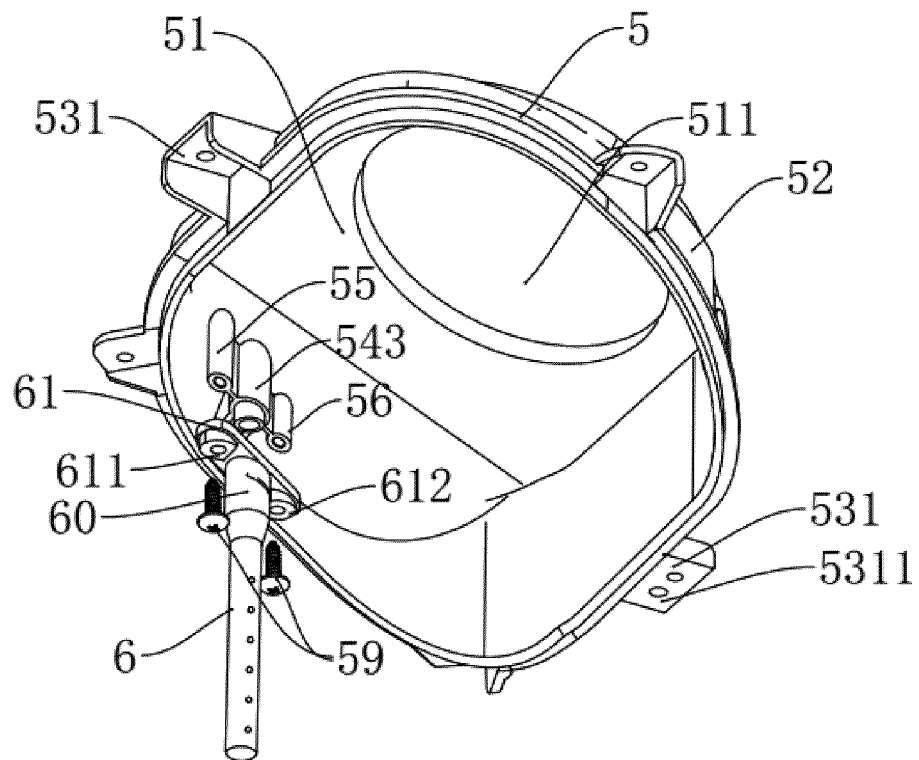


FIG. 19

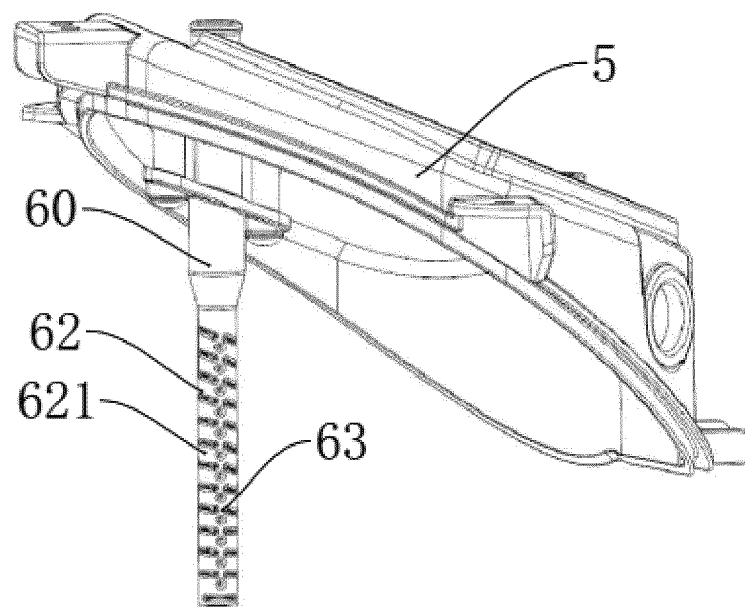


FIG. 20

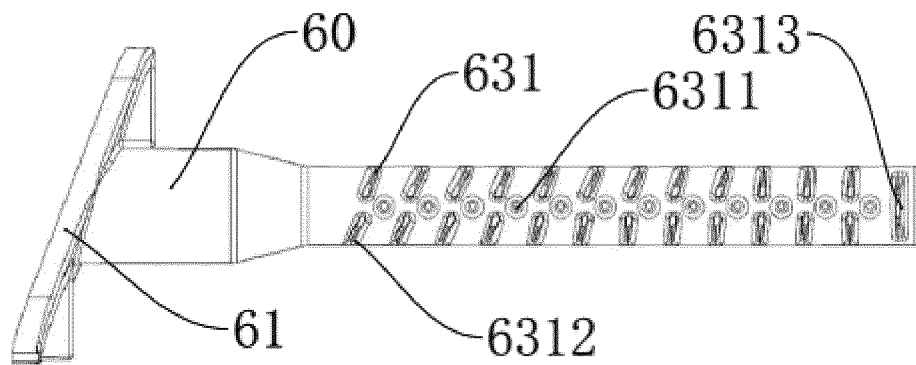


FIG. 21

