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(54) CLOTHING TREATMENT EQUIPMENT

(57) Clothing treatment equipment, comprising: a clothing accommodating space (1100) used for accommodating clothing to be treated; and a drying module (2000) used for drying the clothing. The drying module (2000) comprises a moisture absorption member (2200); the moisture absorption member comprises a moisture absorption rotating disc (2201), an outer peripheral housing of the moisture absorption rotating disc, and a circumferential shock absorber; the outer peripheral housing comprises an outer peripheral upper clamping housing and an outer peripheral lower clamping housing, and surrounds the outer periphery of the moisture absorption rotating disc; the circumferential shock absorber is arranged on the outer periphery of the moisture absorption rotating disc or the inner peripheral wall of the outer peripheral housing; a sealing ring is provided at the joint of the outer peripheral upper clamping housing and the outer peripheral lower clamping housing, or at the outer periphery of the separate outer peripheral upper clamping housing or the separate outer peripheral lower clamping housing.

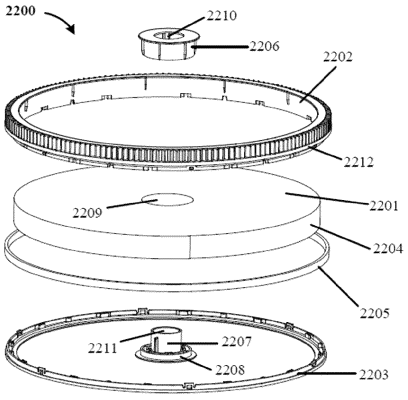

FIG. 13

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Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the priorities of the Patent Application PCT/CN2022/116242, filed on August 31, 2022, and the Chinese Patent Application No. 202222327022.1, the Chinese Patent Application No. 202222305979.6 and the Chinese Patent Application No. 202222324363.3, filed on August 31, 2022, the disclosure of which are incorporated herein by reference.

TECHNICAL FIELD

[0002] The present application relates to the technical field of electric household appliances, and particularly, to a laundry treating device.

BACKGROUND

[0003] In daily life, people usually use an airing method to dry washed laundry. Airing laundry is greatly affected by weather factors, such that effective drying of laundry is hardly achieved in humid and dark weather. Dryers are increasingly popular with consumers because they can dry washed laundry.

[0004] Existing dryers are mainly classified into a heat pump type, a condensing type and an exhaust type. So far, no commercially available household dryers which use rotating moisture adsorption and desorption members for laundry drying have been found. The main reasons are as follows: (1) the drying efficiency is low, and drying is excessively time-consuming; and (2) for both washer-dryer machines and conventional dryers, after moisture adsorption and desorption members are added, special setting and arrangement of the moisture adsorption and desorption members and other related components are required in order to maintain the size of the original device as much as possible.

SUMMARY

[0005] The purpose of the present application is to provide a laundry treating device to overcome the defects of the prior art existing in the drying process, namely, low moisture adsorption efficiency, time-consuming drying, high power consumption, and difficult temperature control.

[0006] For the aforementioned purpose, it would be advantageous for the present application to provide a mechanism to mitigate, alleviate or even eliminate one or more of the above problems.

[0007] Embodiments of the present disclosure provide a laundry treating device. The laundry treating device includes a laundry holding space and a drying module, wherein

the drying module includes a moisture adsorption member, and the moisture adsorption member includes a moisture adsorption rotary disk, a peripheral housing of the moisture adsorption rotary disk, and a circumferential damping member;

the peripheral housing includes an upper peripheral clamping housing and a lower peripheral clamping housing, and is disposed around an outer circumference of the moisture adsorption rotary disk;

the circumferential damping member is disposed on the outer circumference of the moisture adsorption rotary disk, or on an inner circumferential wall of the peripheral housing; and

a sealing ring is provided at a junction between the upper peripheral clamping housing and the lower peripheral clamping housing, or on an outer circumference of the upper peripheral clamping housing alone, or on an outer circumference of the lower peripheral clamping housing alone.

[0008] Further, the laundry treating device further includes an auxiliary rotary ring disposed on an outer circumference of the peripheral housing in parallel with the sealing ring.

[0009] Further, drive teeth or a belt groove is disposed on the outer circumference of the peripheral housing.

[0010] Further, an outer ring diameter of the sealing ring is larger than an outer ring diameter of the auxiliary rotary ring.

[0011] Further, the auxiliary rotary ring slightly protrudes from the drive teeth or is flush with the drive teeth in a peripheral direction.

[0012] Further, the drying module includes a housing for holding the moisture adsorption rotary disk, the housing is provided with at least one flexible roller inside, and the at least one flexible roller is optionally in rolling contact with the auxiliary rotary ring.

[0013] Further, the moisture adsorption rotary disk is of a cylindrical shape, with a thickness of 10 mm to 100 mm and a diameter of 40 mm to 500 mm.

[0014] Further, the moisture adsorption rotary disk further includes a central clamping member and a central end surface damping member, and the central clamping member includes an upper central clamping member and a lower central clamping member.

[0015] Further, a first hole is disposed in a center of the moisture adsorption rotary disk, a second hole is disposed in the upper central clamping member, and a third hole is disposed in the lower central clamping member; and the upper central clamping member and the lower central clamping member pass through the first hole to clamp and fix the moisture adsorption rotary disk.

[0016] Embodiments of the present disclosure further provide a laundry treating device. The laundry treating device includes a drying apparatus and a laundry holding space, wherein

the drying apparatus includes: a moisture adsorption rotary disk; and

a housing, on which at least one separator is disposed, wherein the at least one separator divides a space formed by the housing into a moisture adsorption part and a moisture desorption part which are isolated from each other;

the drying apparatus further includes a central clamping member of the moisture adsorption rotary disk, the central clamping member has a certain diameter, and a clamp holding part matching the central clamping member is disposed on the housing; and

the at least one separator points to the clamp holding part and does not point to a rotary shaft.

[0017] Further, the housing includes a first housing and a second housing, the first housing is provided with at least one first separator, and the second housing is provided with at least one second separator; and the at least one first separator and the at least one second separator are disposed to be opposite to each other, so as to at least divide a space formed by connecting the first housing and the second housing into a first space and a second space which are isolated from each other.

[0018] Further, the clamp holding part has a circular contour, and the separator is tangent to the circular contour of the clamp holding part.

[0019] Embodiments of the present disclosure further provide a laundry treating device. The laundry treating device includes a laundry holding space and a drying module, wherein

the drying module includes a moisture adsorption member and a housing for holding the moisture adsorption member;

the moisture adsorption member includes a moisture adsorption rotary disk; and

the moisture adsorption member is disposed approximately horizontally; the housing includes at least one airflow inlet and at least one airflow outlet; and from the perspective of an overall direction of an airflow, an airflow direction at the at least one airflow inlet and/or an airflow direction at the least one airflow outlet are/is approximately parallel to at least one surface of the moisture adsorption rotary disk.

[0020] Further, the housing includes a first housing and a second housing, the airflow inlet is disposed on the first housing, and the airflow outlet is disposed on the second housing.

[0021] Further, the moisture adsorption member is disposed horizontally above or below the laundry holding space.

[0022] Further, an airflow at the at least one airflow inlet and an airflow at the at least one airflow outlet are approximately parallel to two surfaces of the moisture adsorption rotary disk.

[0023] Further, the laundry treating device further includes a circulating fan, and the circulating fan is disposed in a position near the airflow inlet.

[0024] Further, the laundry treating device further includes a regenerating fan, and the regenerating fan is disposed in proximity to the circulating fan.

[0025] Further, the drying module further includes a condensing module, and the condensing module is disposed in proximity to the regenerating fan.

[0026] Further, the condensing module, the regenerating fan, and the circulating fan are all located on one side of the moisture adsorption rotary disk that is in proximity to the airflow inlet or the airflow outlet.

[0027] Further, the housing further includes a regenerating airflow inlet and a regenerating airflow outlet, and at least one airflow direction at the regenerating airflow inlet and the regenerating airflow outlet is approximately parallel to the at least one surface of the moisture adsorption rotary disk.

[0028] Further, via the circulating fan, an airflow direction inside an airflow passage is changed to a direction approximately parallel to at least one surface of the moisture adsorption rotary disk.

[0029] Embodiments of the present disclosure further provide a laundry treating device. The laundry treating method at least includes a laundry holding space and a drying module, wherein

the drying module at least includes:

a housing, including an airflow inlet and an airflow outlet;

a moisture adsorption rotary disk, accommodated inside the housing, wherein the moisture adsorption rotary disk includes a first surface and a second surface which are parallel to each other; and

a circulating fan, wherein

the moisture adsorption rotary disk is approximately horizontally disposed; and under the action of the circulating fan, an airflow enters from an outer circumference side of the housing into a space on at least one side of the moisture adsorption rotary disk.

[0030] Further, the housing includes a first housing and a second housing; the airflow inlet is disposed on the first housing, and the airflow outlet is disposed on the second housing; and an airflow enters into the housing from the airflow inlet, flows through the moisture adsorption rotary disk, and flows out of the housing from the airflow outlet.

[0031] Embodiments of the present disclosure further provide a laundry treating device. The laundry treating device at least includes a laundry holding space and a drying module, wherein

the drying module at least includes:

a housing, including a circulating airflow inlet and a circulating airflow outlet;

a moisture adsorption rotary disk, accommodated inside the housing, wherein the moisture adsorption rotary disk includes a first surface and a second surface which are parallel to each other; and

a circulating fan, configured to drive an airflow to flow between the laundry holding space and the housing, wherein

the first surface is communicated with the circulating airflow inlet of the housing, and the circulating airflow inlet is communicated with an air outlet of the laundry holding space; the second surface is communicated with the circulating airflow outlet of the housing, and the circulating airflow outlet is communicated with an air inlet of the laundry holding space; at least one normal on a curved surface or a plane on which the circulating airflow inlet is located is approximately parallel to the first surface; and/or at least one normal on a curved surface or a plane on which the circulating airflow outlet is located is approximately parallel to the second surface.

[0032] Further, the housing includes a first housing and a second housing, the airflow inlet is disposed on the first housing, and the airflow outlet is disposed on the second housing.

[0033] Embodiments of the present disclosure further provide a laundry treating device. The laundry treating device includes a laundry holding space and a drying module, wherein

the drying module includes:

a moisture adsorption member, configured to rotate around a rotary shaft under the action of a driving mechanism;

a housing, configured to at least partially accommodate the moisture adsorption member;

at least one separator, disposed on the housing to at least divide an interior of the housing into a first space and a second space;

a circulating fan, communicated with a fluid in the first space; and

a regenerating fan, communicated with a fluid in the second space, wherein

in a plane direction that is perpendicular to a rotary shaft of the moisture adsorption member, a projection area of the second space is smaller than or equal to a projection area of the first space; and

the circulating fan and the regenerating fan are both located on the same semicircular side of the moisture adsorption member.

[0034] Further, the drying module further includes a condensing module, and a main body of the condensing module is also located on the same semicircular side.

[0035] Further, the housing includes a circulating airflow inlet and a circulating airflow outlet which are communicated with the first space, and at least part of the circulating airflow inlet and at least part of the circulating airflow outlet are located on the same semicircular side.

[0036] Further, the housing includes a regenerating airflow inlet and a regenerating airflow outlet which are communicated with the second space, and at least part of the regenerating airflow inlet and at least part of the regenerating airflow outlet are located on the same semicircular side.

[0037] Further, the housing includes a first housing and a second housing, the first housing is provided with at least one first separator, and the second housing is provided with at least one second separator.

[0038] Further, after the first housing and the second housing are fixedly connected to accommodate the moisture adsorption member, the second separator and the first separator together divide a space in which the moisture adsorption member is located into a first space and a second space which are isolated from each other to form a moisture adsorption region and a regenerating region which are isolated from each other.

[0039] Further, the laundry treating device further includes a drive motor for a moisture adsorption rotary disk, and the drive motor is disposed on the other semicircular side.

[0040] Embodiments of the present disclosure further provide a laundry treating device. The laundry treating device includes a laundry holding space and a drying module, wherein

the drying module includes:

a moisture adsorption member; and

a housing, on which at least one separator is disposed, wherein the at least one separator at least partially divides a space formed by the housing into a moisture adsorption region and a regenerating region which are isolated from each other; and

the drying module further includes: a circulating fan, a regenerating fan, a moisture adsorption member, and a condenser, wherein

the circulating fan and the regenerating fan are disposed near one side of the regenerating region; and

a rotary shaft of the moisture adsorption member is approximately parallel to a rotary shaft of the circulating fan and a rotary shaft of the regenerating fan.

[0041] Further, when viewed in a plane direction that is perpendicular to a rotary shaft of the moisture adsorption member, the rotary shaft of the circulating fan and/or the rotary shaft of the regenerating fan are/is located beyond a projection scope of the moisture adsorption member.

[0042] Further, the regenerating fan is disposed between the circulating fan and the condensing module.

[0043] Embodiments of the present disclosure further provide a laundry treating device. The laundry treating device includes a laundry holding space and a drying module, wherein

the drying module includes:

a moisture adsorption member that rotates under the driving of a motor; and

the drying module further includes a housing in which the moisture adsorption member is accommodated, and the housing includes at least one airflow inlet and

at least one airflow outlet, wherein
the housing further includes at least two separators for at least dividing an internal space of the housing into a moisture adsorption region and a regenerating region;
the airflow inlet is disposed on one side of the moisture adsorption region near the regenerating region, and the airflow outlet is disposed on the other side away from the airflow inlet and near the regenerating region; and
a rotating direction of the moisture adsorption member is that the moisture adsorption member passes sequentially through the regenerating region, a region corresponding to the airflow outlet and a region corresponding to the airflow inlet.

[0044] Further, the regenerating region includes a regenerating airflow inlet and a regenerating airflow outlet.

[0045] Further, the regenerating airflow inlet is disposed in proximity to the airflow inlet.

[0046] Further, the regenerating airflow outlet is disposed in proximity to the airflow inlet.

[0047] Further, the regenerating airflow outlet is disposed in proximity to the airflow outlet.

[0048] Further, the regenerating airflow inlet is disposed in proximity to the airflow outlet.

[0049] Further, the housing includes a first housing and a second housing, the first housing and the second housing forming an holding space in which the moisture adsorption member is mounted.

[0050] Further, the first housing is provided with at least one first separator, and the second housing is provided with at least one second separator; and after the first housing and the second housing are fixedly connected, the at least one second separator and the at least one first separator together divide a space in which the moisture adsorption member is located into at least a first space and a second space to form a moisture adsorption region and a regenerating region.

[0051] Further, a volume of the first space is larger than a volume of the second space.

[0052] Further, at least one third separator is provided inside the moisture adsorption region of the first housing to divide a space formed together by the first housing and the moisture adsorption member into at least two parts.

[0053] Embodiments of the present disclosure further provide a laundry treating device. The laundry treating device includes a drying module and a laundry holding space, wherein
the drying module includes:

a moisture adsorption rotary disk, including a first surface and a second surface which are parallel to each other; and
a housing for holding the moisture adsorption rotary disk, wherein
the housing includes a first housing and a second housing disposed to be opposite to each other; and
the first housing and/or the second housing are/is provided with at least one separator for at least dividing an internal space of the housing into a first space and a second space; and
the first housing is at least provided with a circulating airflow inlet that forms an airflow inlet of the first space; the second housing is at least provided with a circulating airflow outlet that forms an airflow outlet of the first space; and the circulating airflow inlet and the circulating airflow outlet are disposed in proximity to the second space and are located on both sides of the second space, respectively.

[0054] Further, in a plane direction parallel to the first surface or the second surface, a projection area of the first space is larger than or equal to a projection area of the second space.

[0055] Further, in the first space, the airflow flows in from the circulating airflow inlet, at least partially flows through the moisture adsorption rotary disk, and flows out of the first space from the circulating airflow outlet.

[0056] Further, the circulating airflow inlet is communicated with an air outlet of the laundry holding space; and the circulating airflow outlet is communicated with an air inlet of the laundry holding space.

[0057] Further, the second space of the housing at least includes one regenerating airflow inlet and one regenerating airflow outlet.

[0058] Further, the regenerating airflow inlet and the regenerating airflow outlet are disposed on different sides of the moisture adsorption rotary disk.

[0059] Further, an airflow in the second space flows in from the regenerating airflow inlet, flows through the moisture adsorption rotary disk, and flows out from the regenerating airflow outlet.

[0060] Further, directions of the airflows in the first space and the second space which flow through the moisture adsorption rotary disk are opposite.

[0061] Further, the drying module includes a condensing module, and an airflow flowing out from the regenerating airflow outlet enters into the condensing module.

[0062] Further, the drying module includes a regenerating fan which produces an airflow passing through the second space.

[0063] Embodiments of the present disclosure further provide a laundry treating device. The laundry treating device includes a drying module and a laundry holding space, wherein
the drying module includes:

a moisture adsorption member;
a housing for holding at least part of the moisture adsorption member; and
a driving member and/or a transmission member for making the moisture adsorption member rotate, wherein
the housing at least includes a first space and a second space; when the housing accommodates

the moisture adsorption member, the first space and the second space are sealed in an isolated manner to form a moisture adsorption region and a regenerating region which are isolated from each other; and the housing further includes at least a third space configured to at least accommodate the driving member and/or the transmission member, and the first space is communicated with the third space to together form a sealed space.

[0064] Further, the housing at least includes a first housing and a second housing, the first housing and the second housing forming a holding space in which the moisture adsorption member is mounted.

[0065] Further, the driving member is a motor located outside the third space.

[0066] Further, the transmission member is a speed reduction mechanism located inside the third space.

[0067] Further, the first housing and the second housing form sealed docking.

[0068] Further, either of the first housing or the second housing is provided with a groove, and the other is provided with a protrusion; and the protrusion and the groove form sealed docking.

[0069] Further, a sealing ring is provided inside the groove.

[0070] Further, the driving mechanism is disposed outside the third space and is connected to the transmission member via a transmission shaft.

[0071] Further, the first housing is provided with at least one first separator, and the second housing is provided with at least one second separator.

[0072] Further, after the first housing and the second housing are fixedly connected, the second separator and the first separator together at least divide a space in which the moisture adsorption member is located into a first space and a second space which are isolated from each other to form a moisture adsorption region and a regenerating region which are isolated from each other.

[0073] Embodiments of the present disclosure further provide a laundry treating device. The laundry treating device includes a laundry holding space and a drying module, wherein

the drying module includes a moisture adsorption member;

the moisture adsorption member rotates under the driving of a motor; and

the moisture adsorption member includes a cylindrical moisture adsorption rotary disk, and a thickness-to-diameter ratio of the moisture adsorption rotary disk ranges from 1: 20 to 1: 5.

[0074] Further, a thickness of the moisture adsorption rotary disk is 10 mm to 100 mm, preferably 25 mm.

[0075] Further, a diameter of the moisture adsorption rotary disk is 40 mm to 500 mm, preferably 320 mm.

[0076] Further, the drying module includes a housing, and the moisture adsorption member is accommodated in the housing, which includes at least one airflow inlet and at least one airflow outlet.

[0077] Further, an airflow flows in from the at least one airflow inlet of the housing, flows through the moisture adsorption rotary disk, and flows out from the at least one airflow outlet.

BRIEF DESCRIPTION OF DRAWINGS

[0078] To describe technical solutions in the specific implementations of the present application or in the prior art more clearly, the following briefly describes the accompanying drawings required for describing the specific implementations or the prior art. Apparently, the accompanying drawings in the following description show merely some implementations of the present application, and those of ordinary skill in the art may still derive other drawings from these accompanying drawings without creative efforts.

FIGs. 1 to 3 show a perspective view, a rear view and a top view of a washer-dryer machine according to some embodiments of the present disclosure, respectively;

FIG. 4 and FIG. 5 show a top view and a perspective view of a drying module shown in FIGs. 2 to 3, respectively;

FIG. 6 shows a structural diagram of a lower housing of a drying module;

FIGs. 7 to 9 show a top view, a bottom view and an exploded view of a circulating fan, respectively;

FIG. 10 shows a schematic diagram of a cooperating mode of a circulating fan and a lower housing of a drying module;

FIG. 11 shows a schematic diagram of a connecting mode of a flexible pipe and a lower housing;

FIG. 12 shows a schematic diagram of a flow direction of a circulating airflow;

FIG. 13 and FIG. 14 show an exploded view of a moisture adsorption member and a perspective view upon the completion of assembly, respectively;

FIG. 15 shows a top view of a lower housing;

FIG. 16 and FIG. 17 show exploded views of a lower housing in which a moisture adsorption member is mounted and a second moisture adsorption member housing, respectively;

FIG. 18 shows an exploded view upon the mounting of a lower housing, a second moisture adsorption member housing, and a moisture adsorption member;

FIG. 19 shows a schematic diagram of a fixing mode of an integrated lower housing and a second moisture adsorption member housing;

FIG. 20 shows a schematic diagram of a flow direction of a dehumidifying airflow;

FIG. 21 and FIG. 22 show an exploded view and a perspective view of related structures of a heating

assembly and a regenerating fan, respectively;
FIG. 23 and FIG. 24 show a perspective view and an exploded view of a first connector, respectively;
FIG. 25 and FIG. 26 show a perspective view and an exploded view of a second connector, respectively;
FIG. 27 shows a schematic diagram of a mounting position of a heating assembly on a second housing;
FIGs. 28 to 30 show a perspective view of a heating assembly, a schematic diagram of a mesh plate and a bottom view of a heating assembly, respectively;
FIG. 31 shows a schematic diagram of a fixing mode of a condenser and a first housing; and
FIG. 32 shows a sectional view of a condenser shell.

DETAILED DESCRIPTION

[0079] The following clearly and completely describes technical solutions in embodiments of the present application with reference to accompanying drawings in the embodiments of the present application. Apparently, the described embodiments are some but not all of the embodiments of the present application. Generally, assemblies in the embodiments of the present application described and shown in the accompanying drawings herein may be arranged and designed according to various configurations. Therefore, the following detailed description of the embodiments of the present application with reference to the accompanying drawings is not intended to limit the protection scope of the present application, but merely represents selected embodiments of the present application. Features included in different embodiments may be combined to each other. All other embodiments (including new embodiments formed by combining the features included in different embodiments each other) obtained by those skilled in the art without making creative efforts based on the embodiments of the present application will fall within the protection scope of the present application.

[0080] It should be noted that similar reference signs and letters indicate similar items in the following drawings. Therefore, once a specific item is defined in one of the drawings, it needs not to be further defined and explained in subsequent drawings. In addition, in the description of the present application, the terms "first", "second", and the like are merely intended for distinguishing description, and shall not be understood as an indication or implication of relative importance.

[0081] In the embodiments of the present disclosure, a laundry treating device is a device having a laundry drying function. The laundry treating device may be, for example, a dryer having only a laundry drying function, or a washer-dryer machine having both a laundry washing function and a laundry drying function.

[0082] According to some embodiments, a moisture adsorption member is provided with a moisture absorbent. The moisture absorbent may be, for example, zeolite (molecular sieve), alkali metal aluminosilicate (13X molecular sieve), lithium chloride, silica gel, modified silica gel, activated alumina, and other solid moisture absorbents. Correspondingly, the moisture adsorption member may be of a solid structure provided with a solid moisture absorbent. The moisture absorbent may be, for example, a lithium chloride solution, a lithium bromide solution or other liquid moisture absorbent. Correspondingly, the moisture adsorption member may be a container containing the liquid moisture absorbent.

