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(54) TABLEWARE TREATMENT DEVICE

(57) A tableware treatment device (H), belonging to the technical field of electric appliances. A tableware treatment device (H), comprising a cleaning compartment (H1) and a drying module (D). The drying module (D) comprises: a moisture absorption channel (D2), a moisture discharging channel (D3) and a moisture absorption and moisture discharging component (D1); the moisture absorption channel (D2) comprises a moisture absorption channel air inlet (D21) and a moisture absorption channel air outlet (D22) which are in communication with the cleaning compartment (H1); a moisture absorption channel fan (D23) is provided in the moisture absorption channel (D2), so as to form in the cleaning compartment (H1) and the moisture absorption channel (D2) moisture absorption airflows; a moisture discharging fluid drive unit (D33) is provided in the moisture discharging channel (D3), so as to form in the moisture discharging channel (D3) moisture discharging airflows; the moisture absorption and moisture discharging component (D1) is arranged in paths of the moisture absorption channel (D2) and of the moisture discharging channel (D3), so as to allow the moisture adsorption airflows and the moisture discharging airflows both to flow through the moisture absorption and moisture discharging component (D1), so that during the rotation process, the moisture absorption and moisture discharging component (D1) absorbs moisture of the moisture absorption airflows, and discharges the absorbed moisture out of the moisture discharging channel (D3) by means of the moisture discharging airflows.

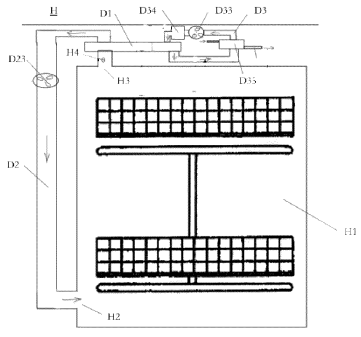

FIG. 2

EP 4 582 006 A1

Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present disclosure claims priorities to Chinese Patent Application No. 202211059244.8, filed on August 31, 2022 and entitled "WASHER-DRYER MACHINE"; Chinese Patent Application No. 202211068418.7, filed on August 31, 2022 and entitled "WASHER-DRYER MACHINE"; WIPO Patent Application No. PCT/CN2022/116142, filed on August 31, 2022 and entitled "WASHER-DRYER MACHINE"; Chinese Patent Application No. 202222326904.6 filed on August 31, 2022 and entitled "WASHER-DRYER MACHINE"; Chinese Patent Application No. 202222324363.3, filed on August 31, 2022 and entitled "WASHER-DRYER MACHINE"; Chinese Patent Application No. 202222327022.1, filed on August 31, 2022 and entitled "WASHER-DRYER MACHINE", the entire contents of which are incorporated herein by reference.

TECHNICAL FIELD

[0002] The present disclosure belongs to the technical field of household appliances and particularly relates to a tableware treating apparatus.

BACKGROUND

[0003] As people's living standards improve, people's lifestyles are constantly changing, and consumers are no longer satisfied with basic functions of consumer goods. Electrical appliances such as tableware treating apparatuses are increasingly chosen by the consumers. However, most tableware treating apparatuses currently on the market cannot dry tableware after cleaning. Users have to manually take the tableware out of the tableware treating apparatuses to drain or manually wipe the tableware dry, which leads to poor user experience.

SUMMARY

[0004] The present disclosure is intended to solve, at least to some extent, the technical problem that automatic drying cannot be performed. Therefore, the present disclosure provides a tableware treating apparatus.

[0005] Embodiments of the present disclosure provide a tableware treating apparatus, including: a cleaning compartment and a drying module, wherein the drying module includes:

a moisture-absorbing channel, including a moisture-absorbing channel air inlet and a moisture-absorbing channel air outlet, the cleaning compartment being communicated with the moisture-absorbing channel air inlet and the moisture-absorbing channel air outlet, and a moisture-absorbing channel fan being arranged in the moisture-absorbing channel to form a moisture-absorbing airflow inside the moisture-absorbing channel and the cleaning compartment;

a moisture-removing channel, provided with a moisture-removing fluid driving unit to form a moisture-removing airflow inside the moisture-removing channel; and

a moisture-absorbing and moisture-removing component, arranged in a path of the moisture-absorbing channel and the moisture-removing channel to enable both of the moisture-absorbing airflow and the moisture-removing airflow to flow through the moisture-absorbing and moisture-removing component, so that the moisture-absorbing and moisture-removing component absorbs moisture in the moisture-absorbing airflow during rotation and discharges the absorbed moisture from the moisture-removing channel through the moisture-removing airflow.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] In order to illustrate the implementations in the embodiments of the present disclosure more clearly, the accompanying drawings to be used in the descriptions of the embodiments will be briefly introduced below. Obviously, the accompanying drawings in the following descriptions show some of the embodiments of the present disclosure, and those of ordinary skill in the art may still derive other drawings from these accompanying drawings without creative effort.

FIG. 1 is a schematic structural diagram of a tableware treating apparatus according to the present disclosure;

FIG. 2 is a schematic diagram of circulation of a fluid in the tableware treating apparatus according to the present disclosure;

FIG. 3 is a schematic structural diagram of a drying module according to the present disclosure in a perspective view;

FIG. 4 is a schematic diagram of a flow path of a moisture-absorbing airflow of the drying module according to the present disclosure;

FIG. 5 is a schematic diagram of a flow path of a moisture-removing airflow of the drying module according to the present disclosure;

FIG. 6 is a schematic structural diagram of a moisture-absorbing and moisture-removing component of the drying module according to the present disclosure in an exploded view;

FIG. 7 is a schematic structural diagram of a moisture-absorbing rotary wheel assembly and a lower rotary wheel housing of the drying module according to the present disclosure in a perspective view;

FIG. 8 is a schematic structural diagram of the moisture-absorbing rotary wheel assembly of the drying module according to the present disclosure in an exploded view;

FIG. 9 is a perspective diagram of the moisture-

absorbing rotary wheel assembly, a rotary wheel driving mechanism and the lower rotary wheel housing of the drying module according to the present disclosure;

FIG. 10 is a top view of the lower rotary wheel housing with a peripheral roller mechanism of the drying module according to the present disclosure;

FIG. 11 is a perspective diagram of a peripheral roller of the drying module according to the present disclosure;

FIG. 12 is a schematic structural diagram of a moisture-removing and heating assembly of the drying module according to the present disclosure in a perspective view;

FIG. 13 is a schematic structural diagram of a mesh plate in the moisture-removing and heating assembly of the drying module according to the present disclosure from the front side in a perspective view;

FIG. 14 is a schematic structural diagram of the mesh plate in the moisture-removing and heating assembly of the drying module according to the present disclosure from the back side in a perspective view;

FIG. 15 is a schematic structural diagram of an upper rotary wheel housing, not provided with a moisture-removing and heating assembly, of the drying module according to the present disclosure in a perspective view;

FIG. 16 is a schematic structural diagram of a moisture-removing and condensing tube integrated body of a moisture-removing and condensing assembly of the drying module according to the present disclosure in a perspective view;

FIG. 17 is a schematic structural diagram of a cut portion of a moisture-removing and condensing assembly housing of the moisture-removing and condensing assembly of the drying module according to the present disclosure in a perspective view; and

FIG. 18 is a workflow chart of the tableware treating apparatus according to one or more embodiments of the present disclosure.

[0007] Reference numerals: D: drying module, D1: moisture-absorbing and moisture-removing component, D11: moisture-absorbing rotary wheel assembly, D111: wheel disk, D112: outer peripheral housing part, D112U: outer peripheral upper clamping housing, D112L: outer peripheral lower clamping housing, D113: central housing part, D113U: central upper clamp, D113L: central lower clamp, D114: power input part, D115: auxiliary rotary ring, D116: rotary wheel seal, D117: outer peripheral vibration absorber, and D118: central vibration absorber;

D12: rotary wheel housing, D12U: upper rotary wheel housing, D12L: lower rotary wheel housing, D1211: moisture-absorbing region, D1212: moisture-removing region, D121: separator, D122: peripheral roller mechanism, D1221: peripheral roller, D1222: peripheral roller support, D1223: roller body, D1224: rotary shaft, D1225: inner ring, D1226: outer rim, D1227: spoke, D123: bottom roller mechanism, D124: rotary wheel housing seal, D125: separating seal, D126: separating extruding sheet and D127: airflow guiding piece;

D13: rotary wheel driving mechanism, D131: rotary wheel driving motor, and D132: matched transmission mechanism;

D2: moisture-absorbing channel, D21: moisture-absorbing channel air inlet, D22: moisture-absorbing channel air outlet, and D23: moisture-absorbing channel fan;

D3: moisture-removing channel, D33: moisture-removing fluid driving unit, D34: moisture-removing and heating assembly, D341: moisture-removing and heating assembly housing, D3411: upper end face wall, D3412: lower end face wall, D3413: circumferential side wall, D3414: radial side wall, D3415: connecting seal, D3416: connecting heat insulator, D342: mesh plate, D343: moisture-removing and heating member, D344: thermostat mounting portion, D3441: heat conducting sheet, D3442: thermostat, D35: moisture-removing and condensing assembly, D351: moisture-removing condensing tube integrated body, D352: moisture-removing and condensing assembly housing, and D353: baffle; and

H: tableware treating apparatus, H1: cleaning compartment, H2: cleaning air inlet, H3: cleaning air outlet, and H4: sensor.

DETAILED DESCRIPTION

[0008] The implementations in the embodiments of the present disclosure will be clearly and completely described below with reference to the accompanying drawings of the embodiments of the present disclosure. Apparently, the described embodiments are only some, but not all of the embodiments of the present disclosure. All other embodiments acquired by those of ordinary skills in the art without creative efforts based on the embodiments in the present disclosure are within the protection scope of the present disclosure.

[0009] It should be noted that all directional indications in the embodiments of the present disclosure are only used to explain the relative positional relationships between and movement of components in a specific posture. If the specific posture changes, the directional indications will change accordingly.

[0010] In the present disclosure, unless otherwise explicitly defined and limited, the terms "connect", "fix" and the like should be comprehended in a broad sense. For example, the term "fix" may refer to a fixed connection, detachable connection or integrated connection, or may be a mechanical connection or electrical connection, or may refer to a direct connection or an indirect connection via an intermediary, namely, an internal communication

of two elements or an interactive relationship between the two elements, unless otherwise explicitly defined. The specific meanings of the foregoing terms in the present disclosure may be understood by those of ordinary skill in the art according to specific circumstances.

[0011] In addition, the terms "first", "second" and the like involved in the present disclosure are used for descriptive purposes only, and are not to be construed as indicating or implying a relative importance or implicitly indicating the number of technical features indicated. Thus, the features defined by the terms "first" and "second" may include one or more of the features either explicitly or implicitly. Moreover, the embodiments of the various embodiments may be combined, which must be based on the fact of being able to be achieved by those of ordinary skill in the art. When the combination of the embodiments appears to be contradictory or unachievable, it should be assumed that such combination of the embodiments does not exist and goes beyond the scope of protection of the present disclosure.

[0012] The present disclosure will be described below with reference to specific embodiments in conjunction with the accompanying drawings.

[0013] FIG. 3 shows a drying module D according to the present disclosure. The drying module D may be applied to various devices requiring moisture removal, such as a dryer, a washer-dryer machine, a clothes dryer, a dehumidifier and a tableware treating apparatus H. For the ease of description, the present disclosure takes application of the drying module D to the tableware treating apparatus H as an example, and the tableware treating apparatus may be a dishwasher, and so on when the drying module D is applied to other devices.

[0014] Referring to FIG. 1 to FIG. 3, the tableware treating apparatus H includes a cleaning compartment H1 and the drying module D described above, and the cleaning compartment H1 is communicated with a moisture-absorbing channel air inlet D21 and a moisture-absorbing channel air outlet D22 to form a circulating moisture-absorbing airflow inside the cleaning compartment H1 and a moisture-absorbing channel D2.

[0015] The drying module D includes a moisture-absorbing and moisture-removing component D1, the moisture-absorbing channel D2 and a moisture-removing channel D3. The moisture-absorbing and moisture-removing component D1 includes a moisture-absorbing rotary wheel assembly D11, a rotary wheel housing D12 and a rotary wheel driving mechanism D13. The moisture-absorbing channel air inlet D21, the moisture-absorbing channel air outlet D22 and a moisture-absorbing channel fan D23 are arranged in the moisture-absorbing channel D2. A moisture-removing fluid driving unit D33, a moisture-removing and heating assembly D34 and a moisture-removing and condensing assembly D35 are arranged in the moisture-removing channel. In addition, a moisture-absorbing and heating assembly, a moisture-absorbing and condensing assembly and/or a moisture-absorbing and filtering assembly may also be optionally arranged inside the moisture-absorbing channel D2; and a moisture-removing and filtering assembly may also be optionally arranged inside the moisture-removing channel D3.

[0016] A hot and humid airflow in the cleaning compartment H1 enters into the moisture-absorbing channel D2 through the air inlet of the moisture-absorbing channel D2. When the fan of the moisture-absorbing channel D2 is started, the airflow may flow circularly in the cleaning compartment H1 and the drying module D to form the circulating moisture-absorbing airflow. The fan of the moisture-absorbing channel D2 sucks humid air into the air inlet of the moisture-absorbing channel D2 of the drying module D from the cleaning compartment H1; and after the humid air passes through the fan, the fan discharges the humid air into a moisture-absorbing region D1211 between the moisture-absorbing rotary wheel assembly D11 and a bottom of the rotary wheel housing D12. After passing through a wheel disk D111 in the moisture-absorbing rotary wheel assembly D11 from bottom to top, the humid air becomes a dry air, and the dry air re-enters into the cleaning compartment H1 by means of the air outlet of the moisture-absorbing channel D2. This cycle is carried out to achieve drying of an inner chamber of the cleaning compartment H1.

