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(54) DRYING MODULE AND WASHING AND DRYING INTEGRATED MACHINE

(57) A drying module and a washing and drying integrated machine. A wet circulating air flow from a drum is conveyed by means of a circulation module (3) to a dehumidification module (1) for drying, and the dehumidification module (1) adsorbs moisture from the wet circulating air flow from the drum, such that a dry circulating air flow is outputted to the drum. A regeneration module (2) enables a dry regenerated air flow to be outputted to the dehumidification module (1) so that at least a part of the dehumidification module (1) desorbs moisture and regains a moisture adsorption capacity. A condensation module (4) is used for condensing the regenerated air flow, which is outputted by the regeneration module (2), so as to form a low-temperature dry regenerated air flow. Condensate water formed during condensation is discharged. The dehumidification module (1), the circulation module (3) and the condensation module (4) are modules independent of each other, and the dehumidification module (1) is respectively connected and fixed to the circulation module (3) and the condensation module (4) to form an integrated module, which can be conveniently dismounted from and mounted on a rack, and can also serve as a separate device for drying air.

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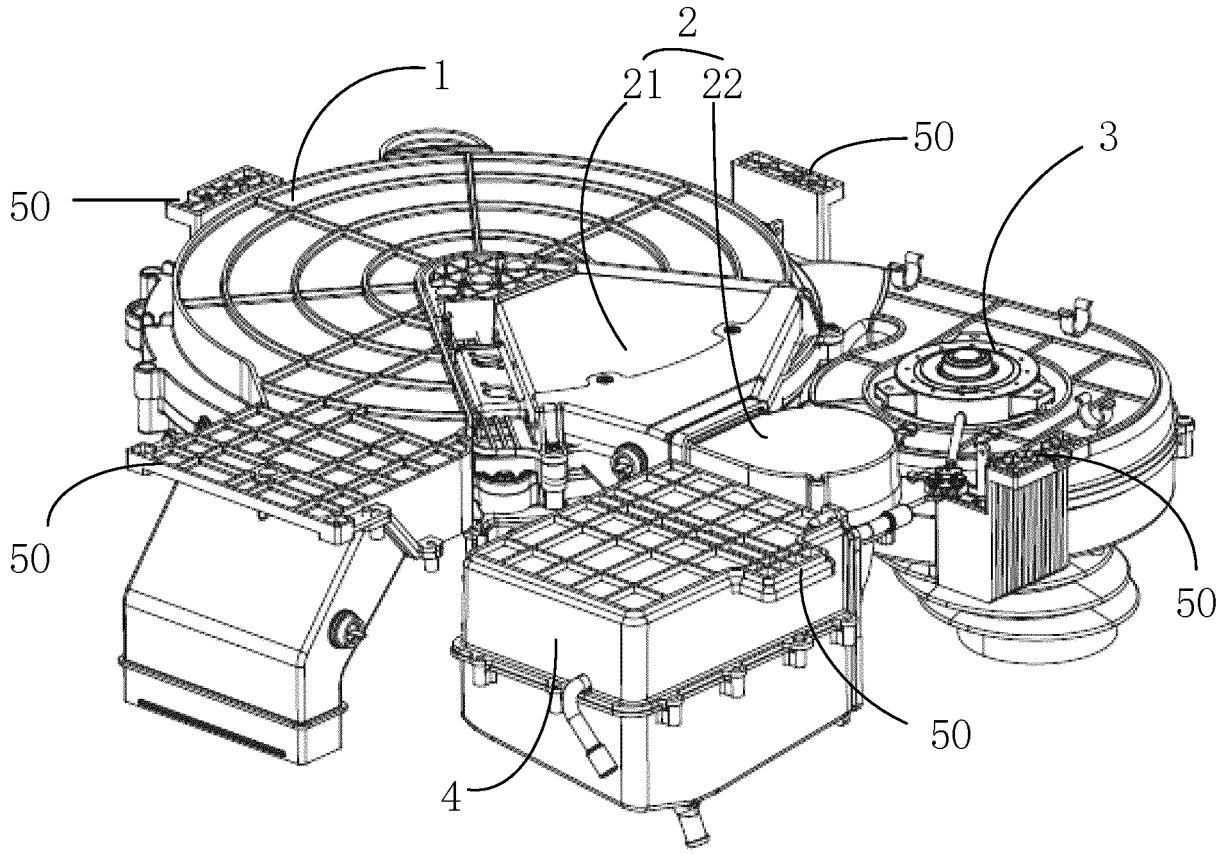

FIG.1

Description

TECHNICAL FIELD

[0001] The present invention relates to the field of laundering devices, and in particular, to a drying module and a washer-dryer machine.

BACKGROUND OF THE INVENTION

[0002] Boosted by factors such as the growing pursuit for healthy and quality life of people and the increasingly fast pace of life of urban residents, washer-dryer machines have emerged and become immensely popular among a wide range of consumers. Washer-dryer machines are especially suitable for families in the south during rainy seasons and families in the north where outdoor air drying is not suitable due to poor air quality as well as a population of users who want clothes ready to wear immediately after washing or seek more fluffy and comfortable clothes.

[0003] In drying systems of some existing washer-dryer machines, heating and moisture absorption are performed on humid air in an inner drum of the washer-dryer machine by using an evaporator to obtain high-temperature air which enters the inner drum of the washer-dryer machine again to evaporate moisture in laundry. However, an overall temperature of the evaporator is consistent. During evaporation of humid air, a moisture absorption capability of the evaporator for the humid air decreases, resulting in low moisture absorption efficiency, long drying time, and high power consumption. In some other washer-dryer machines, a manner of directly dehumidifying a wet air flow by using condensed water spraying or a condenser is used. An air flow treated in this manner still contains a high proportion of moisture, and the air flow still requires heating-cooling and dehumidification-reheating for cyclic use, resulting in low dehumidification efficiency and high power consumption.

SUMMARY OF THE INVENTION

[0004] An objective of the present invention is to provide a drying module and a washer-dryer machine, to resolve the problem in the related art that a dehumidified air flow still contains a high proportion of moisture, and the air flow still requires heating-cooling and dehumidification-reheating for cyclic use, resulting in low dehumidification efficiency and high power consumption.

[0005] To resolve the foregoing technical problems, according to some embodiments, the present invention provides a drying module. The drying module includes:

a circulation module, in communication with a drum, in which the circulation module outputs a wet circulating air flow from the drum to a dehumidification module for dehumidification;

the dehumidification module, in communication with the circulation module and the drum, in which the dehumidification module is configured to absorb moisture from the wet circulating air flow from the drum, and output a dry circulating air flow to the drum;

a regeneration module, mounted on a shell of the dehumidification module, in which the regeneration module is in communication with a part of air flow in the dehumidification module disposed in a regeneration air flow passage, to output a dry regeneration air flow to the part of the dehumidification module to desorb moisture from at least a part of the dehumidification module; and

a condensation module, in communication with a regeneration air flow outlet of the regeneration module, and configured to condense the regeneration air flow outputted by the regeneration module to form a low-temperature dry air flow, in which

the dehumidification module is connected and fixed to the circulation module and the condensation module respectively to form an integral module.

[0006] Further, a joining portion is arranged on a periphery of the integral module, and is configured to fixedly connect the integral module to a frame.

[0007] Further, the dehumidification module includes a dehumidification module upper shell and a dehumidification module lower shell; the regeneration module includes a regeneration module upper shell and a regeneration module lower shell; the circulation module includes a circulation module upper shell and a circulation module lower shell; and the condensation module includes a condensation module upper shell and a condensation module lower shell;

the dehumidification module lower shell, the regeneration module lower shell, the circulation module lower shell, and the condensation module lower shell are integrally formed into a drying module lower shell; and

the joining portion is arranged on the drying module lower shell.

[0008] Further, one end of the circulating air exhaust passage in communication with the dehumidification module and the other end connected to the drum by a first bellows hose.

[0009] Further, a circulating air intake passage is mounted on the drum, and one end of the circulating air intake passage in communication with the drum and the other end in communication with the circulation module.

[0010] Further, a filter assembly is arranged in the circulating air intake passage, and is configured to filter out impurities in the circulating air flow.

[0011] Further, the dehumidification module, the regeneration module, the circulation module, and the condensation module are discrete, and form the integral

module in a manner of fixed connection.

[0012] Further, the regeneration module upper shell includes a heating module accommodating cavity; and a heating module, mounted in the heating module accommodating cavity, in which the heating module is arranged close to a rotary disk in the dehumidification module, and the heating module accommodating cavity in communication with the dehumidification module; and the heating module is configured to desorb moisture from at least a part of the rotary disk by heating.

[0013] Further, the heating module includes:

a heater, mounted in a first space;
a heat conduction member, configured to receive heat conducted from the first space;
a temperature detection module, configured to detect a temperature in the first space, in which the temperature detection module is mounted in a third space, the third space is a space formed through wrapping by the heat conduction member, and the third space and the first space are separated by the heat conduction member; and
an air distribution member, arranged close to or at an interval from the rotary disk in the dehumidification module, in which the regeneration air flow enters the heating module accommodating cavity and sequentially passes through the air distribution member/-heater, the heater/air distribution member, and the rotary disk.

[0014] Further, the heat conduction member is mounted in a second space in communication with the first space, and the second space and the third space are separated by the heat conduction member.

[0015] Further, the regeneration module upper shell includes a base, a top wall, and a sidewall protruding from the top wall, the top wall and the sidewall enclose to form the first space, the base is arranged on a periphery of the sidewall, and the base extends toward an outer side away from the first space; and
a recess is provided on a bottom surface of the base, and the recess forms the second space.

[0016] Further, the regeneration module upper shell is a fan-shaped structure;

a heater air inlet is provided on an outer arc side surface of the regeneration module upper shell, and a heater air outlet is provided on a side opposite to the top wall, in which the heater air inlet, the first space, and the heater air outlet are connected to one another sequentially; and
the base at least includes a first side edge, the first side edge extends in a radial direction of the sector shape, and the recess is disposed on the first side edge.

[0017] Further, the base is connected and mounted to the heating module accommodating cavity by a thermal buffer member.

[0018] Further, the thermal buffer member includes a heat insulating member; and the heat insulating member is arranged on a peripheral side of the base, and is configured to prevent high-temperature heat of the heating member from being directly transferred to the shell.

[0019] Further, the thermal buffer member further includes a seal gasket; and the seal gasket is wrapped outside the heat insulating member.

[0020] Further, a preset gap is kept between an arrangement position of the seal gasket and a bottom of a mounting portion.

[0021] Further, the preset gap ranges from 0.2 mm to 5 mm.

[0022] Further, the heating module includes a mounting seat, the mounting seat is connected and fixed to the first side edge, and the mounting seat is disposed on another side surface of the first side edge away from the recess;

the mounting seat is provided with a penetrating mounting hole and forms an approximately hexahedron shape with one opening surface, the temperature detection module is arranged inside the mounting hole, and a space formed by the heat conduction member wrapping the opening surface of the mounting seat is the third space; and
the mounting hole adapts to the temperature detection module.

[0023] Further, the heat conduction member is in contact with a contact of the temperature detection module.

[0024] Further, a heat-resistant anti-corrosive coating is provided on a surface of the heat conduction member.

[0025] Further, the air distribution member includes an air distribution plate and a side plate protruding from a periphery of the air distribution plate, the air distribution plate and the side plate enclose to form a heater accommodating region, and the heater is arranged in the heater accommodating region; and
the air distribution plate has a fan shape, and air holes distributed at intervals are provided on the air distribution plate.

[0026] Further, the heater includes a plurality of heating pipes connected from tail to end, and the heating pipes are distributed at intervals in a radius direction of the sector shape; and
a length of the heating pipes is arranged to be parallel to a sidewall opposite to a heater air inlet.

[0027] Further, the air holes are arranged in rows, and an arrangement position of each row of air holes corresponds to a position of each of the heating pipes; and
diameters of the air holes have a trend of decreasing from an outer arc toward a center of circle in the radius direction of the sector shape.