[0083] According to some embodiments, in order to improve a moisture adsorption effect and achieve sustainable use of the moisture absorbent and cost reduction, a drying module further includes a dehumidifying assembly. The dehumidifying assembly is disposed on a regenerating passage to desorb moisture absorbed by the moisture absorbent. The dehumidifying assembly may be, for example, a heating assembly, an ultrasonic generator, a microwave generator, and the like.

[0084] A specific structure of the dehumidifying assembly may be determined according to the moisture absorbent. For example, for the zeolite (molecular sieve), the alkali metal aluminosilicate (13X molecular sieve), the lithium chloride, the modified silica gel, the activated alumina, and other solid moisture absorbents, the heating assembly may be used to desorb moisture in the moisture absorbent. The heating assembly may include, for example, a heating wire, a positive temperature coefficient (PTC) heater, and other elements having a heating function. For a solid moisture absorbent with high thermal stability such as silica gel, the effect of desorbing moisture using the heating assembly is not very good because it is not sensitive to temperature. Alternatively, an ultrasonic generator, a microwave generator, and the like, may be used to desorb moisture in the moisture absorbent by means of high-frequency vibration. For a liquid moisture absorbent, the heating assembly may be used to desorb moisture absorbed by the liquid moisture absorbent. Further, a semi-permeable membrane may be disposed in a container containing the liquid moisture absorbent and only water may pass through the semi-permeable membrane, thereby avoiding the evaporation of the liquid moisture absorbent together with moisture during the regeneration process and ensuring the concentration and moisture adsorption effect of the liquid moisture absorbent.

[0085] According to some embodiments, a driving mechanism is configured to move a moisture adsorption member relative to a moisture adsorption passage and a regenerating passage. The driving mechanism may be, for example, a drive motor (namely, an electrical drive), a pneumatic drive, a hydraulic drive, and the like.

[0086] According to some embodiments, the moisture adsorption member may be provided in different shapes. For example, the moisture adsorption member may be provided as a circular moisture adsorption rotary disk, a bar-shaped moisture adsorption strip, containers with openings of different shapes, and the like. The specific mode in which the moisture adsorption member moves relative to the moisture adsorption passage and the re-

generating passage may be determined according to the shape of the moisture adsorption member.

[0087] For example, in the case that the moisture adsorption member is the circular moisture adsorption rotary disk, the driving mechanism may drive the moisture adsorption rotary disk to rotate relative to the moisture adsorption passage and the regenerating passage, or drive the moisture adsorption passage and the regenerating passage to rotate relative to the moisture adsorption rotary disk. In the case that the moisture adsorption member is the moisture adsorption strip, the driving mechanism may drive the moisture adsorption strip to perform a reciprocating linear motion (namely, translation) relative to the moisture adsorption passage and the regenerating passage, or drive the moisture adsorption passage and the regenerating passage to perform a reciprocating linear motion relative to the moisture adsorption strip. In the case that the moisture adsorption member is the container, the driving mechanism may drive the container to rotate/perform a linear motion relative to the moisture adsorption passage and the regenerating passage, or drive the moisture adsorption passage and the regenerating passage to rotate/perform a linear motion relative to the container. In other embodiments, two or more moisture adsorption members may be provided, and the driving mechanism is configured to drive different moisture adsorption members (or drive the moisture adsorption passage and the regenerating passage), such that different moisture adsorption members are alternately located on the moisture adsorption passage and the regenerating passage.

[0088] Based on the above description, it should be understood that the laundry treating device, the moisture adsorption member, the dehumidifying assembly, the driving mechanism, and other structures in the embodiments of the present disclosure may be implemented in a plurality of ways.

[0089] A laundry drying scheme in the embodiments of the present disclosure will be described in detail below by taking the laundry treating device being a washer-dryer machine, the moisture adsorption member being a moisture adsorption rotary disk, the dehumidifying assembly being a heating assembly and the driving mechanism being a drive motor, as examples. It should be understood that the laundry drying scheme in the embodiments of the present disclosure is also applicable to a laundry treating device, a moisture adsorption member, a dehumidifying assembly, and a driving mechanism in other embodiments.

[0090] FIGs. 1 to 32 show a washer-dryer machine 1000 according to some embodiments of the present disclosure.

[0091] FIGs. 1 to 3 show a perspective view, a rear view and a top view of a washer-dryer machine according to some embodiments of the present disclosure, respectively.

[0092] FIG. 4 and FIG. 5 show a top view and a perspective view of a drying module shown in FIGs. 2 to 3, respectively.

[0093] As shown in FIGs. 1 to 2, the washer-dryer machine 1000 includes a laundry holding space (namely, drum 1100) configured to accommodate laundry to be treated (the term "treated" here may refer to a washing treatment or a drying treatment). The drum 1100 includes an inner tub and an outer tub, the inner tub being configured to hold the laundry to be treated and rotate under the action of a driving mechanism, with the outer tub being fixed relative to a machine body in a hanging manner. A door body 1110 is disposed at a position, corresponding to the drum 1100, on a shell 1200 of the washer-dryer machine 1000. The door body 1110 is pivotally connected to the shell 1200. The opening and closing of the door body 1110 may be controlled manually by a user or by means of an electronic controller.

[0094] As shown in FIGs. 1 to 2, the washer-dryer machine 1000 includes a drying module 2000 configured to dry the laundry inside the drum 1100. The drying module 2000 is disposed above the drum 1100.

[0095] As shown in FIG. 4 and FIG. 5, in the embodiments of the present disclosure, the drying module 2000 includes a moisture adsorption passage, a regenerating passage, a circulating fan 2100, a moisture adsorption member 2200, a driving mechanism 2300, and a regenerating fan 2400.

[0096] As shown in FIG. 2, a first air inlet 2901 of the moisture adsorption passage is communicated with an air outlet pipeline 1300 of the drum 1100. A first air outlet 2902 of the moisture adsorption passage is communicated with an air inlet pipeline of the drum 1100. For example, as shown in FIG. 5, the first air outlet 2902 is communicated with the air inlet pipeline of the drum 1100 (not shown in FIG. 5) through a connector 1400. The circulating fan 2100 is located inside the moisture adsorption passage and configured to form a circulating airflow inside the drum 1100 and the moisture adsorption passage. The regenerating fan 2400 is located inside the regenerating passage and configured to form a dehumidifying airflow inside the regenerating passage.

[0097] One part of the moisture adsorption member 2200 is located on the moisture adsorption passage, and the other part of the moisture adsorption member 2200 is located on the regenerating passage, such that the circulating airflow in the moisture adsorption passage and the dehumidifying airflow in the regenerating passage both flow through the moisture adsorption member 2200. The driving mechanism 2300 may be, for example, a drive motor that is configured to move (for example, rotate) the moisture adsorption member 2200 relative to the moisture adsorption passage and the regenerating passage. The moisture adsorption member 2200 absorbs moisture in the circulating airflow in the rotation process and discharges the absorbed moisture through the dehumidifying airflow.

[0098] According to some embodiments, the moisture adsorption member 2200 may include a moisture adsorption rotary disk 2201. The moisture adsorption rotary disk

2201 is provided with a moisture absorbent configured to absorb moisture. The moisture absorbent may be, for example, zeolite (molecular sieve), alkali metal aluminosilicate (13X molecular sieve), lithium chloride, silica gel, modified silica gel, activated alumina, or the like.

[0099] The driving mechanism 2300 is configured to drive the moisture adsorption rotary disk 2201 to rotate relative to the moisture adsorption passage and the regenerating passage. The circulating airflow and the dehumidifying airflow both flow over the moisture adsorption rotary disk 2201. A region on the moisture adsorption rotary disk 2201 through which the circulating airflow flows is a moisture adsorption region, while a region through which the dehumidifying airflow flows is a regenerating region.

[0100] According to some embodiments, as shown in FIG. 4 and FIG. 5, the drying module 2000 may further include a heating assembly 2500 and a condenser 2600 that are disposed on the regenerating passage. The heating assembly 2500 covers the regenerating region of the moisture adsorption member 2200 (the moisture adsorption rotary disk 2201) and configured to heat the regenerating region of the moisture adsorption member 2200 (the moisture adsorption rotary disk 2201) to desorb moisture absorbed by the moisture adsorption member 2200 (the moisture adsorption rotary disk 2201). The condenser 2600 is configured to condense the dehumidifying airflow flowing from the regenerating region of the moisture adsorption member 2200 to dry the dehumidifying airflow. The condenser 2600 includes a water inlet 2610 and a water outlet 2620, as shown in FIG. 31.

[0101] According to some embodiments, the drying module 2000 further includes a housing. Taking the drying apparatus 2000 arranged horizontally as example, the housing includes a lower housing 2700 and an upper housing (if the drying apparatus 2000 is arranged in other manners, the lower housing may be defined as a first housing, and the upper housing may be defined as a second housing, that is, "upper" is defined as "second", and "lower" is defined as "first"). The lower housing 2700 and the upper housing cover and fix various components of the drying module 2000, such that the drying module 2000 forms an integral module.

[0102] According to some embodiments, the upper housing and the lower housing 2700 of the drying module 2000 may be discrete housings that correspond to respective components of the drying module 2000, respectively, or an integrated housing that corresponds to a plurality of components of the drying module 2000. For example, in the embodiment shown in FIG. 4 and FIG. 5, the lower housing 2700 of the drying module 2000 is an integrated housing. FIG. 6 further shows a structural diagram of the integrated lower housing 2700. As shown in FIG. 6, the lower housing 2700 is provided with a mounting part 2710 (namely, a first circulating fan housing) on which the circulating fan 2100 is mounted, a mounting part 2720 (namely, a first moisture adsorption member housing) on which the moisture adsorption member 2200 is mounted, a mounting part 2730 (namely, a first regenerating fan housing) on which the regenerating fan 2400 is mounted, and a mounting part 2740 (namely, a first condenser housing) on which the condenser 2600 is mounted. The upper housings of the drying module 2000 are discrete housings, including an upper housing 2810 (namely, a second circulating fan housing) in which the circulating fan 2100 is mounted, an upper housing 2820 (namely, a second moisture adsorption member housing) in which the moisture adsorption member 2200 is mounted, an upper housing 2830 (namely, a second condenser housing) in which the condenser 2600 is mounted, and the like.

[0103] According to some embodiments, as shown in FIG. 5, the lower housing 2700 of the drying module 2000 is provided with a plurality of fourth mounting parts 2701, and the second moisture adsorption member housing 2820 is provided with a fifth mounting part 2801. The fourth mounting parts 2701 and the fifth mounting part 2801 are fixed to the shell 1200 of the washer-dryer machine 1000 in a lap-joint manner, thereby achieving the mounting and fixation of the entire drying module 2000. In this embodiment, there is no direct rigid connection between the drying module 2000 and the drum 1100, so as to avoid the transfer of the vibration of the drum 1100 during the operation process to the drying module 2000 (especially to the moisture adsorption member 2200), thereby improving the stability and reliability of the drying module 2000.

[0104] According to some embodiments, as shown in FIG. 2 and FIG. 5, the first air inlet 2901 of the moisture adsorption member of the drying module 2000 may be communicated with the air outlet pipeline 1300 of the drum 1100 through a flexible pipe (such as a corrugated hose) 2903. According to some embodiments, a filter (such as a filter screen) configured to filter debris and clothes waddings may be disposed inside the air outlet pipeline 1300. In addition, the connector 1400 may also be communicated with the air inlet pipeline of the drum 1100 via a flexible pipe (not shown in FIG. 2 and FIG. 5). Therefore, the transfer of the vibration of the drum 1100 to the drying module 2000 (especially to the moisture adsorption member 2200) can be avoided, thereby improving the stability and reliability of the drying module 2000.

[0105] The first moisture adsorption member housing 2720 and the second moisture adsorption member housing 2820 form a holding space in which the moisture adsorption member 2200 is mounted. As shown in FIGs. 16 to 18, the first moisture adsorption member housing 2720 is provided with a first separator 2725, and the second moisture adsorption member housing 2820 is provided with a second separator 2822. After the moisture adsorption member 2200 is mounted into the first moisture adsorption member housing 2720 and the second moisture adsorption member housing 2820, which are fixedly connected, the second separator 2822 and the first separator 2725 together divide a space in which the moisture adsorption member 2200 is located into a

first space (corresponding to the moisture adsorption region 2907) and a second space (corresponding to the regenerating region 2908) which are isolated from each other to form a moisture adsorption region 2907 and a regenerating region 2908 which are isolated from each other. That is, the first separator 2725 and the second separator 2822 may divide the moisture adsorption rotary disk 2201 into the moisture adsorption region 2907 and the regenerating region 2908. The "first space" described above may be understood as: a space formed together by partial inner walls of the first moisture adsorption member housing 2720 and the second moisture adsorption member housing 2820, side walls of the first separator 2725 and the second separator 2822 facing the moisture adsorption region 2907, and a side wall produced by a part of an extended contact between the first and second separators and facing the moisture adsorption region 2907. The "second space" may be understood as: a space formed together by the other partial inner wall of the first moisture adsorption member housing 2720, side walls of the first separator 2725 and the second separator 2822 which face the regenerating region 2908, and a partial wall of the heating assembly 2500 described later. A volume of the first space is larger than or equal to a volume of the second space. Correspondingly, in a plane that is perpendicular to a rotary shaft of the moisture adsorption member, a projection area of the first space is larger than or equal to a projection area of the second space.

[0106] According to some embodiments, the housing includes a first moisture adsorption member housing 2720 and a second moisture adsorption member housing 2820 for holding the moisture adsorption and desorption rotary disk 2201. Two separation ribs are provided on the first moisture adsorption member housing 2720, namely, a first separator 2725-1 and a first separator 2725-2 as shown in FIG. 16, and two separation ribs are provided on the second moisture adsorption member housing, namely, a second separator 2822-1 and a second separator 2822-2 as shown in FIG. 17. A short shaft 2721 and a holding part in which the short shaft 2721 is mounted are disposed in a central position of the first moisture adsorption member housing 2720, and one separation rib 2725-1 of the first moisture adsorption member housing 2720 may be disposed as extending from an inner circumferential wall of the housing to the holding part for the housing. The other separation rib 2725-2 of the first moisture adsorption member housing 2720 may be disposed as extending from another position on the inner circumferential wall of the housing to the holding part for the housing. At least two separation ribs do not intersect with the short shaft 2721, thereby dividing an internal space formed by the docking between the first moisture adsorption member housing 2720 and the second moisture adsorption member housing 2820 into two spaces, namely, a first space and a second space, or a moisture adsorption space and a regenerating space, or a moisture adsorption region and a regenerating region. According to some examples, the holding part is of a ring shape, and at least two separation ribs are disposed as being tangent to the outer circumference of the ring-shaped holding part.

[0107] The first space and the second space are sealed in an isolated manner, which may be understood as: restricting the airflow exchange between the first space and the second space through some sealing measures, and avoiding free circulation of an airflow between the first space and the second space when possible. For example, after the first moisture adsorption member housing 2720 and the second moisture adsorption member housing 2820 are fixedly connected, the first separator 2725 and the second separator 2822, opposite to each other, form a first space and a second space. Air outside the first space (corresponding to the moisture adsorption region 2907) may not freely enter into the first space, and air outside the second space (corresponding to the regenerating region 2908) may not freely enter into the second space.

[0108] Referring to FIG. 4 and FIG. 11, the first moisture adsorption member housing 2720 is provided with a circulating airflow inlet 2702, the circulating airflow inlet 2702 being disposed on one side of the moisture adsorption region near the regenerating region. At least one normal on a curved surface or a plane on which the circulating airflow inlet 2702 is located is approximately parallel to at least one surface of the moisture adsorption rotary disk 2201.

[0109] The second moisture adsorption member housing 2820 is provided with a circulating airflow outlet 2902, the circulating airflow outlet 2902 being disposed on the other side away from the circulating airflow inlet 2702 and near the regenerating region. At least one normal on a curved surface or a plane on which the circulating airflow outlet 2902 is located is approximately parallel to at least one surface of the moisture adsorption rotary disk 2201. The airflow originating from the laundry holding space enters into the first space from the circulating airflow inlet 2702, flows through the moisture adsorption rotary disk, and flows out from the circulating airflow outlet 2902.

[0110] Disposing the circulating fan 2100 on one side near the regenerating region may be understood as: the circulating fan and the regenerating region being located on the same side of a diameter D0 of the moisture adsorption rotary disk. For example, the circulating fan 2100 is disposed near the circulating airflow inlet 2702; and for example, the circulating fan 2100 may further be disposed near the circulating airflow outlet 2902.

[0111] The circulating fan 2100 is disposed near the circulating airflow inlet 2702, and the circulating fan includes a motor and a motor impeller. After an airflow originating from the laundry holding space flows through the circulating fan 2100, under the action of the circulating fan, the airflow in the airflow passage enters into the first space from the circulating airflow inlet 2702 on the outer circumference side of the first moisture adsorption member housing 2720.

[0112] According to some embodiments, taking the moisture adsorption rotary disk 2201 being disposed approximately horizontally as example, in this case, under the action of the circulating fan 2100, the airflow enters into a space on a lower side and/or an upper side of the moisture adsorption rotary disk from the outer circumference side of the housing. From the perspective of an overall direction of the airflow, through the action of the circulating fan 2100, an airflow direction at the at least one airflow inlet is approximately parallel to an upper surface or a lower surface of the moisture adsorption rotary disk 2201.

[0113] The circulating fan 2100 may further be disposed near the circulating airflow outlet 2902, that is, the circulating fan is disposed between the circulating airflow outlet 2902 and the air inlet of the laundry holding space. Through the action of the circulating fan, an airflow direction at the circulating airflow outlet 2902 is approximately parallel to the upper surface or the lower surface of the moisture adsorption rotary disk 2201.

[0114] It should be noted that a plurality of circulating airflow inlets 2702 and a plurality of circulating airflow outlets 2902 may be disposed. The circulating airflow inlets 2702 may further be disposed on the second moisture adsorption member housing 2820, and the corresponding circulating airflow outlets 2902 may be disposed on the first moisture adsorption member housing 2720. The circulating airflow inlets 2702 and the circulating airflow outlets 2902 are disposed in proximity to the second space and are located on both sides of the second space, namely, the regenerating region 2908, respectively.

[0115] The second space in which the regenerating region 2908 is located includes a regenerating airflow inlet and a regenerating airflow outlet. The regenerating airflow inlet is disposed in proximity to the circulating airflow inlet 2702 or the circulating airflow outlet 2902, and the regenerating airflow outlet is disposed in proximity to the circulating airflow inlet 2702 or the circulating airflow outlet 2902. An airflow flowing out from the regenerating airflow outlet enters into the condenser 2600, and the airflow entering into the condensing module 2600 flows through the regenerating fan 2400 and then enters into the second space again via the regenerating airflow inlet.

[0116] Directions of the airflows in the first space and the second space which flow through the moisture adsorption rotary disk 2201 are opposite. Taking the moisture adsorption rotary disk 2201 being placed horizontally as example, when an airflow direction in the moisture adsorption region 2907 is that an airflow flows through the moisture adsorption rotary disk 2201 from below and enters into an upper space, an airflow direction in the regenerating region 2908 is that an airflow flows through the moisture adsorption rotary disk 2201 from above and enters into a lower space, and vice versa. Of course, by changing the position of the airflow inlet or the airflow outlet on the first moisture adsorption member housing 2720 and/or the second moisture adsorption member housing 2820, or by adjusting the position of the airflow outlet of the circulating fan and/or the regenerating fan, directions of the airflows in the first space and the second space which flow through the moisture adsorption rotary disk 2201 may also be the same.

[0117] As shown in FIGs. 15 to 23, the first moisture adsorption member housing 2720 and the second moisture adsorption member housing 2820 are fixedly connected to further form a third space (as the third space 2921 shown in FIG. 17). The third space is at least configured to accommodate the driving member and/or the transmission member. The first space is communicated with the third space to together form a sealed space. The third space is configured to accommodate the transmission member and/or the driving mechanism 2300. The driving mechanism 2300 may be, for example, a drive motor, that is configured to move (for example, rotate) the moisture adsorption member 2200 relative to the moisture adsorption passage and the regenerating passage. The transmission member may be a speed reduction mechanism located inside the third space.

[0118] Either of the first moisture adsorption member housing 2720 or the second moisture adsorption member housing 2820 is provided with a groove, and the other is provided with a protrusion. The protrusion and the groove form sealed docking. A sealing ring may be provided inside the groove to further improve the sealing effect. The drive motor may be disposed outside the third space and is connected to the transmission mechanism via a transmission shaft.

[0119] The moisture adsorption member 2200 rotates under the driving of the driving member and/or the transmission member. In order to improve the moisture adsorption efficiency, a rotating direction is that the moisture adsorption member 2200 passes sequentially through the regenerating region, a region corresponding to the airflow outlet, and a region corresponding to the airflow inlet. Due to the highest humidity at the airflow inlet region and the relatively low humidity at the airflow outlet region, according to the rotation sequence described above, the moisture adsorption member 2200 passes through the regenerating region and then recovers the moisture adsorption ability. After recovering the moisture adsorption ability, the moisture adsorption member 2200 first passes through the airflow outlet region to better absorb moisture in this region, thereby reducing the humidity of the airflow which returns to the laundry holding space. Then, the moisture adsorption member 2200 passes through the airflow inlet region, in which the moisture adsorption member 2200 absorbs moisture sufficiently and enters into the regenerating region again. After heat treatment, the moisture adsorption member 2200 recovers the moisture adsorption ability again.

[0120] As shown in FIGs. 4 to 11, a sector-shaped region in which the heating assembly 2500 is located is the regenerating region; and the condenser 2600, the regenerating fan 2400, and the circulating fan 2100 are all

located in a position near one side in proximity to the regenerating region. The circulating fan 2100 is disposed on one side near the regenerating region, and the airflow inlet is disposed in a position in proximity to the regenerating region. The regenerating fan 2400 is disposed on one side near the regenerating region and is disposed in proximity to the circulating fan 2100; the condenser 2600 is disposed in proximity to the regenerating fan 2100, namely, the regenerating fan is disposed between the circulating fan and the condenser 2600; and the regenerating fan 2400, the circulating fan 2100, and the condenser 2600 are all located on the same semicircular side of the moisture adsorption rotary disk. In other words, as shown in FIG. 4, the regenerating fan 2400, the circulating fan 2100, and the condenser 2600 are all located on the same side of a diameter D0 of the moisture adsorption rotary disk.

[0121] Further, the circulating airflow inlet 2702 and the circulating airflow outlet 2902 of the housing are located on the same semicircular side as the regenerating fan 2400, the circulating fan 2100, and the condenser 2600, and are both located on the same side of a diameter D0 of the moisture adsorption rotary disk.

[0122] Still further, the regenerating airflow inlet, the regenerating airflow outlet, the circulating airflow inlet 2702, and the circulating airflow outlet 2902 are located on the same semicircular side as the regenerating fan 2400, the circulating fan 2100, and the condenser 2600, and are al located on the same side of a diameter D0 of the moisture adsorption rotary disk.

[0123] Based on the above arrangements, all of the members are disposed within approximately the same plane in a very compact manner and may meet the requirement on the overall dimension of the machine body.

[0124] The moisture adsorption member 2200, the circulating fan 2100, and the regenerating fan 2400 are provided with a rotary shaft, respectively. The rotary shaft of the moisture adsorption member 2200 is approximately parallel to the rotary shafts of the circulating fan 2100 and the regenerating fan 2400. The rotary shafts of the circulating fan 2100 and/or the regenerating fan 2400 are/is located beyond a projection scope of the moisture adsorption member 2200. In a plane direction that is perpendicular to a rotary shaft of the moisture adsorption member 2201, a projection area of the second space is smaller than or equal to a projection area of the first space, that is, the moisture adsorption member has a larger moisture adsorption area and a relatively smaller regenerating area.