[0017] In some embodiments, the drying module D is mounted at an upper portion, a lateral portion or a bottom of the cleaning compartment H1.

[0018] When the drying module D is arranged at the upper portion of the cleaning compartment H1, the space between a built-in cabinet countertop and an upper surface of the tableware treating apparatus H can be effectively utilized, the dimension of a machine body in an embedding direction can be reduced to adapt to different countertop designs, and a larger capacity of the cleaning compartment H1 can also be achieved to clean more sets of standard tableware in the smaller machine body.

[0019] Besides, the drying module D may also be mounted at the lateral portion or the bottom of the cleaning compartment H1. In some embodiments, the lateral portion includes a left side, a right side and a rear side, namely, the drying module D may also be mounted on the left side of the cleaning compartment H1 or the right side of the cleaning compartment H1 or the rear side of the cleaning compartment H1.

[0020] In some embodiments, the cleaning compartment H1 is provided with a cleaning air inlet H2 and a cleaning air outlet H3, the cleaning air inlet H2 is communicated with the air outlet of the moisture-absorbing channel D2, the cleaning air outlet H3 is communicated with the moisture-absorbing channel air inlet D21, and the cleaning air inlet H2 is arranged at the lateral portion or the bottom of the cleaning compartment H1.

[0021] The cleaning air outlet H3 introduces hot and humid air from the cleaning compartment H1 into the moisture-absorbing channel D2, while the cleaning air inlet H2 recycles dry-hot air obtained after dehumidification by the moisture-absorbing rotary wheel assembly

D11 into the cleaning compartment H1, and tableware in the cleaning compartment H1 is dried by the dry-hot air. In order to improve the material exchange efficiency of the tableware in the cleaning compartment H1, the cleaning air inlet H2 is optionally arranged below a bowl basket, namely, the cleaning air inlet H2 may be arranged at the lateral portion or the bottom of the cleaning compartment H1. If the cleaning air inlet H2 is arranged at the lateral portion of the cleaning compartment H1, it is only necessary to ensure that the cleaning air inlet H2 is arranged below the bowl basket.

[0022] The bowl basket (or called a dish rack) is arranged inside the cleaning compartment H1 for carrying tableware such as bowls, plates and cups. There may be a plurality of groups of bowl baskets of different geometric shapes to carry various types of tableware with different specifications. The bowl basket may be made of plastic, metal or an inorganic non-metallic material, or made of a mixture of multiple materials (such as plastic embedded with metal and metal wrapped in inorganic non-metallic materials).

[0023] In some embodiments, the tableware treating apparatus H further includes a sensor H4, the sensor H4 may be a temperature sensor, the temperature sensor is configured to detect a real-time temperature value of the cleaning compartment H1, and a controller is configured to control the drying module D to start after the tableware treating apparatus H stops washing and completes water drainage. In some embodiments, the heating power of a moisture-removing and heating member D343 or the power of an auxiliary heating element may also be adjusted according to the real-time temperature value to obtain a preset temperature inside the cleaning compartment H1. The auxiliary heating element may be arranged inside the moisture-absorbing channel D2, and an airflow heated by the auxiliary heating element is blown into the cleaning compartment H1.

[0024] In some embodiments, the temperature inside the cleaning compartment H1 is adjusted by the auxiliary heating element. When the real-time temperature value in the cleaning compartment H1 is greater than or equal to the set temperature value, it means that the cleaning compartment H1 has reached a drying condition, at which time the drying module D may be controlled to start to dry tableware inside the cleaning compartment H1. In some other embodiments, the tableware may also be dried by a low temperature or cold air, namely, the auxiliary heating element is turned off or omitted, and residual moisture on the tableware is removed only by the circulating moisture-absorbing airflow formed between the drying module D and the cleaning compartment H1. In this case, residual heat from the previous washing procedure may be fully utilized to remove the moisture.

[0025] It should be noted that in some embodiments, there are two start conditions for the drying module D. The drying module D is started until the washing mode is completed and the real-time temperature value reaches the drying condition, and the drying module D is not started if either of the two conditions is not met.

[0026] In some embodiments, a heater is arranged inside the cleaning compartment H1, so that air in the cleaning compartment H1 can be heated to increase energy in the cleaning compartment H1, thereby increasing the temperature value and enabling the real-time temperature value to reach the set temperature value. The heater may be in various forms, and for example, may be a heat pump, a semiconductor heater, a vortex tube, a heating wire or the like. Of course, energy absorbed by exchange water in a condensing module may also be transferred to the cleaning compartment H1 again for raising the temperature inside the cleaning compartment H1, so as to achieve the purposes of energy saving and efficient drying.

[0027] In some other embodiments, the sensor H4 may also be a humidity sensor, the humidity sensor is configured to detect a real-time humidity value of the cleaning compartment H1, and a controller is configured to control the drying module D to stop when the real-time humidity value is less than or equal to a set humidity value. For example, it can be directly determined from data of the sensor or affirmed by an appropriate logic with reference to the data of the sensor that the tableware inside the cleaning compartment H1 has been dried.

[0028] When the real-time humidity value is less than or equal to the set humidity value, it means that the humidity value inside the cleaning compartment H1 is small at that time and the tableware in the washing compartment H1 has been dried, at which time the drying module D may be controlled to stop.

[0029] In addition, the following sensors H4 may also be provided, including but not limited to a particle sensor, a conductivity sensor, a rotational speed sensor, a pressure sensor, etc. It should be noted that the sensor H4 is not specifically limited in arrangement position, and may be arranged inside the moisture-absorbing channel D2, inside the moisture-removing channel D3, proximal to the moisture-removing and heating member D343 or proximal to the moisture-removing and condensing assembly D35. Exemplarily, when a temperature sensor or a humidity sensor is mounted at the air inlet of the moisture-absorbing channel D2, the sensor may detect an environment of a dishwashing compartment before drying, and an appropriate program is automatically matched to increase, before drying, the temperature inside the dishwashing compartment to a temperature required for drying. The output humidity data may also be used as a reference for the end of the drying procedure. If a conductivity sensor H4 is mounted at the air inlet of the moisture-absorbing channel D2, the hardness, the degree of filling and the degree of dirtiness of dishwashing water may be detected, and operations such as adjusting the water quality of the dishwasher or opening a water inlet valve to replenish water are performed correspondingly.

[0030] The drying module D includes the moisture-absorbing and moisture-removing component D1, the

moisture-absorbing channel D2 and the moisture-removing channel. The moisture-absorbing and moisture-removing component D1 includes the moisture-absorbing rotary wheel assembly D11, the rotary wheel housing D12 and the rotary wheel driving mechanism D13. The moisture-absorbing channel air inlet D21, the moisture-absorbing channel air outlet D22 and the moisture-absorbing channel fan D23 are arranged in the moisture-absorbing channel D2. The moisture-removing fluid driving unit D33, the moisture-removing and heating assembly D34 and the moisture-removing and condensing assembly D35 are arranged in the moisture-removing channel D3. In addition, the moisture-absorbing and heating assembly, the moisture-absorbing and condensing assembly and/or the moisture-absorbing and filtering assembly and the like may also be optionally arranged inside the moisture-absorbing channel D2, and the moisture-removing and filtering assembly may also be optionally arranged inside the moisture-removing channel D3.

[0031] The moisture-absorbing and heating assembly is configured to heat the moisture-absorbing airflow so as to increase the temperature of the moisture-absorbing airflow and thus improve the drying efficiency. The moisture-absorbing and heating assembly is arranged near the air outlet of the moisture-absorbing channel D2 of the drying module D, so that air dried by the moisture-absorbing and heating assembly can be heated to prevent evaporated moisture from condensing on an inner wall of the moisture-absorbing channel D2. The moisture-absorbing and heating assembly may determine whether to heat and determine the heating power according to a detection value of the temperature sensor.

[0032] The moisture-absorbing and condensing assembly is configured to additionally condense and dehumidify the moisture-absorbing airflow. The moisture-absorbing and condensing assembly may be arranged near the air inlet of the moisture-absorbing channel D2 of the drying module D, so that wet-hot air from the cleaning compartment may be pre-dehumidified to improve the drying efficiency.

[0033] In the moisture-absorbing channel D2, the moisture-absorbing and filtering assembly is arranged upstream of the moisture-absorbing and moisture-removing component D1, particularly at the air inlet of the moisture-absorbing channel D2, and is configured to filter impurities in the moisture-absorbing airflow, so as to protect the moisture-absorbing channel D2, particularly the moisture-absorbing and moisture-removing component D1, from being contaminated by the impurities.

[0034] The drying module D may be pre-assembled into only one pre-assembled module, particularly before the whole tableware treating apparatus H is assembled. The pre-assembled module may include only one integrally constructed lower housing and a plurality of separately arranged upper housings. The lower housing and the upper housing of the module together form a plurality of chambers, and the chambers are configured to accommodate one or more of various functional assemblies, such as the moisture-absorbing rotary wheel assembly D11, the fan of the moisture-absorbing channel D2, the moisture-removing fluid driving unit D33, the rotary wheel driving mechanism D13, the moisture-absorbing and heating assembly, the moisture-absorbing and condensing assembly, the moisture-removing and heating assembly D34 and the moisture-removing and condensing assembly D35. Such an integrated modular manufacturing greatly simplifies the assembling and thus improves the assembling efficiency in one aspect, and in another aspect, omits or shortens a corresponding connecting pipeline, thereby enabling the structure of the drying module D to be more compact.

[0035] When the drying module D is provided with only one integrally constructed lower housing with an integrated structure, a plurality of lugs, preferably four lugs, are integrally formed at or fixed to a periphery of the lower housing. It should be noted that the drying module D, when positioned correctly, is not in contact with the cleaning compartment. Therefore, the functional modules in the drying module D are prevented from being severely affected by vibration of the cleaning compartment, which is very beneficial to the drying module based on the moisture-absorbing and moisture-removing component D1 provided by the present disclosure, because the vibration may cause a wheel disk D111 in the moisture-absorbing rotary wheel assembly D11 to rotate unevenly, leading to a collision between the wheel disk D111 and the rotary wheel housing D12 or an assembly fixed to the rotary wheel housing D12. As a result, it may also cause a sealing failure, causing the airflow to escape from a predetermined flow path.

[0036] As shown in FIG. 3, the above functional modules are connected with each other and connected to the top of the tableware treating apparatus by means of the lugs in a lap-joint manner. In some embodiments, at least four lugs are included, at least three of the lugs are separately manufactured and then connected to edges of the above functional modules, and at least the last lug is directly integrally molded with the rotary wheel housing D12 of the moisture-absorbing and moisture-removing component D1. Other numbers of lugs and other forms of connection to a frame are also conceivable. In summary, the functional modules that have been connected into a whole are directly fixed to the frame using the lugs, which in one aspect facilitates assembling and in another aspect is beneficial to reducing the influence from the tableware treating apparatus on the drying module D during operation. It can also be contemplated that these functional modules are separately fixed to the tableware treating apparatus, and particularly advantageous herein, the moisture-absorbing and moisture-removing component D1 is fixed to the frame.

[0037] In some embodiments, the moisture-absorbing channel air inlet D21 of the moisture-absorbing channel D2 is in fluid communication with an air outlet of the

cleaning compartment of the tableware treating apparatus, and the moisture-absorbing channel air outlet D22 of the moisture-absorbing channel D2 is in fluid communication with an air inlet of the cleaning compartment of the tableware treating apparatus. As shown in FIG. 4, an air outlet of the moisture-absorbing channel fan D23 is configured to be opened in a direction perpendicular to an axis of rotation of the moisture-absorbing rotary wheel assembly D11, and the air outlet is in fluid communication with a moisture-absorbing airflow inlet configured on a circumferential side wall of the rotary wheel housing D12 by means of an air outlet connecting portion, and thus is in fluid communication with the moisture-absorbing region D1211 of the rotary wheel housing D12. The moisture-absorbing airflow inlet of the rotary wheel housing D12 is arranged, on the circumferential side wall of the rotary wheel housing D12, between the moisture-absorbing rotary wheel assembly D11 and the bottom of the rotary wheel housing D12.

[0038] As shown in FIG. 3, the moisture-removing channels D3 are connected end to end to form an internal circulation channel not communicated with an external environment. An air outlet of the moisture-removing fluid driving unit D33 is also configured to be opened in a direction perpendicular to the axis of rotation of the moisture-absorbing rotary wheel assembly D11, and the air outlet is in fluid communication with a circumferential side wall D3413 of a moisture-removing and heating housing D341 of the moisture-removing and heating assembly D34 by means of an air outlet connecting portion. The moisture-removing and heating assembly D34 is secured to an upper surface of an upper rotary wheel housing D12U of the rotary wheel housing D12 and is configured in a shape complementary to that of the rotary wheel housing D12. A moisture-removing airflow outlet is formed in a lower end face wall D3412 of the moisture-removing and heating assembly housing D341 and is in fluid communication with a moisture-removing region D1212 of the moisture-absorbing rotary wheel assembly D11. Thus, the drying module D with a compact structure, particularly in a direction of the axis of rotation, is formed, which is very beneficial to reducing the height or the thickness of the tableware treating apparatus H.