[0028] Further, the heating pipes are disposed below the air holes; and
an axis of each of the heating pipes is arranged to deviate

from a centerline of each corresponding row of air holes, and the centerline of each row of air holes is closer to the heater air inlet than the axis of the heating pipe.

[0029] Further, a direction in which the regeneration air flow enters the heating module accommodating cavity is arranged to be opposite to or the same as a rotational direction of the rotary disk.

[0030] Another aspect of the present invention provides a washer-dryer machine, including a drum and a frame, and including the drying module in any foregoing technical solution.

BRIEF DESCRIPTION OF DRAWINGS

[0031] For clearer descriptions of the technical solutions in the embodiments of the present invention or the related art, the following briefly introduces the accompanying drawings required for the embodiments. Apparently, the accompanying drawings in the following description show merely some embodiments of the present invention, and persons of ordinary skill in the art may still derive other drawings from these accompanying drawings without creative efforts.

FIG. 1 is a three-dimensional diagram of a drying module according to an embodiment of the present invention;

FIG. 2 is a top view of a drying module according to an embodiment of the present invention;

FIG. 3 is a three-dimensional schematic diagram of a heating module according to an embodiment of the present invention;

FIG. 4 is another three-dimensional schematic diagram of a heating module according to an embodiment of the present invention;

FIG. 5 is a three-dimensional schematic diagram of a heating module according to an embodiment of the present invention;

FIG. 6 is a bottom view of FIG. 5;

FIG. 7 is a schematic assembly diagram of a heating module and a dehumidification module according to an embodiment of the present invention;

FIG. 8 is a schematic diagram of an air distribution member according to an embodiment of the present invention;

FIG. 9 is an exploded view of a drying module according to an embodiment of the present invention;

FIG. 10 is a schematic assembly diagram of a rotary disk in a dehumidification module and a regeneration module according to an embodiment of the present invention;

FIG. 11 is a schematic disassembly diagram of a heating module and a regenerating fan in a regeneration module according to an embodiment of the present invention; and

FIG. 12 is a schematic diagram of a condensation module in a drying module according to an embodiment of the present invention.

Reference numerals:

[0032] 1. dehumidification module; 2. regeneration module; 21. heating module; 22. regenerating fan; 3. circulation module; 4. condensation module; 50. joining portion; 21. heating module; 210. regeneration module upper shell; 211. heater air inlet; 212. top wall; 213. sidewall; 214. base; 240. heating pipe; 218. mounting seat; 250. heat conduction member; 100. rotary disk; 110. rotary disk upper shell; 120. rotary disk lower shell; 210. regeneration module upper shell; 230. air distribution plate; 231. air hole; 270. thermal buffer member; 271. heat insulating member; 272. seal gasket; 401. condensation module upper shell; 402. condensation module lower shell; 43. condenser; 3013. first connecting member; and 3014. second connecting member.

DETAILED DESCRIPTION

[0033] At present, a problem that a dehumidified air flow still contains a high proportion of moisture, and the air flow still requires heating-cooling and dehumidification-reheating for cyclic use, resulting in low dehumidification efficiency and high power consumption exists in the related art.

[0034] To resolve the foregoing problem, as shown in FIG. 1, an embodiment of the present invention provides a drying module. The drying module includes: a circulation module 3, in communication with a drum of a washer-dryer machine, in which the circulation module 3 outputs a wet circulating air flow from the drum to a dehumidification module 1 for dehumidification; the dehumidification module 1, in communication with the circulation module 3 and the drum respectively, in which the dehumidification module 1 is configured to absorb moisture from the wet circulating air flow from the drum, to output a dry circulating air flow to the drum; a regeneration module 2, mounted on a shell of the dehumidification module 1, in which the regeneration module 2 is connected to the dehumidification module 1, to output a dry regeneration air flow to the dehumidification module 1 to desorb moisture from at least a part of the dehumidification module 1 to enable the dehumidification module 1 to restore a moisture absorption capability; and a condensation module 4, in communication with a regenerated wind outlet of the regeneration module 2, and configured to condense the regeneration air flow outputted by the regeneration module 2 to form a low-temperature dry regeneration air flow, in which the dehumidification module 1 is connected and fixed to the circulation module 3 and the condensation module 4 respectively to form an integral module.

[0035] In this embodiment, the drying module is configured to dry a wet air flow, which is defined as a regeneration air flow. The circulation module 3 produces power for an air flow to circulate between the drum and the dehumidification module 1. A wet circulating air flow from the drum is transported to the dehumidification module 1 through the circulation module 3 for moisture

absorption. The dehumidification module 1 absorbs moisture from the wet circulating air flow from the drum, to output a dry circulating air flow to the drum. The regeneration module 2 is connected to a part of the dehumidification module 1, to output a dry regeneration air flow to the part of the dehumidification module 1 to desorb moisture from at least a part of the dehumidification module 1 to enable the dehumidification module 1 to restore the moisture absorption capability. The condensation module 4 is connected to a regenerated wind outlet of the regeneration module 2, and is configured to condense the regeneration air flow outputted by the regeneration module 2 to form a low-temperature dry regeneration air flow. Condensed water formed during condensation is discharged. The dehumidification module 1, the circulation module 3, and the condensation module 4 are modules independent of each other. The dehumidification module is connected and fixed to the circulation module 3 and the condensation module 4 respectively to form an integral module for convenient assembly on and disassembly from a frame or for use as a separate device to dry air.

[0036] In an embodiment of the present invention, as shown in FIG. 2 and FIG. 10, in the drying module, a joining portion 50 is arranged on a periphery of the integral module, and is configured to fixedly connect the integral module to the frame. Specifically, at least one joining portion 50 is arranged on each of the dehumidification module 1, the circulation module 3, and the condensation module 4, to ensure that the integral module bears a force uniformly.

[0037] The dehumidification module 1 includes a dehumidification module upper shell and a dehumidification module lower shell. The regeneration module 2 includes a regeneration module upper shell and a regeneration module lower shell. The circulation module 3 includes a circulation module upper shell and a circulation module lower shell. The condensation module 4 includes a condensation module upper shell and a condensation module lower shell. The dehumidification module lower shell, the regeneration module lower shell, the circulation module lower shell, and the condensation module lower shell are integrally formed into a drying module lower shell. The joining portion 50 is at least arranged on the drying module lower shell. In the technical solution, the integrally formed drying module lower shell has good sealing, and can provide a support force for the drying module to some extent. Therefore, it is only necessary to arrange the joining portion 50 on a peripheral edge of the drying module lower shell to lap the entire drying module on the frame.

[0038] The dehumidification module 1, the regeneration module 2, the circulation module 3, and the condensation module 4 have a fixed connection relationship with the frame. Therefore, air inlets/outlets on the shells of the four modules may be fixedly connected. The circulation module 3 needs to be flexibly connected to the drum, to avoid damage due to different amplitudes and frequencies of vibration of the drum and frame.

[0039] In an embodiment of the present invention, in the dehumidification module 1, an air exhaust passage includes one end in communication with the dehumidification module 1 and the other end connected to the drum by a first bellows hose.

[0040] In this embodiment, the dehumidification module 1 is connected to the interior of the drum through the first bellows hose, to avoid damage to the circulating air exhaust passage and the dehumidification module 1 due to rotation of the drum. The circulating air exhaust passage is used as a passage for a dry air flow obtained through moisture absorption by a rotary wheel module to enter the drum. In some embodiments, a filter assembly is arranged in the air exhaust passage of the drum and is configured to filter the air flow that enters the dehumidification module from the drum.

[0041] In an embodiment of the present invention, the dehumidification module 1 further includes an air intake passage, which may be mounted on the drum, and includes one end in communication with the drum and the other end in communication with the circulation module 3. Further, the dehumidification module further includes a filter assembly arranged in the circulating air intake passage and configured to filter out impurities in the circulating air flow. The filter assembly (which may be a filter screen) is arranged in the circulating air intake passage to remove impurities in the circulating air flow, to keep lint and dust impurities from entering the circulation module 3 and the dehumidification module 1, thereby preventing phenomena such as blockage in the above modules or combustion of impurities. The lint and dust impurities come from the drum. Therefore, the circulating air intake passage being mounted on the drum is beneficial to direct filtering of the circulating air flow, to avoid clogging of the circulating air intake passage and the circulation module 3.

[0042] In an embodiment of the present invention, the regeneration module 2 includes: a regeneration module upper shell 210, in which the regeneration module upper shell 210 includes a heating module 21 accommodating cavity; and

a heating module 21, mounted in the heating module accommodating cavity, in which the heating module 21 is arranged close to a rotary disk 100 in the dehumidification module, and the heating module 21 accommodating cavity is connected to the dehumidification module 1; and the heating module 21 is configured to desorb moisture from at least a part of the rotary disk 100 by heating; and a regenerating fan 22, mounted on a regenerating fan 22 mounting portion, in communication with the condensation module, and configured to transport the low-temperature dry regeneration air flow formed through condensation by the condensation module 4 to the heating module 21, in which the heating module 21 heats a part of the dehumidification module 1 to evaporate moisture absorbed in the dehumidification module 1, and the regenerating fan 22 transports air to the heating module

21 to form a high-temperature regeneration air flow, thereby accelerating restoration of the moisture absorption capability of the dehumidification module 1.

[0043] In an embodiment of the present invention, the heating module 21 includes: a heater, mounted in a first space; a heat conduction member 250, configured to receive heat conducted from the first space; a temperature detection module, configured to detect a temperature in the first space, in which the temperature detection module is mounted in a third space, the third space is a space formed through wrapping by the heat conduction member 250, and the third space and the first space are separated by the heat conduction member 250; and an air distribution member, arranged close to or at an interval from the rotary disk in the dehumidification module, in which the regeneration air flow enters the heating module accommodating cavity and sequentially passes through the air distribution member/heater, the heater/air distribution member, and the rotary disk 100. It may be understood that the heat conduction member 250 may completely isolate the first space and the third space, between which no gas exchange occurs. Alternatively, an opening may be provided on the heat conduction member 250. Partial gas exchange may occur between the first space and the third space. The temperature detection module determines the temperature in the first space by detecting the temperature of the heat conduction member 250.

[0044] The temperature detection module is configured to detect the temperature in a heating region, including the temperature required for heating and dehumidifying laundry or an intermediate medium. The heating module 21 includes a heater, and a source of power is arranged to enable the air flow in the first space to circulate after being heated by the heater, to remove moisture in the intermediate medium to be dehydrated. The intermediate medium here may be, for example, the rotary disk 100. The rotary disk 100 may be made of a material with good moisture absorption performance, which may be, for example, zeolite, lithium chloride, silica gel, modified silica gel, or a 13X (sodium X type) molecular sieve. Therefore, moisture absorbed by the rotary disk 100 may be dehydrated and dried through the heated air flow. During rotation, at least a part of the rotary disk 100 keeps performing moisture absorption, and at least another part keeps being dehydrated and dried, such that the rotary disk 100 undergoes desorption immediately after moisture absorption, and can be regenerated for use by repeating this cycle. The air flow in the first space may be defined as the regeneration air flow in the embodiments of the present invention.

[0045] In this embodiment, as shown in FIG. 3 and FIG. 4, the heating module 21 includes a heater and a temperature detection module. The heater is arranged in the first space. The temperature detection module is configured to detect the temperature in the first space. The temperature detection module is mounted in the third space. The heat conduction member 250 wraps the temperature detection module. The heat conduction member 250 transfers heat received from the first space to the temperature detection module in the third space, to measure the temperature of the regeneration air flow in the first space. The heat conduction member 250 may be made of a metal material that conducts heat easily, which may be, for example, copper or aluminum. The heat conduction member 250 receives heat of the high-temperature regeneration air flow in the second space and transfers the heat to the temperature detection module in the third space, such that the conduction of heat can be uniform, and the temperature detected by the temperature detection module becomes stabilized, thereby improving the accuracy of the detection result. In this way, the temperature detection module can be kept from directly detecting the regeneration air flow in the first space. The regeneration air flow in the first space may have turbulent current/turbulence that leads to frequent fluctuations in the detection result.