[0125] According to some embodiments, as shown in FIG. 4 and FIG. 5, various components (including the circulating fan 2100, the moisture adsorption member 2200, the driving mechanism 2300, the regenerating fan 2400, the heating assembly 2500, the condenser 2600, and the like) of the drying module 2000 are disposed horizontally, in which rotary shafts of the rotary components (including the circulating fan 2100, the moisture adsorption member 2200, the driving mechanism 2300, and the regenerating fan 2400) are approximately parallel, and approximately perpendicular to rotary shafts of the second housing and the drum 1100 of the washer-dryer machine 1000. According to these embodiments, the height of the washer-dryer machine 1000 may be maximally reduced, thereby saving space.

[0126] It should be understood that the drum 1100 is usually of a cylindrical structure with a rotary shaft parallel to the ground, such that there is a larger available space on the laterally upper side (relative to directly above) of the drum 1100. According to some embodiments, some components of the drying module 2000 may be disposed in a space between the laterally upper side of the drum 1100 and the shell 1200, such that an internal space of the washer-dryer machine 1000 may be sufficiently utilized, making the structure of the washer-dryer machine 1000 more compact and the volume thereof smaller. For example, in the embodiments shown in FIGs. 2 to 5, the circulating fan 2100, the driving mechanism 2300, the regenerating fan 2400, the condenser 2600, and other components are all disposed on the laterally upper side of the drum 1100. In this embodiment, the overall height of the washer-dryer machine 1000 depends on the diameter of the drum 1100 and the thickness of a component (namely, the moisture adsorption member 2200) located directly above the drum 1100.

[0127] According to some embodiments, rotary shafts of two rotary components having the largest diameters of the drying module 2000 may be disposed on both sides of the rotary shaft of the drum 1100, respectively, and both are located in different planes from and perpendicular to the rotary shaft of the drum 1100. Therefore, the internal space of the washer-dryer machine 1000 may be further utilized sufficiently, making the structure of the washer-dryer machine more compact and the volume thereof smaller. For example, in the embodiment shown in FIG. 5, the two rotary components having the largest diameters may be the moisture adsorption member 2200 and the circulating fan 2100. The rotary shafts of the moisture adsorption member 2200 and the circulating fan 2100 are disposed on the right side and the left side (viewed from a front view of the washer-dryer machine 1000) of the drum 1100, respectively, and both are located in different planes from and perpendicular to the rotary shaft of the drum 1100.

[0128] FIGs. 7 to 9 show a top view, a bottom view and an exploded view of the circulating fan 2100, respectively. As shown in FIGs. 7 to 9, the circulating fan 2100 includes a motor 2110, a second circulating fan housing 2810, a fan impeller 2120 and a sealing gasket 2130.

[0129] According to some embodiments, the second circulating fan housing 2810 is in a volute shape, which meets fluid design requirements, and may be used as a flow channel to provide a maximum air volume and air speed for the moisture adsorption passage of the drying module 2000. The second circulating fan housing 2810 is provided with a pipe path fixing clamp 2811 configured to

fix pipe paths and a wire fixing clamp 2812 configured to fix wires (such as a power wire, a control wire, and the like, of the motor 2110). The motor 2110 and the second fan housing 2810 may be fixed by means of screws.

[0130] FIG. 10 shows a cooperating mode of the circulating fan 2100 and the integrated first housing 2700 of the drying module 2000. As shown in FIG. 10, the second circulating fan housing 2810 may be fixed to the first circulating fan housing 2710 by means of a screw 2904, such that the circulating fan 2100 and the first housing 2700 are fixedly connected. The sealing gasket 2130 is located at the junction between the second circulating fan housing 2810 and the first circulating fan housing 2710. According to some embodiments, in order to facilitate mounting the circulating fan 2100 to the first housing 2700 and improve the air tightness of the circulating fan 2100, a sunken groove (not shown in FIG. 10) in which the sealing gasket 2130 is placed may be disposed at the edge of the first circulating fan housing 2710 or the edge of the second circulating fan housing 2810.

[0131] According to some embodiments, an air inlet of the circulating fan 2100 may be the first air inlet 2901 of the moisture adsorption passage. Correspondingly, the air inlet of the circulating fan 2100 may be communicated with the air outlet pipeline of the inner tub through the flexible pipe 2903. According to some embodiments, as shown in FIG. 11, the flexible pipe 2903 and a pressing plate 2905 may be connected through a positioning pin. The pressing plate 2905 is fixed to the first circulating fan housing 2710 of the first housing 2700 through a bolt 2906, such that the flexible pipe 2903 is connected to the air inlet of the circulating fan 2100, and the other end of the flexible pipe 2903 may also be connected to an air outlet of the air outlet pipeline in the same way.

[0132] Under the action of the circulating fan 2100, a circulating airflow may be formed between the moisture adsorption passage and the inner tub. FIG. 12 shows a direction of the circulating airflow in this embodiment of the present disclosure. As shown in FIG. 12, under the action of the circulating fan 2100, the airflow in the inner tub enters into the first air inlet 2901 of the moisture adsorption passage sequentially through the air outlet pipeline (with a filter inside) of the inner tub and the flexible pipe 2903, that is, the airflow enters into the air inlet of the circulating fan 2100 (as shown by an arrow A). The airflow flows from the air outlet of the circulating fan 2100 to the lower side of the moisture adsorption rotary disk 2201 (as shown by an arrow B), flows through the moisture adsorption rotary disk 2201 to the upper side of the moisture adsorption rotary disk 2201 (as shown by an arrow C), flows in the upper space of the moisture adsorption rotary disk 2201 (corresponding to the moisture adsorption region) (as shown by an arrow D), and enters into the inner tub through the first air outlet 2902 of the moisture adsorption passage and the connector 1400 (as shown by an arrow E).

[0133] FIG. 13 and FIG. 14 show an exploded view of the moisture adsorption member 2200 and a perspective view upon the completion of assembly, respectively. FIG. 15 shows a top view of the first housing 2700.

[0134] According to some embodiments, as shown in FIG. 13, the moisture adsorption member 2200 includes a moisture adsorption rotary disk 2201, a peripheral housing of the moisture adsorption rotary disk 2201 and a circumferential damping member 2204. The peripheral housing of the moisture adsorption rotary disk 2201 includes an upper peripheral clamping housing 2202 and a lower peripheral clamping housing 2203. The circumferential damping member 2204 is disposed on the outer circumference of the moisture adsorption rotary disk 2201, or the inner circumferential wall of the upper peripheral clamping housing 2202 and/or the lower peripheral clamping housing 2203. The upper peripheral clamping housing 2202 and the lower peripheral clamping housing 2203 clamp and fix the moisture adsorption rotary disk 2201 and the circumferential damping member 2204. The clamping and fixing may be, for example, achieved by means of snaps, screws, adhesives, and the like.

[0135] The circumferential damping member 2204 may be, for example, foam, soft rubber, wool strips or other materials. The circumferential damping member 2204 is attached to the outer circumference of the moisture adsorption rotary disk 2201, or the inner circumferential wall of the upper peripheral clamping housing 2202 and/or the lower peripheral clamping housing 2203, so as to form a buffer between an outer ring of the moisture adsorption rotary disk 2201 and inner rings of the upper peripheral clamping housing 2202 and the lower peripheral clamping housing 2203, thereby protecting the moisture adsorption rotary disk 2201 (especially when the moisture adsorption rotary disk 2201 is implemented as a brittle material such as a molecular sieve) against damage caused by collision with the upper peripheral clamping housing 2202 and the lower peripheral clamping housing 2203 in the rotation process.

[0136] According to some embodiments, as shown in FIG. 13 and FIG. 14, a first sealing ring 2205 is disposed at the junction between the upper peripheral clamping housing 2202 and the lower peripheral clamping housing 2203, or on an outer circumference of the upper peripheral clamping housing 2202 alone or an outer circumference of the lower peripheral clamping housing 2203 alone. The first sealing ring 2205 may be, for example, foam, soft rubber, wool strips or other materials. The first sealing ring 2205 may, on the one hand, seal the junction between the upper peripheral clamping housing 2202 and the lower peripheral clamping housing 2203, and, on the other hand, form a rotating seal with a housing sealing ring 2724 disposed in the first moisture adsorption member housing 2720 of the first housing 2700, such that the vast majority of moist airflow ascending from the inner tub may flow through the moisture adsorption rotary disk 2201 to be moisture-absorbed, without leaking from a gap between the outer circumference of the moisture

adsorption rotary disk 2201 and the inner circumference of the first housing 2700, thereby ensuring a moisture adsorption effect.

[0137] According to some embodiments, as shown in FIG. 13 and FIG. 14, the moisture adsorption member 2200 further includes an upper central clamping member 2206, a lower central clamping member 2207, and a central end surface damping member 2208. A first hole 2209 is defined in the center of the moisture adsorption rotary disk 2201, a second hole 2210 is defined in the center of the upper central clamping member 2206, and a third hole 2211 is defined in the center of the lower central clamping member 2207. The upper central clamping member 2206 and the lower central clamping member 2207 pass through the first hole 2209 to clamp and fix the moisture adsorption rotary disk 2201. The clamping and fixing may be, for example, achieved by means of snaps, screws, adhesives, and the like. A short shaft 2721 in the center of the first moisture adsorption member housing 2720 of the first housing 2700 is sleeved with the first hole 2209, the second hole 2210 and the third hole 2211, respectively, such that the moisture adsorption member 2200 and the first housing 2700 are rotatably connected. The central end-surface shock absorber 2208 sleeves the lower central clamping member 2207 and is located between the lower central clamping member 2207 and the moisture adsorption rotary disk 2201 and configured to protect the moisture adsorption rotary disk 2201 against damage caused by friction with the lower central clamping member 2207 in the rotation process.

[0138] As shown in FIGs. 16 and 18, the moisture adsorption rotary disk has a central clamping member, and the central clamping member has a certain diameter. The first moisture adsorption member housing 2720 and the second moisture adsorption member housing 2820 are provided with a clamp holding part matching the central clamping member, and the clamp holding part is of a circular shape; and the first separator 2725 and the second separator 2822 point to the clamp holding part and do not point to the rotary shaft. According to some embodiments, the first separator 2725 and the second separator 2822 are tangent to the outer circumference of the clamp holding part.

[0139] According to some embodiments, as shown in FIGs. 13 and 14, drive teeth are disposed on the outer circumference of the upper peripheral clamping housing 2202. The driving mechanism 2300 may be a drive motor, an output end of which is provided with a gear. The gear of the drive motor is meshed with the drive teeth on the upper peripheral clamping housing 2202, thereby driving the moisture adsorption member 2200 to rotate. A belt groove may also be disposed in the outer circumference of the upper peripheral clamping housing 2202, and the drive motor drives the moisture adsorption member 2200 to rotate by means of belt drive.

[0140] It should be noted that the drive mode of the moisture adsorption member 2200 is not limited to a peripheral drive mode shown in FIG. 14. In some other embodiments, the moisture adsorption member 2200 may also be driven to rotate in other modes. For example, the output end of the driving mechanism 2300 may also be connected to the upper central clamping member 2206 or the lower central clamping member 2207, and the moisture adsorption member 2200 is driven to rotate by driving the upper central clamping member 2206 or the lower central clamping member 2207, that is, in a central drive mode. Generally, in the central drive mode, the driving mechanism 2300 needs to be disposed in a vertical (above or below) direction of the moisture adsorption member 2200. However, in the peripheral drive mode shown in FIG. 14, the driving mechanism 2300 is disposed in a horizontal direction of the moisture adsorption member 2200. It may be understood that the central drive mode occupies more vertical space than the peripheral drive mode, resulting in the increase of the height and volume of the washer-dryer machine. However, the central drive mode allows the driving mechanism 2300 to directly drive the moisture adsorption member 2200 to rotate, unlike the peripheral drive mode, in which a gear or belt is additionally disposed at the output end of the driving mechanism to drive the moisture adsorption member 2200, thereby simplifying the structure of the driving mechanism 2300 and reducing a moment of a central shaft. Those skilled in the art may choose a suitable drive mode to drive the moisture adsorption member 2200 to rotate according to actual needs.

[0141] According to some embodiments, as shown in FIG. 13 and FIG. 14, an auxiliary rotary ring 2202 is disposed on the outer circumference of the upper peripheral clamping housing 2202. As shown in FIG. 15, the first housing 2700 is provided with a first moisture adsorption member housing 2720 in which the moisture adsorption member 2200 is mounted, and a flexible roller 2722 is disposed on the inner sidewall of the first moisture adsorption member housing 2720. The flexible roller 2722 may be, for example, disposed on a mounting part that protrudes outward from the inner sidewall of the first moisture adsorption member housing 2720. A rotary shaft of the flexible roller 2722 is parallel to the rotary shaft of the moisture adsorption member 2200.

[0142] As the moisture adsorption member 2200 rotates, the auxiliary rotary ring 2212 is in rolling fit with the flexible roller 2722, which can ensure the stable rotation of the moisture adsorption member 2200 and eliminate a sliding friction between the moisture adsorption member 2200 and the inner ring of the first housing 2700. The diameter of the flexible roller 2722 is elastically variable. That is, when the flexible roller 2722 is pressed radially, a distance between a pressed point and the rotary shaft of the flexible roller 2722 is variable. As the moisture adsorption member 2200 rotates, in the case that the rotary shaft of the moisture adsorption member 2200 is offset from the short shaft 2721, the auxiliary rotary ring 2212 may press the flexible roller 2722 to cause its deformation without any sliding friction under the pressing of the auxiliary rotary ring 2212 and the flexible roller 2722.

The cooperation of the auxiliary rotary ring 2212 and the flexible roller 2722 can reduce the collision with the inner ring of the first housing 2700 due to the unstable and uneven rotation of the moisture adsorption member 2200 and avoid damage to the moisture adsorption member 2200 (especially the moisture adsorption rotary disk 2201) due to collision.

[0143] According to some embodiments, the auxiliary rotary ring 2212 may also be disposed on the outer circumference of the lower peripheral clamping housing 2203, in addition to being disposed on the outer circumference of the upper peripheral clamping housing 2202 as shown in FIG. 13 and FIG. 14. Moreover, the number of the flexible rollers 2722 will not be limited in the embodiments of the present disclosure. Those skilled in the art may provide five flexible rollers 2722 as shown in FIG. 15, or a larger or smaller number of flexible rollers 2722.

[0144] According to some embodiments, the outer ring diameter of the sealing ring is larger than that of the auxiliary rotary ring, and the auxiliary rotary ring protrudes from the drive teeth in a peripheral direction to prevent the airflow from flowing out from the driving part, so as to improve the sealing effect.

[0145] According to some embodiments, as shown in FIG. 15, a rigid roller 2723 is disposed on the bottom surface of the first moisture adsorption member housing 2720. The rigid roller 2723 may be, for example, disposed on the edge of the bottom surface of the first moisture adsorption member housing 2720. The diameter of the rigid roller 2723 is fixed. A rotary shaft of the rigid roller 2723 is perpendicular to the rotary shaft of the moisture adsorption member 2200. As the moisture adsorption member 2200 rotates, the rigid roller 2723 can be in rolling fit with the lower surface of the lower peripheral clamping housing 2203, so as to support the lower peripheral clamping housing 2203, thereby eliminating a friction between the moisture adsorption member 2200 and the bottom surface of the first housing 2700.

[0146] It should be noted that the number of the rigid rollers 2723 will not be limited in the embodiments of the present disclosure. Those skilled in the art may provide four rigid rollers 2723 as shown in FIG. 15, or more or fewer rigid rollers 2723.

[0147] FIG. 16 and FIG. 17 show exploded views of the first moisture adsorption member housing 2720 and the second moisture adsorption member housing 2820 in which the moisture adsorption member 2200 is mounted. FIG. 18 shows an exploded view upon the mounting of the first moisture adsorption member housing 2720, the second moisture adsorption member housing 2820 and the moisture adsorption member 2200.

[0148] According to some embodiments, as shown in FIGs. 16 to 18, the first housing 2700 of the drying module 2000 may be an integrated first housing, and the first moisture adsorption member housing 2720 in which the moisture adsorption member 2200 is mounted is disposed on the integrated first housing. The drying module 2000 further includes a separate second moisture adsorption member housing 2820 in which the moisture adsorption member 2200 is mounted. The second moisture adsorption member housing 2820, in addition to including a circular second mounting part 2821 on which the moisture adsorption member 2200 is mounted, further includes a first air outlet 2902 of the moisture adsorption passage. The moisture adsorption member 2200 is rotatably connected to the short shaft 2721 of the first moisture adsorption member housing 2720, such that the moisture adsorption member 2200 is rotatably connected into an approximately cylindrical space formed by the first moisture adsorption member housing 2720 and the second mounting part 2821. The moisture adsorption rotary disk may be of a cylindrical shape. The moisture adsorption rotary disk may have a thickness of 10 mm to 100 mm, and a diameter of 40 mm to 500 mm. In an embodiment, the thickness of the moisture adsorption rotary disk may be set as 25 mm, and the diameter may be set as 320 mm. In an embodiment, the thickness of the moisture adsorption rotary disk may be set as 30 mm, and the diameter may be set as 200 mm. In another embodiment, the thickness of the moisture adsorption rotary disk may be set as 35 mm, and the diameter may be set as 300 mm. In yet another embodiment, the thickness of the moisture adsorption rotary disk may be set as 40 mm, and the diameter may be set as 350 mm.

[0149] In an embodiment, the moisture adsorption member includes a cylindrical moisture adsorption rotary disk, and a thickness-to-diameter ratio of the moisture adsorption rotary disk ranges from 1: 20 to 1: 5. In an embodiment, when a thickness of the moisture adsorption rotary disk is set as 35 mm, a diameter of the moisture adsorption rotary disk may be set as 175 mm to 750 mm. In an embodiment, when the thickness of the moisture adsorption rotary disk is set as 42 mm, the diameter of the moisture adsorption rotary disk may be set as 210 mm to 840 mm. In an embodiment, when the thickness of the moisture adsorption rotary disk is set as 25 mm, the diameter of the moisture adsorption rotary disk may be set as 125 mm to 500 mm.

[0150] According to some embodiments, as shown in FIGs. 16 to 18, the first moisture adsorption member housing 2720 is provided with a first separator 2725, and the second mounting part 2821 is provided with a second separator 2822. After the first moisture adsorption member housing 2720 and the second moisture adsorption member housing 2820 are fixedly connected, the second separator 2822 and the first separator 2725 are opposite to each other, thereby dividing a cylindrical space in which the moisture adsorption member 2200 is located into a moisture adsorption region 2907 and a regenerating region 2908. That is, the first separator 2725 and the second separator 2822 may divide the moisture adsorption rotary disk 2201 into the moisture adsorption region 2907 and the regenerating region 2908. The circulating airflow flows into the moisture adsorption region 2907 from one side (such as from below) of the moisture adsorption rotary disk 2201,

and the moisture adsorption region 2907 is configured to absorb the moisture in the circulating airflow. The dehumidifying airflow flows into the regenerating region 2908 from the other side (such as from above) of the moisture adsorption rotary disk 2201, and the regenerating region 2908 is configured to discharge the moisture absorbed by the moisture adsorption rotary disk 2201 through the dehumidifying airflow, thereby achieving the regeneration and recycling of the moisture adsorption rotary disk 2201.

[0151] According to some embodiments, as shown in FIG. 16 and FIG. 18, the first moisture adsorption member housing 2720 is further provided with at least one third separator 2726. The at least one third separator 2726 divides the moisture adsorption region 2907 into at least two parts, namely, a first moisture adsorption region 2907-1 and a second moisture adsorption region 2907-2, thereby separating the circulating airflow flowing into the moisture adsorption region 2907. After entering into a space between the first housing 2700 and the moisture adsorption member 2200 through the circulating fan, the circulating airflow is separated by the third separator 2726 into at least two parts relatively evenly (namely, the volumes of the airflows in the two parts are approximately the same), thereby preventing the circulating airflow from flowing more to the circumference of the moisture adsorption member 2200 while less near the center of the circle under the action of a centrifugal force. According to these embodiments, the moisture-adsorption efficiency of the moisture adsorption member 2200 can be improved to realize even and stable moisture adsorption.

[0152] According to some embodiments, as shown in FIG. 16 and FIG. 18, a first sealing member is disposed between the moisture adsorption member 2200 and the first separator 2725 of the first moisture adsorption member housing 2720. The first sealing member is fixed (such as by means of screws, snaps, or adhesives) to the upper end surface of the first separator 2725. The first sealing member may include, for example, a sealing strip 2728 and a metal pressing plate 2727. The sealing strip 2728 may be made of, for example, rubber, foam, wool strips or other materials. The metal pressing plate 2727 may be connected to the sealing strip 2728 by means of a screw or adhesive, and fixes the sealing strip 2728 to the first separator 2725.

[0153] Similar to the above embodiments, as shown in FIG. 17 and FIG. 18, a second sealing member is disposed between the moisture adsorption member 2200 and the second separator 2822 of the second moisture adsorption member housing 2820. The second sealing member is fixed (such as by means of screws, snaps, or adhesives) to the lower end surface of the second separator 2822 and is located directly above the first sealing member 2727 and the sealing strip 2728. The second sealing member may include, for example, a sealing ring 2824 and a metal pressing plate 2823. The sealing ring 2824 may be made of, for example, rubber, foam, wool strips or other materials. The metal pressing plate 2823 may be connected to the sealing ring 2824 by means of a screw or adhesive, and fixes the sealing ring 2824 to the second separator 2822.

[0154] The first sealing member 2727 and the sealing strip 2728, as well as the second sealing member 2823 and the sealing ring 2824, may achieve a dynamic seal between the moisture adsorption member 2200 and each of the first moisture adsorption member housing 2700 and the second moisture adsorption member housing 2820. That is, as the moisture adsorption member 2200 rotates, the moisture adsorption region 2907 and the regenerating region 2908 are separated and maintain a relative seal. The circulating airflow of the moisture adsorption region 2907 passes as little as possible through the first separator 2725 and the second separator 2822 to the regenerating region 2908, and the dehumidifying airflow of the regenerating region 2908 also passes as little as possible through the first separator 2725 and the second separator 2822 to the moisture adsorption region 2907.

[0155] According to some embodiments, a spacing between each of the first sealing member and the second sealing member, in particular between each of the sealing strip 2728 and the sealing ring 2824 and the moisture adsorption member 2200, may be set in a reasonable small range, such as between 0 mm and 0.5 mm, or between 0.6 mm and 0.8 mm, which is relatively easy to achieve. In this way, the moisture adsorption rotary disk may achieve a better dynamic sealing effect without contacting the first sealing member and the second sealing member in the rotation process of the moisture adsorption rotary disk to increase rotational resistance. FIG. 19 shows an exemplary fixing mode of the integrated first moisture adsorption member housing 2720 and second moisture adsorption member housing 2820. As shown in FIG. 19, a housing sealing ring 2724 is disposed at the junction between the second moisture adsorption member housing 2820 and the first moisture adsorption member housing 2720. The housing sealing ring 2724 is configured to ensure the air tightness of the space where the moisture adsorption member 2200 is located. The housing sealing ring 2724 may be, for example, a rubber gasket, a silicone gasket, and the like. A groove in which the housing sealing ring 2724 is mounted is disposed in the second moisture adsorption member housing 2820 or the first moisture adsorption member housing 2720. The housing sealing ring 2724 is mounted in the groove, and the second moisture adsorption member housing 2820 is fastened to the first moisture adsorption member housing 2720 and bolted.