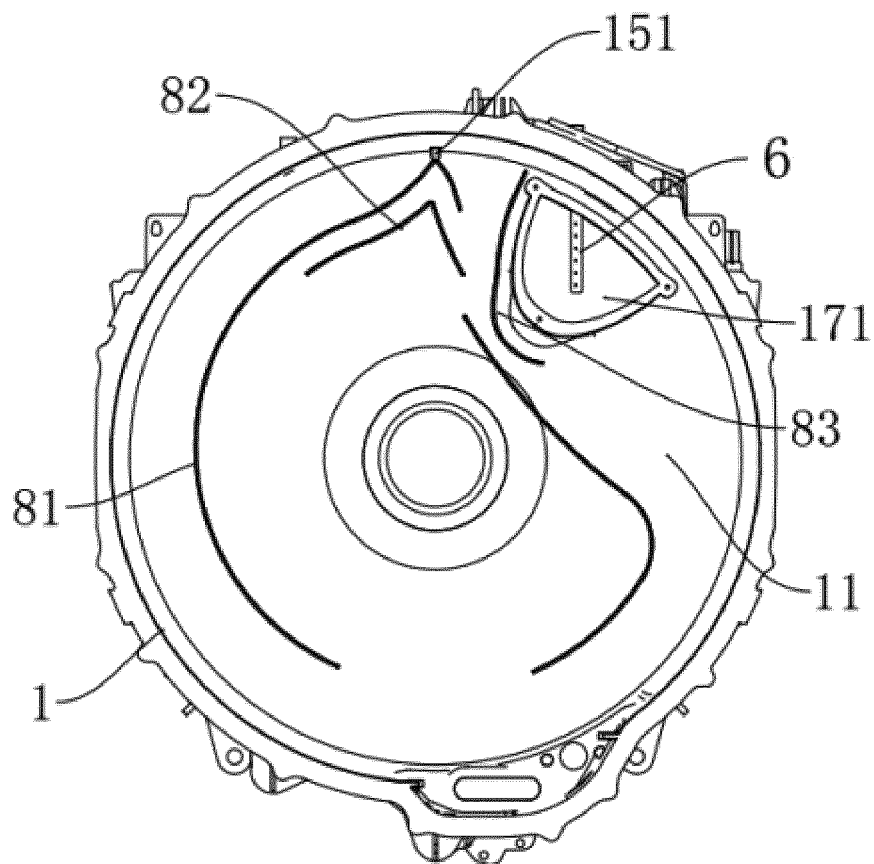


FIG. 22

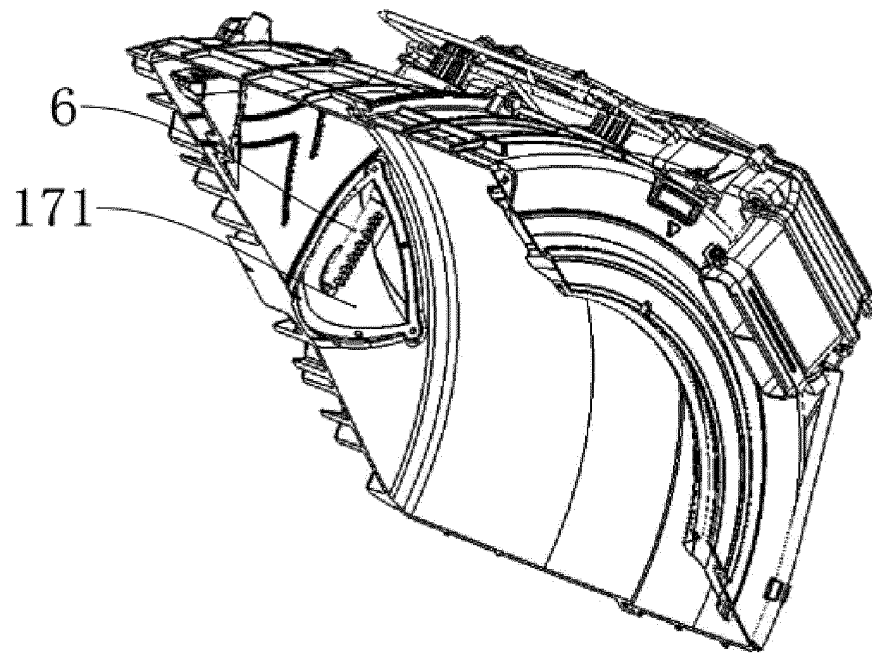


FIG. 23

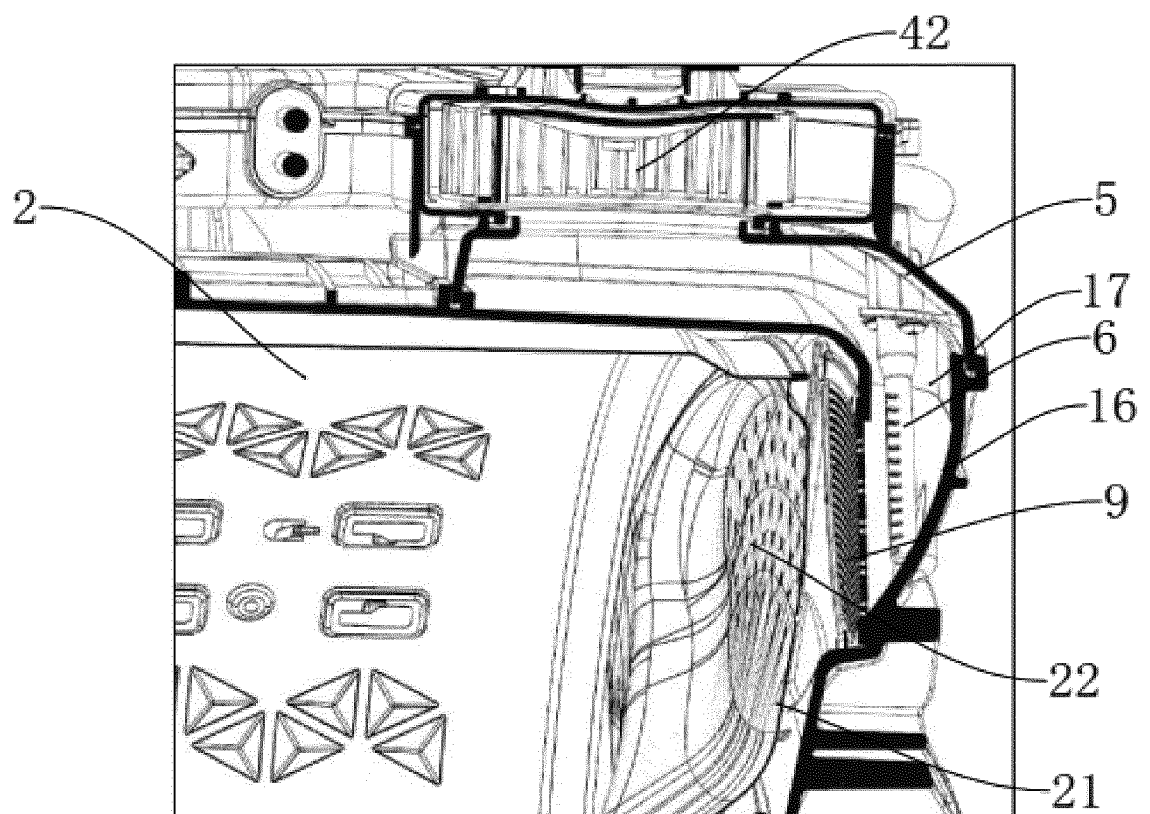


FIG. 24

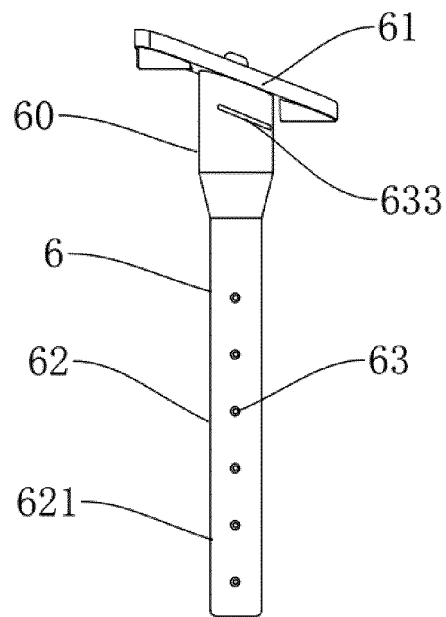