[0046] The heat conduction member 250 is mounted in the second space in communication with the first space, and the second space and the third space are separated by the heat conduction member 250. The regeneration air flow is heated by the heater in the first space to turn into the high-temperature regeneration air flow. Because the second space is connected to the first space, the high-temperature regeneration air flow diffuses into the second space. Therefore, the temperature in the first space can be learned by detecting the temperature in the second space.

[0047] In an embodiment of the present invention, as shown in FIG. 5, the regeneration module upper shell 210 includes a base 214, a top wall 212, and a sidewall 213 protruding from the top wall 212. The top wall 212 and the sidewall 213 enclose to form the first space. The base 214 is arranged on a periphery of the sidewall 213, and the base 214 extends toward an outer side away from the first space. A recess is provided on a bottom surface of at least a part of the base 214, and the recess forms the second space.

[0048] Specifically, the heating module 21 may be configured to heat the regeneration air flow, and remove moisture absorbed in the rotary disk 100 by using the high-temperature regeneration air flow. The top wall 212 and the sidewall 213 of the regeneration module upper shell 210 enclose to form the first space, and the heater is mounted in the first space. A recess is provided on the bottom surface of the base 214, and the heat conduction member 250 is mounted in the recess and wraps the temperature detection module.

[0049] In an embodiment of the present invention, as shown in FIG. 6, the regeneration module upper shell 210 is a fan-shaped structure. A heater air inlet 211 is provided on an outer arc side surface of the regeneration module upper shell 210, and a heater air outlet is provided on a side opposite to the top wall 212. The heater air inlet 211, the first space, and the heater air outlet are connected to one another sequentially. The base 214

includes a first side edge. The first side edge extends in a radial direction of the sector shape, and the recess is disposed on the first side edge. Certainly, for more accurate detection, a same recess may be provided on a second side opposite to the first side edge, and the temperature detection module is arranged in the recess.

[0050] Specifically, the regeneration air flow enters through the heater air inlet 211, which is then heated by the heater in the first space, and finally flows out through the heater air outlet. The recess is disposed on the first side edge, and the recess is connected to the first space. The heated high-temperature regeneration air flow diffuses into the recess. The heat conduction member 250 receives heat and transfers the heat to the temperature detection module, to keep the temperature detection module from being directly blown by the regeneration air flow circulating in the first space, thereby reducing fluctuations in the detection result caused by turbulent current/turbulence.

[0051] In an embodiment of the present invention, the heating module 21 further includes a mounting seat 218. The mounting seat 218 is connected and fixed to the first side edge, and the mounting seat 218 is disposed on another side surface of the first side edge away from the recess. The mounting seat 218 is provided with a penetrating mounting hole and forms an approximately hexahedron shape with one opening surface. The temperature detection module is arranged inside the mounting hole. A space formed by the heat conduction member 250 wrapping the opening surface of the mounting seat 218 is the third space. The mounting hole adapts to the temperature detection module. Specifically, the temperature detection module is mounted in the mounting hole, and is wrapped by the heat conduction member 250, to isolate the temperature detection module from the second space, thereby avoiding leakage of the regeneration air flow. A fixing member may be arranged on the mounting seat 218, and the fixing member may be configured to fix a cable connected to the temperature detection module.

[0052] Further, the heat conduction member 250 is in contact with a contact of the temperature detection module. The regeneration air flow circulating in the first space may have turbulent current/turbulence, and the temperature of the regeneration air flow is unstable locally. In some embodiments, a lug structure is arranged on a surface of the heat conduction member 250 facing the second space, to increase the contact area with the high-temperature regeneration air flow and extend the conduction path, such that the temperature of the temperature detection module approaches a stable mean value. The heat conduction member 250 may be arranged as a heat conduction sheet, which is easy to form to wrap the temperature detection module. For example, a protruding portion is arranged on the surface of the heat conduction member 250 facing the second space, and a concave portion is provided on the other surface correspondingly. The temperature detection module may be inserted into the concave portion, and a contact of the temperature detection module may contact the concave portion. In this way, the contact area between the heat conduction member 250 and the regeneration air flow is increased through the protruding portion.

[0053] In an embodiment of the present application, as shown in FIG. 7, the base 214 is connected and mounted to a mounting portion by a thermal buffer member 270.

[0054] In the drying module in the foregoing embodiment, the thermal buffer member 270 is arranged between the heating module 21 and the dehumidification module upper shell to buffer heat generated by the heating module 21, which prevents high-temperature heat from being directly transferred to the dehumidification module upper shell, thereby avoiding damage to the dehumidification module upper shell. The aging of the dehumidification module upper shell is mitigated, and the service life of the drying module is improved.

[0055] In this embodiment, the dehumidification module upper shell accommodating the rotary disk 100 is an integral-form dehumidification module upper shell. A moisture absorption region and a moisture desorption region are arranged on the dehumidification module upper shell. The moisture absorption region and the moisture desorption region divide the dehumidification module upper shell accommodating the rotary disk 100 into at least two functional regions through at least two radial ribs. A heating module 21 mounting portion is arranged in the moisture desorption region of the dehumidification module upper shell to facilitate modular assembly of the heating module 21. The shape of the heating module 21 matches the shape of the moisture desorption region. If the dehumidification module upper shell is a circular structure, the moisture desorption region is a sector-shaped region. In this case, the heating module 21 is a fan-shaped structure, and includes a space formed by upper and lower walls and two sidewalls in a radius direction. A base and a heating member disposed under the base are arranged in the space. A thermostat mounting portion extends outward from a sidewall of the lower wall. Air holes are provided on the base. Air is blown over the base in the radial direction through an air entrance of the heating module 21, and is blown downward over the heating member through the air holes to flow to a rotary wheel part in the moisture absorption region. In this way, an effect of heating and desorbing moisture for the rotary wheel part in the moisture absorption region is formed. The heating member is closely adjacent to the base, to avoid forming a large resistance for air passing through the air holes. The heating member is disposed right below the air holes and slightly deviates in the radius direction. Since a speed exists in the radius direction indicated by the arrow when air is blown inward along the radius and passes through the air holes, with the arrangement of a slight deviation, air that passes through the air holes can be blown right in front of the heating member.

[0056] In some embodiments, the thermal buffer mem-

ber 270 includes a heat insulating member 271.

[0057] The heat insulating member 271 is arranged on a peripheral side of the base, and is configured to prevent high-temperature heat of the heating member from being directly transferred to the dehumidification module upper shell.

[0058] In this embodiment, the heat insulating member 271 is arranged on the peripheral side of the base, i.e., between the heating module 21 and the dehumidification module upper shell. In this way, the heat insulating member 271 can block heat generated by the heating module 21, to prevent high-temperature heat generated by the heating module 21 from being directly transferred to the dehumidification module upper shell, thereby avoiding damage to the dehumidification module upper shell due to the direct transfer of the high-temperature heat to the dehumidification module upper shell. The aging of the dehumidification module upper shell is mitigated, and the service life of the drying module is improved.

[0059] In some embodiments, the heat insulating member 271 may be made of a heat insulating material or a metal material.

[0060] In this embodiment, the heat insulating material is a general name for a thermal insulation material and a cold insulation material. The performance of the heat insulating material may include: a small thermal conductivity coefficient; stable material performance, a clear thermal conductivity coefficient formula, and a large temperature application range; small density; resistance to particular vibration, and particular mechanical strength; good chemical stability, and no corrosiveness; and good waterproof performance, and low moisture absorptivity. The heat insulating material has a small amount of combustible components, and should have characteristics such as self-extinguishing and incombustibility. In order to reduce costs, a metal material may be used. For example, a hardware member is used. The hardware member has a particular heat insulation function, and also has a long service life and good thermal plasticity.

[0061] In some embodiments, the thermal buffer member 270 further includes a seal gasket 272.

[0062] The seal gasket 272 is wrapped outside the heat insulating member 271. Alternatively, the seal gasket 272 is arranged on two sides of the heat insulating member 271 respectively, i.e., the heating module 21, the seal gasket 272, the heat insulating member 271, the seal gasket 272, and the dehumidification module upper shell are sequentially arranged. Alternatively, the seal gasket 272 is only arranged between the heat insulating member 271 and the dehumidification module upper shell.

[0063] In this embodiment, the seal gasket 272 may be arranged along the heat insulating member 271. To further prevent heat dissipation, heat may be transferred according to a preset path, such that while efficient utilization of heat is ensured, heat can be prevented from damaging the dehumidification module upper shell and other modules.

[0064] In some embodiments, the seal gasket 272 may be made of a foam material, a silicone material, or a soft rubber material.

[0065] In this embodiment, the seal gasket 272 is made of a flexible and elastic material, which can change along with the structural change of the heat insulating member 271, and can further improve the airtightness of the moisture desorption region.

[0066] In some embodiments, a preset gap is kept between an arrangement position of the seal gasket 272 and a bottom of the mounting portion.

[0067] In this embodiment, the particular preset gap is kept to reduce a resistance between the drying module and other modules. For example, a rotary wheel may be arranged under the drying module. If the seal gasket 272 is in complete contact with the rotary wheel, a rotational resistance of the rotary wheel is increased, which affects the rotation of the rotary wheel and also reduces the service life of the rotary wheel.

[0068] In some embodiments, the preset gap ranges from 0.2 mm to 5 mm.

[0069] In this embodiment, a preferred range is given for the preset gap. In the range, the seal gasket 272 is not in contact with an adjacent device or module, and also produces a particular sealing effect, thereby avoiding dissipation of heat. Through repeated research and experiments, the effect is good when the preset gap is controlled within 0.6 mm to 0.8 mm.

[0070] In an embodiment of the present invention, a heat-resistant anti-corrosive coating is provided on a surface of the heat conduction member 250 to improve the service life of the heat conduction member 250, such that the heat conduction member 250 can be kept from rusting in a high-temperature humid environment.

[0071] The heating module 21 is mounted in the heating module 21 accommodating cavity, the heating module 21 is disposed above the rotary disk 100, and the heating module 21 accommodating cavity is connected to the rotary disk 100. The heating module 21 is configured to heat the regeneration air flow to desorb moisture absorbed in the rotary disk 100. In some embodiments, the rotary disk 100 member may include the rotary disk 100 and a driving assembly. The driving assembly may include a motor. The motor may drive the rotary disk 100 to rotate. The rotary disk 100 may be made of a material with good moisture absorption performance, which may be, for example, zeolite, lithium chloride, silica gel, modified silica gel, or a 13X (sodium X type) molecular sieve. The wet circulating air flow discharged from the drum enters a bottom of a rotary disk 100 accommodating cavity. The wet circulating air flow in a dehumidification region passes through the rotary disk 100 from bottom to top. The rotary disk 100 absorbs moisture in the wet circulating air flow to make the wet circulating air flow turn into a dry circulating air flow. The dry circulating air flow enters the drum through an air inlet of the drum to fully contact laundry, thereby improving drying efficiency and reducing energy consumption. A regeneration mem-

ber may include a heater configured to heat the regeneration air flow. The heated regeneration air flow flows through the heating module 21 accommodating cavity and passes through the rotary disk 100 from top to bottom, to dehydrate and dry the part of the rotary disk 100 in a regeneration region. During rotation, the rotary disk 100 cyclically passes through the dehumidification region and the regeneration region, which is a process of continuously absorbing moisture and desorbing moisture. In this way, the dry circulating air flow may be continuously obtained and enter the drum to fully contact laundry, thereby improving the drying efficiency and reducing energy consumption.

[0072] Specifically, the regeneration module upper shell 210 may include: a first top wall and a first sidewall protruding from a periphery of the first top wall for forming the heating module 21 accommodating cavity and a base 214 protruding outward along the first sidewall. A mounting hole may be provided on the base 214, through which the base may be connected and fixed to the rotary disk 100 upper shell 110.