[0156] Referring to FIG. 6, the integrated first housing 2700 of the drying module 2000 is provided with a mounting part 2730 (a first housing 2410 of the regenerating fan) on which the regenerating fan 2400 is mounted. The mounting part 2730 may cooperate with another separate housing (a second housing 2410 of the regenerating fan) corresponding to the regenerating fan 2400 to fix the

regenerating fan 2400 in the mounting part 2730 of the first housing 2700. The regenerating fan 2400 may be, for example, an already encapsulated fan module.

[0157] Under the action of the regenerating fan 2400, a dehumidifying airflow may be formed in the regenerating passage. FIG. 20 shows a flow direction of the dehumidifying airflow in this embodiment of the present disclosure. As shown in FIG. 20, the dehumidifying airflow enters into an air inlet of the regenerating fan 2400 (as shown by an arrow A) under the action of the regenerating fan 2400, flows through the regenerating fan 2400 and enters into a heating assembly 2500 via a first connector 2909 (as shown by arrows B and C). The heating assembly 2500 is located on one side of the regenerating region of the moisture adsorption rotary disk 2201. In this embodiment, the drying module is horizontally disposed, and the heating assembly 2500 is located above the moisture adsorption rotary disk 2201. The dehumidifying airflow flows into the heating assembly 2500, flows through the regenerating region of the moisture adsorption rotary disk 2201 from top to bottom (as shown by an arrow D), and then flows into the condenser 2600 (as shown by an arrow E). An air outlet in a shell (not shown in FIG. 20) of the condenser 2600 is communicated with the air inlet of the regenerating fan 2400 through a second connector 2910, such that the regenerating passage forms a closed loop. The dehumidifying airflow condensed by the condenser 2600 flows again into the air inlet of the regenerating fan 2400 through the second connector 2910 (as shown by an arrow A), such that the dehumidifying airflow may circularly flow in the regenerating passage. The closed-loop regenerating passage can avoid the interaction between the dehumidifying airflow and an external environment of the washer-dryer machine, thereby reducing the impact on the external environment (such as the impact on the humidity of outside air, and the like).

[0158] In some other embodiments, the regenerating passage may also be an open-loop passage. For example, in the embodiments shown in FIG. 1 and FIG. 5, the side surface of the shell 10 of the washer-dryer machine is provided with a second air outlet 102 and a second air inlet 103. The second air outlet 102 is communicated with an air outlet end 621 of the regenerating passage 202, and the second air inlet 103 is communicated with an air inlet end 622 of the regenerating passage 202. In these embodiments, a condenser may be disposed at at least one of the air outlet end 621 and the air inlet end 622. The condenser disposed at the air outlet end 621 may condense and dry the dehumidifying airflow discharged to the outside, thereby reducing the humidity of the airflow discharged to the outside and reducing the impact on the external environment. The condenser disposed at the air inlet end 622 may dry an external airflow flowing into the regenerating passage, thereby improving the dehumidifying effect of the regenerating region.

[0159] According to some embodiments, an electric auxiliary heating assembly may be disposed at the air inlet end 622. The electric auxiliary heating assembly is configured to preheat the dehumidifying airflow flowing into the regenerating passage 202 to improve a dehumidifying effect of the regenerating region.

[0160] As the moisture adsorption rotary disk 2201 rotates, various parts of the moisture adsorption rotary disk 2201 rotate from the moisture adsorption passage to the regenerating passage, and then from the regenerating passage to the moisture adsorption passage, such that a portion of the moisture adsorption rotary disk 2201 located in the moisture adsorption region absorbs the moisture in the wet circulating airflow in the moisture adsorption passage and then rotates to the regenerating region. The heating assembly 2500 heats this portion, such that the moisture in this portion is quickly desorbed into the dehumidifying airflow. Consequently, the dehumidifying airflow becomes a high-temperature, water-vapor-containing airflow (namely, a high-temperature moisture-containing airflow). The condenser 2600 condenses the high-temperature moisture-containing airflow into a low-temperature dry airflow, and condensate water is discharged from the condenser 2600 through a condensate water outlet. The low-temperature dry airflow treated by the condenser 2600 enters into the air inlet (corresponding to the above closed-loop regenerating passage) of the regenerating fan 2400 again or is discharged to the outside (corresponding to the above open-loop regenerating passage).

[0161] The heating assembly 2500 is disposed on one side of the regenerating region of the moisture adsorption rotary disk 2201. In this embodiment, the heating assembly 2500 is disposed above the regenerating region of the moisture adsorption rotary disk 2201 and covers the regenerating region. FIG. 21 and FIG. 22 show an exploded view and a perspective view of related structures of the heating assembly 2500 and the regenerating fan 2400, respectively. As shown in FIGs. 20 to 28, the regenerating fan 2400 is fixed in a first regenerating fan housing 2410 and a second regenerating fan housing 2420. The heating assembly 2500 is communicated with the air outlet of the regenerating fan 2400 via the first connector 2909. A first sealing gasket 2912 is disposed at the junction between the heating assembly 2500 and the first connector 2909. The heating assembly 2500 may be connected to a second housing for a module corresponding to the moisture adsorption member through a third connector 2911, for example, connected to a sector-shaped notch in the upper end surface of the second moisture adsorption member housing 2820 shown in FIG. 18. The air inlet of the regenerating fan 2400 is connected to a shell of the condenser 2600 through the second connector 2910 (not shown in FIG. 21 and FIG. 28). A second sealing gasket 2913 is disposed at the junction between the second connector 2910 and the shell of the condenser 2600.

[0162] FIG. 23 and FIG. 24 show a perspective view and an exploded view of the first connector 2909, respectively. FIG. 25 and FIG. 26 show a perspective view

and an exploded view of the second connector 2910, respectively. As shown in FIGs. 23 to 26, the first connector 2909 may be split into two parts, namely, an upper part 2914 of the first connector and a lower part 2915 of the first connector. The upper part 2914 of the first connector and the lower part 2915 of the first connector may be machined separately, and then welded or bolted to obtain the first connector 2909. Similarly, the second connector 2910 may also be split into two parts, namely, an upper part 2916 of the second connector and a lower part 2917 of the second connector. The upper part 2916 of the second connector and the lower part 2917 of the second connector may be machined separately, and then welded or bolted to obtain the second connector 2910.

[0163] By splitting each of the first connector 2909 and the second connector 2910 into two parts, the machining difficulty of the first connector and the second connector may be reduced and the manufacturability thereof may be ensured. In addition, the shapes of the first connector 2909 and the second connector 2910 are determined based on the structures and arrangement modes of the regenerating fan 2400, the heating assembly 2500, the condenser 2600, and other components in the regenerating passage, so as to cooperate with other components in the regenerating passage, thereby achieving the effects of sealing the regenerating passage and adjusting the flow direction of the dehumidifying airflow.

[0164] The first connector 2909 may be of a flexible integrated structure, and an air inlet part and an air outlet part at both ends of the first connector may extend into an air outlet of the condenser housing and an air inlet housing of the regenerating fan due to deformation, and form a sealed connection by means of bolting after returning to original shapes.

[0165] FIG. 27 shows a schematic diagram of a mounting position of the heating assembly 2500 on the second moisture adsorption member housing 2820. As shown in FIG. 27, the heating assembly 2500 is disposed on the second moisture adsorption member housing 2820, and a heat shield ring 2918 and a second sealing ring 2919 are disposed between the heating assembly 2500 and the second moisture adsorption member housing 2820. The heat shield ring 2918 is made of a heat shield material or heat insulation material. In some embodiments, the heat shield ring 2918 may be made of a metal material. The second sealing ring 2919 may be made of silicone, rubber, foam, or other materials.

[0166] As shown in FIG. 27, the second sealing ring 2919 covers the heat shield ring 2918, and the second sealing ring 2919 is in direct contact with the second moisture adsorption member housing 2820 and the heat shield ring 2918. The regenerating region of the moisture adsorption rotary disk is located below the heating assembly 2500. By providing the heat shield ring 2918 and the second sealing ring 2919 between the heating assembly 2500 and the second moisture adsorption member housing 2820, the moisture adsorption rotary disk can be spatially divided into the moisture adsorption region and the regenerating region, such that the dehumidifying airflow may flow smoothly through the moisture adsorption rotary disk.

[0167] It may be understood that, if the heating assembly 2500 is in direct contact with the second moisture adsorption member housing 2820 (the second moisture adsorption member housing 2820 may be, for example, made of a plastic material) for an extended period, a deformation or damage of the second moisture adsorption member housing 2820 may be caused due to relatively high temperature of the heating assembly 2500. A buffer zone for temperature transfer may be formed between the heating assembly 2500 and the second moisture adsorption member housing 2820 by disposing the heat shield ring 2918 and the second sealing ring 2919, avoiding a deformation or damage of the second moisture adsorption member housing 2820 due to high temperature.

[0168] FIGs. 28 to 30 show a perspective view of the heating assembly 2500, a schematic diagram of a mesh plate 2550, and a bottom view of the heating assembly 2500, respectively. As shown in FIGs. 28 to 30, the heating assembly 2500 includes a sector-shaped housing 2510, and a mesh plate 2520 and a heating pipe 2530 which are disposed in the sector-shaped housing 2510. The heating pipe 2530 is disposed below the mesh plate 2520, and the mesh plate 2520 is provided with a plurality of air holes 2521.

[0169] An air inlet 2540 is defined in a circumferential side or radius side of the sector-shaped housing 2510. The dehumidifying airflow flowing out from the first connector 2909 (see FIGs. 20 to 22) flows from the air inlet 2540 into a space above the mesh plate 2520 in the sector-shaped housing 2510, then flows through meshes 2521 in the mesh plate 2520, is heated by the heating pipe 2530, and flows down to the regenerating region on the moisture adsorption rotary disk. The high-temperature dehumidifying airflow heated by the heating pipe 2530 can desorb the moisture in the regenerating region.

[0170] According to some embodiments, the diameters of the plurality of air holes 2521 in the mesh plate 2520 may not be identical. The diameters of the plurality of air holes 2521 may be reduced sequentially along the flow direction of the dehumidifying airflow in the heating assembly 2500, such that the air volume may be adjusted. Thus, the dehumidifying airflow flows evenly through the mesh plate 2520, and hence the dehumidifying airflow may be heated evenly by the heating pipe 2530. For example, as shown in FIG. 28 and FIG. 35, a flow direction of the dehumidifying airflow inside the sector-shaped housing 2510 starts from the circumference to the center of the circle in the case that the air inlet 2540 is defined in the circumferential side of the fan-shaped housing 2510. Correspondingly, the diameters of the plurality of air holes 2521 in the mesh plate 2520 tend to decrease along a direction from the circumference of the sector-shaped housing to the center of the circle (as indicated by arrows in FIG. 29), thereby adjusting the air

volume. Therefore, the dehumidifying airflow may be heated evenly by the heating pipe 2530.

[0171] In some other embodiments (not shown in FIGs. 28 to 30), the air inlet 2540 may also be disposed on the radius side of the sector-shaped housing 2510. In this case, the dehumidifying airflow flows in a direction approximately perpendicular to the radius (namely, a circumferential direction) inside the sector-shaped housing 2510, in other words, along a direction from the radius side where the air inlet is located to the other radius side of the sector-shaped housing 2510. Correspondingly, the diameters of the plurality of air holes 2521 in the mesh plate 2520 tend to decrease along the direction from the radius side where the air inlet is located to the other radius side. Therefore, the volume of air flowing through the mesh plate 2520 can be adjusted, such that the dehumidifying airflow can be heated evenly by the heating pipe 2530. Further, the heated high-temperature dehumidifying airflow evenly dehumidifies the moisture in the regenerating region of the moisture adsorption rotary disk, thereby improving the dehumidifying effect.

[0172] According to some embodiments, as shown in FIG. 30, the heating pipe 2530 is not disposed directly below the air holes 2521 but is offset towards a center of the sector-shaped housing relative to the air holes 2521. Due to a certain offset of the position of the heating pipe 2530 relative to the air holes 2521, the heating pipe 2530 will not form significant resistance to the dehumidifying airflow flowing through the air holes 2521. Further, the dehumidifying airflow has a velocity along a direction from the circumference of the sector-shaped housing to the center of the circle (as indicated by arrows in FIG. 29) when the dehumidifying airflow enters into the air inlet 2540 and flows through the air holes 2521. By disposing the heating pipe 2530 at a position offset towards the center of the sector-shaped housing relative to the air holes 2521, the dehumidifying airflow flowing through the air holes 2521 may be directly opposite to the heating pipe 2530, thereby improving the heating efficiency of the heating pipe 2530 to the dehumidifying airflow.

[0173] According to some embodiments, as shown in FIG. 28 and FIG. 30, the lower wall of the sector-shaped housing 2510 extends outward to form a third mounting part 2550. The heating assembly 2500 further includes a temperature sensor 2560 of a heat-conducting sheet 2570. The temperature sensor 2560 is coated with the heat-conducting sheet 2570 and then disposed on the third mounting part 2550.

[0174] The temperature sensor 2560 is configured to detect the temperature of the heating assembly 2500 so as to control the heating pipe 2530 to be turned on and off. It may be understood that the temperature in the heating assembly 2500 is not stable since the heated dehumidifying airflow may create turbulence in the heating assembly 2500. If the temperature sensor 2560 is directly used to detect the temperature of the airflow in the heating assembly 2500, a temperature value detected by the temperature sensor 2560 will be fluctuated and unstable, which is not conducive to effective control of the heating pipe 2530. By disposing the temperature sensor 2560 in the heat-conducting sheet 2570, the temperature in the heating assembly 2500 is first conducted to the heat-conducting sheet 2570 by means of heat conduction, and the temperature sensor 2560 detects the temperature of the heat-conducting sheet 2570. The temperature of the heat-conducting sheet 2570 is more stable than the temperature of the airflow. Therefore, compared with the direct detection of the airflow temperature by the temperature sensor 2560, the detection of the temperature value of the heat-conducting sheet 2570 by the temperature sensor 2560 can improve the stability and accuracy of the temperature detection. Thus, the heating pipe 2530 can be effectively controlled.

[0175] As described above, the heating assembly 2500 heats the dehumidifying airflow to obtain a high-temperature airflow. This high-temperature airflow can desorb the moisture in the regenerating region of the moisture adsorption rotary disk to obtain a high-temperature moisture-containing airflow. The heated high-temperature moisture-containing airflow continues to flow into the condenser 2600 and is condensed into a low-temperature dry airflow, and condensate water is discharged out of the condenser 2600 through a condensate water outlet. The low-temperature dry airflow treated by the condenser 2600 again enters into the air inlet (corresponding to the above closed-loop regenerating passage) of the regenerating fan 2400 or is discharged to the outside (corresponding to the above open-loop regenerating passage).

[0176] FIG. 31 shows a schematic diagram of a fixing mode of the condenser 2600 and the first housing 2700. As shown in FIG. 31, the second condenser housing 2830 matches the mounting part 2740 (namely, the first condenser housing) in the first housing 2700 in which the condenser is mounted. The second condenser housing covers the condenser 2600 and downwardly presses a sealing strip 2920 around the condenser 2600, to be sealed and fixed with the mounting part 2740. The second condenser housing 2830 and the mounting part 2740 form a complete shell of the condenser 2600, that is, a condenser shell. An air outlet 2631 is defined in the condenser shell and connected to the air inlet of the regenerating fan 2400 through the second connector 2910 (see FIGs. 20 to 22).

[0177] FIG. 32 shows a sectional view of the condenser shell 2630. As shown in FIG. 32, a high-temperature and high-humidity dehumidifying airflow flowing through the regenerating region 2908 enters into the condenser shell 2630 (as shown by an arrow A), undergoes a drying treatment (as shown by an arrow B) by the condenser 2600 (not shown in FIG. 32), and flows to the second connector 2910 (as shown by an arrow C) from the air outlet 2631.

[0178] According to some embodiments, as shown in FIG. 32, a baffle 2632 is disposed at a position, close to

the air outlet 2631, on a bottom surface of the condenser shell 2630. The baffle 2632 can improve the condensation effect of the condenser 2600, such that the dehumidifying airflow is fully dried by the condenser 2600. For example, the baffle 2632 can avoid the following situation: the dehumidifying airflow into the condenser shell 2630 flows out of a gap between the condenser 2600 and the bottom surface of the condenser shell 2630 directly, without flowing through the condenser 2600, resulting in the failure of condensing and drying this part of the airflow.

[0179] As shown in FIG. 31, a condensate water pipe 2640 configured to circulate condensate water is disposed inside the condenser 2600. The condensate water pipe 2640 further includes a water inlet 2610 and a water outlet 2620. The direction shown by an arrow A in FIG. 31 is a flow direction of the dehumidifying airflow in the condenser 2600.

[0180] According to some embodiments, a sensor configured to detect a condition of the condensate water, such as a temperature sensor or a flow sensor, may be disposed inside the condensate water pipe 2640, or an inductive sensor is disposed outside a condensate water inlet pipe to detect whether the condensate water flows through the condensate water pipe 2640. A water flow in the condensate water pipe 2640 may be adjusted or a warning is issued based on the condition data detected by the sensor, so as to ensure the normal operation of the condenser 2600 and improve the condensation effect. For example, if the temperature sensor detects that the temperature of the condensate water is too high, the current condensation effect may be relatively poor. Therefore, a flow rate of the condensate water may increase accordingly, thereby reducing the water temperature of the condensate water and improving the condensation effect. For example, if the flow sensor detects that the flow rate of the condensate water is insufficient, the condensate water pipe 2640 may have a risk of leakage, and a warning message may be issued to remind the user to inspect or repair the condensate water pipe 2640. Of course, a temperature sensor may also be disposed at the air inlet and/or air outlet of the condenser housing, and whether the condenser operates normally is determined according to a detected temperature value, a detected temperature difference, or a temperature difference between the air inlet and the air outlet.

[0181] According to some embodiments, as shown in FIG. 31, the condensate water pipe 2640 may be a serpentine pipe. In the example shown in FIG. 31, the condensate water pipe 2640 is disposed circuitously in the condenser 2600, such that a contact area between the dehumidifying airflow and the condensate water pipe 2640 can increase, and hence the dehumidifying airflow can be fully condensed. As shown in FIG. 31, the condenser 2600 includes a first side and a second side opposite to each other in the flow direction of the dehumidifying airflow (see an arrow A), wherein the first side is located downstream of the second side. In an example not shown, the water inlet 2610 and the water outlet 2620 of the condensate water pipe 2640 both are located on the sidewall of the condenser 2600, this sidewall is connected to the first side and the second side of the condenser 2600, and the water inlet 2610 and the water outlet 2620 are closer to the first side than the second side. In such an example, the condensate water pipe 2640 extends from the water inlet 2610 along a first zigzag path towards the second side of the condenser 2600 to a position away from the first side, and then extends from this position along a second zigzag path toward the first side to the water outlet 2620, wherein the first zigzag path has a length larger than that of the second zigzag path, for example, twice the length of the second zigzag path. It will be understood that such an arrangement may be advantageous, since the temperature of the condensate water gradually increases from the first side of the condenser 2600 to the second side of the condenser 2600 due to the heat release of the dehumidifying airflow. In turn, the temperature of the dehumidifying airflow gradually decreases from the second side of the condenser 2600 to the first side of the condenser 2600 due to the heat adsorption of the condensate water. Therefore, the dehumidifying airflow and the condensate water maintain a certain temperature difference during the entire condensation process, thereby improving the condensation effect.

[0182] In the above embodiment, the condenser 2600 is a water-cooled condenser, that is, the flowing condensate water is used as a cooling medium to take away heat released as the dehumidifying airflow condenses. In some other embodiments, the condenser 2600 may also be an air condenser (with air as a cooling medium), an evaporative condenser (with water and air as a cooling medium), and the like.

[0183] It should be noted that the drying module 2000 described above is only an exemplary embodiment of the drying module in the present disclosure. Respective technical features of the drying module 2000 may be replaced with other technical features, thereby forming a drying module in other embodiments of the present disclosure.

[0184] It should be noted that a mounting mode of the drying module is not limited in the present disclosure. In the embodiments described above, the drying module 2000 includes an integrated first housing 2700 and discrete second housings, such as a second circulating fan housing 2810, a second moisture adsorption member housing 2820, a second condenser housing 2830, and the like. The drying module 2000 is fixed to the shell 1200 of the washer-dryer machine in a lap-joint manner through the fourth mounting part 2701 on the first housing 2700. In addition, flexible pipes are disposed at the junction between the drying module 2000 and the water outlet pipeline of the drum 1100 and the junction between the drying module 2000 and the air inlet pipeline of the drum 1100. Therefore, damage to the drying module

2000 caused by the transfer of the vibration of the drum 1100 to the drying module 2000 can be avoided.

[0185] In some other embodiments, the first housing and the second housing of the drying module may both be discrete, that is, the drying module may be assembled from various components such as a circulating fan housing, a moisture adsorption member housing, a regenerating fan housing, a condenser housing, and the like. According to these embodiments, the respective components of the drying module may be modularized, facilitating the repair and replacement of individual components, thereby facilitating the maintenance of the entire drying module.

[0186] In the above embodiments, the respective components of the drying module may be fixedly connected to the outer tub of the drum. Therefore, the space can be saved to reduce the height of the washer-dryer machine.

[0187] In some other embodiments, since the moisture adsorption member (especially the moisture adsorption rotary disk) is more fragile and more affected by vibration than other components of the drying module and other components are less affected by vibration, the moisture adsorption member housing may be fixedly connected to the shell of the washer-dryer machine, and other components may be fixedly connected to the outer tub of the inner tub. This reduces the cost of the first housing of the integrally molded drying module while avoiding damage to the moisture adsorption member (especially the moisture adsorption rotary disk) caused by vibration. In order to further reduce the impact of vibration, in these embodiments, pipelines between the moisture adsorption member and all other components that may vibrate are flexible pipes for transitional connection to achieve vibration isolation.

[0188] It should be noted that a positional relationship between the drum 1100 and the drying module 2000 is not limited in the present disclosure. In addition to disposing the drying module 2000 above the drum 1100 as described above, the drying module 2000 may also be disposed at the rear of the drum 1100 (not shown), below the drum 1100 (not shown), and the like.

[0189] It should be noted that a position of the air outlet pipeline of the inner tub is not limited in the present disclosure. In addition to disposing the air outlet pipeline 1300 of the inner tub in the left rear of the drum 1100 as described above (as shown in FIG. 2), the air outlet pipeline 1300 may also be disposed in the left front, the right rear, the right front, and the like of the drum 1100. It may be understood that, upon the adjustment of the position of the air outlet pipeline 1300, the positions of other components of the drying module (such as the circulating fan and the moisture adsorption member) also need to be adjusted accordingly.

[0190] According to some embodiments, in addition to cleaning the filter automatically by using the cleaning assembly as described above, the filter may also be manually cleaned. According to some embodiments, the air outlet pipeline 1300 may extend from the left rear of the inner tub to the left front of the inner tub. A filter screen box on which the filter screen is mounted is disposed at a position in the air outlet pipeline 1300 near a front panel or a side panel of the washer-dryer machine, such that the user can easily remove the filter screen manually. It may be understood that since the filter screen is removed manually, the air outlet pipeline 1300 will actually be cut off by the filter screen box. Therefore, in order to ensure the air tightness and integrity of the air outlet pipeline 1300, it is necessary to provide a sealing member in the position of the filter screen box.