FIG. 25

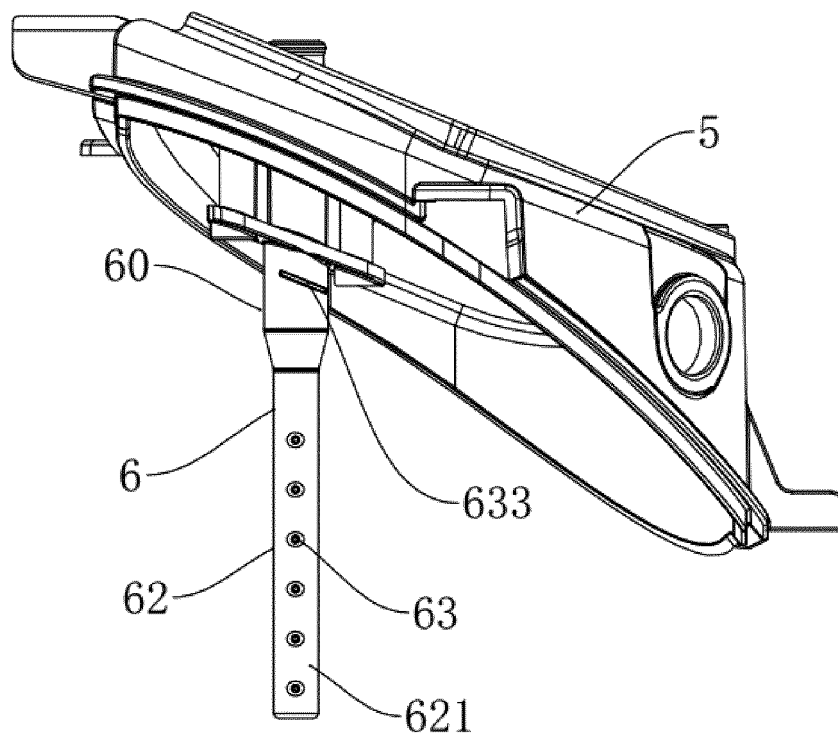


FIG. 26

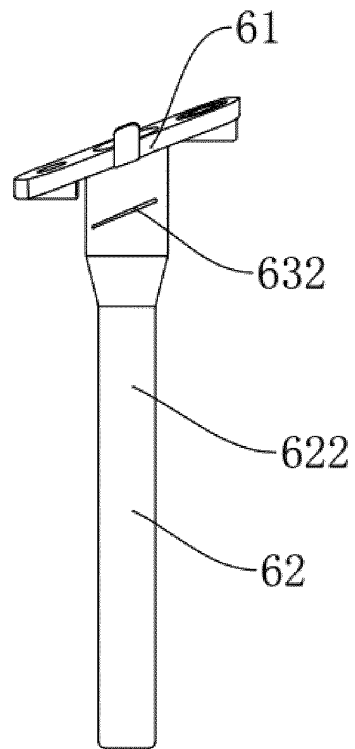


FIG. 27

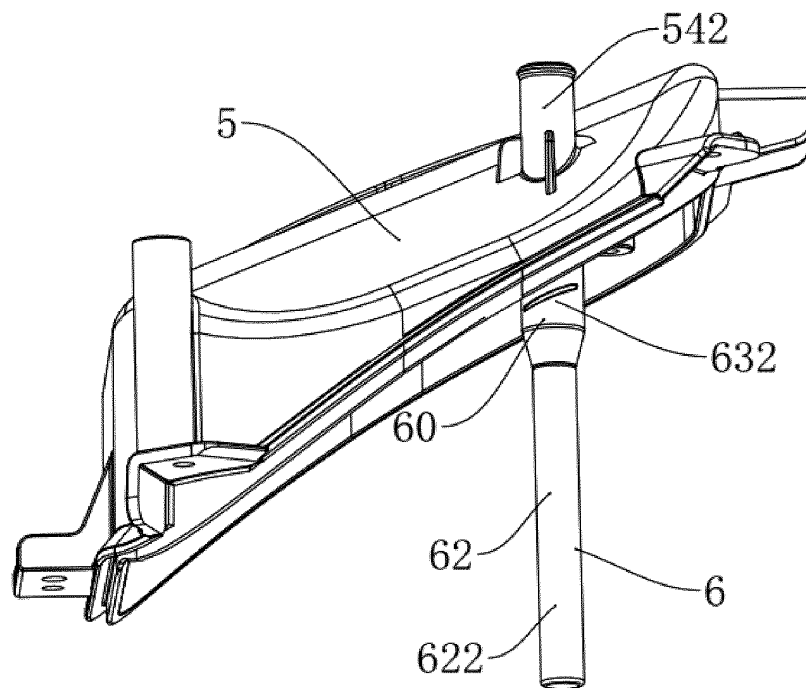


FIG. 28