[0073] In some embodiments, as shown in FIG. 8, to make the fed regeneration air flow receive heat more uniformly and dehydrate and dry the rotary disk 100 more uniformly, in a preferred solution, the heating module 21 includes an air distribution member and a heater that are stacked. The heater is disposed between the air distribution member and the rotary disk 100. The regeneration air flow enters the heating module 21 accommodating cavity, and sequentially passes through the air distribution member, the heater, and the rotary disk 100. The air distribution member may be arranged upstream or downstream the heater, and certainly, being arranged upstream is preferable. The air distribution member guides an air flow that enters a heater accommodating space to enable the regeneration air flow to fully transfer heat of the heater to the rotary disk 100. In this case, the heater is closer to the rotary disk 100, and the air distribution member is arranged at an interval from the rotary disk 100. Alternatively, the air distribution member is arranged downstream the heater. In this case, the benefit is that the regeneration air flow first fully contacts the heater to make the temperature of the regeneration air flow rise uniformly, and then the hot air flow is guided by the air distribution member to flow to the rotary disk 100. In this case, the air distribution member and the rotary disk 100 are arranged adjacent to each other, and the heater and the rotary disk 100 are arranged at an interval. In addition to uniform air flow distribution and guidance, the air distribution member can further protect heating pipes of the heater to some extent. Alternatively, the air distribution member may be omitted, and the regeneration air flow directly flows to the rotary disk 100 after flowing through the heater. In this case, costs can be reduced, and mechanism complexity can be reduced.

[0074] In some embodiments, the regeneration module upper shell 210 is a fan-shaped structure. The heater air inlet 211 is arranged on the outer arc side surface of the regeneration module upper shell 210. In the embodiments of the present invention, as a preferred solution, the regeneration module upper shell 210 is a fan-shaped structure. The regeneration module upper shell 210 may be an irregular structure, which is not excessively limited herein. The regeneration module upper shell 210 is fittingly connected to the rotary disk 100 upper shell 110 to separate the dehumidification region and the regeneration region. That is, the wet circulating air flow in the dehumidification region and the regeneration air flow in the regeneration region can be isolated to a great extent.

[0075] In some embodiments, a gap exists between the air distribution member and the top wall of the regeneration module upper shell 210 to form a third air flow passage. The third air flow passage is connected to the heater air inlet 211. A gap exists between a bottom surface of the rotary disk 100 and an inner wall of a regeneration region of a rotary disk 100 lower shell 120 to form a fourth air flow passage. The regeneration air flow enters the third air flow passage through the heater air inlet 211. The air distribution member may make the regeneration air flow contact the heater more uniformly. The regeneration air flow that receives heat uniformly desorbs moisture in the part of the rotary disk 100 in the regeneration region.

[0076] In some embodiments, the air distribution member includes an air distribution plate 230 and a side plate protruding from a periphery of the air distribution plate 230. The air distribution plate 230 and the side plate enclose to form a heater accommodating region, and the heater is arranged in the heater accommodating region. The air distribution plate 230 has a fan shape, and air holes 231 distributed at intervals are provided on the air distribution plate 230. Through the arrangement of the air holes, the regeneration air flow can enter the heater below more uniformly.

[0077] In some embodiments, the heater includes a plurality of heating pipes 240 connected from tail to end, and the heating pipes 240 are distributed at intervals in the radius direction of the sector shape. The length of the heating pipes 240 is arranged approximately perpendicular to the radius direction of the sector shape. The heating pipes 240 are distributed in an S shape, such that the length distribution of the heating pipes 240 is longer in the heater accommodating region, to increase the contact area with the regeneration air flow, thereby improving the efficiency of heat exchange with the regeneration air flow.

[0078] In some embodiments, the air holes are arranged in rows, and an arrangement position of each row of air holes approximately corresponds to a position of each of the heating pipes 240. Diameters of the air holes have a trend of decreasing from an outer arc toward a center of circle in the radius direction of the sector shape. The heater air inlet 211 is disposed on the outer arc side surface of the regeneration module upper shell 210. The air holes arranged closer to the heater air inlet 211 have larger diameters, and the air holes far away

from the heater air inlet 211 have smaller diameters.

[0079] In some embodiments, the heating pipes 240 are disposed below the air holes. An axis of each of the heating pipes 240 is arranged to deviate from a centerline of each corresponding row of air holes, and the centerline of each row of air holes is closer to the heater air inlet 211 than the axis of the heating pipe 240. The heating pipes 240 are disposed below the air holes, and the heating pipes 240 are close to the air distribution plate 230, or in other words, are closely adjacent to the air distribution plate 230, such that a large resistance will not be formed for the regeneration air flow passing through the air holes. The heating pipes 240 may be fixed on the air distribution plate 230 by pipe clips, and particular gaps may exist between the heating pipes 240 and the air distribution plate 230 to allow the passage of the regeneration air flow. When being blown in through the heater air inlet 211, the regeneration air flow is blown inward in the radius direction of the sector shape, and a speed exists in a flow direction of the regeneration air flow. Therefore, the centerline of each row of air holes being arranged to slightly deviate can allow the regeneration air flow that passes through the air holes to be blown right in front of the heating pipes 240, to implement higher efficiency of heat exchange between the regeneration air flow and the heating pipes 240.

[0080] In some embodiments, the regeneration module upper shell 210 is a fan-shaped structure. The heater air inlet 211 is arranged on the sidewall of the regeneration module upper shell 210. The sidewall is arranged in the radial direction of the sector shape. A direction in which the regeneration air flow enters the heating module 21 accommodating cavity is arranged opposite to a rotational direction of the rotary disk 100. That is, in a direction the same as or opposite to the rotational direction of the rotary disk 100, the regeneration air flow is blown into the heater accommodating space in a direction approximately perpendicular to the radius of the regeneration module with a sector shape, such that the temperature of the air flow can be increased by the heater more uniformly.

[0081] In some embodiments, the heater includes a plurality of heating pipes 240 connected from tail to end, and the heating pipes 240 are distributed at intervals in the radial direction of the sector shape. The length of the heating pipes 240 is arranged to be parallel to a sidewall opposite to the heater air inlet 211. Certainly, the heating pipes 240 may be arranged approximately in a radial direction of the heating module. In this case, an air intake direction perpendicular to the radius direction is used, thereby implementing better uniform air flow distribution and heating.

[0082] The regeneration module provided in the embodiments of the present invention is described below in detail with reference to the flow direction of the regeneration air flow.

Embodiment 1

[0083] The heater air inlet 211 is disposed on the outer arc side surface of the regeneration module upper shell 210. The regeneration module upper shell 210 is a fan-shaped structure. A regeneration air flow enters the third air flow passage from the heater air inlet 211 in the radial direction, passes through the air holes on the air distribution plate 230 to enter the heater accommodating region, and performs heat exchange with the heating pipes 240. A heated high-temperature regeneration air flow passes through the rotary disk 100 to dehydrate and dry the part of the rotary disk 100 in the regeneration region. The diameters of the air holes have a trend of decreasing from the outer arc toward the center of circle in the radius direction of the sector shape. The heating pipes 240 are distributed in an S shape. The heating pipes 240 are distributed at intervals in the radius direction of the sector shape, and the length of the heating pipes 240 is arranged approximately perpendicular to the radius direction of the sector shape. Since the air holes on the air distribution plate 230 are arranged corresponding to the heating pipes 240, the air holes arranged closer to the heater air inlet 211 have larger diameters, and the air holes far away from the heater air inlet 211 have smaller diameters. That is, flow rates of the heated high-temperature regeneration air flow received by the rotary disk 100 in the regeneration region uniformly or non-uniformly decrease from the outer arc to the center of circle in the radius direction of the sector shape, such that the rotary disk 100 can be heated and dried more uniformly.

Embodiment 2

[0084] The same content in Embodiment 1 and Embodiment 2 is not described in detail again, and differences between Embodiment 2 and Embodiment 1 lie in the following.

[0085] The heater air inlet 211 is disposed on the sidewall of the regeneration module upper shell 210, and the sidewall is arranged in the radial direction of the sector shape. The flow direction of the regeneration air flow is arranged in a direction opposite to or the same as the rotational direction of the rotary disk 100. The regeneration air flow enters the third air flow passage from the heater air inlet 211, passes through the air holes on the air distribution plate 230 to enter the heater accommodating region, and performs heat exchange with the heating pipes 240. A heated high-temperature regeneration air flow passes through the rotary disk 100 from top to bottom to dehydrate and dry the part of the rotary disk 100 in the regeneration region. The heating pipes 240 are distributed in an S shape. The length of the heating pipes 240 is arranged to be parallel to the sidewall opposite to the heater air inlet 211, and the heating pipes 240 are distributed at intervals in the radial direction of the sector shape. The air holes on the air distribution plate 230 are arranged corresponding to the heating pipes 240. There-

fore, on a side away from the heater air inlet 211, the air holes on the air distribution plate 230 are arranged denser and have larger diameters. The flow rate of the heated high-temperature regeneration air flow is controlled by the arrangement of the air holes. When the rotary disk 100 absorbs moisture in the wet circulating air flow in the dehumidification region and rotates to the regeneration region, a high-temperature regeneration air flow with a large flow rate first dehydrates and dries the part of the rotary disk 100. Then when the rotary disk 100 rotates through the regeneration region, the flow rate of the high-temperature regeneration air flow is gradually reduced, such that the rotary disk 100 can be heated and dried more uniformly.

[0086] As shown in FIG. 12, the condensation module 4 may specifically further include a condensation module upper shell 401 and a condensation module lower shell 402. The condensation module upper shell 401 and the condensation module lower shell 402 may be fittingly connected to form a condenser accommodating cavity, and a condenser 43 is mounted in the condenser accommodating cavity. The arrows in FIG. 9 are the flow directions of the regeneration air flow. The regeneration air flow passes through the rotary disk 100 from top to bottom to reach the fourth air flow passage, and the regeneration air flow that turns wet and hot flows into the condensation module lower shell 402, and enters the condenser 43 to perform heat exchange for temperature reduction.

[0087] In some embodiments, the drying module further includes: a first connecting member 3013 having two ends in communication with the condenser and a regenerating fan 22 respectively, to enable the regeneration air flow to pass through the condenser 43 to enter the regenerating fan 22; and a second connecting member 3014 having two ends in communication with the regenerating fan 22 and the heater air inlet, to enable the regeneration air flow to pass through the regenerating fan 22 to enter the third air flow passage. Because the condenser 43 is very close to the regenerating fan 22, a rigid pipe joint shown in FIG. 11 may be used, such that the regenerating fan 22 can be supported, and the overall structure of the drying module can be compact and occupy a small space. Certainly, the first connecting member 3013 may be a flexible member that can be conveniently joined to the two rigid structures, i.e., the condenser and an air inlet of the regenerating fan 22.

[0088] In some embodiments, the first connecting member 3013 includes a first air inlet and a first air outlet. The first air inlet adapts to and is connected to an air outlet of the condenser. The first air outlet adapts to and is connected to an air inlet of the regenerating fan 22. The first air inlet is an approximately rectangular opening. The first air outlet is an approximately circular opening. A plane on which the first air inlet is disposed and a plane on which the first air outlet is disposed are arranged approximately perpendicular, to adjust the flow direction of the regeneration air flow. A rectangular connecting flange or a flexible boundary is arranged on an end surface of the first air inlet of the first connecting member 3013, such that the first air inlet is deformable to be placed in the air outlet of the condenser, and is connected and fixed to the condensation module upper shell 401 and the condensation module lower shell 402. The first connecting member 3013 has an irregular shaped shell structure. An air duct in the first connecting member 3013 gradually transitions from a rectangular cross-section at the first air inlet to a circular cross-section at the first air outlet, thereby ensuring smooth air guidance by the first connecting member 3013.