[0191] According to some embodiments, in addition to the moisture adsorption region and the regenerating region described above, a cooling region may also be disposed on the moisture adsorption rotary disk, that is, the moisture adsorption rotary disk is divided into three sector-shaped regions, namely, the moisture adsorption region, the regenerating region, and the cooling region. The cooling region is located downstream of the regenerating region and upstream of the moisture adsorption region along the rotation direction of the moisture adsorption rotary disk. After a certain part of the moisture adsorption rotary disk is heated by the regenerating region, it rotates to the cooling region for cooling, and then rotates to the moisture adsorption region to absorb moisture of a moist hot airflow from the inner tub, which can improve the moisture adsorption effect and avoid the adverse effect on the moisture adsorption effect due to too high temperature of the moisture adsorption rotary disk.

[0192] According to some embodiments, a cooling passage corresponding to the cooling region described above may be provided. The cooling passage is configured to introduce the airflow into the cooling region to cool the portion of the moisture adsorption rotary disk that is located within the cooling region. In some embodiments, the cooling passage may be different from the moisture adsorption passage and the regenerating passage, and an airflow is generated in the cooling passage by disposing a separate fan in the cooling passage. In some other embodiments, the cooling passage may also be reused as part of the regenerating passage, and the airflow in the cooling passage is generated by the regenerating fan. For example, the air outlet of the regenerating fan may be connected to both the regenerating passage and the cooling passage, such that the airflow is generated in the regenerating passage and the cooling passage. After being heated by the heating assembly, the airflow (namely, the dehumidifying airflow) in the regenerating passage dehumidifies moisture in the portion of the moisture adsorption rotary disk located in the regenerating region; and the airflow in the cooling passage is unnecessary to be heated, but directly flows through the cooling region to cool the portion of the moisture adsorption rotary disk located in the cooling region.

[0193] According to some embodiments, in addition to the circular moisture adsorption rotary disk described above, the moisture adsorption member may also be a

bar-shaped moisture adsorption strip. Correspondingly, the driving mechanism may drive the moisture adsorption strip to perform a reciprocating linear motion (namely, translation) relative to the moisture adsorption passage and the regenerating passage, or drive the moisture adsorption passage and the regenerating passage to perform a linear motion relative to the moisture adsorption strip. A region on the moisture adsorption strip, which is aligned with the moisture adsorption passage, is configured to absorb the moisture from the moist circulating airflow; and a region on the moisture adsorption strip, which is aligned with the regenerating passage, is used for dehumidification.

[0194] According to some embodiments, the moisture adsorption member may be a moisture adsorption plane. A plurality of moisture adsorption passages and a plurality of regenerating passages may be disposed, respectively. The plurality of moisture adsorption passages and the plurality of regenerating passages are alternately disposed horizontally and pass vertically through the moisture adsorption plane. For example, two moisture adsorption passages and two regenerating passages may be provided, and the order of the four passages in a horizontal direction from left to right is the moisture adsorption passage, the regenerating passage, the moisture adsorption passage, and then the regenerating passage.

[0195] According to some embodiments, the driving mechanism may drive the moisture adsorption plane to reciprocate in a horizontal direction in a stepwise manner, that is, each time the driving mechanism drives the moisture adsorption plane to move a distance in the horizontal direction to reach a designated position, and then drives the moisture adsorption plane to move to the next position after the moisture adsorption plane stays at the designated position for a period of time. In the case that the moisture adsorption plane is located in the designated position, a first region on the moisture adsorption plane, which is aligned with the moisture adsorption passage, is configured to absorb the moisture from the moist circulating airflow; and a second region on the moisture adsorption plane, which is aligned with the regenerating passage, is used for dehumidification. After the moisture adsorption plane is moved to the next position, the first region that is originally aligned with the moisture adsorption passage is now aligned with the regenerating passage for dehumidification; and the second region that is originally aligned with the regenerating passage is now aligned with the moisture adsorption passage for moisture adsorption.

[0196] According to some other embodiments, the driving mechanism may also drive the moisture adsorption plane to reciprocate in a horizontal direction in a continuous motion manner. As the moisture adsorption plane moves in the horizontal direction, the first region on the moisture adsorption plane, which is aligned with the moisture adsorption passage, is configured to absorb the moisture from the moist circulating airflow; and the second region on the moisture adsorption plane, which is aligned with the regenerating passage, is used for dehumidification. Moisture desorption is carried out when the first region is moved to be aligned with the regenerating passage; and moisture adsorption is performed when the second region is moved to be aligned with the moisture adsorption passage.

[0197] According to the above embodiments, the moisture adsorption plane reciprocates in the horizontal direction, such that each region on the moisture adsorption plane may periodically absorb and dehumidify moisture, thereby improving the moisture adsorption and moisture desorption efficiency. Moreover, by alternately disposing the plurality of moisture adsorption passages and the plurality of regenerating passages, it may be ensured that all positions on the moisture adsorption plane are in an operating state of moisture adsorption or dehumidification, thereby improving the moisture adsorption and moisture desorption efficiency.

[0198] According to some embodiments, the moisture adsorption member may be fixed without moving. The driving mechanism is configured to alternately locate the moisture adsorption passages and the regenerating passages at the moisture adsorption member, such that the moisture adsorption member alternately performs moisture adsorption and dehumidification. The driving mechanism, for example, may be implemented as a pipeline switching mechanism; and the moisture adsorption passages and the regenerating passages are alternately communicated with the moisture adsorption member by switching pipelines. In these embodiments, since the moisture adsorption member is fixed, damage to the moisture adsorption member caused by friction during motion can be avoided, without the need to consider the dynamic sealing problem of the moisture adsorption member during motion. However, since there is only one moisture adsorption member, moisture adsorption and desorption cannot be carried out at the same time, such that the drying time of the laundry increases accordingly.

[0199] According to some embodiments, a plurality of moisture adsorption members may be disposed. For example, two moisture adsorption members, namely, a first moisture adsorption member and a second moisture adsorption member, are provided. The driving mechanism is configured to locate the first moisture adsorption member and the second moisture adsorption member alternately on the moisture adsorption passages and the regenerating passages, such that the first moisture adsorption member and the second moisture adsorption member alternately perform moisture adsorption and dehumidification. Further, since the plurality of moisture adsorption members is provided, the moisture adsorption process of one moisture adsorption member may be carried out simultaneously with the moisture desorption process of the other moisture adsorption member, such that the laundry drying efficiency can be improved when these embodiments are compared with the previous embodiment.

[0200] The driving mechanism, for example, may be implemented as a pipeline switching mechanism; and the moisture adsorption passages and the regenerating passages are alternately communicated with the first moisture adsorption member and the second moisture adsorption member by switching pipelines. In these embodiments, since the first moisture adsorption member and the second moisture adsorption member may be fixed without moving, damage to the moisture adsorption members caused by friction during motion can be avoided, without the need to consider the dynamic sealing problem of the moisture adsorption members during motion.

[0201] Although the embodiments of the present disclosure have been described with reference to the accompanying drawings, it should be understood that the scope of the present disclosure is not limited by the embodiments or examples, and is only defined by the scope of the granted claims and the equivalents thereof. Various elements in the embodiments or examples may be omitted or substituted by equivalent elements thereof. It should also be understood that as the technology evolves, many elements described herein may be replaced with equivalent elements that appear after the present disclosure.

[0202] It should be understood that in the Description, the orientation or position relationships or dimensions indicated by terms "central", "longitudinal", "transverse", "length", "width", "thickness", "upper", "lower", "front", "back", "left", "right", "vertical", "horizontal", "top", "bottom", "inner", "outer", "clockwise", "counterclockwise", "axial", "radial", "circumferential", and the like are orientation or position relationships or dimensions shown in the accompanying drawings, and are merely intended to facilitate the description, rather than to indicate or imply that the mentioned apparatuses or elements must have a specific orientation or be constructed and operated in a specific orientation. Therefore, these terms may not be construed as a limitation to the protection scope of the present disclosure.

[0203] In addition, the terms "first", "second", "third", and the like are merely intended for a purpose of description, and shall not be understood as an indication or implication of relative importance or implicit indication of the quantity of indicated technical features. Therefore, a feature limited by "first", "second", or "third" may explicitly or implicitly include one or more of the features. In the description of the present disclosure, "a plurality of" means two or more, unless otherwise specifically defined.

[0204] In the present disclosure, unless expressly stipulated and defined otherwise, the terms "mounted", "connected with", "connected to", and "fixed" should be understood in a broad sense. For example, "connection" may be a fixed connection, a detachable connection, or an integral connection; may be a mechanical connection, or may be an electrical connection or communication; or may be a direct connection, an indirect connection by means of an intermediate medium, or an internal communication between two elements or an interaction between two elements. A person of ordinary skill in the art can understand the specific meaning of the above terms in the present disclosure based on specific conditions.

[0205] In the present disclosure, unless expressly specified and defined otherwise, a first feature being "above" or "below" a second feature may include direct contact between the first and second features, or may include that the first and second features may not be in direct contact, but in contact by means of another feature. Moreover, the first feature being "on" or "above" or "over" the second feature includes the first feature being directly above and obliquely above the second feature, or simply means that the level of the first feature is higher than that of the second feature. The first feature being "beneath" or "below" or "under" the second feature includes the first feature being directly below and obliquely below the second feature, or simply means that a horizontal height of the first feature is lower than that of the second feature.

[0206] The Description provides various embodiments or examples that can be used to implement the present disclosure. It should be understood that these different embodiments or examples are completely illustrative. The protection scope of the present disclosure shall be subject to the protection scope defined by the appended claims.

Claims

1. A laundry treating device, comprising a laundry holding space and a drying module, the drying module comprising a moisture adsorption member, the laundry treating device is **characterized in that**, the moisture adsorption member comprises a moisture adsorption rotary disk, a peripheral housing of the moisture adsorption rotary disk, and a circumferential damping member;

   the peripheral housing comprises an upper peripheral clamping housing and a lower peripheral clamping housing, and the peripheral housing is disposed around an outer circumference of the moisture adsorption rotary disk;
   the circumferential damping member is disposed on the outer circumference of the moisture adsorption rotary disk, or on an inner circumferential wall of the peripheral housing; and
   a sealing ring is provided at a junction between the upper peripheral clamping housing and the lower peripheral clamping housing, or on an outer circumference of the upper peripheral clamping housing alone, or on an outer circumference of the lower peripheral clamping housing alone.

2. The laundry treating device according to claim 1,

further comprising an auxiliary rotary ring disposed on an outer circumference of the peripheral housing in parallel with the sealing ring.

3. The laundry treating device according to claim 2, wherein drive teeth or a belt groove is disposed on the outer circumference of the peripheral housing.

4. The laundry treating device according to claim 2, wherein an outer ring diameter of the sealing ring is larger than an outer ring diameter of the auxiliary rotary ring.

5. The laundry treating device according to claim 3, wherein the auxiliary rotary ring slightly protrudes from the drive teeth or is flush with the drive teeth in a peripheral direction.

6. The laundry treating device according to any one of claims 2 to 5, wherein the drying module comprises a housing for holding the moisture adsorption rotary disk, the housing is provided with at least one flexible roller inside, and the at least one flexible roller is optionally in rolling contact with the auxiliary rotary ring.

7. The laundry treating device according to claim 6, wherein the moisture adsorption rotary disk is of a cylindrical shape, with a thickness of 10 mm to 100 mm and a diameter of 40 mm to 500 mm.

8. The laundry treating device according to claim 6, wherein the moisture adsorption rotary disk further comprises a central clamping member and a central end surface damping member, and the central clamping member comprises an upper central clamping member and a lower central clamping member.

9. The laundry treating device according to claim 8, wherein a first hole is disposed at a center of the moisture adsorption rotary disk, a second hole is disposed in the upper central clamping member, and a third hole is disposed in the lower central clamping member; and wherein the upper central clamping member and the lower central clamping member pass through the first hole to clamp and fix the moisture adsorption rotary disk.

10. A laundry treating device, comprising a drying apparatus and a laundry holding space,
the drying apparatus comprising:

a moisture adsorption rotary disk; and
a housing, on which at least one separator is disposed, wherein the at least one separator divides a space formed by the housing into a moisture adsorption part and a moisture desorption part which are isolated from each other;
the laundry treating device is **characterized in that**, the drying apparatus further comprises a central clamping member of the moisture adsorption rotary disk, the central clamping member has a certain diameter, and a clamp holding part matching the central clamping member is disposed on the housing; and
the at least one separator is directed toward the clamp holding part and not toward a rotary shaft.

11. The laundry treating device according to claim 10, wherein the housing comprises a first housing and a second housing, the first housing is provided with at least one first separator, the second housing is provided with at least one second separator, and the at least one first separator and the at least one second separator are disposed to be opposite to each other, so as to at least divide a space formed by connecting the first housing and the second housing into a first space and a second space which are isolated from each other.

12. The laundry treating device according to claim 10, wherein the clamp holding part has a circular contour, and the separator is tangent to the circular contour of the clamp holding part.

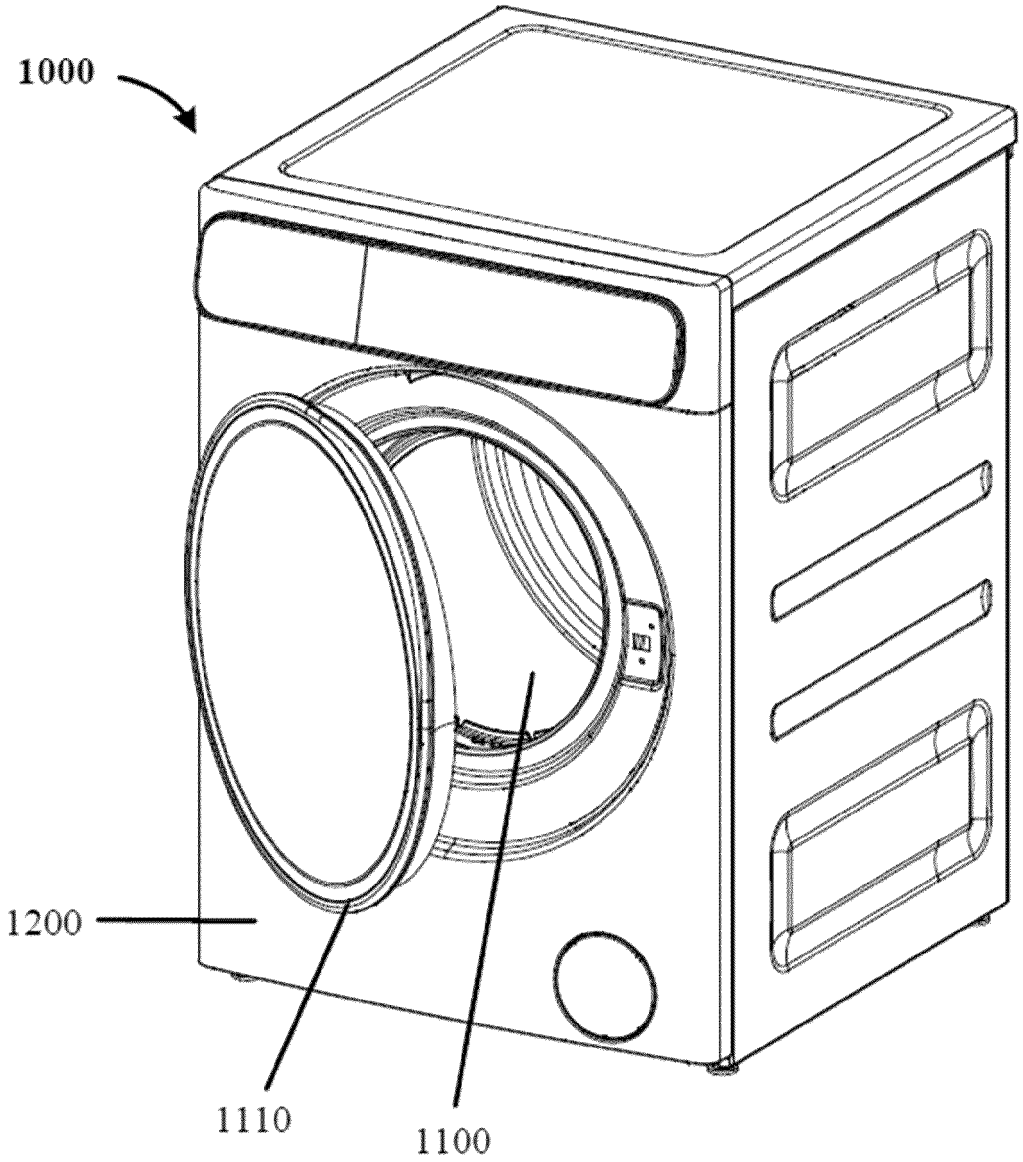


FIG. 1

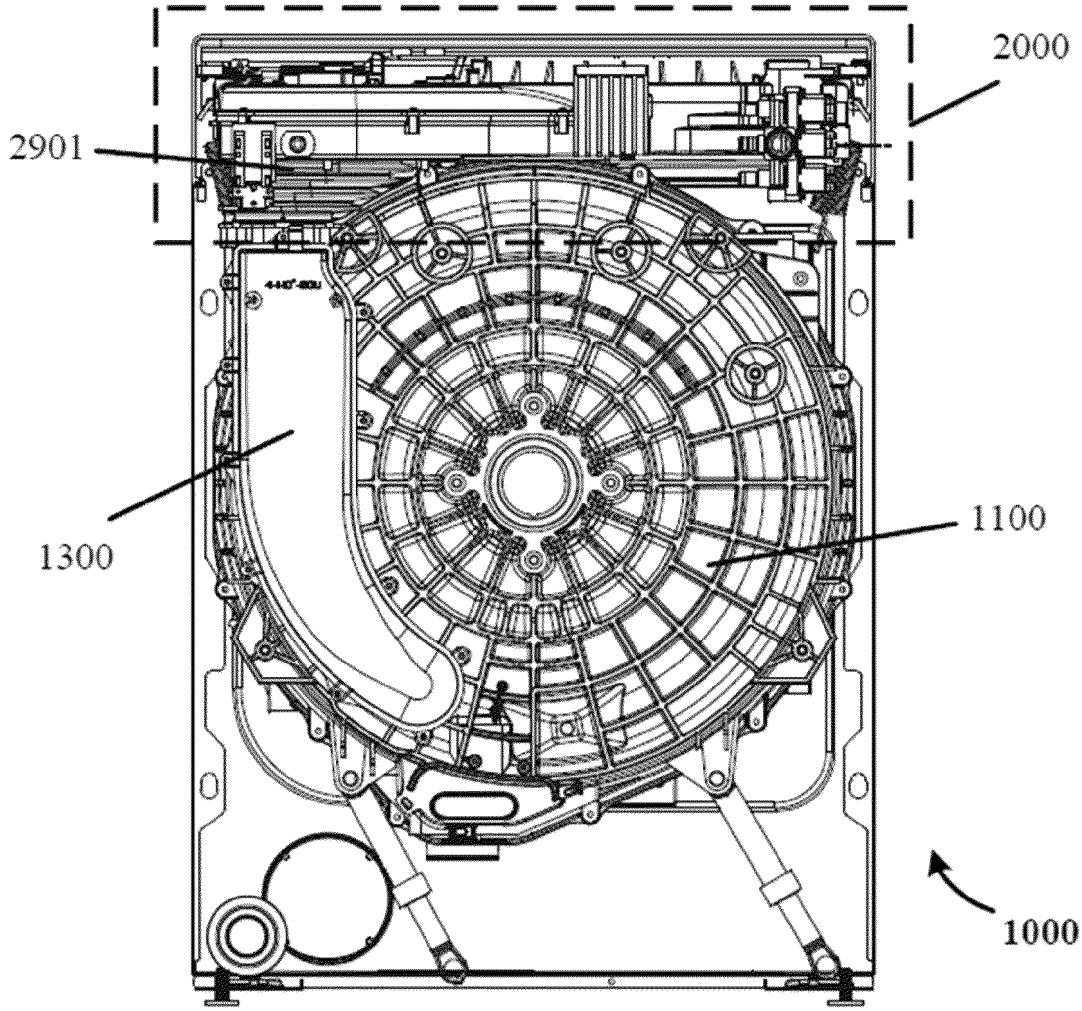


FIG. 2

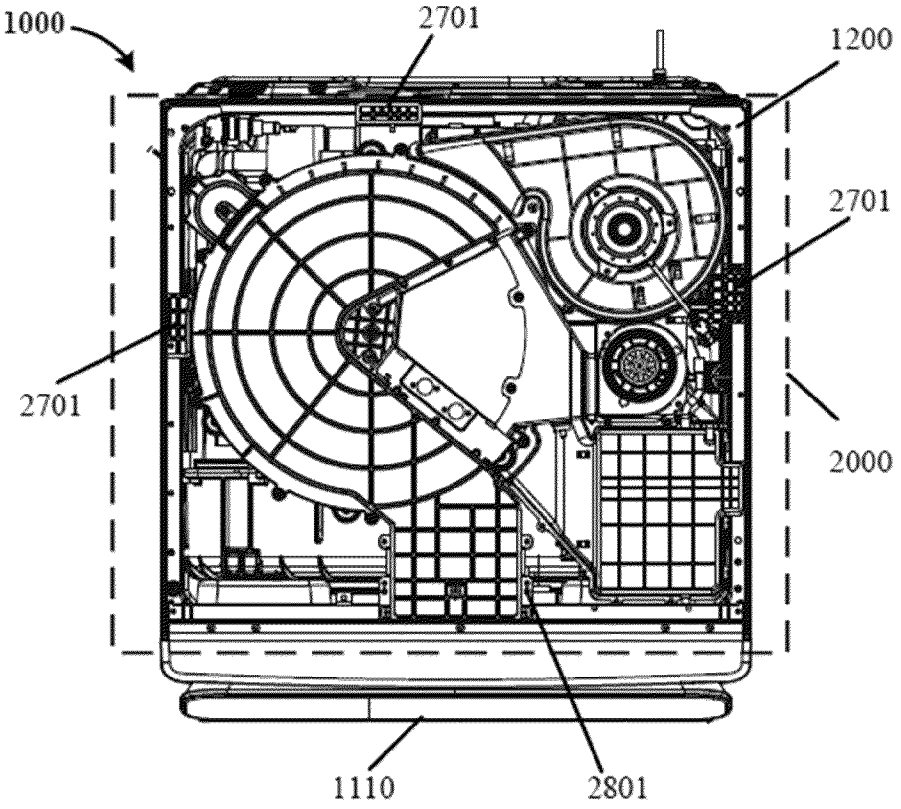
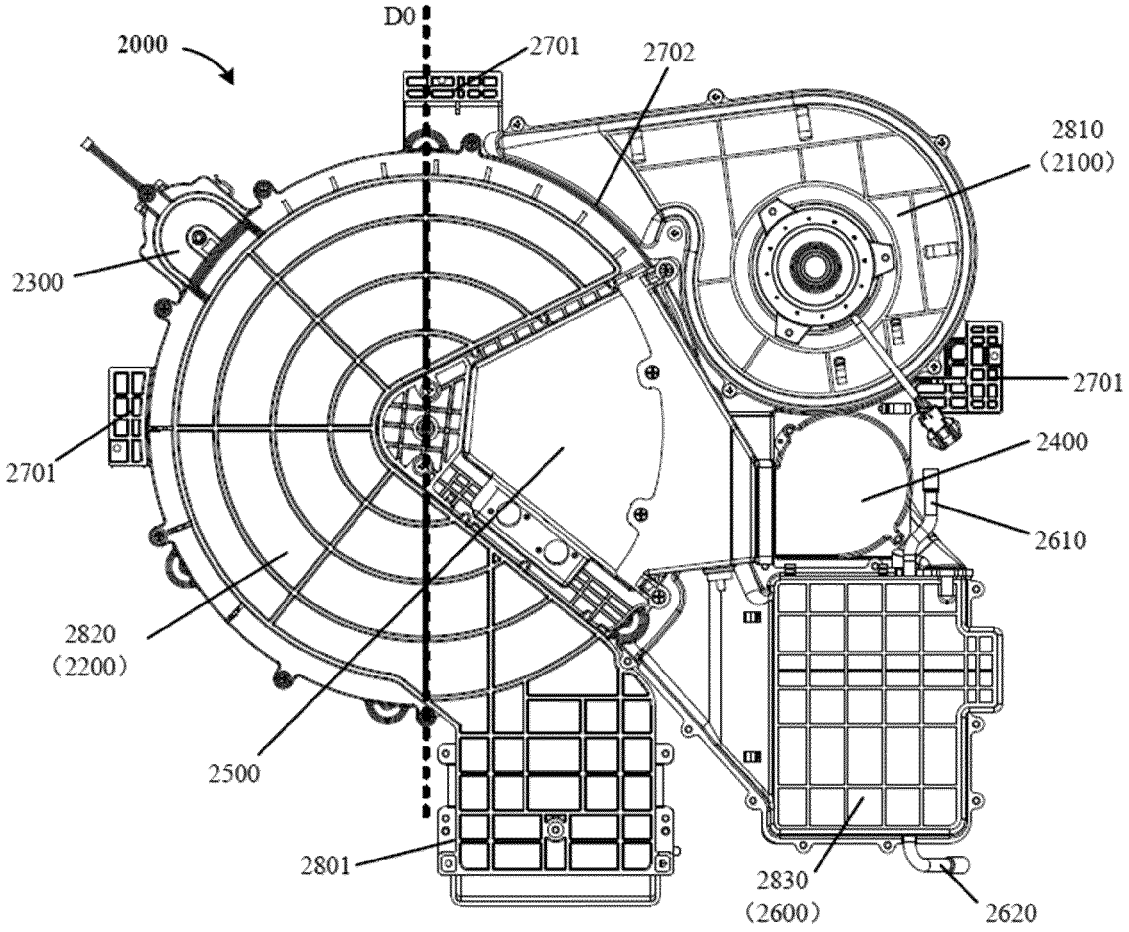