[0039] In an alternative embodiment, the moisture-absorbing and moisture-removing component may be divided into a moisture-absorbing region and a moisture-removing region. In some embodiments, the moisture-absorbing region and the moisture-removing region may be obtained by separating the same moisture-absorbing and moisture-removing component. For example, the moisture-absorbing and moisture-removing component is a rotary wheel, and the rotary wheel is divided into the moisture-absorbing region and the moisture-removing region. In some other embodiments, the moisture-absorbing and moisture-removing component is not partitioned, and all regions are used for moisture absorption; and in a non-moisture-absorbing working state, moisture absorbed by the moisture-absorbing and moisture-removing component needs to be discharged to prepare for the next moisture-absorbing working stage. For example, the moisture-absorbing and moisture-removing component is a moisture-absorbing tank filled with a moisture-absorbing material. In some other embodiments, the moisture-absorbing and moisture-removing component may be a consumable, and is required to be replaced after absorbing moisture for one or more times to keep its good moisture-absorbing effect.

[0040] FIG. 4 schematically shows, by arrows, a flow path of the moisture-absorbing airflow of the drying module D according to the present disclosure. When the moisture-absorbing channel fan D23 is started, the airflow may flow circularly in the cleaning compartment H1 and the drying module D to form a circulating moisture-absorbing airflow. The moisture-absorbing channel fan D23 sucks humid air into the moisture-absorbing channel air inlet D21 of the drying module D from the cleaning compartment; and after the humid air passes through the fan, the fan discharges the humid air into the moisture-absorbing region D1211 between the moisture-absorbing rotary wheel assembly D11 and a bottom of the rotary wheel housing D12. After passing through the wheel disk D111 in the moisture-absorbing rotary wheel assembly D11 from bottom to top, the humid air becomes a dry air, and the dry air re-enters into the cleaning compartment H1 by means of the moisture-absorbing channel air outlet D22. This cycle is carried out to achieve drying of the inner chamber of the cleaning compartment H1.

[0041] FIG. 5 schematically shows, by arrows, a flow path of the moisture-removing airflow in the drying module D according to the present disclosure. When the moisture-removing fluid driving unit D33 is started, the airflow may flow circularly in the moisture-removing channel D3 to form the moisture-removing airflow. The moisture-removing fluid driving unit D33 sucks the dry air flowing out of the moisture-removing and condensing assembly D35 and conveys the dry air to the moisture-removing and heating assembly D34. The heated dry-hot air enters the moisture-removing region D1212 and flows through the wheel disk D111 of the moisture-absorbing rotary wheel assembly D11 from top to bottom. The dry-hot air removes moisture in the wheel disk D111, thereby becoming a wet-hot air. The wet-hot air is then conveyed to the moisture-removing and condensing assembly D34 arranged downstream of the moisture-absorbing rotary wheel assembly d11, where the wet-hot air is condensed and dehumidified to become the dry-cold air again, and the dry-cold air is conveyed to the moisture-absorbing rotary wheel assembly D11 again. This cycle is carried out to achieve regeneration of the wheel disk D111 of the moisture-absorbing rotary wheel assembly D11, so as to continuously maintain its moisture-absorbing capacity. Of course, FIGS. 4 and 5 are an example of the air flow direction in the moisture-absorbing channel D2 and the moisture-removing channel. In practice, the airflow may flow downward from an upper portion of the wheel disk D111 in the moisture-absorbing channel D2, while flow

upward from a lower portion of the wheel disk D111 in the moisture-removing channel; or the airflow simultaneously flows downward from the upper portion or flow upward from the lower portion of the wheel disk D111, which is not limited in the present disclosure.

[0042] FIG. 6 shows the moisture-absorbing and moisture-removing component D1 of the drying module D according to the present disclosure in an exploded view. FIG. 7 shows the moisture-absorbing rotary wheel assembly D11 and a lower rotary wheel housing D12L of the drying module D according to the present disclosure in a perspective view. As shown in FIGS. 6 and 5, the moisture-absorbing and moisture-removing component D1 includes the moisture-absorbing rotary wheel assembly D11, the rotary wheel housing D12 and the rotary wheel driving mechanism D13. The rotary wheel housing D12 includes the upper rotary wheel housing D12U and the lower rotary wheel housing D12L, which are fixed to each other to form an internal cavity. The rotary wheel housing D12 has the moisture-absorbing region D1211 and the moisture-removing region D1212, the moisture-absorbing region D1211 is in communication with the moisture-absorbing channel D2, and the moisture-removing region D1212 is in communication with the moisture-removing channel D3. The moisture-absorbing rotary wheel assembly D11, along its axis of rotation, is rotatably supported in the internal cavity of the rotary wheel housing D12 and is driven by the rotary wheel driving mechanism D13 to rotate. The moisture-absorbing rotary wheel assembly D11 is driven, at its outer periphery, by the rotary wheel driving mechanism D13, namely, the rotary wheel driving mechanism D13 applies its output driving force to the outer periphery of the moisture-absorbing rotary wheel assembly D11.

[0043] In some embodiments, straight teeth uniformly distributed in a circumferential direction are configured on an outer peripheral surface of the moisture-absorbing rotary wheel assembly D11, and the rotary wheel driving mechanism D13 is provided with a matched transmission mechanism D132 configured as a straight gear. The moisture-absorbing rotary wheel assembly D11 and the rotary wheel driving mechanism D13 (especially the matched transmission mechanism D132 in some embodiments) are arranged substantially side by side in a direction perpendicular to the axis of rotation of the moisture-absorbing rotary wheel assembly D11, namely, the radial direction. The rotary wheel housing D12 is provided with accommodating portions for accommodating the moisture-absorbing rotary wheel assembly D11 and the rotary wheel driving mechanism D13 respectively, namely, the two share the same rotary wheel housing D12.

[0044] As shown in FIGS. 6 and 7, the rotary wheel housing D12 is provided with at least two pairs of separators D121, arranged opposite to each other and extend toward each other, on inner walls of end faces of the upper rotary wheel housing D12U and the lower rotary wheel housing D12L, so as to divide an internal space of the rotary wheel housing D12 into the moisture-absorbing region D1211 and the moisture-removing region D1212, so that the moisture-absorbing airflow and the moisture-removing airflow are separated inside the rotary wheel housing D12. A gap is reserved between the separator D121 and the wheel disk D111.

[0045] A separating seal D125 is fixed to a surface of the separator D121 surrounding the moisture-removing region D1212 and facing the wheel disk D111. The dimensional design of the separating seal D125 is such that it only keeps a slight gap with the wheel disk D111, so as to prevent the airflow from cross-flowing between the moisture-absorbing region D1211 and the moisture-removing region D1212 as much as possible without hindering rotation of the wheel disk D111. The gap between the separating seal D125 and the wheel disk D111 is set between 0.2 mm and 5 mm, which is sufficient to not only avoid hindering rotation of the wheel disk D111 in consideration of general axial runout of rotary operation of the wheel disk D111, but also well prevent the airflow from cross-flowing between various regions. The separating seal D125 is flexible, and is for example made of foam, silica gel or soft glue, which is beneficial to reducing the risk of damaging the wheel disk D111 in case of extremely severe axial runout of the wheel disk D111. In some other alternative embodiments, the separating seal D125 may also be configured as a sealing wool top and may be in contact with the wheel disk D111 in an assembled state, thereby forming relatively rotatable contact sealing with the wheel disk D111.

[0046] A separating heat insulator is also secured to the surface of the separator D121 facing the wheel disk D111 of the moisture-absorbing rotary wheel assembly D11 to reduce heat diffusion between the moisture-absorbing region D1211 and the moisture-removing region D1212. The separating heat insulator is at least partially covered by the separating seal D125, and a part of the separating seal D125 is always closer to the wheel disk D111 than the separating heat insulator. A recess for placing the separating heat insulator is formed in a side of the separating seal D125 facing the wheel disk D111, and the thickness of the recess is greater than that of the separating heat insulator, so that the separating seal D125 is closer to the wheel disk D111. At least one of separating seal D125 and the separating heat insulator is shaped and dimensioned to match an edge of the inner chamber surrounded by the separator D121 and, if necessary, the rotary wheel housing D12.

[0047] The separating heat insulator may be made of a heat-isolating material or a heat-insulating material. However, it can also be contemplated that the heat insulator is manufactured using a lower-cost metal or alloy, or the heat insulator is manufactured using an inorganic nonmetallic material or a composite material. Here, although the metal or alloy has good thermal conductivity, it can still achieve a certain heat insulating effect after being coated with the seal. In some other embodiments, outward heat transfer can be avoided using ex-

cellent interfacial reflectivity of the surface of the material to form a good heat insulating effect.

[0048] As shown in FIGS. 8 and 9, a separating extruding sheet D126 is secured to the surface of the separator D121 surrounding the moisture-removing region D1212 and facing the wheel disk D111, the separating extruding sheet D126 is provided with a plurality of protrusions spaced from each other for positioning and extruding the separating seal D125 onto the separator D121. A recess for placing the separating extruding sheet D 126 is configured on a side of the separating seal D125 facing the wheel disk D111, and a thickness of the recess is greater than that of the separating extruding sheet D126, so that the separating seal D125 is closer to the wheel disk D111 in an assembled state.

[0049] The separating seal D125 and the separating extruding sheet D126 have shapes and dimensions that match at least a part of an edge of the moisture-removing region D1212. Here, the separating extruding sheet D126 can also function as a separating heat insulator for reducing heat diffusion between the moisture-absorbing region D1211 and the moisture-removing region D1212. In some embodiments, the separating heat insulator D126 is made of a heat-isolating material or a heat-insulating material, and the heat insulator may also be manufactured using a lower-cost metal or alloy, or the heat insulator is manufactured using an inorganic non-metallic material or a composite material. Here, although the metal or alloy has better thermal conductivity, it can still achieve a certain heat insulating effect after being coated with the seal. In some other embodiments, outward heat transfer can be avoided using excellent interfacial reflectivity of the surface of the material to form an excellent heat insulating effect.

[0050] In some embodiments, the separating extruding sheet D126 and the separating heat insulator are integrally constructed. That is, the separating extruding sheet D126 and the separating heat insulator are integrally formed.

[0051] An airflow guiding piece D127 is also arranged in the rotary wheel housing D12, and is arranged in a flow direction of the moisture-absorbing airflow and configured to divide the airflow entering the moisture-absorbing region into a plurality of streams to flow through different regions of the moisture-absorbing rotary wheel assembly D11.

[0052] The airflow guiding piece D127 is configured to divide the moisture-absorbing airflow entering the rotary wheel housing into a plurality of airflows and enable the plurality of streams of airflow to respectively flow through the wheel disk D111 of the moisture-absorbing rotary wheel assembly D11 from different regions. The provision of such an airflow guiding piece D127 can prevent the moisture-absorbing airflow, after entering the moisture-absorbing region D1211, from converging in an outlying region in the radial direction along with the rotation of the moisture-absorbing rotary wheel assembly D11, that is, the uniformity of the moisture-absorbing airflow in flowing through the wheel disk D111 is improved, thereby improving the moisture-absorbing efficiency.

[0053] One or a plurality of airflow guiding pieces D127 may be provided. When one airflow guiding piece D127 is provided, one end of the airflow guiding piece D127 is arranged in a center of a region of the moisture-absorbing airflow inlet D21 of the rotary wheel housing D12 for the moisture-absorbing airflow. It can also be contemplated that a plurality of airflow guiding pieces D127 are provided, end portions of which preferably equally divide the region of the moisture-absorbing airflow inlet, and the airflow guiding pieces D127 are preferably arranged substantially uniformly in the whole moisture-absorbing region D1211. Each airflow guiding piece D127 is curved. The number of the airflow guiding pieces D127 may not be limited.

[0054] FIG. 8 shows the moisture-absorbing rotary wheel assembly D11 of the drying module D according to the present disclosure in an exploded view. In some embodiments, the moisture-absorbing rotary wheel assembly D11 includes a wheel disk D111, an outer peripheral housing part D112, a central housing part D113, a power input part D114, an auxiliary rotary ring D115, a rotary wheel seal D116, an outer peripheral vibration absorber D117 and a central vibration absorber D118.

[0055] The wheel disk D111 is made of a renewable moisture-absorbing material. The wheel disk D111 may be constructed as a porous structure or may be made of a porous material, and may be in the shape of a disk. In some embodiments, the wheel disk D111 may be made of fibers with good moisture-absorbing capacity, for example, cotton cloth. The wheel disk D111 is provided with a central hole symmetrically configured along a center of the axis of rotation, and the central hole is a through hole.

[0056] FIG. 7 exemplarily shows a perspective diagram of the moisture-absorbing rotary wheel assembly D11 and the rotary wheel driving mechanism D13 in an engaged state. As shown in FIG. 9, the moisture-absorbing rotary wheel assembly D11 is driven, at its outer periphery, by the rotary wheel driving mechanism D13, instead of being driven in a central region. That is, the rotary wheel driving mechanism D13 applies its output driving force to the outer periphery of the moisture-absorbing rotary wheel assembly D11.

[0057] Specifically, the moisture-absorbing rotary wheel assembly D11 includes a power input part D114 for introducing power for rotation of the moisture-absorbing rotary wheel assembly D11 from the rotary wheel driving mechanism D13. The power input part D114 is integrally formed on an outer peripheral surface of the outer peripheral housing part D112 of the moisture-absorbing rotary wheel assembly D11. Of course, the separately manufactured power input part D114 may also be fixed to the outer peripheral surface of the outer peripheral housing part D112. The power input part D114 is formed by tooth structures (which are straight teeth in some embodiments) uniformly distributed in the circumferential direction.

[0058] The rotary wheel driving mechanism D13 includes a rotary wheel driving motor D131 and a matched transmission mechanism D132. An output shaft of the rotary wheel drive motor D131 and the matched transmission mechanism D132 are connected in a manner of being non-rotatable relative to each other, and are for example connected by means of key-slot fitting or the like. The matched transmission mechanism D132 is configured to match the power input part D114 of the moisture-absorbing rotary wheel assembly D11. In the illustrated embodiment, the matched transmission mechanism D132 is composed of a straight gear capable of engaging with the straight teeth of the power input part D114.