[0089] In some embodiments, the second connecting member 3014 includes a second air inlet and a second air outlet. The second air inlet adapts to and is connected to an air outlet of the regenerating fan 22. The second air outlet adapts to and is connected to the heater air inlet. The second air inlet is an approximately rectangular opening. The second air outlet is an approximately arc-shaped opening. A plane on which the second air inlet is disposed and a plane on which the second air outlet is disposed are arranged approximately in parallel. An area of the second air outlet is larger than that of the second air inlet. An air duct in the second connecting member 3014 gradually expands from the second air inlet to the second air outlet, such that dynamic pressure energy of the air flow is further converted into static pressure energy, thereby improving operating performance of the fan, and minimizing turbulent current.

[0090] The washer-dryer machine proposed in the present invention includes a drum and a frame, and includes the drying module in any foregoing technical solution, and therefore has all the advantages and beneficial effects of the drying module in any foregoing technical solution.

[0091] It should be understood that the above specific embodiments of the present invention are used only for exemplary description or explanation of the principles of the present invention, and do not constitute a limitation on the present invention. Accordingly, any modification, equivalent replacement, improvement, or the like made without departing from the spirit and scope of the present invention shall be included in the scope of protection of the present invention. In addition, the claims appended to the present invention are intended to cover all variations and modifications of examples that fall within the scope and boundaries of the appended claims, or the equivalent form of such scope and boundaries.

Claims

1. A drying module, comprising:

a circulation module (3), in communication with a drum, wherein the circulation module (3) outputs a wet circulating air flow from the drum to a dehumidification module (1) for dehumidifica-

tion;
the dehumidification module (1), in communication with the circulation module (3) and the drum, wherein the dehumidification module (1) is configured to absorb moisture from the wet circulating air flow from the drum, and output a dry circulating air flow to the drum;
a regeneration module (2), mounted on a shell of the dehumidification module (1), wherein the regeneration module (2) is in communication with a part of air flow in the dehumidification module (1) disposed in a regeneration air flow passage, to output a dry regeneration air flow to the part of the dehumidification module (1) to desorb moisture from at least a part of the dehumidification module (1); and
a condensation module (4), in communication with a regeneration air flow outlet of the regeneration module (2), and configured to condense the regeneration air flow outputted by the regeneration module (2) to form a low-temperature dry air flow, wherein
the dehumidification module (1) is connected and fixed to the circulation module (3) and the condensation module (4) respectively to form an integral module.

2. The drying module according to claim 1, wherein a joining portion (50) is arranged on a periphery of the integral module, and is configured to fixedly connect the integral module to a frame.

3. The drying module according to claim 1, wherein the dehumidification module (1) comprises a dehumidification module upper shell and a dehumidification module lower shell; the regeneration module (2) comprises a regeneration module upper shell (210) and a regeneration module lower shell; the circulation module (3) comprises a circulation module upper shell and a circulation module lower shell; and the condensation module comprises a condensation module upper shell and a condensation module lower shell;

the dehumidification module lower shell, the regeneration module lower shell, the circulation module lower shell, and the condensation module lower shell are integrally formed into a drying module lower shell; and
the joining portion (50) is arranged on the drying module lower shell.

4. The drying module according to claim 1, wherein one end of a circulating air exhaust passage is in communication with the dehumidification module (1) and the other end is connected to the drum by a first bellows hose.

5. The drying module according to claim 1, wherein a circulating air intake passage is mounted on the drum, and one end of the circulating air intake passage is in communication with the drum and the other end is in communication with the circulation module (3).

6. The drying module according to claim 5, wherein a filter assembly is arranged in the circulating air intake passage, and is configured to filter out impurities in the circulating air flow.

7. The drying module according to claim 1, wherein the dehumidification module (1), the regeneration module (2), the circulation module (3), and the condensation module (4) are separate, and form an integral module through fixed connection.

8. The drying module according to claim 1, wherein the regeneration module upper shell (210) comprises a heating module accommodating cavity; and
a heating module (21), mounted in the heating module accommodating cavity, wherein the heating module (21) is arranged close to a rotary disk in the dehumidification module, and the heating module accommodating cavity is in communication with the dehumidification module (1); and the heating module (21) is configured to desorb moisture from at least a part of the rotary disk (100) by heating.

9. The drying module according to claim 8, wherein the heating module comprises:

a heater, mounted in a first space;
a heat conduction member (250), configured to receive heat conducted from the first space;
a temperature detection module, configured to detect a temperature in the first space, wherein the temperature detection module is mounted in a third space, the third space is a space formed through wrapping by the heat conduction member (250), and the third space and the first space are separated by the heat conduction member (250); and
an air distribution member, arranged close to or at an interval from the rotary disk in the dehumidification module (1), wherein the regeneration air flow enters the heating module accommodating cavity and sequentially passes through the air distribution member/heater, the heater/air distribution member, and the rotary disk.

10. The drying module according to claim 9, wherein the heat conduction member (250) is mounted in a second space in communication with the first space, and the second space and the third space are separated by the heat conduction member (250).

11. The drying module according to claim 9, wherein

the regeneration module upper shell (210) comprises a base (214), a top wall (212), and a sidewall (213) protruding from the top wall (212), the top wall (212) and the sidewall (213) enclose to form the first space, the base (214) is arranged along a periphery of the sidewall (213), and the base (214) extends toward an outer side away from the first space; and
a recess is provided on a bottom surface of the base (214), and the recess forms the second space.

12. The drying module according to claim 11, wherein the regeneration module upper shell (210) is a sector-shaped structure;

a heater air inlet (211) is provided on an outer arc side surface of the regeneration module upper shell (210), and a heater air outlet is provided on a side opposite to the top wall (212), wherein the heater air inlet (211), the first space, and the heater air outlet are in communication with one another sequentially; and
the base (214) at least comprises a first side edge, the first side edge extends in a radial direction of a sector shape, and the recess is disposed on the first side edge.

13. The drying module according to claim 12, wherein the base (214) is connected and mounted to the heating module accommodating cavity by a thermal buffer member (270).

14. The drying module according to claim 12, wherein the thermal buffer member (270) comprises a heat insulating member (271); and the heat insulating member (271) is arranged on a peripheral side of the base, and is configured to prevent high temperature of the heating member from being directly transferred to the shell.

15. The drying module according to claim 12, wherein the thermal buffer member (270) further comprises a seal gasket (272); and the seal gasket (272) is wrapped outside the heat insulating member (271).

16. The drying module according to claim 15, wherein a preset gap is maintained between an arrangement position of the seal gasket (272) and a bottom of a mounting portion.

17. The drying module according to claim 16, wherein the preset gap ranges from 0.2 mm to 5 mm.

18. The drying module according to claim 12, wherein the heating module comprises a mounting seat (218), the mounting seat (218) is connected and fixed to the first side edge, and the mounting seat (218) is disposed on another side surface of the first side edge away from the recess;

the mounting seat (218) is provided with a penetrating mounting hole and forms an approximately hexahedron shape with one opening surface, the temperature detection module is arranged inside the mounting hole, and a space formed by the heat conduction member (250) wrapping the opening surface of the mounting seat (218) is the third space; and
the mounting hole adapts to the temperature detection module.

19. The drying module according to claim 9, wherein the heat conduction member (250) is in contact with a contact of the temperature detection module.

20. The drying module according to claim 9, wherein a heat-resistant anti-corrosive coating is provided on a surface of the heat conduction member (250).

21. The drying module according to claim 9, wherein the air distribution member comprises an air distribution plate (230) and a side plate protruding from a periphery of the air distribution plate (230), the air distribution plate (230) and the side plate enclose to form a heater accommodating region, and the heater is arranged in the heater accommodating region; and the air distribution plate (230) has a sector shape, and air holes (231) distributed at intervals are provided on the air distribution plate (230).

22. The drying module according to claim 9, wherein the heater comprises a plurality of heating pipes connected from tail to end, and the heating pipes are distributed at intervals in a radius direction of the sector shape; and
a length of the heating pipes is arranged in parallel to a sidewall opposite to a heater air inlet.

23. The regeneration module according to claim 22, wherein the air holes (231) are arranged in rows, and an arrangement position of each row of air holes (231) corresponds to a position of the heating pipes; and
diameters of the air holes (231) have a trend of decreasing from an outer arc toward a center of circle in the radius direction of the sector shape.

24. The regeneration module according to claim 23, wherein the heating pipes are disposed below the air holes (231); and
an axis of the heating pipe is arranged to deviate from a centerline of each corresponding row of air holes (231), and the centerline of each row of air holes

(231) is closer to the heater air inlet than the axis of the heating pipe.

25. The regeneration module according to claim 20, wherein a direction in which the regeneration air flow enters the heating module accommodating cavity is arranged to be opposite to or the same as a rotational direction of the rotary disk.

26. A washer-dryer machine, comprising a drum and a frame, and comprising the drying module according to any one of claims 1 to 25.