FIG. 3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2702
2810
(2100)
2300
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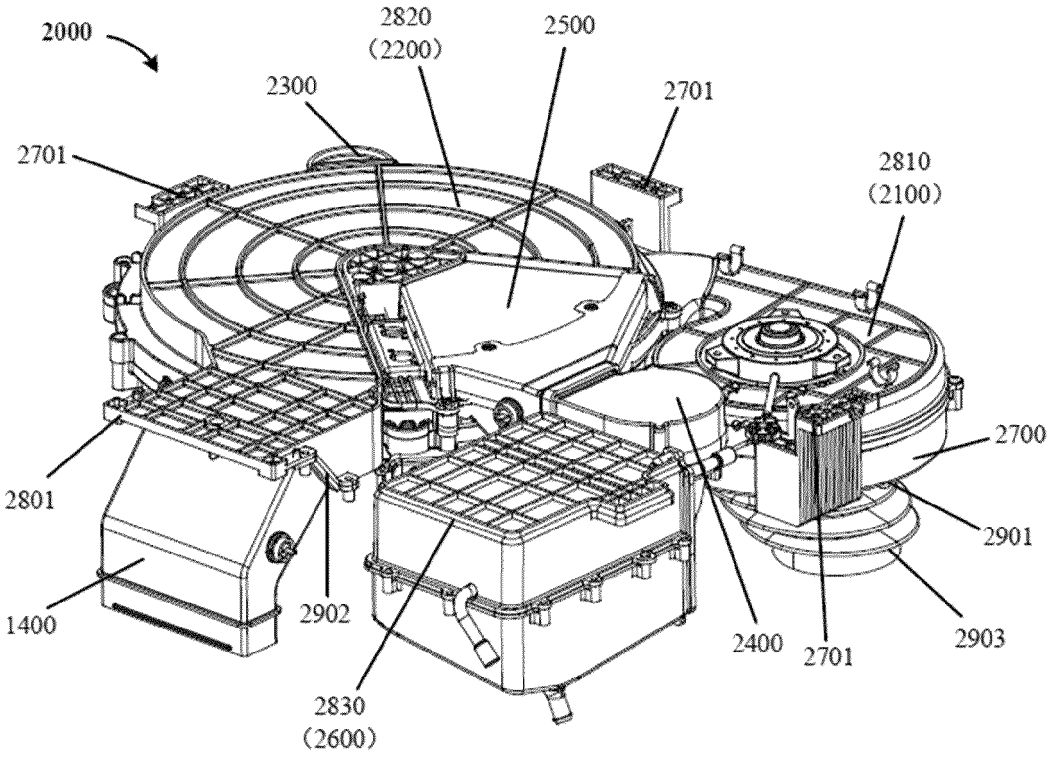
2701
2400
2610
2820
(2200)
2500
2801
2830
(2600)
2620

FIG. 4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2300
2701
2701
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2700
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2901
1400
2902
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2701
2903
2830
(2600)

FIG. 5

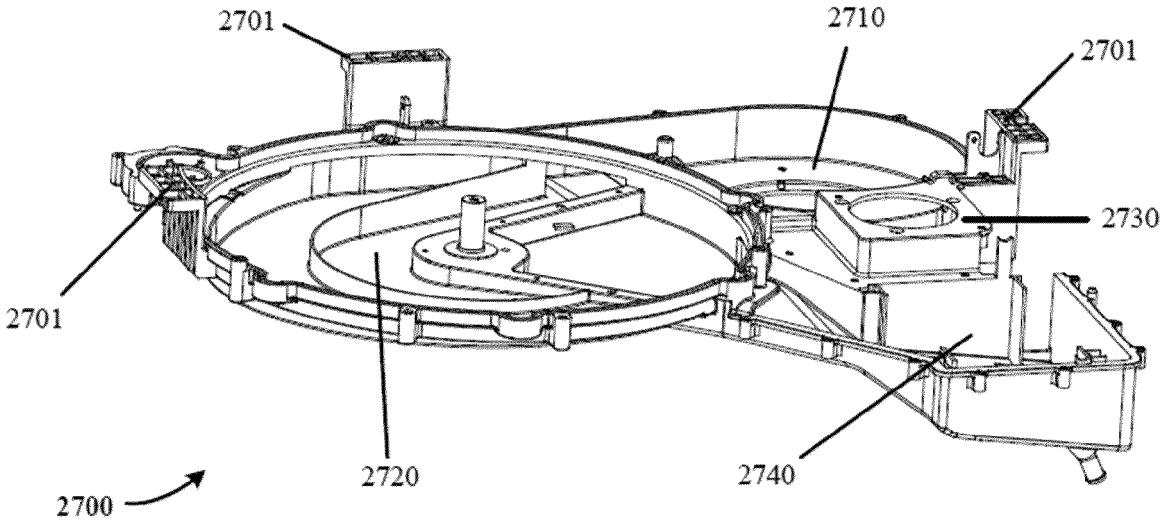
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FIG. 6

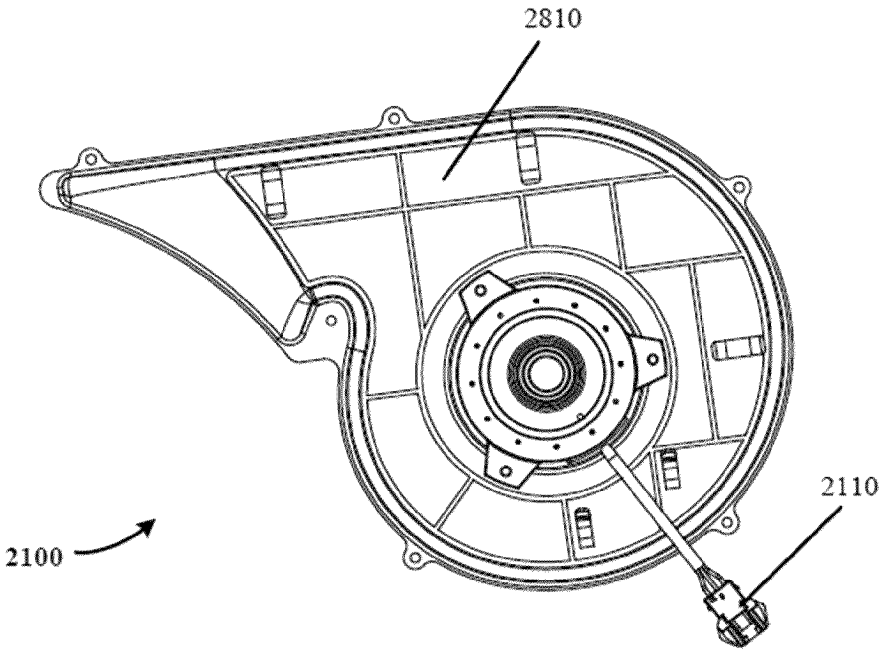


FIG. 7

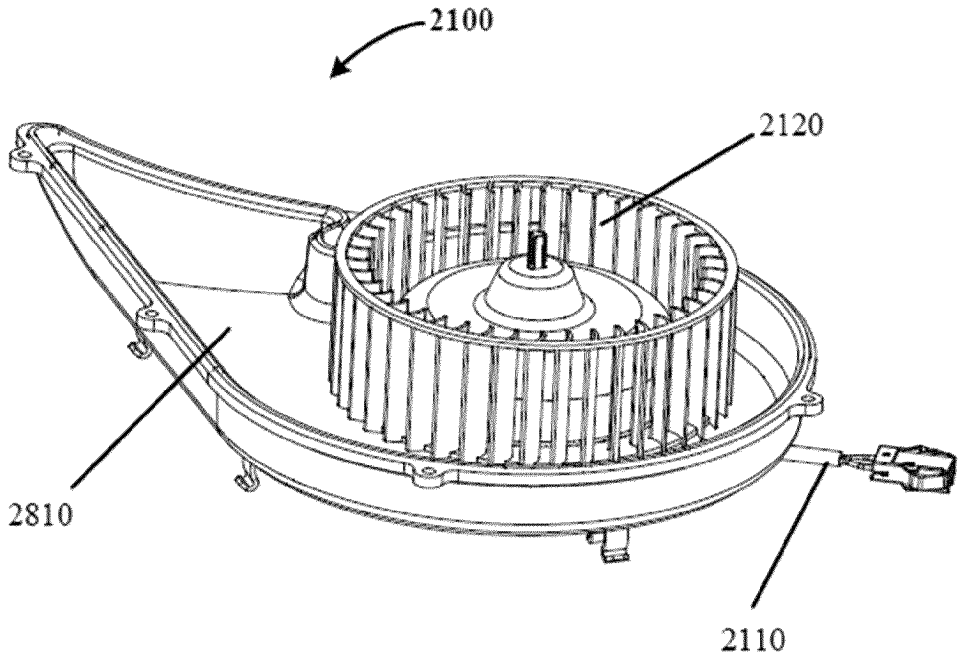


FIG. 8

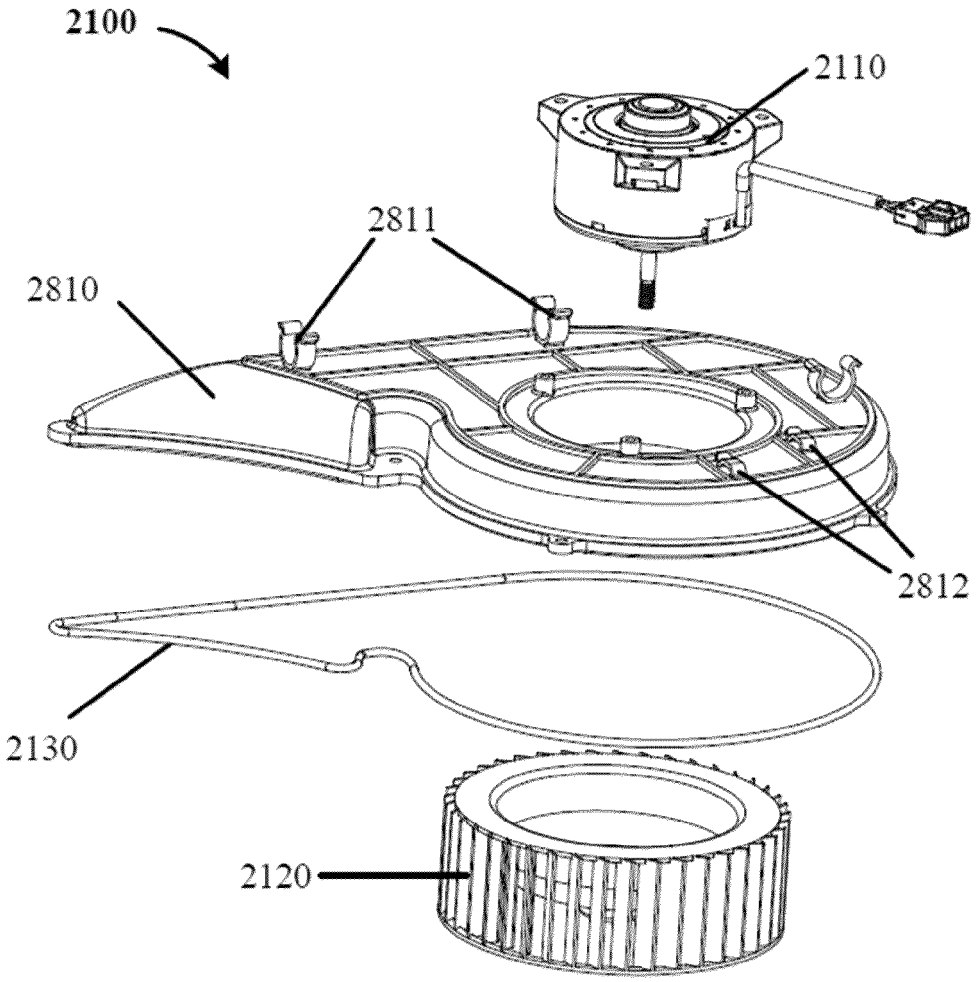


FIG. 9

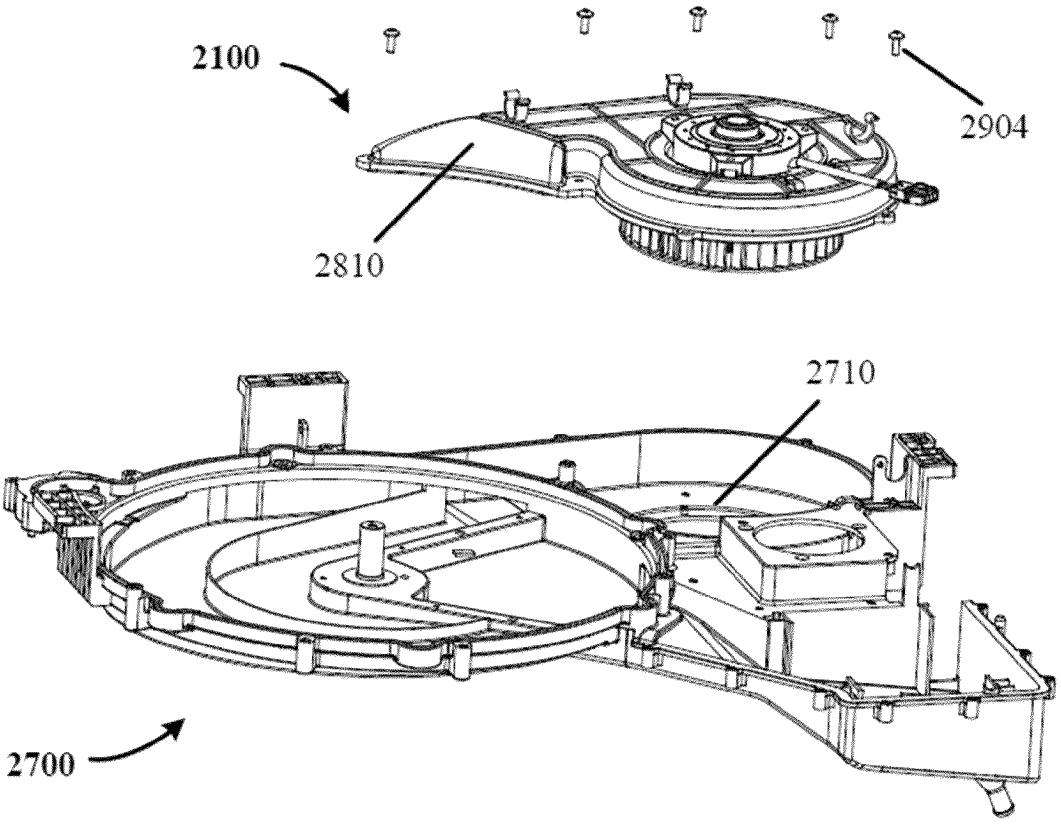


FIG. 10

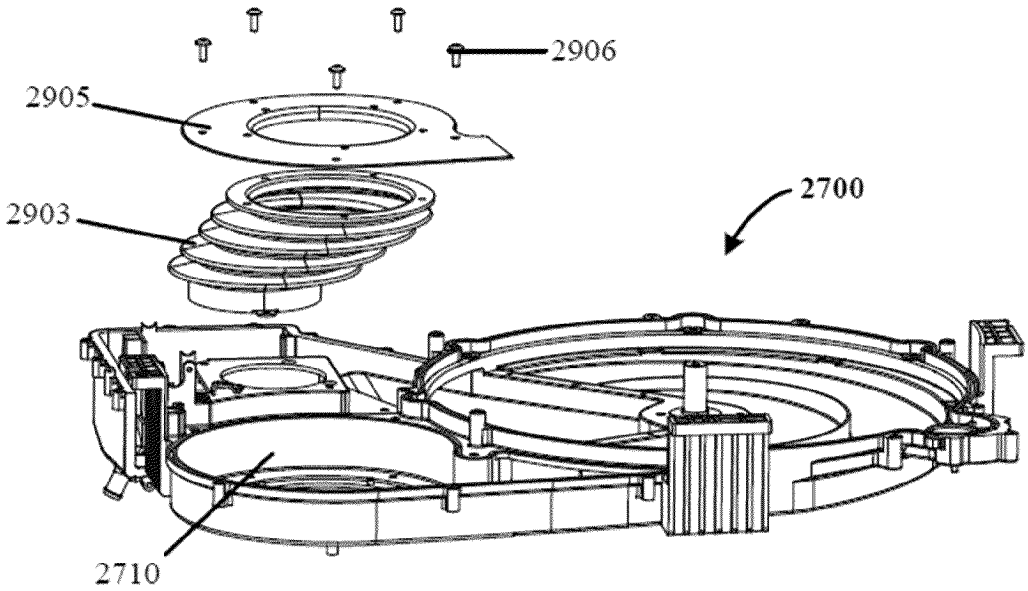
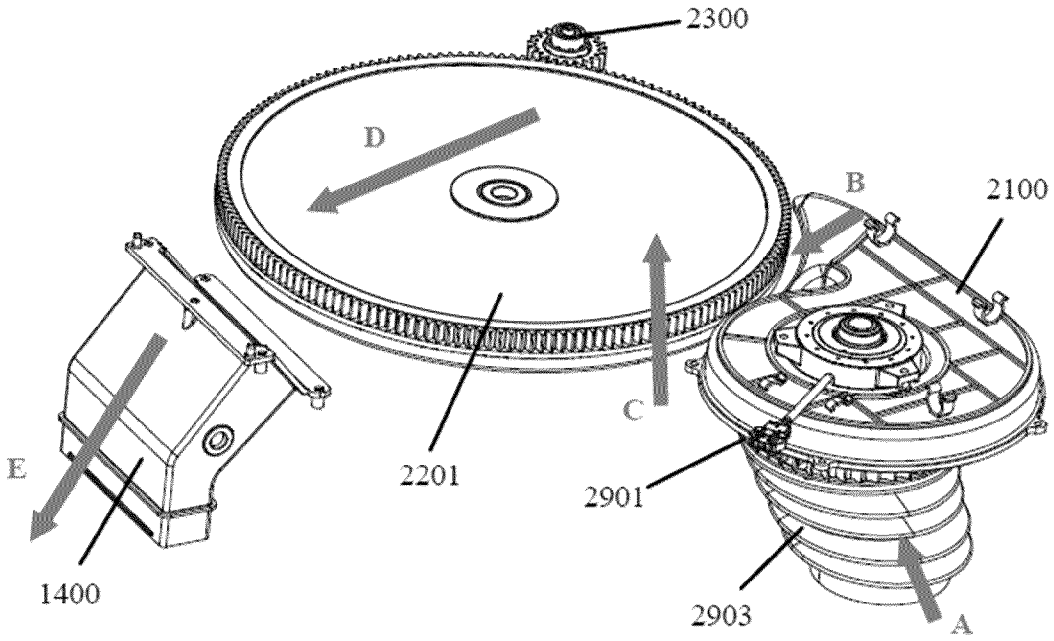


FIG. 11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D
B
2100
C
E
2201
2901
1400
2903
A