[0059] The moisture-absorbing rotary wheel assembly D11 and the rotary wheel driving mechanism D13 are arranged substantially side by side in a direction perpendicular to the axis of rotation of the moisture-absorbing rotary wheel assembly D11, namely, in the radial direction. In some embodiments, the power input part D114 of the moisture-absorbing rotary wheel assembly D11 and the matched transmission mechanism D132 of the rotary wheel driving mechanism D13 are arranged in the same plane extending perpendicular to the axis of rotation. The rotary wheel driving motor D131 of the rotary wheel driving mechanism D13 is arranged below the matched transmission mechanism D132. In some embodiments, the output shaft of the rotary wheel driving motor D131 extends in a direction parallel to the axis of rotation. Therefore, a compact structure of the moisture-absorbing rotary wheel assembly D11 is achieved. The rotary wheel driving mechanism D13 may be completely arranged beyond a radial dimension range of the moisture-absorbing rotary wheel assembly D11, thereby avoiding obstructing the flowing of the airflow through the moisture-absorbing rotary wheel assembly D11.

[0060] In some other unillustrated embodiments, the power input part D114 may also be configured as other types of teeth, such as helical teeth or curved teeth. For example, curved teeth may also be configured at an end surface of an outer edge of the outer peripheral housing part D112 of the moisture-absorbing rotary wheel assembly D11, and correspondingly, the matched transmission mechanism D132 is configured as a bevel gear. In this embodiment, the output shaft of the rotary wheel driving motor D131 is arranged perpendicular to the axis of rotation of the moisture-absorbing rotary wheel assembly D11.

[0061] In some other unillustrated embodiments, the power input part D114 may also be composed of smooth surfaces or grooves uniformly distributed in the circumferential direction, and correspondingly, the matched transmission mechanism D132 is configured as a friction pulley (e.g., a flat belt drive pulley), or an engaging pulley (e.g., a toothed belt pulley). When the matched transmission mechanism D132 is configured as a friction pulley, the power input part D114 may be configured as a smooth surface having a surface microstructure to increase friction.

[0062] In some other unillustrated embodiments, the rotary wheel driving mechanism D13 may also be arranged within the radial dimension range of the moisture-absorbing rotary wheel assembly D11. For example, the rotary wheel driving mechanism D13 is arranged coaxial with the moisture-absorbing rotary wheel assembly D11. Specifically, a power output end of the rotary wheel driving mechanism D13 is connected to a rotary shaft of the moisture-absorbing rotary wheel assembly D11.

[0063] In some other unillustrated embodiments, the power input part D114 is composed of a friction surface, and the rotary wheel driving mechanism D13 drives, by friction, the power input part D114 to rotate. That is, the rotary wheel driving mechanism D13 and the power input part D114 adopt a driving mode similar to a friction pulley.

[0064] In some other unillustrated embodiments, a magnetic material is arranged at an edge of the moisture-absorbing rotary wheel assembly D11 to drive, by a moving magnetic field, the moisture-absorbing rotary wheel assembly D11 to move.

[0065] In some other unillustrated embodiments, the power input part D114 may also be composed of sprocket teeth, and correspondingly, the matched transmission mechanism D132 is configured as a sprocket.

[0066] As shown in FIG. 6, in the illustrated embodiment, the rotary wheel driving mechanism D13 and the moisture-absorbing rotary wheel assembly D11 share the same rotary wheel housing D12. In other words, the rotary wheel housing D12 is provided with accommodating portions for accommodating the moisture-absorbing wheel assembly D11 and the rotary wheel driving mechanism D13 respectively. Such an arrangement is particularly beneficial to sealing of the moisture-absorbing airflow and the moisture-removing airflow, since the moisture-absorbing airflow and the moisture-removing airflow can be prevented from escaping out of the rotary wheel housing D12 by peripheral sealing of the whole rotary wheel housing D12. Here, a baffle and optionally a seal are arranged at the accommodating portion of the rotary wheel housing D12 for the rotary wheel driving mechanism D13, so as to prevent the airflow from flowing to the accommodating portion for the rotary wheel driving mechanism D13 from the accommodating portion for the moisture-absorbing rotary wheel assembly D11, thereby protecting the rotary wheel driving mechanism D13 against moisture.

[0067] Of course, it can also be contemplated that the rotary wheel driving mechanism D13 and the moisture-absorbing rotary wheel assembly D11 are respectively provided with separate housings, which are fixed to each other. In this embodiment, it is necessary to provide additional seals to seal positions where the respective housings of the rotary wheel driving mechanism D13 and the moisture-absorbing wheel assembly D11 are fixed to each other.

[0068] The rotary wheel driving mechanism D13 arranged at the outer periphery of the moisture-absorbing

rotary wheel assembly D11 can flexibly utilize the space around the moisture-absorbing rotary wheel assembly D11 to reduce the axial dimension of the moisture-absorbing and moisture-removing component D1, so that the moisture-absorbing and moisture-removing component D1 is flatter as a whole. This can contribute to reducing the overall height or thickness of the tableware treating apparatus H. Moreover, in this embodiment, there is no transmission structure, for hindering the airflow from flowing through, in the central region of the wheel disk D111 inside the rotary wheel housing D12, which is also beneficial to guiding the airflow to flow through the wheel disk more uniformly.

[0069] Since a driving force is loaded at the outer periphery of the moisture-absorbing rotary wheel assembly D11, the stress of the moisture-absorbing rotary wheel assembly D11 is non-centrosymmetric. In order to enable the moisture-absorbing rotary wheel assembly D11, when driven on a peripheral side, to rotate more smoothly, the moisture-absorbing rotary wheel assembly D11 may be assisted in rotating steadily using a peripheral roller mechanism D122 and/or a bottom roller mechanism D123.

[0070] As shown in FIG. 7, a plurality of bottom roller mechanisms D123 are arranged on an inner bottom wall of the rotary wheel housing D12. Here, four bottom roller mechanisms D123 are provided. Each bottom roller mechanism D123 includes a bottom roller and a bottom roller support. The bottom roller is rotatably supported on the bottom roller support. The bottom roller support is arranged on the rotary wheel housing D12. The bottom roller is arranged within a radial size range of the moisture-absorbing rotary wheel assembly D11 as viewed in the direction perpendicular to the axis of rotation of the moisture-absorbing rotary wheel assembly D11, namely, the radial direction. In addition, as viewed in a direction parallel to the axis of rotation of the moisture-absorbing rotary wheel assembly D11, namely, an axial direction, the bottom roller is arranged between the moisture-absorbing rotary wheel assembly D11 and the rotary wheel housing D12, and a spacing between the bottom roller and the moisture-absorbing rotary wheel assembly D11 is smaller than a minimum spacing between the moisture-absorbing rotary wheel assembly D11 and the rotary wheel housing D12. In the embodiment shown in this figure, the bottom roller at least partially protrudes from the entire inner bottom wall of the rotary wheel housing D12 towards the moisture-absorbing rotary wheel assembly D11.

[0071] The bottom roller mechanism D123 is constructed to be not deformable or slightly deformable. A peripheral surface of the bottom roller is constructed smoothly or constructed with a rugged surface structure. The bottom roller support may be integrally formed with or connected to an inner bottom surface of the rotary wheel housing D12. The bottom roller support may be constructed as a hollow part. After being assembled, the bottom roller is partially accommodated in an inner chamber of the hollow part. A groove used for accommodating the bottom roller mechanism D123 is formed in the inner bottom surface of the rotary wheel housing D12. The bottom roller support is fixed in the groove, or the bottom roller support is directly formed as a groove structure on the inner bottom surface of the rotary wheel housing D12.

[0072] In some embodiments, the bottom roller support is fixed onto the rotary wheel housing D12 by means of a fixing mechanism. The fixing mechanism is constructed to be capable of adjusting an axial spacing between the bottom roller support and the moisture-absorbing rotary wheel assembly D11 in an initial mounting position. FIG. 10 exemplarily shows a top view of the lower rotary wheel housing D12L with the peripheral roller mechanism D122. A plurality of peripheral roller mechanisms D122 is arranged at an inner periphery of the rotary wheel housing D12. Each peripheral roller mechanism D122 includes a peripheral roller D1221 and a peripheral roller support D1222. In some embodiments, the peripheral roller D1221 is rotatably supported on the peripheral roller support D1222; and the peripheral roller support D1222 is arranged at the inner periphery of the rotary wheel housing D12. As viewed in the direction parallel to the axis of rotation of the moisture-absorbing rotary wheel assembly D11, namely, the axial direction, the peripheral roller D1221 is arranged within an axial size range of the moisture-absorbing rotary wheel assembly D11, that is, the peripheral roller D1221 is arranged with a thickness range of the moisture-absorbing rotary wheel assembly D1. As viewed in the direction perpendicular to the axis of rotation of the moisture-absorbing rotary wheel assembly D11, namely, the radial direction, the peripheral roller D1221 is arranged between the moisture-absorbing rotary wheel assembly D1 and the rotary wheel housing D12; and the peripheral roller D1221 is capable of being in rolling contact with an outer peripheral surface of the moisture-absorbing rotary wheel assembly D11 at least part of time during a rotation process of the moisture-absorbing rotary wheel assembly D11. In some embodiments, the peripheral roller D1221 at least partially protrudes from an entire inner peripheral wall of the inner periphery of the rotary wheel housing D12 towards the axis of rotation.

[0073] As shown in FIG. 7, an inner periphery of the lower rotary wheel housing D12L is constructed to take the shape of a stair. The peripheral roller support D1222 is arranged on an end surface of the stair that extends in a direction perpendicular to the axis of rotation, namely, in the axial direction. The peripheral roller D1221 is rotatably supported on the peripheral roller support D1222. In this embodiment, after being assembled, the peripheral roller D1221 at least partially protrudes from the entire inner peripheral wall of the inner periphery of the rotary wheel housing D12 towards the axis of rotation, and also protrudes from a peripheral surface of the stair. In this embodiment, the peripheral surface of the stair forms a rotary wheel housing seal D124, that is, the rotary wheel housing seal D124 is formed from an inner wall of the

rotary wheel housing D12 per se, and forms contact sealing with a rotary wheel seal D116 of the moisture-absorbing rotary wheel assembly D11. In other embodiments, the rotary wheel housing seal D124 may also be a structure formed independently and mounted on the inner wall of the rotary wheel housing D12, or a structure integrally formed on the inner wall of the rotary wheel housing D12. Certainly, the following is also conceivable. After being assembled, the peripheral roller D1221 protrudes from an inner peripheral wall of the rotary wheel housing D12 only in its axial direction, and may not be a structure that protrudes from the inner periphery of the rotary wheel housing D12 most, provided that the moisture-absorbing rotary wheel assembly D11 can be in rolling contact with the peripheral roller D1221 at least part of time during the rotation process.

[0074] In some embodiments, the rotary wheel seal D116 is formed from an outer surface of an outer periphery of the moisture-absorbing rotary wheel assembly D11 per se or from a surface structure integrally constructed on the outer surface; and/or the rotary wheel housing seal D124 is formed from an inner surface of the rotary wheel housing D12 per se or from a surface structure integrally constructed on the inner surface. The rotary wheel seal D116, the rotary wheel housing seal D124, or each of them is formed from a separately manufactured seal, for example, a sealing wool top, sealing soft rubber, and the like. For example, in some embodiments, the rotary wheel seal D116 is formed from a sealing wool top fixed on the outer peripheral surface of the moisture-absorbing rotary wheel assembly D11; and the rotary wheel housing seal D124 is formed from an inner peripheral surface of the rotary wheel housing D12 per se. In some other embodiments, the rotary wheel seal D116 is formed from the outer peripheral surface of the moisture-absorbing rotary wheel assembly D11 per se; and the rotary wheel housing seal D124 is formed from a sealing wool top fixed on the inner peripheral surface of the rotary wheel housing D12. In some other embodiments, both the rotary wheel seal D116 and the rotary wheel housing seal D124 are formed from sealing wool tops. In some embodiments, the rotary wheel seal D116 and the rotary wheel housing seal D124 form contact sealing in a relatively rotatable manner by using their surfaces that extend parallel to the axis of rotation and/or surfaces that extend perpendicular to the axis of rotation.

[0075] For example, in some embodiments, the rotary wheel seal D116 and the rotary wheel housing seal D124 are arranged on the same plane side by side in a direction perpendicular to the axis of rotation, so that the rotary wheel seal D116 and the rotary wheel housing seal D124 form contact sealing in a relatively rotatable manner by using their opposite peripheral surfaces. In some other embodiments, the rotary wheel seal D116 and the rotary wheel housing seal D124 are arranged in a staggered manner but adjacent to each other along the axis of rotation, so that the rotary wheel seal D116 and the rotary wheel housing seal D124 form contact sealing in a relatively rotatable manner by using their opposite end surfaces. In some embodiments, there are a plurality of groups of rotary wheel seals D116 and rotary wheel housing seals D124 that form contact sealing in a relatively rotatable manner, wherein in each group, the rotary wheel seal D116 and the rotary wheel housing seal D124 are arranged in a staggered manner, so as to form redundant sealing.

[0076] In some embodiments, the plurality of groups of rotary wheel seals D116 and rotary wheel housing seals D124 are all arranged in a staggered manner along the axis of rotation. In some other embodiments, at least one of the plurality of groups of rotary wheel seals D116 and rotary wheel housing seals D124 may be also arranged between an end surface of the moisture-absorbing rotary wheel assembly D11 and an inner top surface or an inner bottom surface of the rotary wheel housing D12.