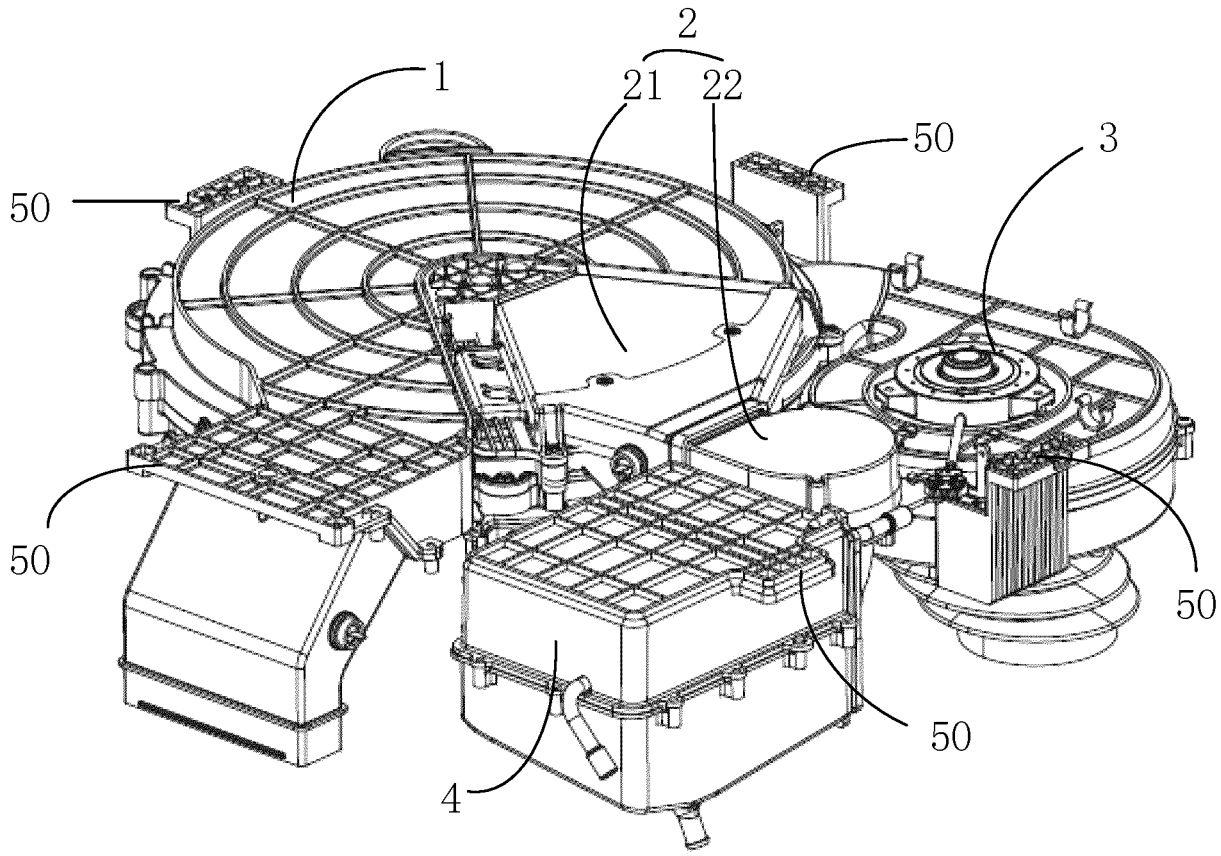

FIG.1

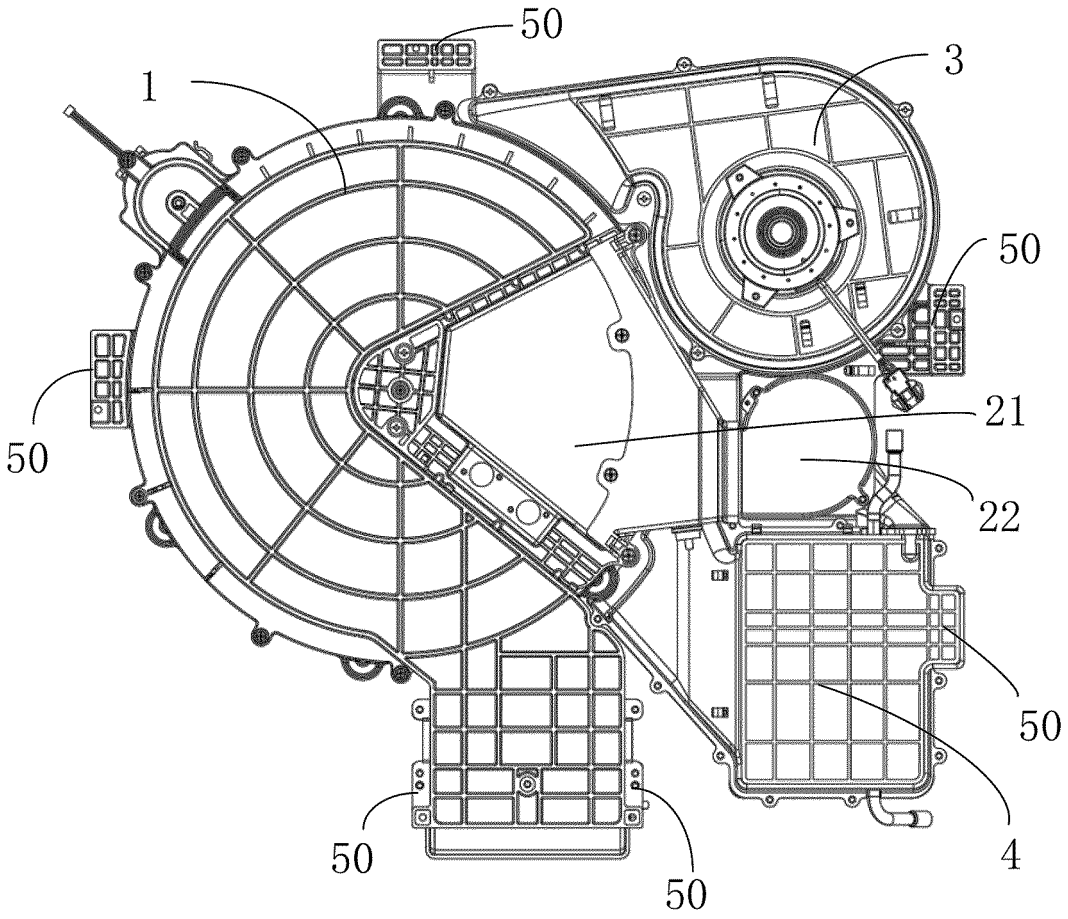

FIG.2

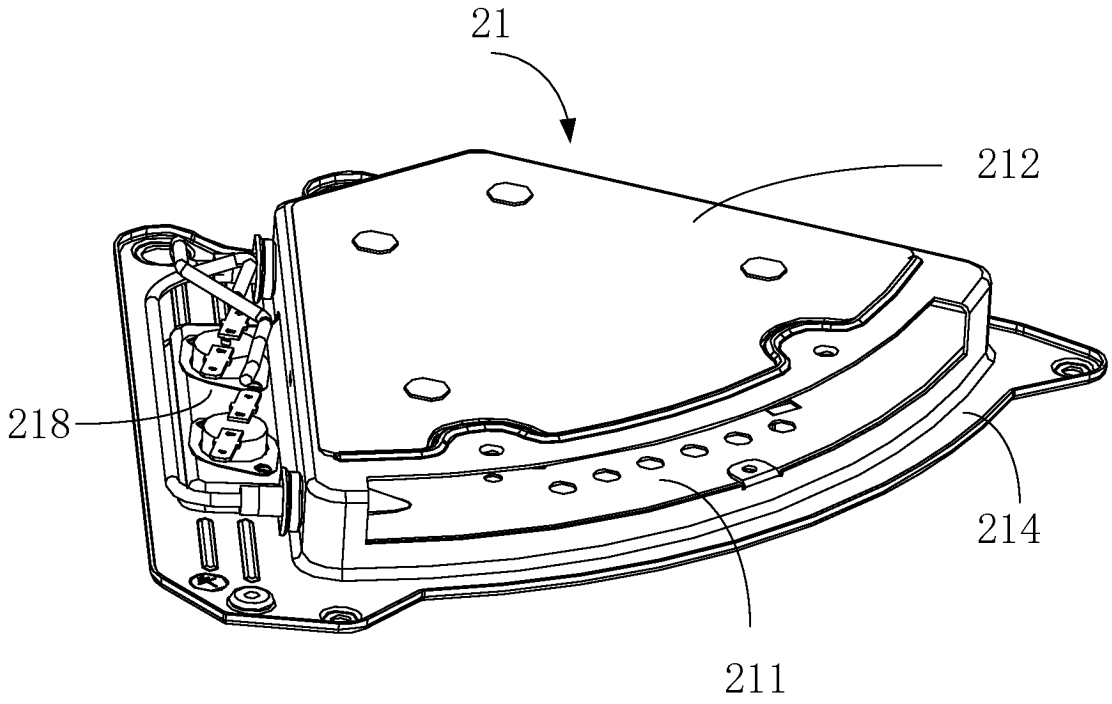

FIG.3

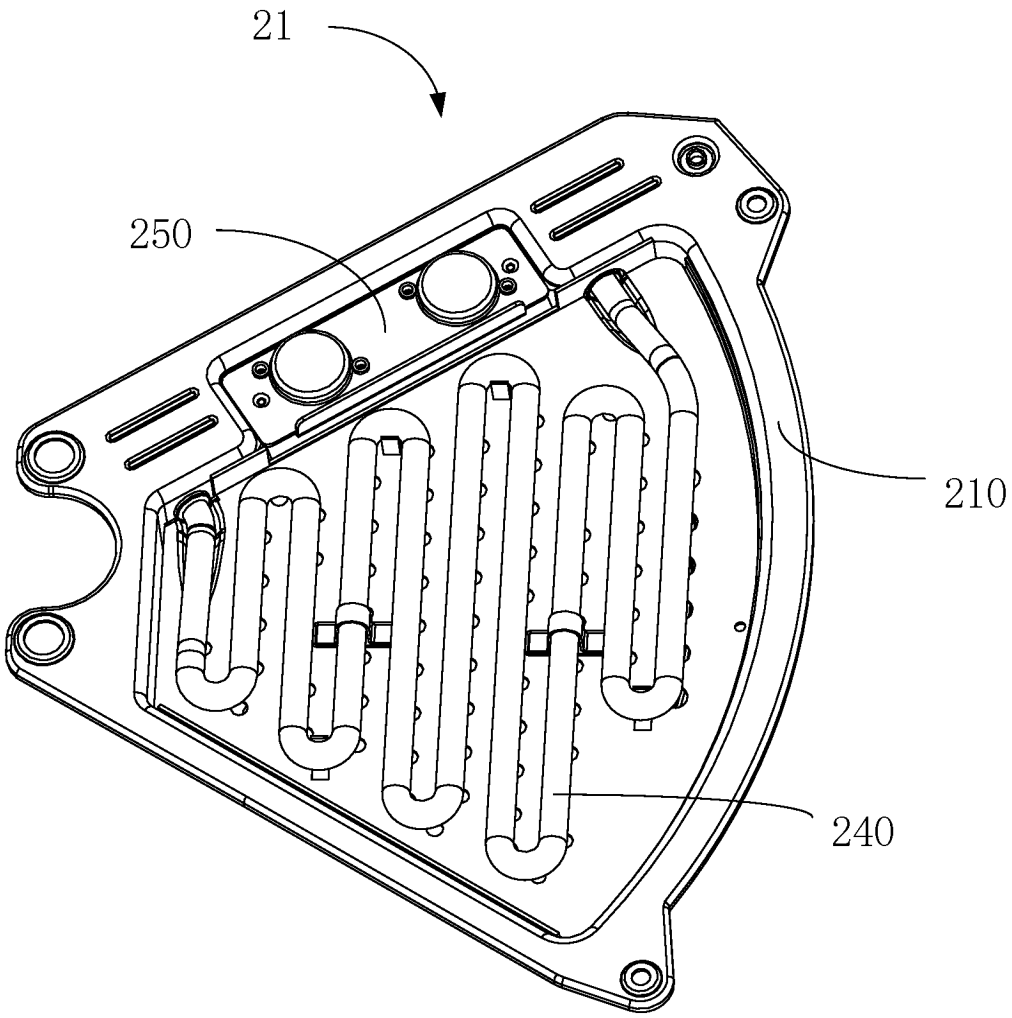

FIG.4

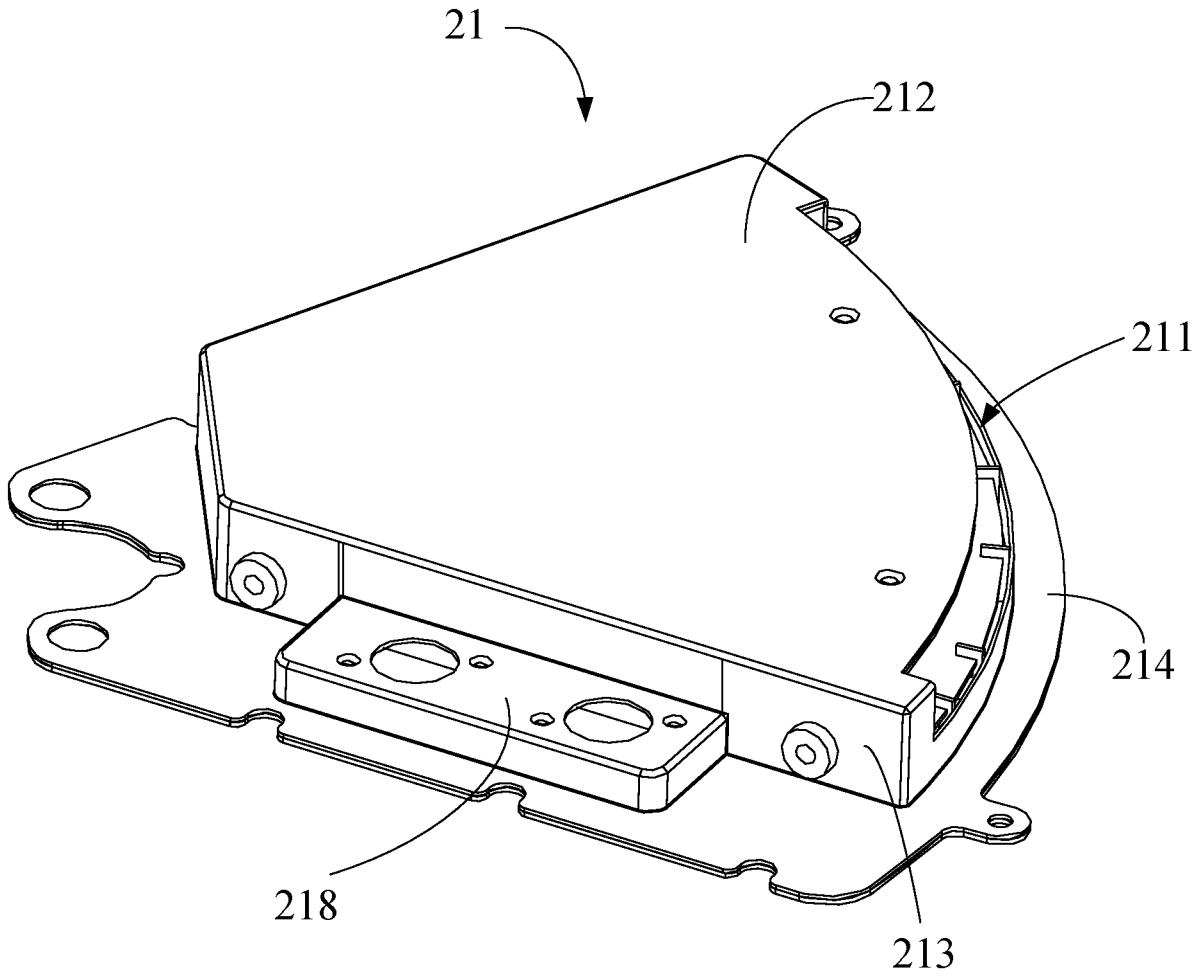

FIG.5

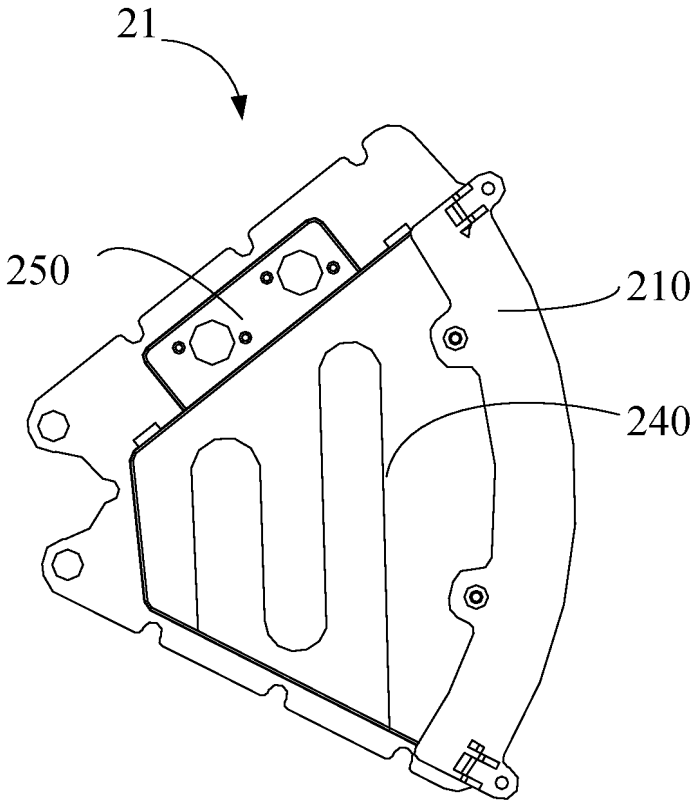

FIG.6

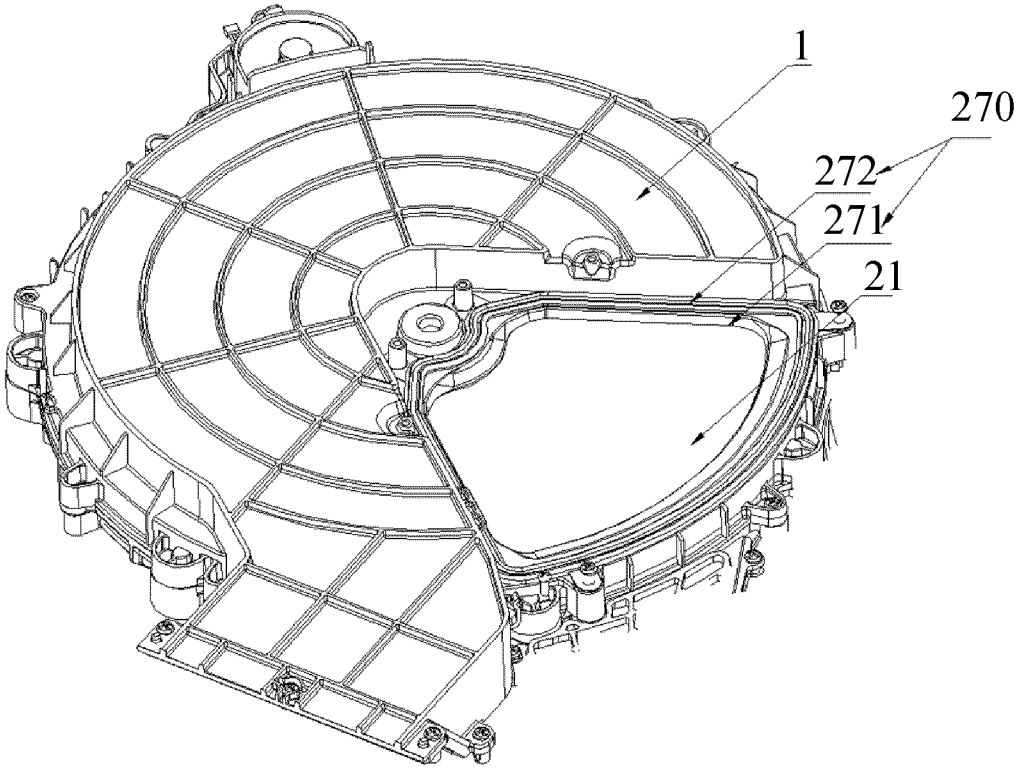

FIG.7

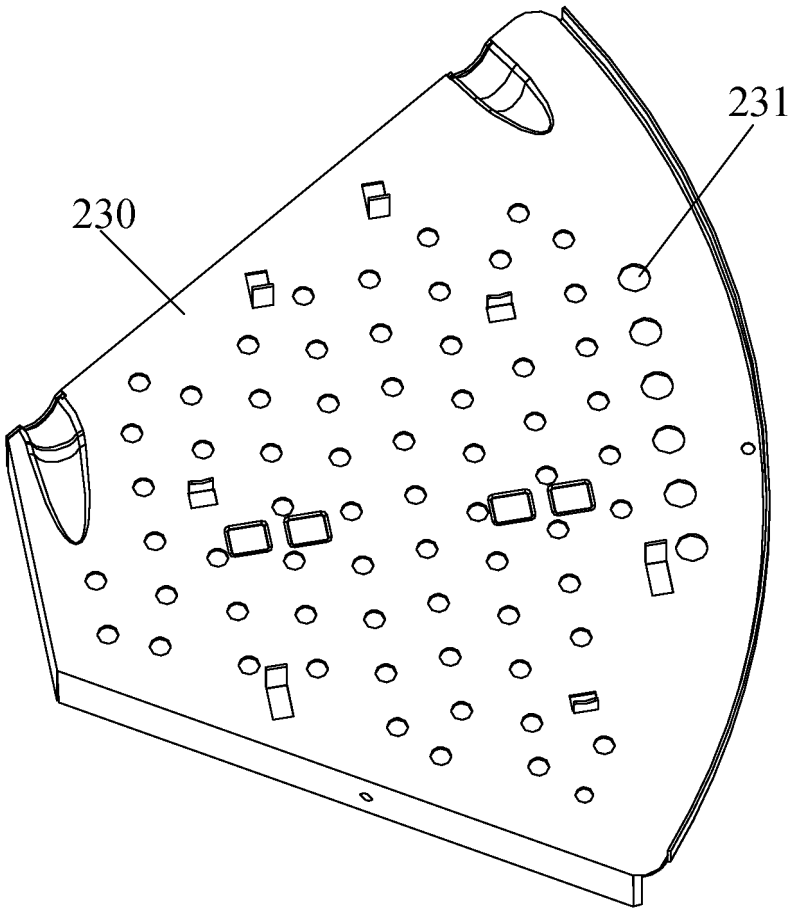

FIG.8

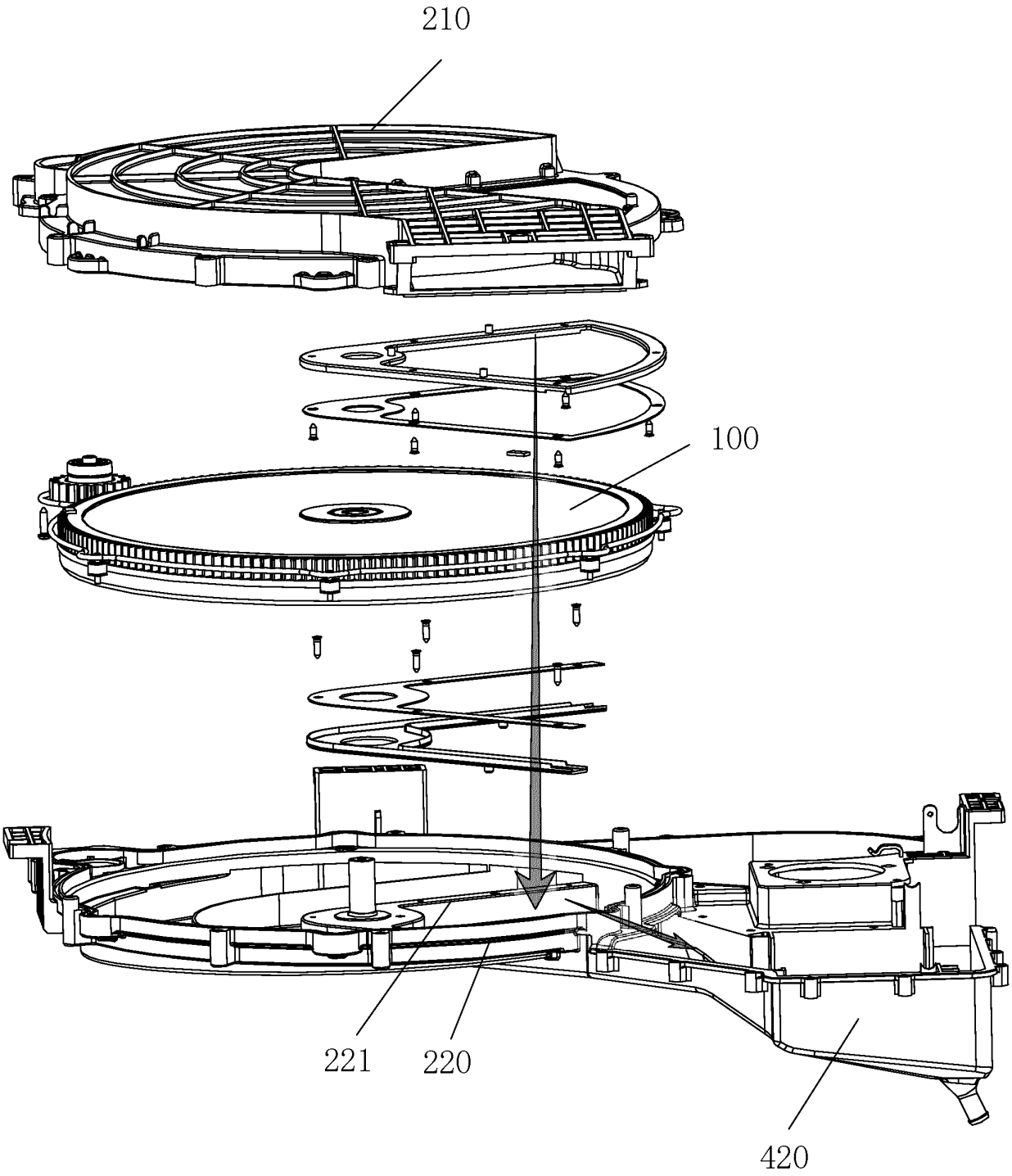

FIG.9

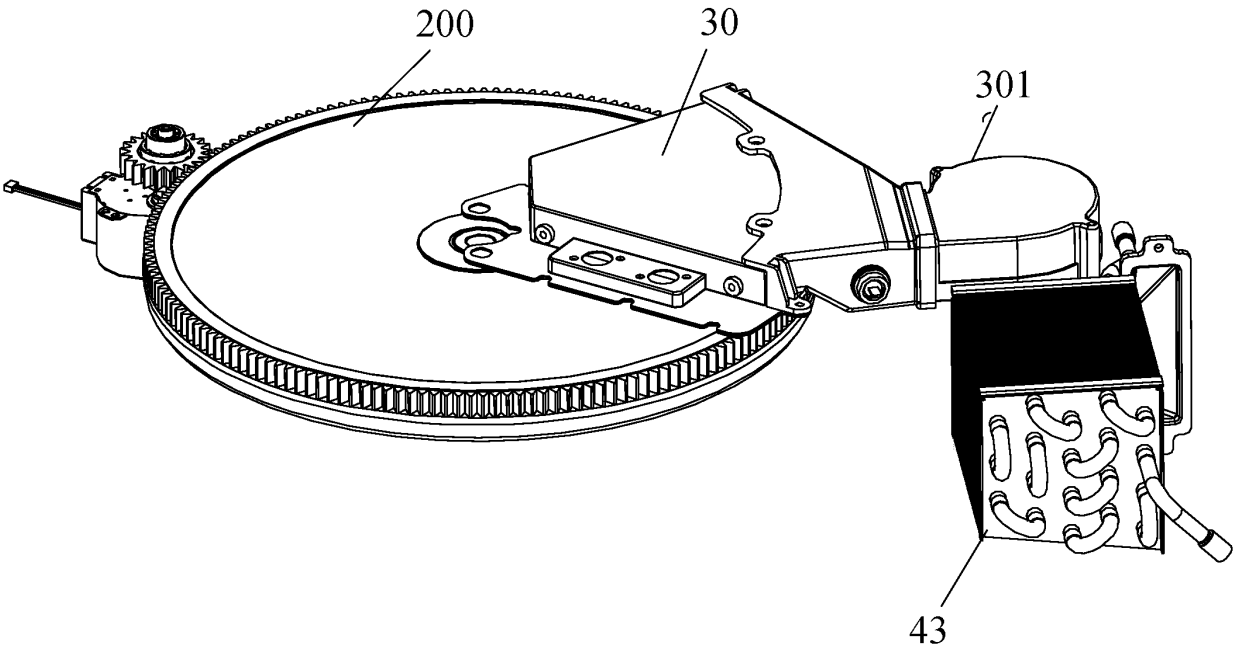

FIG.10

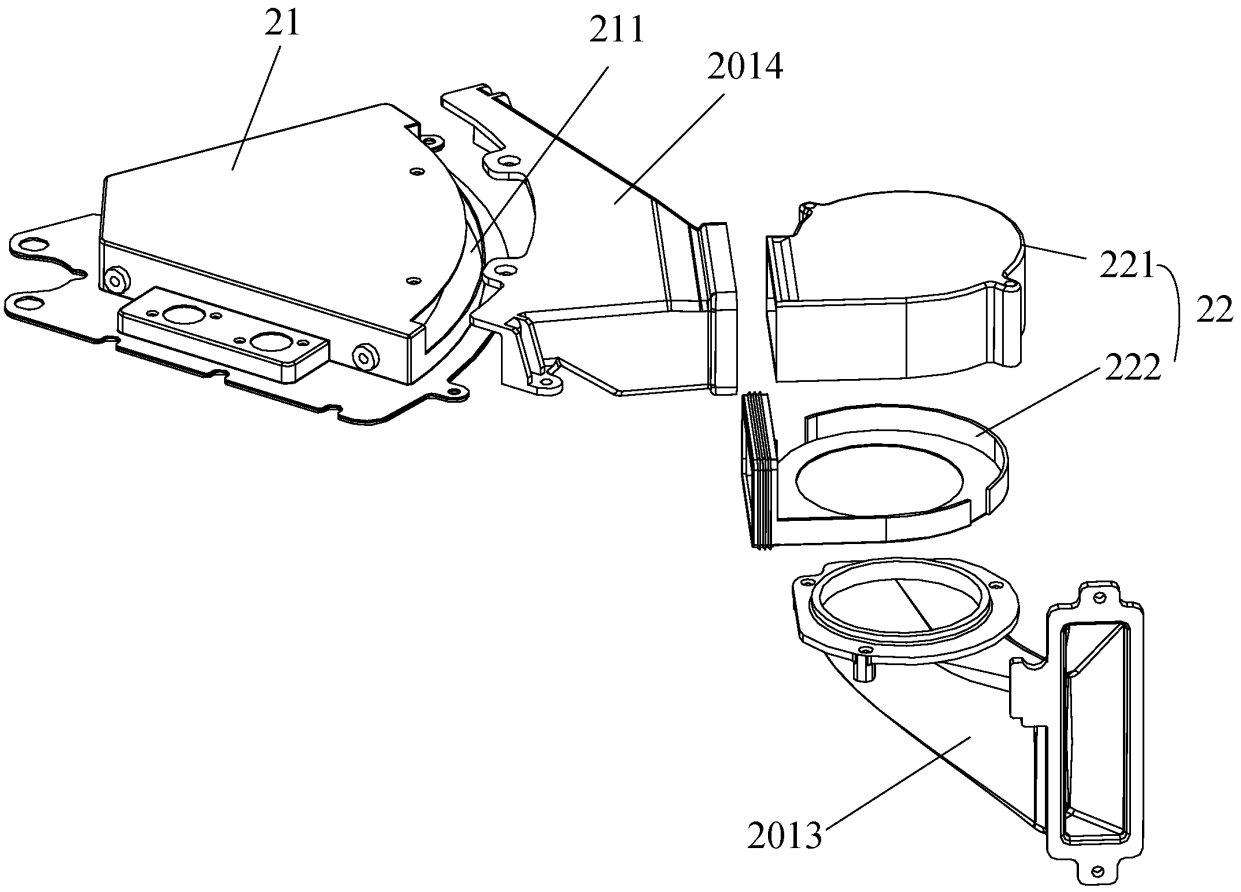

FIG.11

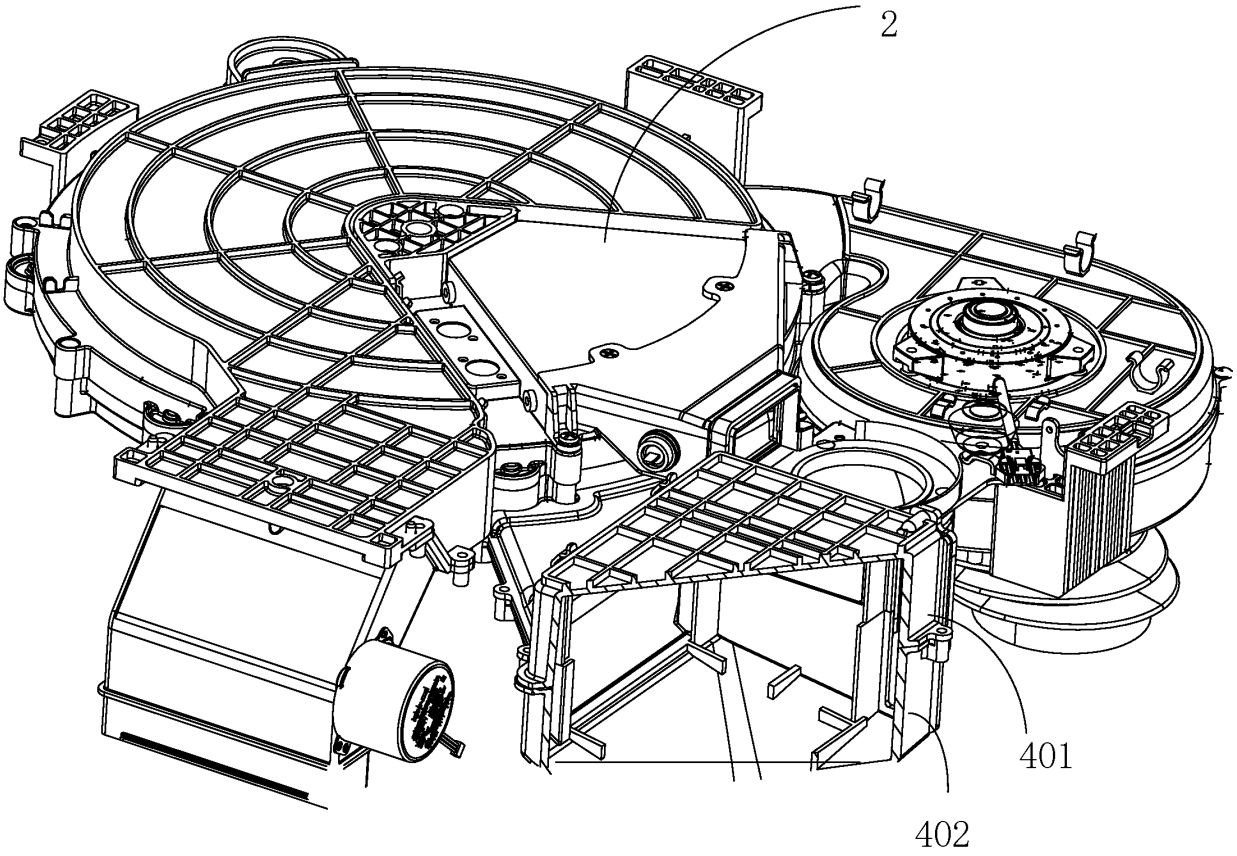

FIG.12

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2023/077475

A. CLASSIFICATION OF SUBJECT MATTER

D06F58/00(2020.01)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)

IPC: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; CNABS; CNTXT; DWPI; SIPOABS: 循环, 除湿, 吸湿, 吸收, 再生, 冷凝, 加热, 转, dehumidify???, absor, heat???, rotat???, dry???, circulat???, condens+, rebirth???, regenerat???

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 218492018 U (SHENZHEN LUOKE INNOVATION TECHNOLOGY CO., LTD.) 17 February 2023 (2023-02-17) description, paragraphs [0037]-[0050], and figure 1	1-26