FIG. 12

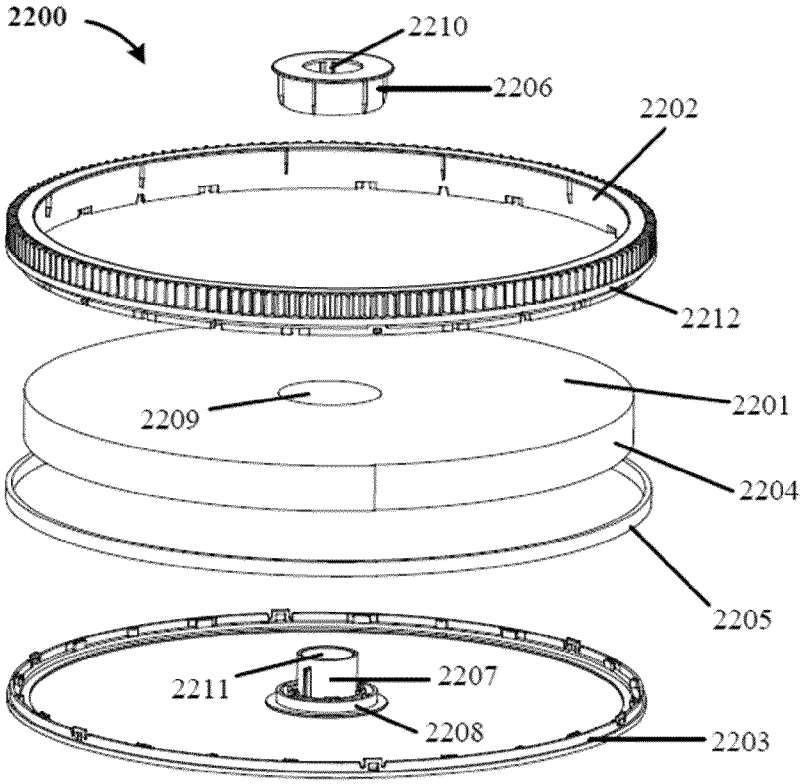
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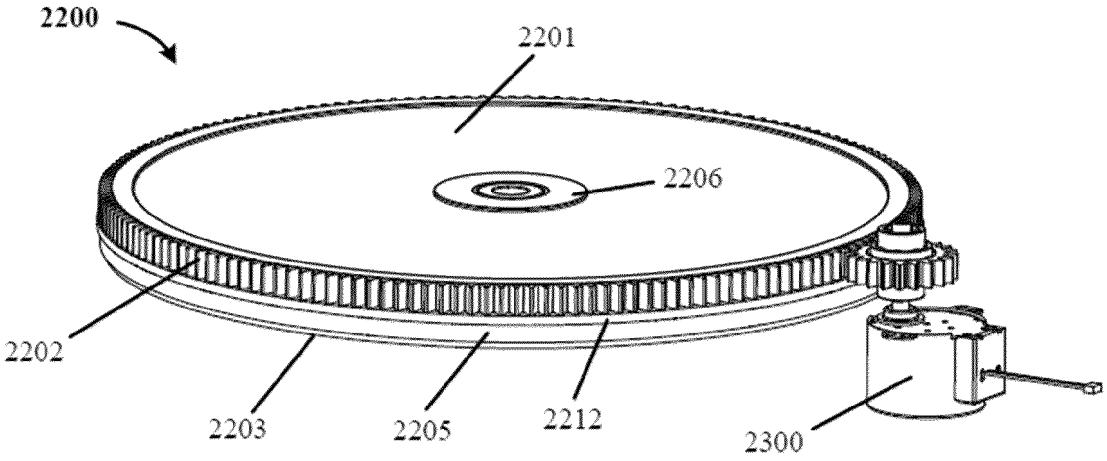
FIG. 13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2212
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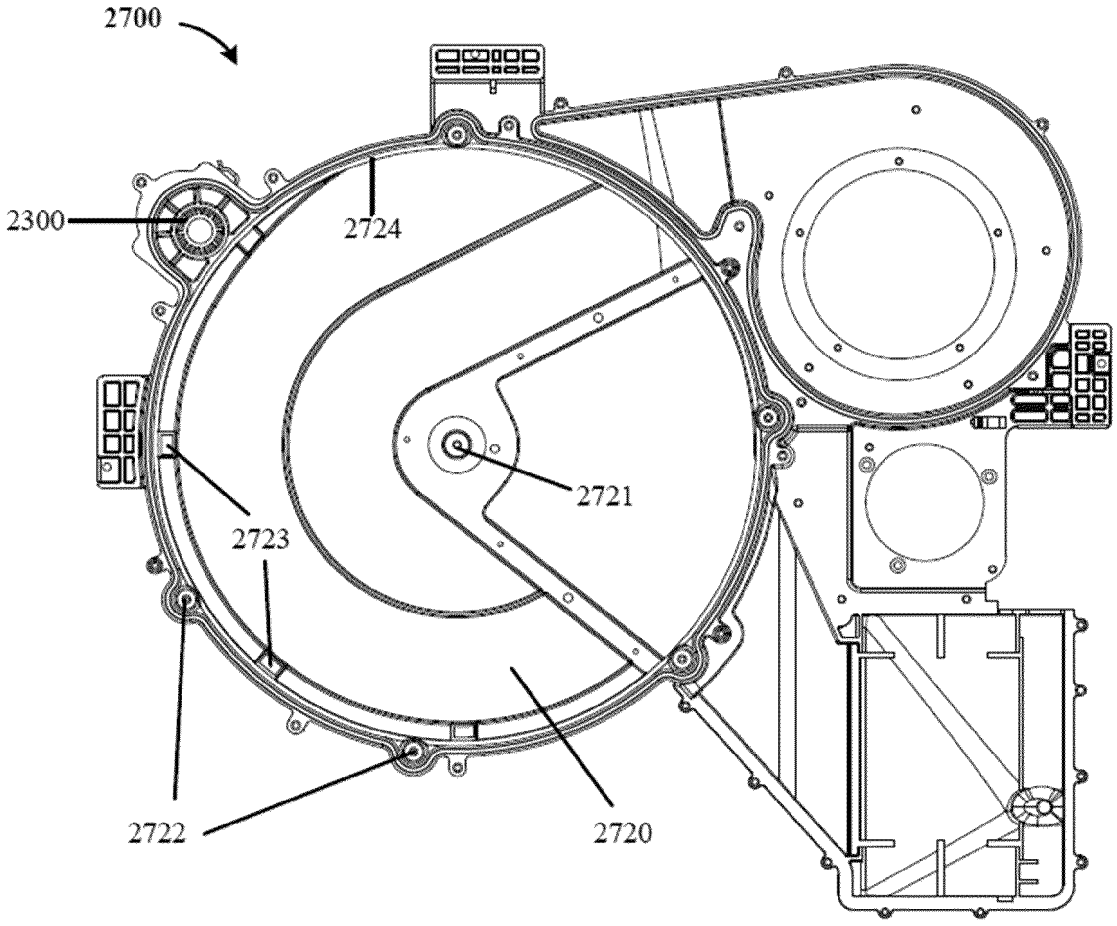
FIG. 14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2720

FIG. 15

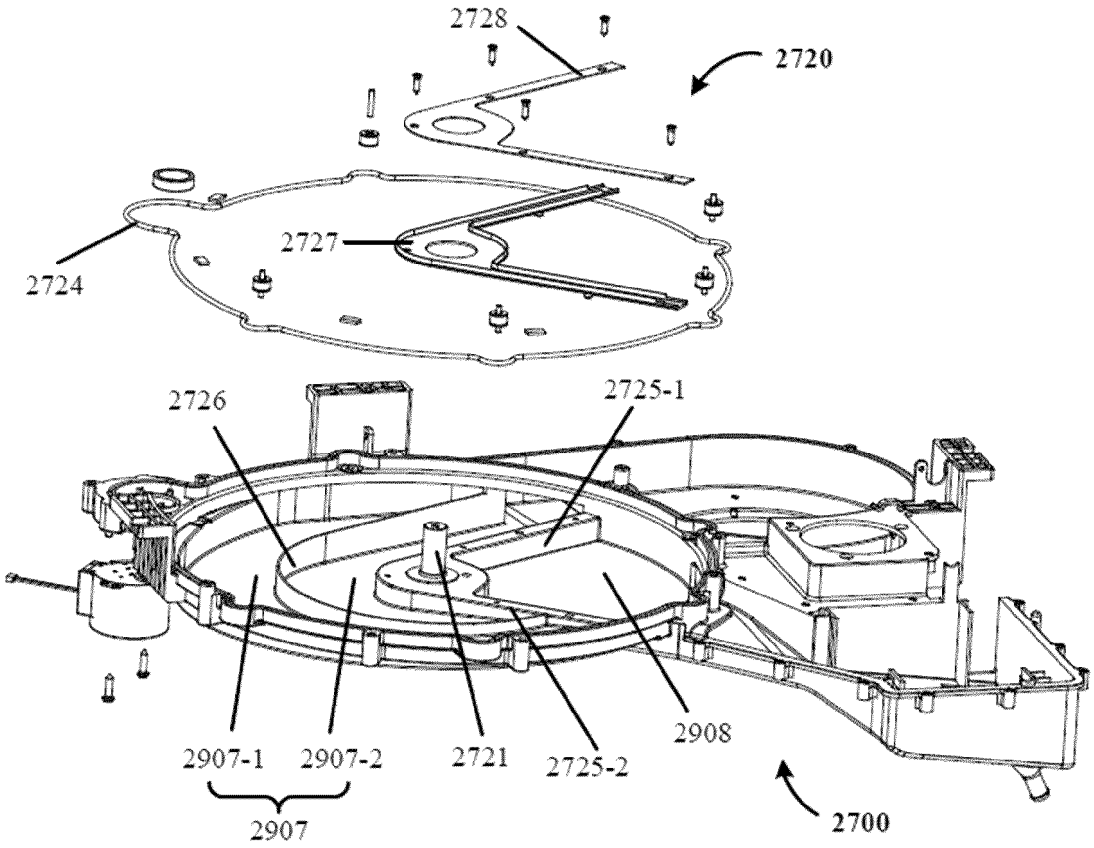
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FIG. 16