[0077] In some embodiments, there are a plurality of rotary wheel seals D116 and/or a plurality of rotary wheel housing seals D124, wherein one rotary wheel seal D116 can form contact sealing with the plurality of rotary wheel seals in a relatively rotatable manner, or one rotary wheel housing seal D124 can form contact sealing with the plurality of rotary wheel seals D116 in a relatively rotatable manner.

[0078] Therefore, when the moisture-absorbing rotary wheel assembly D11 deviates from the radial direction, the peripheral roller mechanism D122 performs a limiting function on the moisture-absorbing rotary wheel assembly D11 in the form of rolling contact, so that under the premise that no remarkable rotational resistance is caused, the moisture-absorbing rotary wheel assembly D11 is assisted in running on its specified rotation track, and is particularly prevented from getting in direct contact with the rotary wheel housing D12, thereby reducing a risk that the moisture-absorbing rotary wheel assembly D11 is damaged.

[0079] In the embodiment shown in this figure, in the initial mounting position, the peripheral roller mechanism D122, particularly the peripheral roller D1221 in some embodiments, is in rolling contact with the outer peripheral surface of the moisture-absorbing rotary wheel assembly D11, and preferably, is in rolling contact with the outer peripheral surface of the moisture-absorbing rotary wheel assembly D11 without mutual extrusion.

[0080] Therefore, the peripheral roller mechanism D122 can always assist in rotation of the moisture-absorbing rotary wheel assembly D11 without significantly increasing the rotational resistance of the moisture-absorbing rotary wheel assembly D11, which prevents the moisture-absorbing rotary wheel assembly D11 from swaying radially during rotation, thereby ensuring the stable rotation of the moisture-absorbing rotary wheel assembly D11.

[0081] In some other embodiments, in the initial mounting position, a tiny gap exists between the peripheral roller mechanism D122, particularly the peripheral roller D1221 in some embodiments, and the outer peripheral

surface of the moisture-absorbing rotary wheel assembly D11, so that the moisture-absorbing rotary wheel assembly D11, when rotating around a specified axis of rotation, does not get in contact with the peripheral roller mechanism D122, and the moisture-absorbing rotary wheel assembly D11, only when deviating in a direction perpendicular to the axis of rotation, namely, the radial direction, is in rolling contact with the peripheral roller mechanism D122 . Herein, the peripheral roller mechanism D122 can protect the moisture-absorbing rotary wheel assembly D11 from directly colliding with the rotary wheel housing D12.

[0082] The peripheral roller mechanism D122 may be constructed to be deformable. In the embodiment shown in this figure, the peripheral roller D1221 in the peripheral roller mechanism D12 is constructed to be flexibly deformable. Therefore, when the moisture-absorbing rotary wheel assembly D11 deviates from the radial direction, such deviation can be buffered by using the flexible deformability of the peripheral roller D122.

[0083] In an additional or alternative embodiment, the peripheral roller support D1222 in the peripheral roller mechanism D122 may be constructed to be capable of deviating, so that when the moisture-absorbing rotary wheel assembly D11 deviates from the radial direction, the peripheral roller support D1222 deviates when being extruded. Therefore, a spacing between the peripheral roller D1221 and the axis of rotation of the moisture-absorbing rotary wheel assembly D11 or the specified axis of rotation changes. In an embodiment, the peripheral roller support D1222 per se is constructed to be elastically deformable. In another embodiment, the peripheral roller support D1222 is constructed to be capable of entirely moving along a slide rail to change a distance from the axis of rotation. In some embodiments, an elastic reset member, for example, a spring, used for driving the peripheral roller support D1222 to return to an initial position is fixed onto the rotary wheel housing D12. The slide rail may include a groove formed in the rotary wheel housing D12, and a slider constructed on the peripheral roller support D1222 and matched with the groove, or the slide rail may include a guiding protrusion formed on the rotary wheel housing D12, and a guiding pawl constructed on the peripheral roller support D1222 and matched with the guiding protrusion.

[0084] As shown in FIG. 10, six peripheral roller mechanisms D122 are arranged at the inner periphery of the rotary wheel housing D12. To ensure that the peripheral roller support D1222 can be displayed clearly, these peripheral roller mechanisms D122 are concyclically and uniformly distributed at the inner periphery of the rotary wheel housing in the embodiment shown in this figure. Herein, a circular hole is formed in the peripheral roller support D1222; and a rotary shaft of the peripheral roller D1221 is inserted into the circular hole. The peripheral roller support D1222 can be integrally formed with the rotary wheel housing D12, and can alternatively be manufactured separately and then fixed with the rotary wheel housing D12. Because the wheel disk D111 is driven circumferentially, a specific eccentric force is generated on the wheel disk D111. Alternatively, the peripheral roller mechanisms D122 are arranged non-uniformly. For example, more peripheral roller mechanisms D122 are arranged on a side distal from a contact portion between the rotary wheel driving mechanism D13 and the moisture-absorbing rotary wheel assembly D11, so as to counteract an effect of the eccentric force described above; and a small number of peripheral roller mechanisms D122 are arranged on a side proximal to the contact portion between the rotary wheel driving mechanism D13 and the moisture-absorbing rotary wheel assembly D11. For example, when the rotary wheel driving mechanism D13 and the moisture-absorbing rotary wheel assembly D11 interact with each other in the form of gear meshing, a gear meshed portion is the contact portion between the rotary wheel driving mechanism D13 and the moisture-absorbing rotary wheel assembly D11. In this case, it is advantageous to arrange more peripheral roller mechanisms D122 on the side distal from the gear meshed portion. For another example, when the rotary wheel driving mechanism D13 and the moisture-absorbing rotary wheel assembly D11 interact with each other in the form of a belt pulley, a position at which a belt in the rotary wheel driving mechanism D13 mutually extrudes with the outer periphery of the moisture-absorbing rotary wheel assembly D11 is the contact portion between the rotary wheel driving mechanism D13 and the moisture-absorbing rotary wheel assembly D11. In this case, it is advantageous to arrange more peripheral roller mechanisms D122 on the side distal from the extruded portion.

[0085] In some embodiments, the peripheral roller support D122 is fixed on the rotary wheel housing D12 by means of the fixing mechanism. The fixing mechanism is constructed to be capable of adjusting a radial spacing between the peripheral roller support D122 and the moisture-absorbing rotary wheel assembly D11 in the initial mounting position. Therefore, the peripheral roller mechanism D122 can be suitable for moisture-absorbing rotary wheel assemblies D11 of more sizes and can be suitable for more operation modes, for example, the above-described mode in which the peripheral roller mechanism in an initial state is in contact with the moisture-absorbing rotary wheel assembly D11 and the above-described mode in which the peripheral roller mechanism in the initial state is not in contact with the moisture-absorbing rotary wheel assembly D11.

[0086] FIG. 11 exemplarily shows the peripheral roller D1221. In some embodiments, a peripheral surface of the peripheral roller D1221 is constructed to be substantially smooth. In some other embodiments, the peripheral surface of the peripheral roller D1221 is constructed with a rugged surface structure. The peripheral roller D122 includes a roller body D1223 and a rotary shaft D1224. In some embodiments, the roller body D1223 is rotatable relative to the rotary shaft D1224. Herein, it is necessary to only connect the rotary shaft D1224 and the peripheral

roller support D1222 together in such a manner that they cannot rotate relatively, for example, they clamp together. In some other embodiments, the roller body D1223 cannot rotate relative to the rotary shaft D1224. In this case, it is necessary to connect the rotary shaft D1224 and the peripheral roller support D1222 together in such a manner that they cannot rotate relatively. The peripheral roller D1221 includes an inner ring D1225, an outer rim D1226, and spokes D1227 connecting the inner ring D1225 to the outer rim D1226. There are at least two spokes D1227 that are flexibly deformable. Optionally, a connecting line formed by joints between the spoke D1227 and the inner ring D1225 and between the spoke D1227 and the outer rim D1226 does not penetrate through the axis of rotation of the roller D1221. The inner ring D1225 may be understood as the rotary shaft D1224 or a tube sleeving the rotary shaft D1224. Certainly, the spoke D1227 may also be replaced with a flexible material, for example, foam, a silica gel ring, or the like. The flexible material sleeves the inner ring D1225. Then, the outer rim D1226 sleeves the flexible material. The outer rim D1226 may be hard, or may be flexible.

[0087] The foregoing circumferential driving form has at least the following advantages: the rotary wheel driving mechanism D13 arranged at the outer periphery of the moisture-absorbing rotary wheel assembly D11 can very flexibly utilize circumferential space of the moisture-absorbing rotary wheel assembly D12, so as to reduce an axial size of the moisture-absorbing and moisture-removing component D1. Therefore, the moisture-absorbing and moisture-removing component is entirely flatter. This can make a contribution to reducing an entire height or thickness of a tableware treating apparatus. Moreover, in the solutions of these embodiments, inside the rotary wheel housing D12, a transmission structure that obstructs flowing of an airflow is no longer provided in a central region of a wheel disk D111, which is also beneficial for guiding the airflow to flow through the wheel disk D111 more uniformly,

[0088] The deviation of the moisture-absorbing rotary wheel assembly D11 during rotation in the direction perpendicular to the axis of rotation of the moisture-absorbing rotary wheel assembly D11 can also be limited. Therefore, operation smoothness of the moisture-absorbing rotary wheel assembly D11 is improved; and a risk of collision between the moisture-absorbing rotary wheel assembly D11 and the rotary wheel housing D12 is reduced.

[0089] As shown in FIG. 8, the outer peripheral housing part D112 includes an outer peripheral upper clamping housing D112U and an outer peripheral lower clamping housing D112L that are constructed circularly. The outer peripheral upper clamping housing D112U has a similarly L-shaped longitudinal section, and includes an end segment extending in the radial direction and a circumferential segment extending in the axial direction.

[0090] Similarly, the outer peripheral lower clamping housing D112L also has a similarly L-shaped longitudinal section, and includes an end segment extending in the radial direction and a circumferential segment extending in the axial direction. The outer peripheral upper clamping housing D112U and the outer peripheral lower clamping housing D112L are mutually clamped by using a buckle and a clamping slot constructed thereon, so that a groove having only one open side and used for accommodating a peripheral region of the wheel disk D111 is formed in inner side of the outer peripheral housing part. In a well clamped state, the outer peripheral upper clamping housing D112U and the outer peripheral lower clamping housing D112L surround an entire outer peripheral surface of the wheel disk D111 and respectively clamp an upper end surface and a lower end surface of the peripheral region of the wheel disk D111, so that the outer peripheral housing part D112 and the wheel disk D111 are connected together in such a manner that they cannot rotate relatively. Herein, the upper end surface and the lower end surface of the wheel disk D111 are surfaces of the wheel disk D111 that extend in the radial direction. Therefore, it is very simple to connect the outer peripheral housing part D112 and the wheel disk D111 together in such a manner that they cannot rotate relatively.

[0091] In some alternative embodiments, the outer peripheral housing part D112 may also include two circular housing parts and one circumferential circular housing part, wherein each of the two circular housing parts has a similarly L-shaped longitudinal section, and is fixedly connected to the circumferential circular housing part. Another housing construction form in which a groove having only one open side may be formed in an inner side may also be conceivable.

[0092] In some other alternative embodiments, the end segments of the outer peripheral upper clamping housing D112U and the outer peripheral lower clamping housing D112L may also be circumferentially discontinuous, provided that they can clamp the wheel disk D111. In addition, fixation between housing parts, for example, fixation between the outer peripheral upper clamping housing D112U and the outer peripheral lower clamping housing D112L in this embodiment, can alternatively be implemented by means of a threaded fastener, welding, gluing, or the like. Arrangement of the outer peripheral housing part D112 can also avoid deformation of the wheel disk D111 caused by a centrifugal force in the rotation process of the wheel disk D111, particularly deformation of the wheel disk D111 after moisture absorption in the peripheral region, and can avoid direct collision of the wheel disk D111 with the rotary wheel housing D12 caused by reasons such as vibration, thereby avoiding damage. In addition, the outer peripheral housing part D112 per se can also reduce a radial spacing between the moisture-absorbing rotary wheel assembly D11 and the rotary wheel housing D12, thereby reducing an amount of airflow that does not flow through the moisture-absorbing rotary wheel assembly. Therefore, the moisture-absorbing efficiency is improved.

[0093] In addition, the outer peripheral lower clamping

housing D112L is constructed to be capable of being in rolling contact with the bottom roller mechanism D123. Particularly, they have been in rolling contact with each other in an initially assembled state. Therefore, a supporting force can be provided for the rotating moisture-absorbing rotary wheel assembly D11 all the time by the bottom roller mechanism D123, thereby substantially eliminating loss caused by sliding friction between the moisture-absorbing rotary wheel assembly D11 and the bottom of the rotary wheel housing D12. As viewed in the axial direction, the end segment of the outer peripheral lower clamping housing D112L is constructed to at least partially cover a mounting position of the bottom roller mechanism D123 on the lower rotary wheel housing D12L, so that the end segment of the outer peripheral lower clamping housing D112L can be in rolling contact with the bottom roller mechanism D123.

[0094] The central housing part D113 includes a central upper clamp D113U and a central lower clamp D113L that are constructed circularly. The central upper clamp D113U has a similarly L-shaped longitudinal section, and includes an end segment extending in the radial direction and a circumferential segment extending in the axial direction. Similarly, the central lower clamp D113L also has a similarly L-shaped longitudinal section, and includes an end segment extending in the radial direction and a circumferential segment extending in the axial direction. Both the central upper clamp D113U and the central lower clamp D113L penetrate through a center hole of the wheel disk D111 and are mutually clamped by using a buckle and a clamping slot constructed thereon, so that a groove having only one open side and used for accommodating a central region of the wheel disk D111 is formed in an outer side of the central housing part. The following is also conceivable: only the central upper clamp D113U or only the central lower clamp D113L penetrates through the center hole of the wheel disk D111. In a well clamped state, the central upper clamp D113U and the central lower clamp D113L clamp an upper end surface and a lower end surface of the central region of the wheel disk D111, respectively, so that the central housing part D113 and the wheel disk D111 are connected together in such a manner that they cannot rotate relatively. Therefore, it is very simple to connect the central housing part D113 and the wheel disk D111 together in such a manner that they cannot rotate relatively.