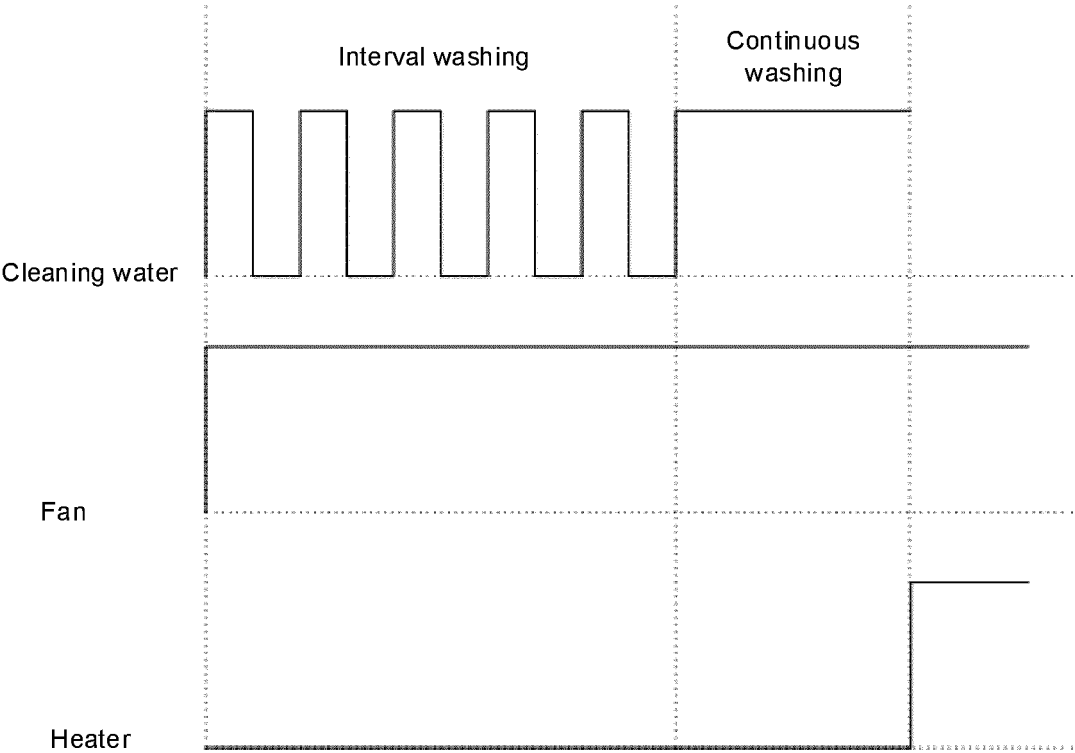


FIG. 29



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2020/091186

**A. CLASSIFICATION OF SUBJECT MATTER**D06F 25/00(2006.01)i; D06F 35/00(2006.01)i; D06F 37/26(2006.01)i; D06F 58/02(2006.01)i; D06F 58/20(2006.01)i;  
D06F 58/22(2006.01)i; D06F 58/24(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)