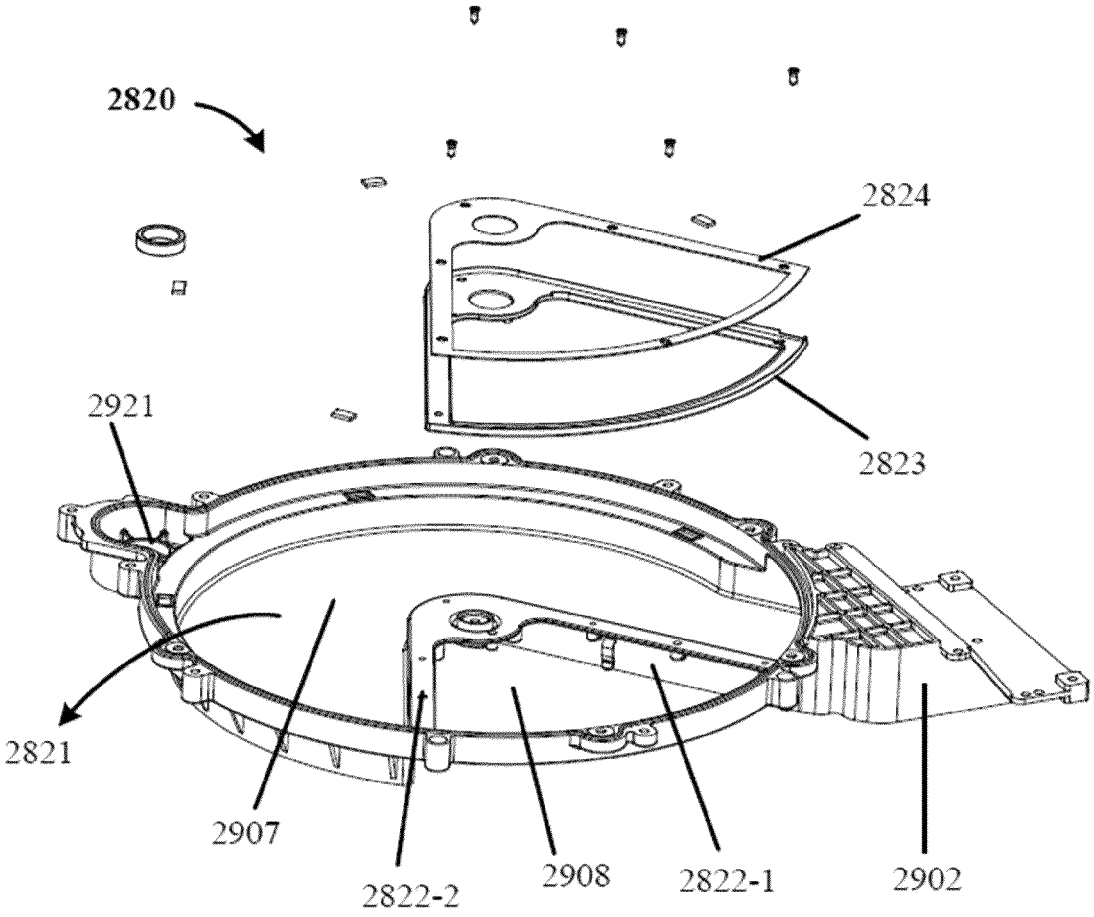

FIG. 17

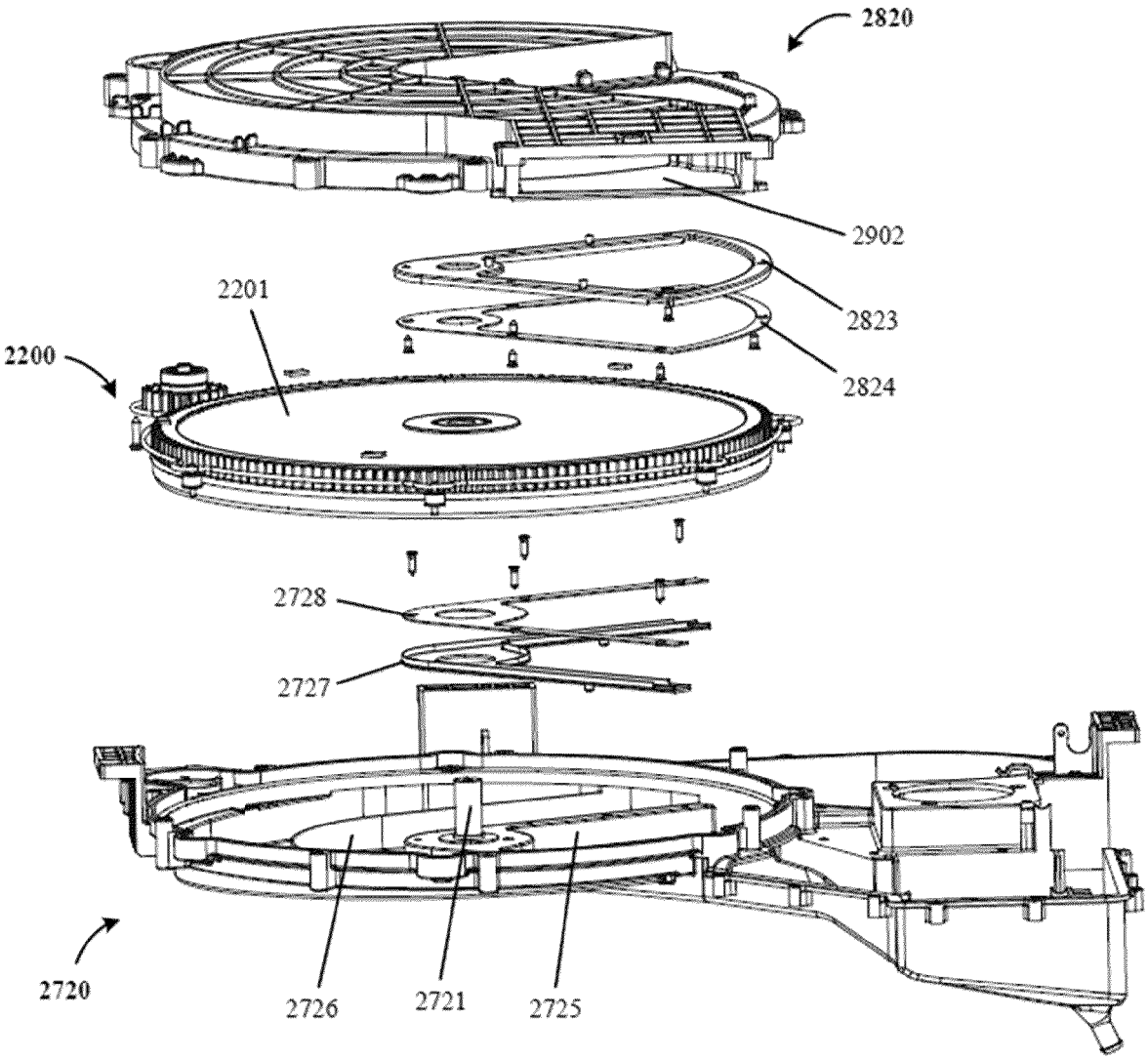

FIG. 18

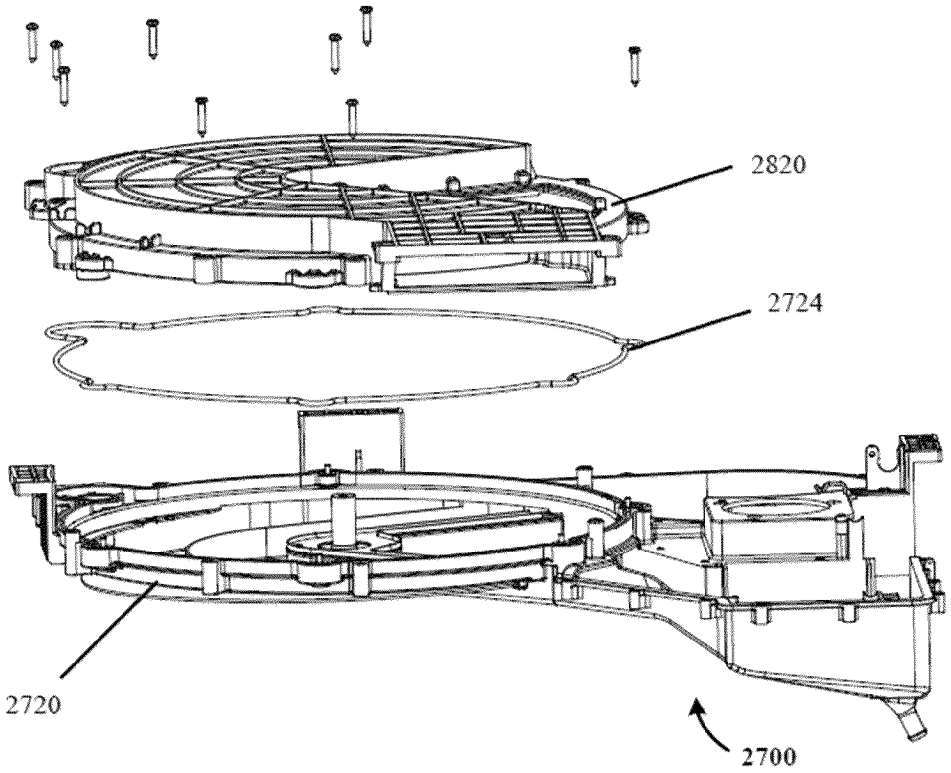

FIG. 19

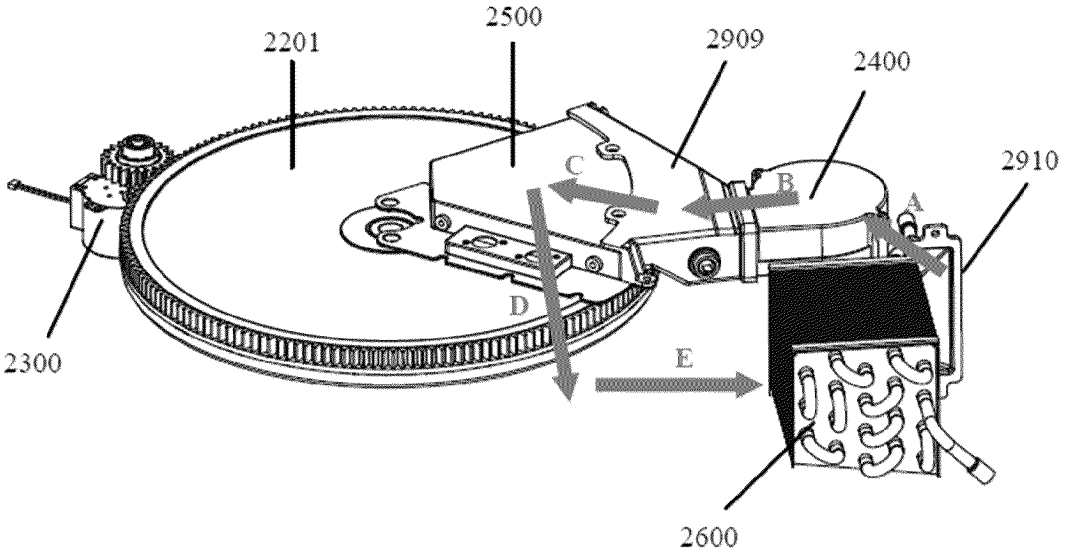

FIG. 20

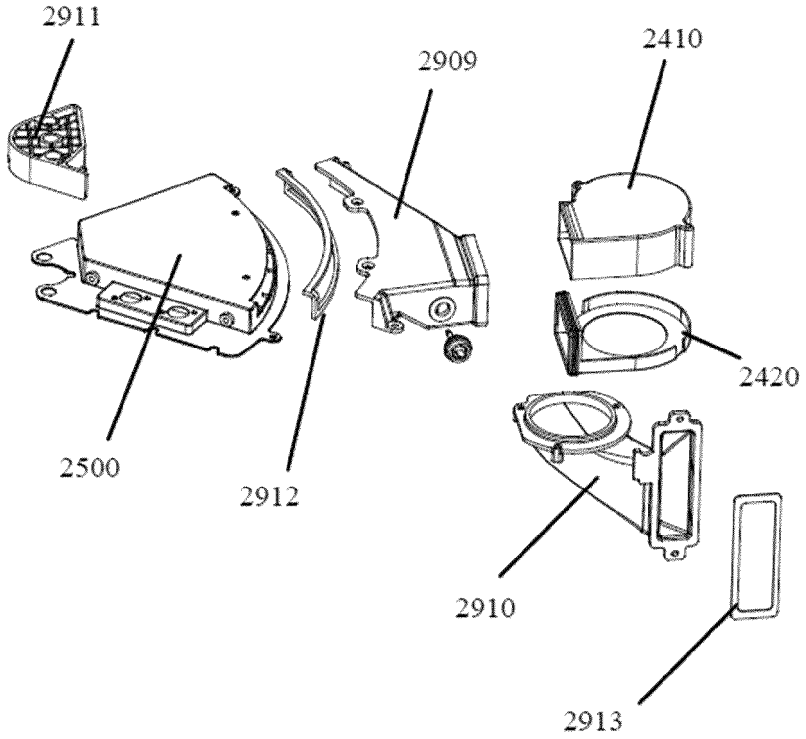

FIG. 21

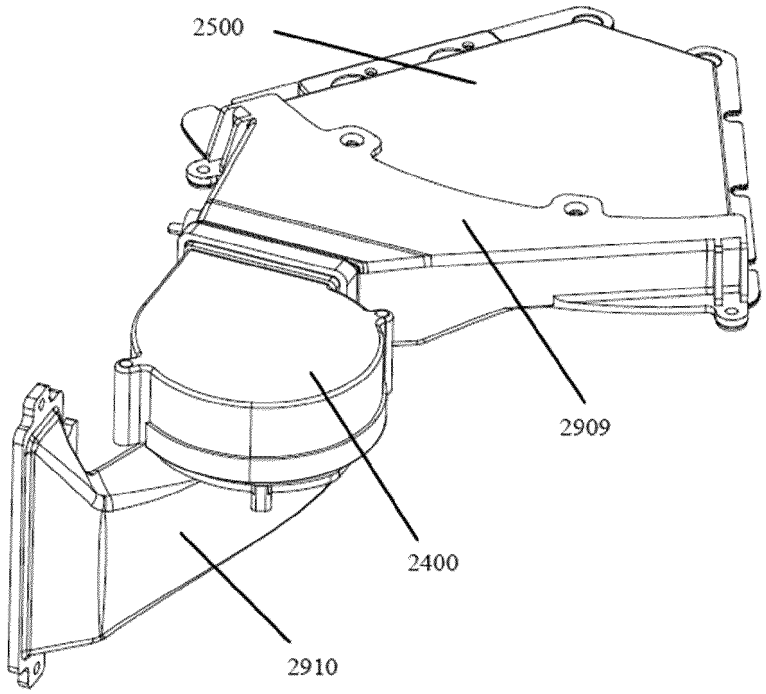

FIG. 22

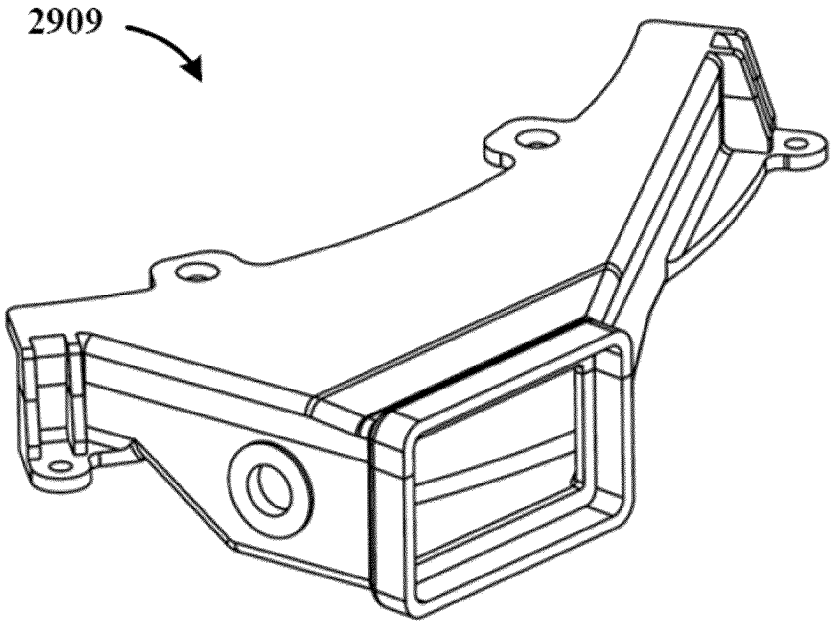

FIG. 23

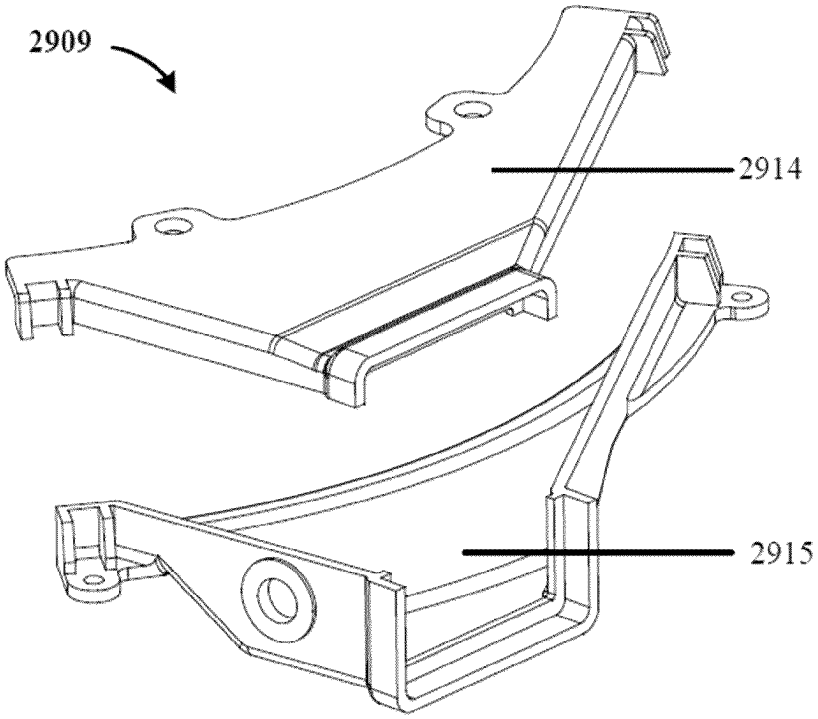

FIG. 24

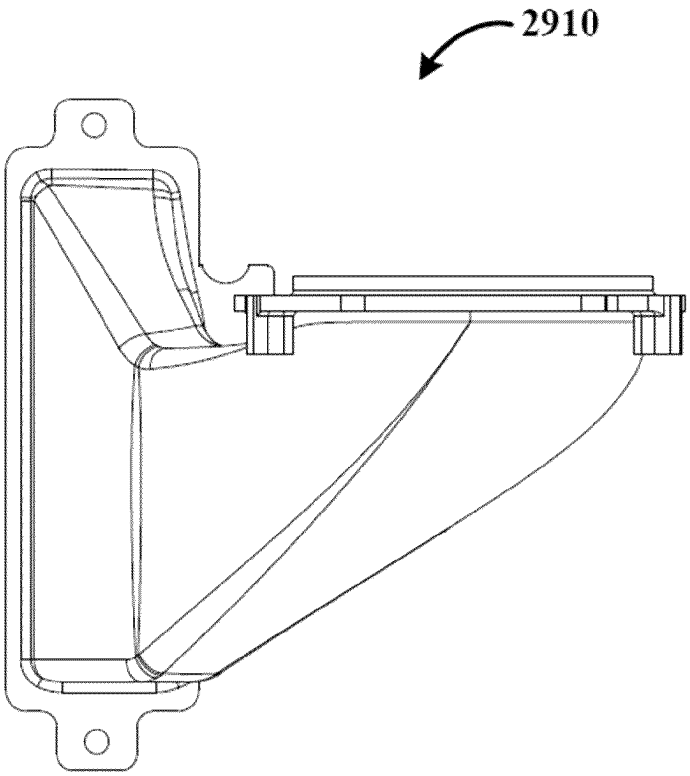

FIG. 25

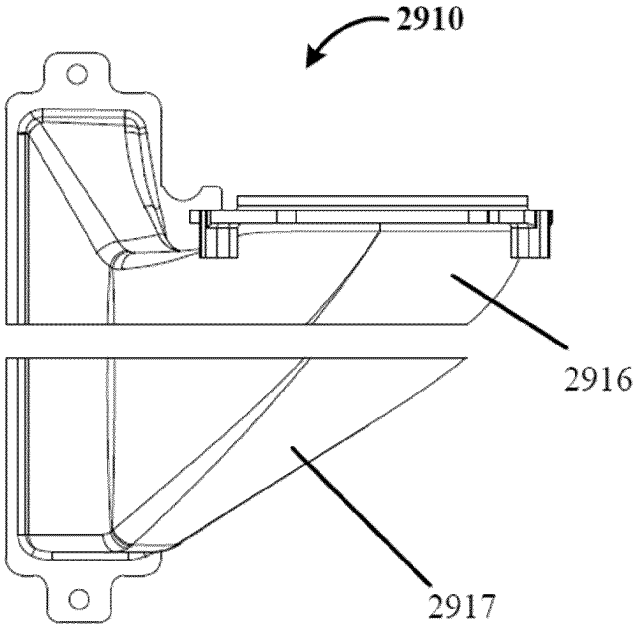

FIG. 26

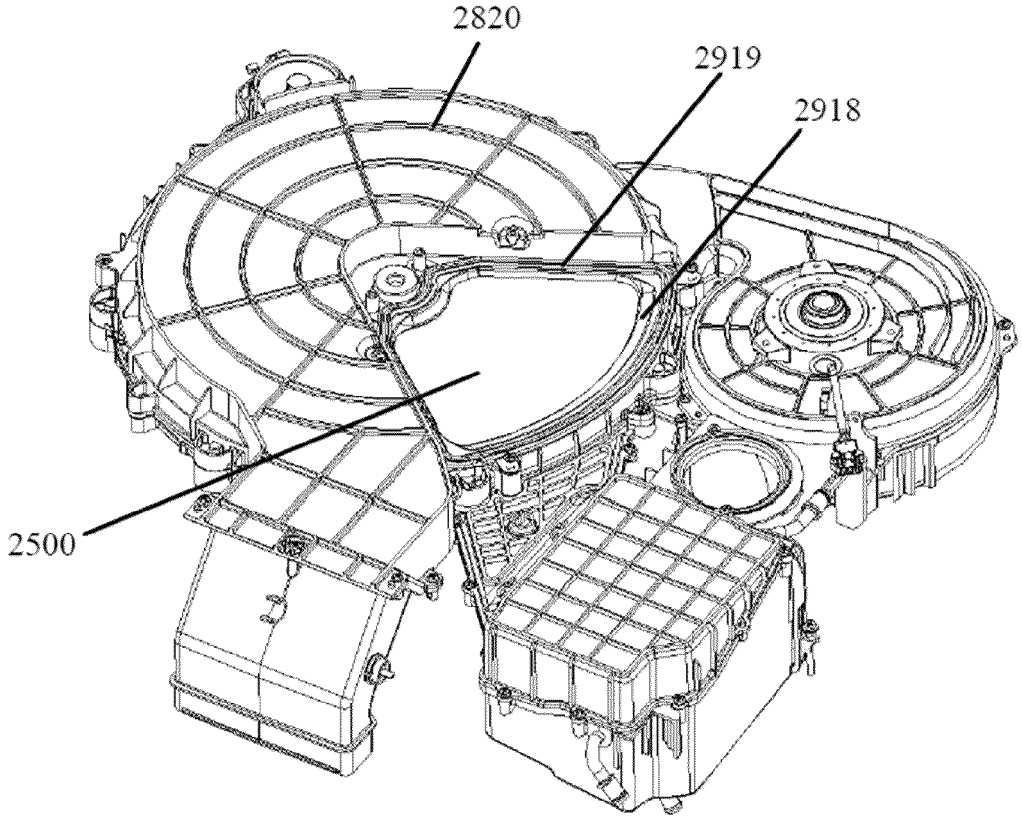

FIG. 27

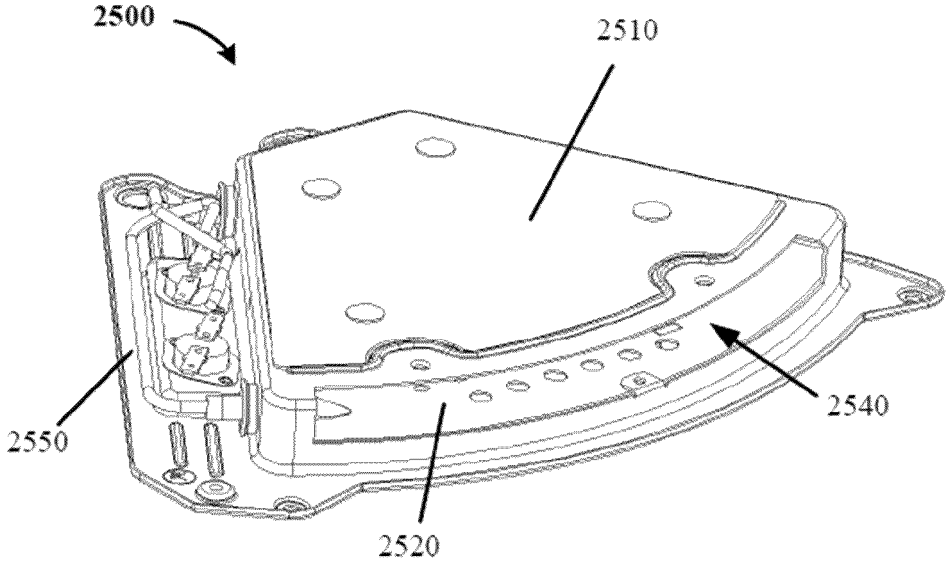

FIG. 28

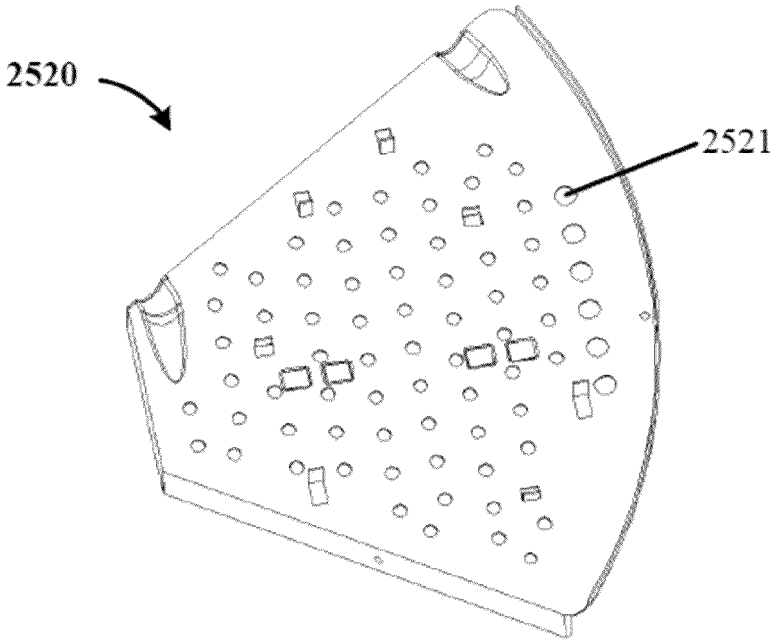

FIG. 29

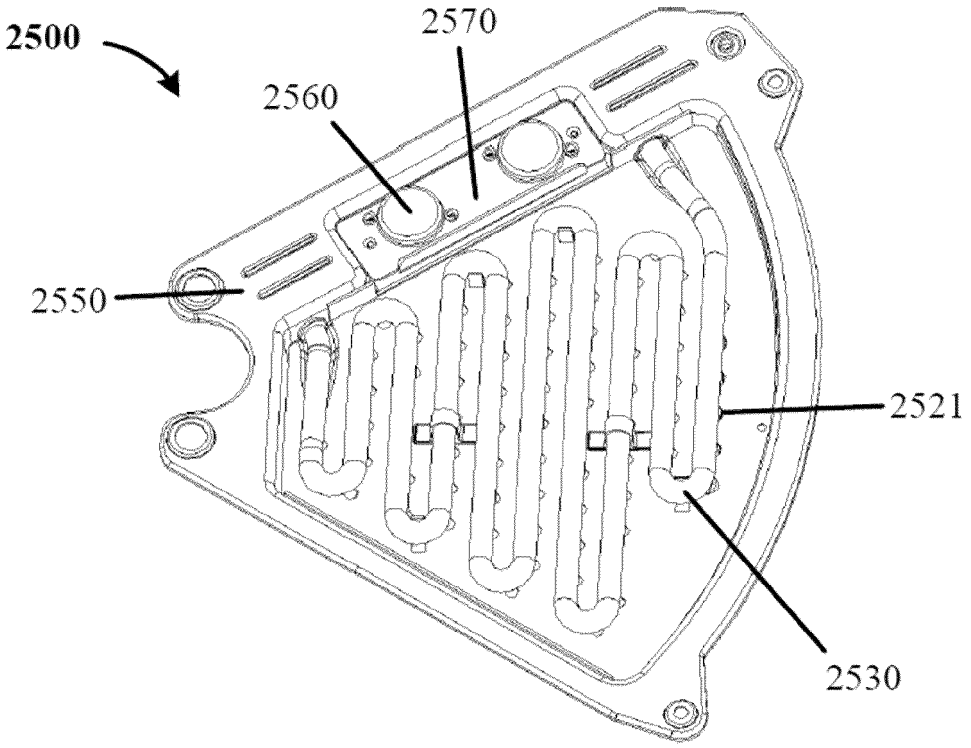

FIG. 30

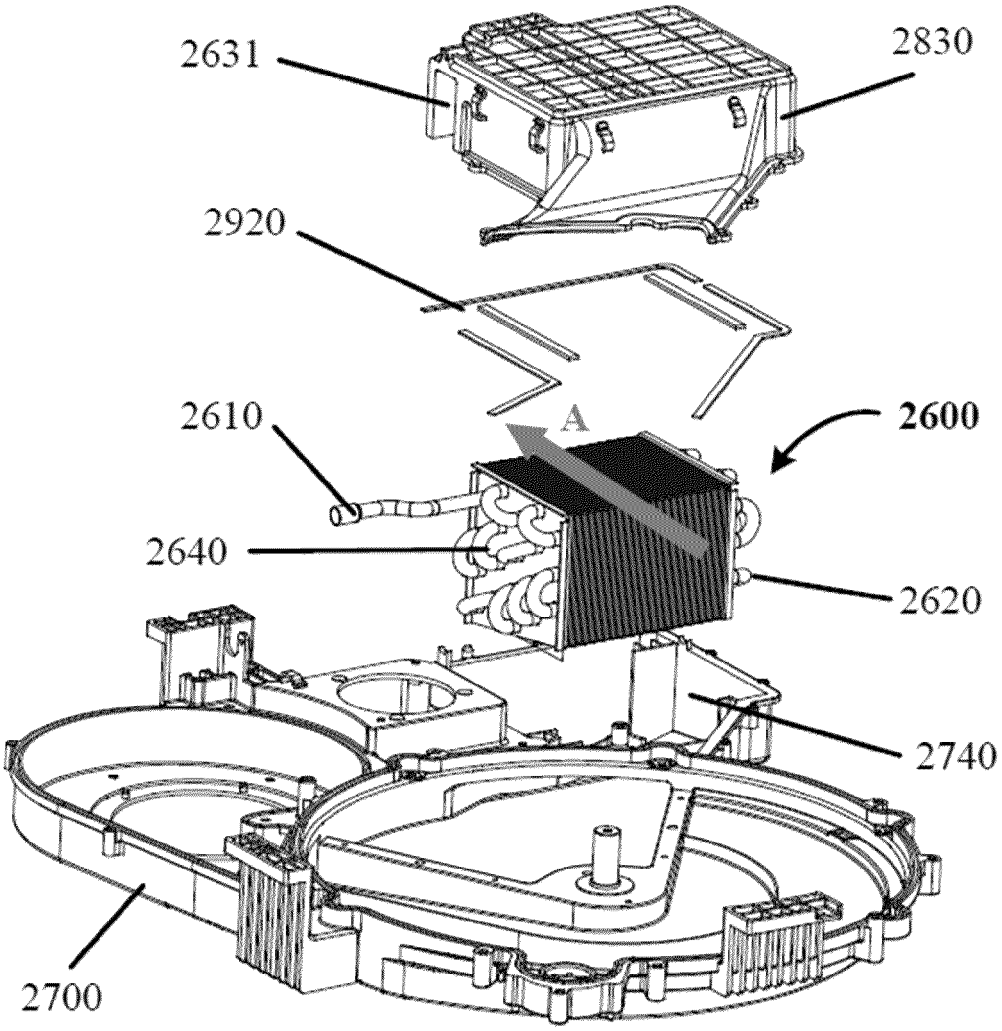

FIG. 31

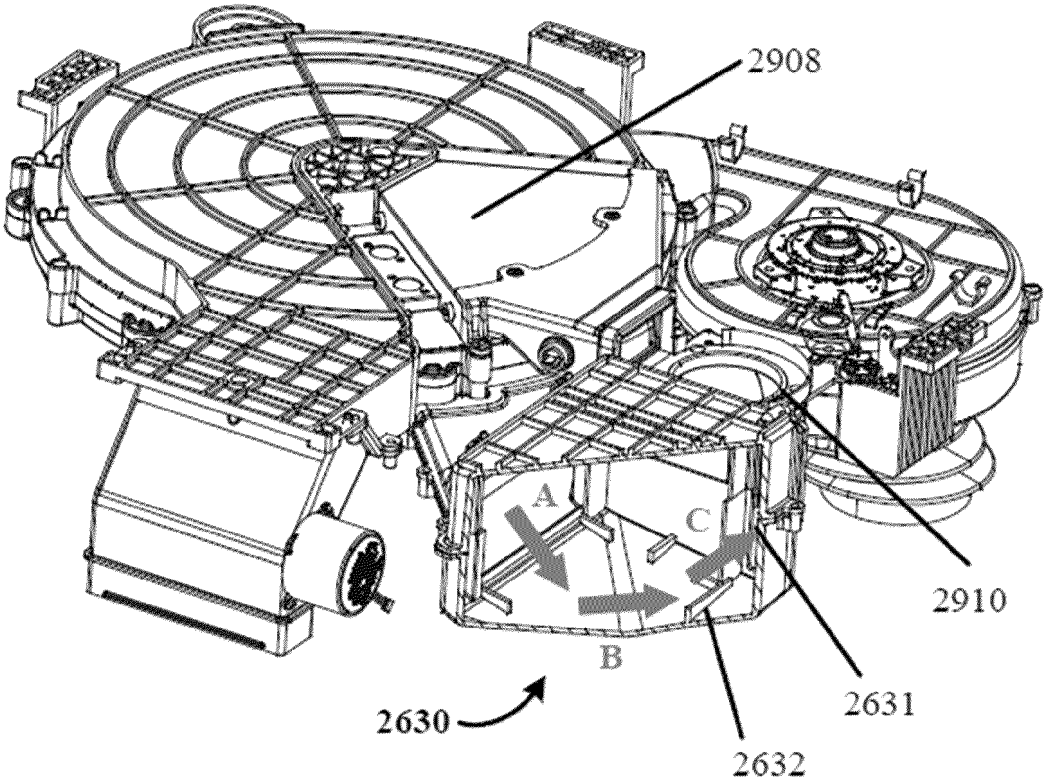

FIG. 32

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2023/072666

A. CLASSIFICATION OF SUBJECT MATTER

D06F37/22(2006.01)i;D06F25/00(2006.01)i;D06F37/30(2020.01)i;D06F58/20(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)

CNTXT, CNKI, ENTXTC, ENTXT, DWPI, WPABS: 烘干, 吸湿, 减震, 减振, 密封, 分隔, dry, wet, damp, seal, compart.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 113981647 A (BEIJING ROBOROCK TECHNOLOGY CO., LTD.) 28 January 2022 (2022-01-28) description, specific embodiments, and figures 1-6	1-12
X	CN 216585700 U (BEIJING ROBOROCK TECHNOLOGY CO., LTD.) 24 May 2022 (2022-05-24) description, specific embodiments, and figures 1-6	1-12
PX	CN 115247341 A (SHENZHEN ROBOROCK INNOVATION TECHNOLOGY CO., LTD.) 28 October 2022 (2022-10-28) description, specific embodiments, and figures 1-7	1-12
PX	CN 115262161 A (SHENZHEN ROBOROCK INNOVATION TECHNOLOGY CO., LTD.) 01 November 2022 (2022-11-01) description, specific embodiments, and figures 1-3	1-12
PX	CN 115287866 A (SHENZHEN ROBOROCK INNOVATION TECHNOLOGY CO., LTD.) 04 November 2022 (2022-11-04) description, specific embodiments, and figures 1-11	1-12

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

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"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
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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
12 May 2023	**25 May 2023**
Name and mailing address of the ISA/CN **China National Intellectual Property Administration (ISA/CN)** **China No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088**	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2023/072666

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 105463812 A (TCL HOME APPLIANCES (HEFEI) CO., LTD.) 06 April 2016 (2016-04-06) entire document	1-12
A	CN 105324528 A (LG ELECTRONICS INC.) 10 February 2016 (2016-02-10) entire document	1-12
A	JP 2009285237 A (HITACHI APPLIANCES INC.) 10 December 2009 (2009-12-10) entire document	1-12
A	JP 2002340372 A (MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.) 27 November 2002 (2002-11-27) entire document	1-12

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2023/072666

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 113981647 A	28 January 2022	None	
CN 216585700 U	24 May 2022	None	
CN 115247341 A	28 October 2022	None	
CN 115262161 A	01 November 2022	None	
CN 115287866 A	04 November 2022	None	
CN 105463812 A	06 April 2016	None	
CN 105324528 A	10 February 2016	EP 3022352 A1	25 May 2016
		EP 3022352 A4	21 December 2016
		EP 3022352 B1	07 February 2018
		US 2015020398 A1	22 January 2015
		US 10316461 B2	11 June 2019
		KR 20150010584 A	28 January 2015
		KR 101579465 B1	23 December 2015
		WO 2015008978 A1	22 January 2015
JP 2009285237 A	10 December 2009	JP 4972612 B2	11 July 2012
JP 2002340372 A	27 November 2002	None	

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- CN 2022116242 W **[0001]**
- CN 202222327022 **[0001]**
- CN 202222305979 **[0001]**
- CN 202222324363 **[0001]**