[0095] In some alternative embodiments, the central housing part D113 may also include two circular housing parts and one circumferential circular housing part, wherein each of the two circular housing parts D113 has a similarly L-shaped longitudinal section, and is fixedly connected to the circumferential circular housing part. Another housing construction form in which a groove having only one open side is formed in an outer side may also be conceivable. In some other alternative embodiments, the end segments of the central upper clamp D113U and the central lower clamp D113L may also be circumferentially discontinuous, provided that they can clamp the wheel disk D111. In addition, fixation between housing parts, for example, fixation between the central upper clamp D113U and the central lower clamp D113L in this embodiment, can alternatively be implemented by means of a threaded fastener, welding, gluing, or the like. Arrangement of the central housing part D113 can avoid damage on the relatively frail wheel disk D111 caused by collision with a part on the axis of rotation, for example, a shaft, and can also enhance a fixedly holding function on the wheel disk D111, thereby avoiding unwanted deformation.

[0096] The power input part D114 is provided on an outer peripheral surface of the outer peripheral upper clamping housing D112U. The power input part D114 may be integrally formed with the outer peripheral upper clamping housing D112U, and may be manufactured separately and then fixed, for example, welded, onto the outer peripheral surface of the outer peripheral upper clamping housing D112U. The power input part D114 is constructed as straight teeth that are uniformly distributed in a circumferential direction. Correspondingly, the rotary wheel driving mechanism D13 has an output gear that can be mutually meshed with the power input part D114, as shown in FIG. 8. Certainly, in an alternative embodiment, the power input part D114 may also be provided on an outer peripheral surface of the outer peripheral lower clamping housing D112L. Herein, the following is also conceivable. The power input part D114 and the rotary wheel driving mechanism D13 are constructed to be in another gear meshed transmission form (for example, a worm and gear transmission form, a bevel gear transmission form, or the like), or a belt transmission form (for example, a friction belt transmission form, a meshing belt transmission form, or the like), or a chain transmission form. Correspondingly, the power input part D114 may also be constructed as a helical gear or spiral gear used in a gear transmission form, a smooth surface used in the friction belt transmission form, various shapes of grooves used in the meshing belt transmission form, sprocket teeth used in chain transmission, or the like. Providing the power input part D114 on the outer peripheral surface of the outer peripheral housing part D112 is beneficial for reducing the thickness of the moisture-absorbing and moisture-removing component D1 along the axis of rotation, thereby making a contribution to reducing the entire height or thickness of the tableware treating apparatus. In some other alternative embodiments, the power input part D114 is provided on an inner peripheral surface of the central housing part D113; and correspondingly, the rotary wheel driving mechanism D13 is arranged in the center hole of the wheel disk D111.

[0097] The auxiliary rotary ring D115 is also provided on the outer peripheral further surface of the outer peripheral upper clamping housing D112U. The auxiliary rotary ring D115 and the power input part D114 are staggered along the axis of rotation. The auxiliary rotary ring D115 may be integrally formed with the outer per-

ipheral upper clamping housing D112U, and may be manufactured separately and then fixed, for example, welded, onto the outer peripheral surface of the outer peripheral upper clamping housing D112. The auxiliary rotary ring D115 is matched with the position of the peripheral roller mechanism D122, particularly, the peripheral roller D1221 in some embodiments, so as to be in rolling fit with the peripheral roller D1221 in the peripheral roller mechanism D122. Certainly, in some other embodiments, the auxiliary rotary ring D115 may be arranged on the outer peripheral lower clamping housing D112L.

[0098] The auxiliary rotary ring D115 is constructed as a circular protrusion. A protruding degree of the protrusion can ensure that the protrusion is in rolling contact with the peripheral roller D1221, even though the peripheral roller D1221 is not a structure that protrudes from the inner periphery of the rotary wheel housing D12 most. In some other embodiments, the auxiliary rotary ring D115 may also be formed by a base surface of the outer peripheral housing part D112 per se. A peripheral surface of the auxiliary rotary ring D115 can be constructed smoothly or constructed with a rugged surface structure.

[0099] In some embodiments, the power input part D114, the auxiliary rotary ring D115, and the rotary wheel seal D116 are completely staggered along the axis of rotation, and are particularly next to each other.

[0100] As shown in FIG. 6, in some embodiments, the auxiliary rotary ring D115 in the initially assembled state keeps in contact with the peripheral roller in the peripheral roller mechanism D122 under the premise that there is no obvious extrusion. When the moisture-absorbing rotary wheel assembly D11 starts to rotate, the auxiliary rotary ring D115 is in rolling contact with the peripheral roller in the peripheral roller mechanism D122, so that sway of the moisture-absorbing rotary wheel assembly D11 in the radial direction is suppressed. Therefore, smooth operation of the moisture-absorbing rotary wheel assembly D11 can be guaranteed with almost no increase in the rotational resistance of the moisture-absorbing rotary wheel assembly D11.

[0101] Certainly, the following may also be considered. In the initially assembled state, a tiny gap is reserved between the auxiliary rotary ring D115 and the peripheral roller in the peripheral roller mechanism D122, so that the rotational resistance is further reduced, and the auxiliary rotary ring D115 functions only when the moisture-absorbing rotary wheel assembly D11 sways in the radial direction. Herein, it is particularly advantageous that the peripheral roller mechanism D122 is set to be deformable. Particularly, the peripheral roller in the peripheral roller mechanism D122 is set to be flexible, so that a damage risk of the auxiliary rotary ring D115 when being collided with the peripheral roller mechanism D122 can be reduced.

[0102] As shown in FIG. 8, one rotary wheel seal D116 is provided on an outer peripheral surface at a position where the outer peripheral upper clamping housing D112U and the outer peripheral lower clamping housing D112L are fixed to each other. The power input part D114, the auxiliary rotary ring D115, and the rotary wheel seal D116 are completely staggered on the outer peripheral surface of the outer peripheral housing part D112 along the axis of rotation, and are arranged from top to bottom sequentially. It is conceivable that the power input part D114, the auxiliary rotary ring D115, and the rotary wheel seal D116 may also be staggered along the axis of rotation in another order. Certainly, the following is also conceivable: they are arranged on the outer peripheral surface of the outer peripheral lower clamping housing D112L, or distributed on the outer peripheral surfaces of the outer peripheral upper clamping housing D112U and the outer peripheral lower clamping housing D112L. Herein, the power input part D114 and the auxiliary rotary ring D115 are constructed integrally. Certainly, they may also be constructed separately.

[0103] In some embodiments, the rotary wheel seal D116 forms a maximum diameter of the moisture-absorbing rotary wheel assembly D11; and the peripheral roller mechanism D122 protrudes from an entire inner peripheral wall at the inner periphery of the rotary wheel housing D12 towards the axis of rotation, so as to be in rolling contact with the auxiliary rotary ring D115 having a smaller diameter. In some other embodiments, the auxiliary rotary ring D115 forms a maximum diameter of the moisture-absorbing rotary wheel assembly D11. In this case, compared with the peripheral roller mechanism D122, the rotary wheel housing seal D124 fitting the rotary wheel seal and serving as a portion of the inner peripheral surface of the rotary wheel housing D12 is closer to the axis of rotation. Herein, the peripheral roller D1221 only needs to protrude from an inner peripheral wall at its axial height. Herein, it should be noted that if a gap exists between the peripheral roller mechanism D122 and the auxiliary rotary ring D115 in the initial mounting position, a size of the gap needs to be small enough to ensure that when the moisture-absorbing rotary wheel assembly D11 deviates in the radial direction, the rotary wheel seal D116 can still rotate relative to the rotary wheel housing seal D124. In other words, the auxiliary rotary ring D115 of the moisture-absorbing rotary wheel assembly D11 needs to be in rolling contact with the peripheral roller mechanism D122 before deformability of the rotary wheel seal D116 is exhausted completely, so as to prevent the rotary wheel seal D116 from getting stuck relative to the rotary wheel housing seal D124.

[0104] In some embodiments, a radial inner side of the rotary wheel seal D116 covers the position where the outer peripheral upper clamping housing D112U and the outer peripheral lower clamping housing D112L are fixed to each other. In this way, the position where the outer peripheral upper clamping housing D112U and the outer peripheral lower clamping housing D112L are fixed to each other can be sealed by the radial inner side of the rotary wheel seal D116, thereby preventing an airflow entered the moisture-absorbing rotary wheel assembly D11 from flowing out through a mounting gap of the outer

peripheral housing part. In addition, the rotary wheel seal D116 is further constructed to extend outwards all the way in a direction perpendicular to the axis of rotation, namely, the radial direction, till it can get in contact in a relatively rotatable manner with the rotary wheel housing seal D124 on the inner peripheral surface of the rotary wheel housing D12. "Get in contact in a relatively rotatable manner" means that contact between the rotary wheel seal D116 and the rotary wheel housing seal D124 does not obviously increase a rotational resistance of the moisture-absorbing rotary wheel assembly D11 having the rotary wheel seal D116. The rotary wheel housing seal D124 in the embodiment shown in this figure is formed from an inner peripheral surface of the rotary wheel housing D12 per se.

[0105] In the embodiment shown in this figure, the outer peripheral surface of the rotary wheel seal D116 forms a maximum diameter of the entire moisture-absorbing rotary wheel assembly D11. In this case, a radial gap between the moisture-absorbing rotary wheel assembly D11 and the rotary wheel housing D12 can be sealed by using a radial outer side of the rotary wheel seal D116, so that an airflow having not undergone moisture absorption is prevented from flowing through the gap and flowing into a cleaning compartment. In other words, the rotary wheel seal D116 in this embodiment has double functions. In one aspect, an airflow having entered the moisture-absorbing rotary wheel assembly D11 is prevented from flowing out through the mounting gap of the outer peripheral housing part. In another aspect, an airflow having not undergone moisture absorption can be prevented from bypassing the moisture-absorbing rotary wheel assembly D11 and from flowing past beyond its periphery. Therefore, the moisture-absorbing efficiency can be improved obviously.

[0106] In some embodiments, the inner peripheral surface of the rotary wheel housing D12 may also be constructed as a protrusion that protrudes inwards slightly in the radial direction, so as to serve as the rotary wheel housing seal D124 in contact sealing with the rotary wheel seal D116. Therefore, a radial size of the rotary wheel seal D116 can be reduced. In this way, the rotatable contact sealing explained above can be achieved even when the outer peripheral surface of the rotary wheel seal D116 is not at the maximum diameter of the entire moisture-absorbing rotary wheel assembly D11. In some other embodiments, an independent sealing ring is connected (for example, glued) to a position where the inner peripheral surface of the rotary wheel housing D12 fits the rotary wheel seal D116, so as to serve as the rotary wheel housing seal D124 in contact sealing with the rotary wheel seal D116. The sealing ring may be made of the same material as the rotary wheel seal D116, so that the sealing ring is also beneficial for reducing the radial size of the rotary wheel seal D116, and can flexibly fit the radial size of the rotary wheel seal D116. In this case, a larger design space is reserved for arranging the rotary wheel seal D116 on the outer peripheral surface of the outer peripheral housing part D112.

[0107] Such independent sealing ring can protect the inner peripheral surface of the rotary wheel housing D12 from being abraded, and is convenient to replace. In addition, the following can also be conceived. A plurality of rotary wheel seals D116 is provided, and arranged at different positions on the outer peripheral surface of the outer peripheral housing part D112 in a staggered manner, so that the double functions described above are implemented at least, or even implemented redundantly. For example, one rotary wheel seal D116 is arranged on an outer peripheral surface at the position where the outer peripheral upper clamping housing D112U and the outer peripheral lower clamping housing D112L are fixed to each other; and another rotary wheel seal D116 is arranged on an outer peripheral surface at a position of the outer peripheral upper clamping housing D112U or the outer peripheral lower clamping housing D112L different from the fixing position; or redundantly, another two rotary wheel seals D116 are respectively provided on outer peripheral surfaces at positions of the outer peripheral upper clamping housing D112U and the outer peripheral lower clamping housing D112L different from the fixing position.

[0108] As shown in FIG. 8, the power input part D114, the auxiliary rotary ring D115, and the rotary wheel seal D116 are completely staggered on the outer peripheral surface of the outer peripheral housing part D112 along the axis of rotation, and are arranged from top to bottom sequentially. It is conceivable that the power input part D114, the auxiliary rotary ring D115, and the rotary wheel seal D116 may also be staggered along the axis of rotation in another order.

[0109] The moisture-absorbing rotary wheel assembly D11 further includes a deformable outer peripheral vibration absorber D117 and a central vibration absorber D118. The outer peripheral vibration absorber D117 is arranged between an outer peripheral surface of the wheel disk D111 and an inner peripheral surface of the outer peripheral housing part D112, so as to form buffering therebetween by using its own deformability. In some embodiments, the outer peripheral vibration absorber D117 is glued to the outer peripheral surface of the wheel disk D111. The central vibration absorber D118 is arranged between the end segment of the central housing part D113 and the central region of the wheel disk D111, so as to form buffering therebetween by using its own deformability.

[0110] The central vibration absorber D118 is arranged between the end segment of the central lower clamp D113L and an end surface of the central region of the wheel disk D111. In an alternative embodiment, the central vibration absorber D118 may also be arranged between the end segment of the central upper clamp D113U and an end surface of the central region of the wheel disk D111. Alternatively, each of the two positions may be provided with one central vibration absorber D118.