CNKI, CNPAT, WPI, EPODOC: HISENSE, washing, laundry, dry+, cool+, guid+, diversion, clean+, filt+, spray+, inlet, outlet,  
海信, 洗衣机, 干燥, 烘干, 集气, 冷凝, 导流, 清洁, 过滤, 滤网, 滤屑, 进水, 分水, 喷嘴, 进气, 出气, 排气**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                                                       | Relevant to claim No. |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| PX        | CN 210506863 U (HISENSE (SHANDONG) REFRIGERATOR CO., LTD.) 12 May 2020<br>(2020-05-12)<br>description paragraphs 0058-0130, figures 1-29 | 1-18,                 |
| PX        | CN 210506864 U (HISENSE (SHANDONG) REFRIGERATOR CO., LTD.) 12 May 2020<br>(2020-05-12)<br>description paragraphs 0056-0129, figures 1-29 | 1-18,                 |
| PX        | CN 210506865 U (HISENSE (SHANDONG) REFRIGERATOR CO., LTD.) 12 May 2020<br>(2020-05-12)<br>description paragraphs 0056-0127, figures 1-29 | 1-18,                 |
| PX        | CN 210506866 U (HISENSE (SHANDONG) REFRIGERATOR CO., LTD.) 12 May 2020<br>(2020-05-12)<br>description paragraphs 0054-0127, figures 1-29 | 1-18,                 |
| PX        | CN 210506867 U (HISENSE (SHANDONG) REFRIGERATOR CO., LTD.) 12 May 2020<br>(2020-05-12)<br>description paragraphs 0061-0133, figures 1-29 | 1-18,                 |

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

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Date of the actual completion of the international search

13 July 2020

Date of mailing of the international search report

19 August 2020

Name and mailing address of the ISA/CN

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Authorized officer

Facsimile No. (86-10)62019451

Telephone No.

Form PCT/ISA/210 (second sheet) (January 2015)

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2020/091186

## C. 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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| X         | CN 109554901 A (HISENSE (SHANDONG) REFRIGERATOR CO., LTD.) 02 April 2019 (2019-04-02)<br>description paragraphs 0035-0052, figures 1-21   | 1-5, 10-18            |
| Y         | CN 109554901 A (HISENSE (SHANDONG) REFRIGERATOR CO., LTD.) 02 April 2019 (2019-04-02)<br>description paragraphs 0035-0052, figures 1-21   | 6-9                   |
| Y         | CN 104711818 A (SUZHOU SAMSUNNG ELECTRONICS CO., LTD. et al.) 17 June 2015 (2015-06-17)<br>description paragraphs 0032-0047, figures 1-8  | 6-9                   |
| X         | CN 109267286 A (HISENSE (SHANDONG) REFRIGERATOR CO., LTD.) 25 January 2019 (2019-01-25)<br>description paragraphs 0034-0051, figures 1-21 | 1-5, 10-18            |
| Y         | CN 109267286 A (HISENSE (SHANDONG) REFRIGERATOR CO., LTD.) 25 January 2019 (2019-01-25)<br>description paragraphs 0034-0051, figures 1-21 | 6-9                   |
| A         | CN 1844541 A (LG ELECTRONICS INC.) 11 October 2006 (2006-10-11)<br>entire document                                                        | 1-18,                 |
| A         | US 2015191863 A1 (SAMSUNG ELECTRONICS CO., LTD.) 09 July 2015 (2015-07-09)<br>entire document                                             | 1-18,                 |
| A         | KR 20180027040 A (LG ELECTRONICS INCORPORATED) 14 March 2018 (2018-03-14)<br>entire document                                              | 1-18,                 |

**INTERNATIONAL SEARCH REPORT**  
**Information on patent family members**

International application No.

**PCT/CN2020/091186**

| Patent document<br>cited in search report | Publication date<br>(day/month/year) | Patent family member(s) | Publication date<br>(day/month/year) |
|-------------------------------------------|--------------------------------------|-------------------------|--------------------------------------|
| CN 210506863 U                            | 12 May 2020                          | None                    |                                      |
| CN 210506864 U                            | 12 May 2020                          | None                    |                                      |
| CN 210506865 U                            | 12 May 2020                          | None                    |                                      |
| CN 210506866 U                            | 12 May 2020                          | None                    |                                      |
| CN 210506867 U                            | 12 May 2020                          | None                    |                                      |
| CN 210561283 U                            | 19 May 2020                          | None                    |                                      |
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| CN 104711818 A                            | 17 June 2015                         | None                    |                                      |
| CN 109267286 A                            | 25 January 2019                      | WO 2020088331 A1        | 07 May 2020                          |
| CN 1844541 A                              | 11 October 2006                      | KR 20060107036 A        | 13 October 2006                      |
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**REFERENCES CITED IN THE DESCRIPTION**

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