PX	CN 218492015 U (SHENZHEN LUOKE INNOVATION TECHNOLOGY CO., LTD.) 17 February 2023 (2023-02-17) description, paragraphs [0042]-[0094], and figures 1-11	1-26
PX	CN 218492016 U (SHENZHEN LUOKE INNOVATION TECHNOLOGY CO., LTD.) 17 February 2023 (2023-02-17) description, paragraphs [0033]-[0046], and figures 1-4	1-26
PX	CN 115198476 A (SHENZHEN LUOKE INNOVATION TECHNOLOGY CO., LTD.) 18 October 2022 (2022-10-18) description, paragraphs [0058]-[0107], and figures 1-13	1-26
X	CN 216585700 U (BEIJING ROBOROCK TECHNOLOGY CO., LTD.) 24 May 2022 (2022-05-24) description, paragraphs [0037]-[0072], and figures 1-6	1-26

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

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"D" document cited by the applicant in the international application
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
13 April 2023	**24 April 2023**

Name and mailing address of the ISA/CN	Authorized officer
China National Intellectual Property Administration (ISA/CN) **China No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088**	
Facsimile No. **(86-10)62019451**	Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2023/077475

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X	CN 105297372 A (QINGDAO HAIER WASHING MACHINE CO., LTD.) 03 February 2016 (2016-02-03) description, paragraphs [0041]-[0066], and figures 1-3	1-26
X	CN 105324528 A (LG ELECTRONICS INC.) 10 February 2016 (2016-02-10) description, paragraphs [00412]-[0144], and figures 1-4	1-26
X	JP 3856238 B1 (TOTO LTD.) 13 December 2006 (2006-12-13) abstract and figures 1-16	1-26
X	JP 2007075241 A (MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.) 29 March 2007 (2007-03-29) abstract, and figures 1-9	1-26
X	JP 2004144455 A (MAX CO., LTD.) 20 May 2004 (2004-05-20) abstract, and figures 1-13	1-26
X	JP H1176696 A (SHARP K.K.) 23 March 1999 (1999-03-23) abstract, and figures 1-4	1-26
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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2023/077475

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CN 218492016 U	17 February 2023	None	
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JP 2004144455 A	20 May 2004	None	
JP H1176696 A	23 March 1999	None	
CN 114753130 A	15 July 2022	None	

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