[0111] In some embodiments, the central vibration ab-

sorber D118 is glued to the end surface of the central region of the wheel disk D111. The outer peripheral vibration absorber D117 and the central vibration absorber D118 are made of, for example, foam. Certainly, the outer peripheral vibration absorber D117 and the central vibration absorber D118 may also be made of another elastically deformable material. Vibration may be generated in an operation process of the tableware treating apparatus H. Such vibration may sometimes cause the entire machine body to vibrate, which in turn causes the moisture-absorbing rotary wheel assembly D11 to vibrate. In this case, the outer peripheral vibration absorber D117 and the central vibration absorber D118 can buffer the vibration from the axial direction and the radial direction, thereby protecting the wheel disk D111 that is usually fragile from being damaged.

[0112] In addition, in some other embodiments, the moisture-absorbing rotary wheel assembly D11 may be fixed onto the rotary wheel housing D12, so as not to rotate relative to the rotary wheel housing D12 anymore. In this case, the rotary wheel housing D12 is no longer divided into different regions. The moisture-absorbing rotary wheel assembly D11 is communicated with the moisture-absorbing channel D2 and the moisture-removing channel D3 alternately. Specifically, when the drying module D operates, the moisture-absorbing rotary wheel assembly D11 is first communicated with the moisture-absorbing channel D2, so as to absorb moisture in and dry the cleaning compartment H1. Then, when it is determined, for example, based on information of a sensor connected onto the moisture-absorbing rotary wheel assembly D11, that the wheel disk D111 in the moisture-absorbing rotary wheel assembly D11 has been saturated, the moisture-absorbing rotary wheel assembly D11 is communicated with the moisture-removing channel D3 by using a switching structure, so that the wheel disk D111 of the moisture-absorbing rotary wheel assembly D11 can be regenerated. Because all of the rotary wheel driving mechanism D13, a dynamic seal (for example, the rotary wheel seal D116 used for dynamic sealing and described above, and a seal of the rotary wheel housing D12), an auxiliary rotary member (for example, the peripheral roller mechanism D122, the bottom roller mechanism D123, and the auxiliary rotary ring D115 that are described above), and the like that are provided for rotation of the wheel disk D111 can be omitted, the purpose of energy saving is achieved.

[0113] In some other embodiments, the moisture-absorbing rotary wheel assembly D11 is fixed onto the rotary wheel housing D12, but the rotary wheel housing D12 is still divided into at least two regions, namely, the moisture-absorbing region D1211 and the moisture-removing region D1212. The two regions are alternatively communicated with the moisture-absorbing channel D2 and the moisture-removing channel D3. In some technical solutions, a pipeline rack capable of swinging back and forth is provided at an outer periphery of the rotary wheel housing D12; and flexible pipelines are connected between the pipeline rack and the moisture-absorbing channel D2 and between the pipeline rack and the moisture-removing channel D3. When the pipeline rack swings back and forth, pipeline openings in the pipeline rack are respectively communicated with inlets and outlets of at least two regions.

[0114] FIG. 12 shows the moisture-removing and heating assembly D34 in the drying module D according to the present disclosure in a perspective view. As viewed in a flow path of a moisture-removing airflow, the moisture-removing and heating assembly D34 can be arranged upstream and/or downstream the moisture-absorbing and moisture-removing component D1. In some technical solutions, the moisture-removing and heating assembly D34 and the moisture-absorbing and moisture-removing component D1 are arranged separately. In another alternative technical solution, the moisture-removing and heating assembly D34 and the moisture-absorbing and moisture-removing component D1 are integrally formed, or fixed together by means of a connecting means, for example, a threaded fastener. A housing of the moisture-removing and heating assembly D34 and the rotary wheel housing D12 of the moisture-absorbing and moisture-removing component D1 are constructed to be substantially shape-complementary and are connected together. The moisture-removing and heating assembly D34 can determine a heating power based on a detected value of the temperature sensor. The moisture-removing and heating assembly D34 may be integrally formed with or fixed with the moisture-absorbing and moisture-removing component D1.

[0115] In some embodiments, the moisture-removing and heating assembly D34 may be arranged on an air inlet side of the moisture-removing fluid driving unit D33, or may be arranged on an air outlet side of the moisture-removing fluid driving unit D33.

[0116] The moisture-removing and heating assembly D34 includes a moisture-removing and heating assembly housing D341, a mesh plate D342, a moisture-removing and heating member D343, and a thermostat mounting portion D344. The moisture-removing and heating assembly housing D341 is constructed as a sector having a sectoral cross section, and thus has an upper end face wall D3411, a lower end face wall D3412, a circumferential side wall D3413, and a radial side wall D3414 of the sector, wherein the circumferential side wall D3413 connects the upper end face wall D3411 and the lower end face wall D341 together and extends in a circumferential direction; and the radial side wall D3414 extends in a radial direction. The sector is constructed to be shape-complementary with the upper rotary wheel housing D12U of the rotary wheel housing D12.

[0117] Specifically, a sectoral notch is formed in the upper rotary wheel housing D12U. The shape of the notch is essentially the same as that of the sector of the moisture-removing and heating assembly housing D341. A moisture-removing airflow outlet is formed as large as possible in the lower end face wall D3412, so that

an airflow can flow into the moisture-absorbing rotary wheel assembly D11 through the moisture-removing airflow outlet. The moisture-removing airflow outlet occupies at least 80% or even 90% of an area of the lower end face wall D3412. A moisture-removing airflow inlet is formed as large as possible in the circumferential side wall D3413 of the moisture-removing and heating assembly housing D341. The moisture-removing airflow inlet occupies at least 80%, preferably 90%, of an area of the circumferential side wall D3413. Therefore, a moisture-removing airflow can enter the moisture-removing and heating assembly D34 through a shortest path. The following is also conceivable: when the moisture-removing airflow inlet is formed in the radial side wall, the moisture-removing airflow can pass through the moisture-absorbing rotary wheel assembly in the radial direction more uniformly. Particularly, when a plurality of moisture-removing airflow inlets are distributed in two radial side walls, or distributed in two radial side walls and one circumferential side wall, moisture-removing airflows can pass through the moisture-absorbing rotary wheel assembly D11 more uniformly within the range of the cross section of the sector, thereby improving the regeneration efficiency of the moisture-absorbing rotary wheel assembly D11.

[0118] The housing of the moisture-removing and heating assembly D34 can be integrally manufactured with the rotary wheel housing D12. In some other embodiments, the housing of the moisture-removing and heating assembly D34 is separately manufactured from the rotary wheel housing D12 and fixed onto the rotary wheel housing D12. A flexible connecting seal is arranged between the housing of the moisture-removing and heating assembly D34 separately manufactured from the rotary wheel housing D12, and the rotary wheel housing D12, particularly the upper rotary wheel housing D12U, so that a moisture-removing airflow is prevented from escaping through a gap between the housing of the moisture-removing and heating assembly D34 and the rotary wheel housing D12.

[0119] The moisture-removing and heating member D343 in the moisture-removing and heating assembly D34 is constructed as a heating tube and a PTC heating unit that is spread in a plane. The heating tube is constructed to be S-shaped or corrugated.

[0120] FIG. 13 shows a mesh plate D342 in the moisture-removing and heating assembly D34 of the drying module D according to the present disclosure from the front side in a perspective view. The mesh plate D342 has a shape matched with the moisture-removing airflow outlet and can be fixed in the moisture-removing airflow outlet. A plurality of through holes is formed in the mesh plate D342. These through holes are distributed on the mesh plate D342 as uniformly as possible. In this case, these through holes are distributed in the mesh plate D342 in an S-shaped manner. It is particularly advantageous that opening apertures of these through holes decrease gradually in a flow direction of the moisture-removing airflow. In some embodiments, the closer the through holes are to the moisture-removing airflow inlet, the larger their opening apertures are; and the further the through holes are from the moisture-removing airflow inlet, the smaller their opening apertures are. In other words, the opening apertures of these through holes decrease inwards gradually in the radial direction. In this way, uniformity of the moisture-removing airflow in flowing through the moisture-absorbing rotary wheel assembly can be further improved.

[0121] FIG. 14 shows the moisture-removing and heating assembly D34 of the drying module D according to the present disclosure from the back side in a perspective view. The moisture-removing and heating member D343 is arranged on a downstream side of the mesh plate D342, namely, the back side of the mesh plate D342, in the flow direction of the moisture-removing airflow. Herein, the moisture-removing and heating member D343 is constructed as a heating tube that is spread in a plane in an S-shaped manner. The following may also be considered. The moisture-removing and heating member D343 is constructed from a PTC heating unit. The PTC heating unit includes, for example, a ceramic heat emitting element and an aluminum pipe. The moisture-removing and heating member D343 is constructed corresponding to the through hole in the mesh plate D342 in shape, and is staggered from the through hole. Specifically, the moisture-removing and heating member D343 is staggered from the through hole in a flowing-in direction of the moisture-removing airflow, so that after passing through the through hole, the moisture-removing airflow directly faces the moisture-removing and heating member D343. Therefore, the heating efficiency is improved. An area enclosed by an envelope line of the moisture-removing and heating member D343 occupies at least 70% of a cross section of the moisture-removing airflow outlet, and an area of a cross section of the moisture-removing and heating member D343 per se only occupies at most 40% of the cross section of the moisture-removing airflow outlet. Therefore, heat can be provided in a large enough range without obstructing flowing of an airflow.

[0122] As shown in FIG. 14, the moisture-removing and heating assembly D34 further includes a thermostat mounting portion D344. The thermostat mounting portion D344 is also arranged on the back side of the mesh plate and is arranged on a side of a region where the through holes are formed. The thermostat mounting portion D344 is constructed to be used for detecting a temperature in an inner chamber of the moisture-removing and heating assembly D34. The controller of the tableware treating apparatus H controls the moisture-removing and heating member D34 based on the temperature. Because it is easy for a heated moisture-removing airflow to form an eddy flow or a turbulent flow in the inner chamber of the moisture-removing and heating assembly D34, inner chamber temperatures obtained in a space of the inner chamber are quite unstable, in other words, fluctuating.

To obtain inner chamber temperatures as stable as possible, the thermostat mounting portion D344 includes a heat conducting sheet D3441 and a thermostat D3442. The heat conducting sheet D3441 completely covers the thermostat D3442. Compared with a manner of directly detecting an inner chamber temperature in the air in the inner chamber, a manner of conducting a temperature to the thermostat D3442 by using the heat conducting sheet D3441 can detect a stabler and representative inner chamber temperature. This is particularly beneficial for controlling a temperature of the moisture-removing and heating member.

[0123] FIG. 15 shows an upper rotary wheel housing D12U, not provided with a moisture-removing and heating assembly D34, in the drying module D according to the present disclosure in a perspective view. The moisture-removing and heating assembly housing D341 is separately manufactured from the rotary wheel housing D12 and fixed on the upper rotary wheel housing D12U. A flexible connecting seal D3415 is arranged between the moisture-removing and heating assembly housing D341 and the upper rotary wheel housing D12U, so that a moisture-removing airflow is prevented from escaping through a gap between the moisture-removing and heating assembly housing D341 and the upper rotary wheel housing D12U. A connecting heat insulator D3416 is further arranged between the moisture-removing and heating assembly housing D341 and the upper rotary wheel housing D12U, so as to reduce outward diffusion of heat in the moisture-removing and heating assembly housing D341, particularly diffusion to the moisture-absorbing region D1212 of the rotary wheel housing D12. The connecting heat insulator D3416 is partially coated with the connecting seal D3415.

[0124] The following is also conceivable: the connecting heat insulator is completely coated with the connecting seal, so that both the moisture-removing and heating assembly housing D341 and the upper rotary wheel housing D12U are merely in contact with the connecting seal. Therefore, the sealing effect is improved. Each of the connecting seal D3415 and the connecting heat insulator D3416 has an inner edge essentially matched with a shape of the moisture-removing airflow outlet in the moisture-removing and heating assembly housing D341. Preferably, the connecting seal is constructed from foam, silica gel, or soft rubber. Preferably, the heat insulator is made of a thermal insulation material. However, the following is also conceivable. The connecting heat insulator is made of a metal or an alloy that has lower costs, or is made of an inorganic non-metallic material or a composite material. Herein, although the metal or alloy has better thermal conductivity, a specific heat insulation effect can be formed after the heat insulator is coated with the connecting seal. In some other embodiments, outward transference of heat can be avoided by using excellent interface reflectivity of a surface of the material, thereby forming an excellent heat insulation effect.

[0125] In some other embodiments that are not shown, the moisture-removing and heating assembly D34 may be a hot end of a semiconductor chilling plate, a hot end of a heat pump, a hot end of a vortex tube, or the like. Correspondingly, a cold end of the semiconductor chilling plate, a cold end of the heat pump, or a cold end of the vortex tube may be used as the moisture-removing and condensing assembly D35, thereby improving energy utilization.

[0126] FIG. 16 shows a moisture-removing condensing tube integrated body D351 of a moisture-removing and condensing assembly D35 of the drying module D according to the present disclosure in a perspective view. FIG. 17 shows a cut portion of a moisture-removing and condensing assembly housing D352 of the moisture-removing and condensing assembly D35 of the drying module D according to the present disclosure in a perspective view. The moisture-removing and condensing assembly D35 includes the moisture-removing condensing tube integrated body D351, the moisture-removing and condensing assembly housing D352, and a moisture-removing and condensing water outlet tube. The moisture-removing and condensing water outlet tube is communicated with the moisture-removing and condensing assembly housing D352. The moisture-removing condensing tube integrated body D351 is fixed in the middle of the moisture-removing and condensing assembly housing D352, and is constructed to perform condensing and moisture removing on a moisture-removing airflow flowing through the moisture-removing condensing tube integrated body D351. Condensed water is discharged out through the moisture-removing and condensing water outlet tube.

[0127] In some embodiments, a cold trap may be outside air, tap water, or secondary condensers connected by using a heat tube. The moisture-removing and condensing assembly D35 may be a naturally heat exchanging condenser, or may be a compulsorily heat exchanging condenser (for example, a heat pump, a semiconductor heat sink, or the like).

[0128] As shown in FIG. 16, the moisture-removing and condensing assembly D35 shares one lower module housing with the moisture-absorbing rotary wheel assembly D11, a moisture-absorbing channel fan D23, and the moisture-removing fluid driving unit D33. The moisture-removing condensing tube integrated body D351 fits the lower module housing by means of a retaining rib and a limiting member. An upper housing of the moisture-removing and condensing assembly housing D352 presses downwards a seal strip around the moisture-removing condensing tube integrated body D351, so as to achieve a sealing effect.

[0129] As shown in FIG. 17, in order to prevent a moisture-removing airflow, after entering the moisture-removing and condensing assembly housing D352, from bypassing the moisture-removing condensing tube integrated body D351 and directly flowing into an outlet of the moisture-removing and condensing assembly housing through the gap between the moisture-removing conden-

sing tube integrated body D351 and the moisture-removing and condensing assembly housing D352, a baffle D353 is arranged between the moisture-removing condensing tube integrated body D351 and the moisture-removing and condensing assembly housing D352.

[0130] Referring to FIG. 18, in some embodiments, a working process of the tableware treating apparatus H is as follows.

[0131] In Step S11, a washing instruction is received, and a pre-rinsing mode is executed in response to an enable instruction.

[0132] After a user loads tableware and sets an appropriate washing mode, the tableware treating apparatus H may first execute the pre-rinsing mode to pre-rinse the tableware. Herein, data about rinsed water may be collected as an evaluation basis, so as to facilitate subsequent water quality detection. The data may be compared with the evaluation basis, thereby obtaining data about variation of degrees of fouling.

[0133] The washing instruction and the enable instruction may be input by the user, or may be automatically triggered by the tableware treating apparatus H.

[0134] In Step S12, a corresponding washing mode is executed according to the washing instruction.

[0135] After pre-rinsing the tableware completely, the tableware treating apparatus H enters the washing mode corresponding to the washing instruction, and starts to wash the tableware according to the washing mode.

[0136] The washing mode may include "fast washing", "soft washing", and the like. The user may select different washing modes according to actual conditions.

[0137] Different washing modes have different water temperature requirements on washing water. Therefore, heating degrees of the washing water are different. For example, in the washing mode such as "fast washing", "soft washing", or the like, such program mainly implements cleaning of the tableware depending on a mechanical force of a water flow sprinkled by a water sprinkling mechanism when a temperature of the water is relatively low, so as to avoid damage on special tableware caused by thermal shock of a high-temperature water flow.

[0138] A triggering condition for exiting the washing mode may be a washing time, that is, when an accumulated washing time of the washing mode reaches a preset time, it may be determined that washing is finished, thereby entering a next-step program.

[0139] Certainly, besides this, a quantity of sprinkling times of the water sprinkling mechanism may also trigger exiting of the washing mode. After the quantity of sprinkling times reaches a preset value, it may also be determined that washing is finished, thereby entering a next-step program.

[0140] In Step S13, a rinsing mode is executed.

[0141] After the washing mode ends, entering the rinsing mode is triggered automatically. Rinsing is mainly used for removing a residual detergent, and verifying a degree of cleanliness of washed tableware. If a specified degree of cleanliness is not reached, rinsing is repeated. Otherwise, the apparatus enters a drying link.

[0142] In other words, whether tableware has been cleaned up needs to be determined in real time during execution of the rinsing mode. Rinsing is performed if the tableware has not been cleaned up. If the tableware has been cleaned up, the apparatus exits the rinsing mode, and enters the drying module.

[0143] In some embodiments, the user may also skip the pre-rinsing mode and/or the washing mode or the like, and select to directly execute the rinsing mode, so as to rinse the tableware.

[0144] In Step S14, whether a real-time temperature value in a cleaning compartment is greater than or equal to a drying temperature value is determined.

[0145] During washing of tableware, because some of the tableware cannot suffer high-temperature washing, before entering a drying program, it is necessary to assess the real-time temperature value in the cleaning compartment to determine whether a drying condition can be met, obtain a required drying temperature environment and avoid damage to the special tableware.

[0146] A temperature change in the cleaning compartment may be monitored in real time by using a sensor. Closed-loop adjustment of a temperature in the cleaning compartment H1 is performed by using a heating apparatus until a target temperature or temperature range is reached. Certainly, an open-loop temperature adjustment step may be added before drying according to different settings by reading a function of a user-set program.

[0147] In Step S15, if the real-time temperature value is smaller than a drying temperature value, the cleaning compartment is heated.

[0148] If the real-time temperature value is smaller than the drying temperature value, it indicates that the value of a current temperature in the cleaning compartment is relatively low and does not reach the drying condition, and thus, it is required to continue heating the cleaning compartment.

[0149] In Step S16, a drying mode is executed.

[0150] Open-loop control is performed on a drying process based on a specified time; or closed-loop control is performed on the drying process by detecting parameters such as a humidity by using a sensor H4. In the drying process, a temperature in the cleaning compartment H1 may be monitored continuously. When the temperature does not meet a specified requirement, adjustment needs to be performed. For example, the temperature is detected by using a temperature sensor; and the temperature is stabilized at a program specified value or within a specified range by controlling a heating mechanism (for example, a heating wire) to work. As described above, when a specified drying time expires, or a measurement apparatus such as a humidity sensor detects that a humidity in the cleaning compartment H1 decreases to a preset value, the drying program stops. In some embodiments, ending of a tableware washing process may also be prompted in an interaction manner such

as lamplight, voice, movement of a mechanism, or data sending.

[0151] In some embodiments, after the rinsing mode ends, the tableware treating apparatus may be controlled to execute a low-temperature drying mode. In the low-temperature drying mode, the temperature in the cleaning compartment H1 does not need to be adjusted; or the temperature in the cleaning compartment H1 is controlled to be lower than a specified target temperature value or within a temperature range. Then, a dry circulating airflow is formed in the cleaning compartment H1 by using the drying module described above, so as to dry the tableware. In this way, problems such as damage to the tableware caused by thermal shock on the tableware arising from excessively high drying temperatures can be avoided.

[0152] It should be understood that the foregoing embodiments are for illustrative and descriptive purposes only and are not intended to limit the present disclosure to the scope of the described embodiments. In other words, the present disclosure may also be implemented in various other combinations of the features described above, and thus is not limited to the embodiments described above.

[0153] In the description of the Description, the description of the terms "one embodiment", "some embodiments", "example", "specific example", "some examples", or the like means that the specific features, structures, materials or characteristics described with reference to the embodiment or example are included in at least one embodiment or example of the present disclosure. In the Description, schematic descriptions of such terms are not necessarily for a same embodiment or example. Moreover, the specific features, structures, materials, or characteristics described may be combined in an appropriate manner in any one or more embodiments or examples. In addition, different embodiments or examples described in the Description may be joined and combined by a person skilled in the art.

[0154] In addition, implementations of the embodiments may be combined with each other, provided that they can be implemented by those of ordinary skill in the art. When a combination of the embodiments incurs conflict or cannot be implemented, it should be considered that such a combination of the embodiments is inexistent and is not within the protection scope claimed by the present disclosure.

[0155] Although the embodiments of the present disclosure have been shown and described, those of ordinary skill in the art may understand that various changes, modifications, replacements, and variants may be made to these embodiments without departing from the principle and purpose of the present disclosure, and the scope of the present disclosure is limited by the claims and their equivalents.

Claims

1. A tableware treating apparatus, comprising a cleaning compartment and a drying module, wherein the drying module comprises:

   a moisture-absorbing channel, comprising a moisture-absorbing channel air inlet and a moisture-absorbing channel air outlet, wherein the cleaning compartment is communicated with the moisture-absorbing channel air inlet and the moisture-absorbing channel air outlet, and a moisture-absorbing fluid driving unit is arranged in the moisture-absorbing channel to form a moisture-absorbing airflow between the moisture-absorbing channel and the cleaning compartment;
   a moisture-removing channel, provided with a moisture-removing fluid driving unit to form a moisture-removing airflow inside the moisture-removing channel; and
   a moisture-absorbing and moisture-removing component, arranged in a path of the moisture-absorbing channel and the moisture-removing channel to enable both of the moisture-absorbing airflow and the moisture-removing airflow to flow through the moisture-absorbing and moisture-removing component, thereby enabling the moisture-absorbing and moisture-removing component to absorb moisture in the moisture-absorbing airflow, and discharge the absorbed moisture from the moisture-removing channel through the moisture-removing airflow.

2. The tableware treating apparatus according to claim 1, wherein the moisture-absorbing and moisture-removing component comprises a moisture-absorbing rotary wheel assembly, a rotary wheel housing and a rotary wheel driving mechanism for driving the moisture-absorbing rotary wheel assembly to rotate, and the moisture-absorbing rotary wheel assembly is rotatably supported in the rotary wheel housing along an axis of rotation;
   the rotary wheel housing is internally provided with a moisture-absorbing region and a moisture-removing region, the moisture-removing region is communicated with the moisture-removing channel, and the moisture-absorbing region is communicated with the moisture-absorbing channel; and the rotary wheel driving mechanism is capable of driving the moisture-absorbing rotary wheel assembly to rotate between the moisture-absorbing region and the moisture-removing region.

3. The tableware treating apparatus according to claim 2, wherein the moisture-absorbing rotary wheel assembly is driven by the rotary wheel driving mechanism at an outer periphery of the moisture-absorbing

rotary wheel assembly.

4. The tableware treating apparatus according to claim 2, wherein the rotary wheel driving mechanism is fixed inside the rotary wheel housing.

5. The tableware treating apparatus according to claim 2, wherein the rotary wheel housing comprises an upper rotary wheel housing and a lower rotary wheel housing, the moisture-absorbing rotary wheel assembly is fixed to the lower rotary wheel housing, and at least one of the upper rotary wheel housing and the lower rotary wheel housing is provided with a separator facing the moisture-absorbing rotary wheel assembly to divide an interior of the rotary wheel housing into the moisture-absorbing region and the moisture-removing region.

6. The tableware treating apparatus according to claim 5, wherein the separator is provided with a separating seal, and the separating seal is spaced apart from the moisture-absorbing rotary wheel assembly.

7. The tableware treating apparatus according to claim 5, wherein a spacing between the moisture-absorbing rotary wheel assembly and the separator is 0.2 mm to 5 mm.

8. The tableware treating apparatus according to claim 5, wherein the moisture-absorbing and moisture-removing component further comprises a separating extruding sheet, a recess for placing the separating extruding sheet is configured on a side of the separating seal facing a wheel disk, the separating extruding sheet is provided with a plurality of protrusions spaced from each other, and the protrusions are pressed into the recess for extruding the separating seal onto the separator.

9. The tableware treating apparatus according to claim 2, wherein an airflow guiding piece is arranged in the moisture-absorbing region, and the airflow guiding piece is arranged in a flow direction of the moisture-absorbing airflow and configured to divide an airflow entering the moisture-absorbing region into a plurality of streams so as to flow through different regions of the moisture-absorbing rotary wheel assembly.

10. The tableware treating apparatus according to claim 2, wherein the moisture-absorbing rotary wheel assembly comprises a wheel disk, an outer peripheral housing part and a power input part, the outer peripheral housing part is arranged around a periphery of the wheel disk, the power input part is connected to the outer peripheral housing part, and the power input part is in transmission connection with the rotary wheel driving mechanism.

11. The tableware treating apparatus according to claim 10, wherein the power input part is integrally molded with the outer peripheral housing part, or the power input part is fixed to the outer peripheral housing part.

12. The tableware treating apparatus according to claim 10, wherein an auxiliary rotary ring is arranged at an outer periphery of the outer peripheral housing part, a peripheral roller mechanism is arranged at an inner periphery of the rotary wheel housing, and the auxiliary rotary ring is in rolling contact with the peripheral roller mechanism.

13. The tableware treating apparatus according to claim 12, wherein the auxiliary rotary ring and the power input part are staggered in a direction of an axis of rotation of the wheel disk.

14. The tableware treating apparatus according to claim 12, wherein the peripheral roller mechanism and the moisture-absorbing rotary wheel assembly are arranged side by side in a radial direction of the moisture-absorbing rotary wheel assembly.

15. The tableware treating apparatus according to claim 12, wherein in an initial mounting position, the peripheral roller mechanism is in rolling fit with the moisture-absorbing rotary wheel assembly without extruding against each other.

16. The tableware treating apparatus according to claim 12, wherein in an initial mounting position, a gap exists between the peripheral roller mechanism and the moisture-absorbing rotary wheel assembly, and the moisture-absorbing rotary wheel assembly is in rolling contact with the peripheral roller mechanism when the moisture-absorbing rotary wheel assembly deviates in a direction perpendicular to the axis of rotation.

17. The tableware treating apparatus according to claim 12, wherein a plurality of peripheral roller mechanisms is provided, and the plurality of peripheral roller mechanisms are uniformly arranged at the inner periphery of the rotary wheel housing;
or
a number of peripheral roller mechanisms on a side close to a contact portion between the rotary wheel driving mechanism and the moisture-absorbing rotary wheel assembly is smaller than a number of peripheral roller mechanisms on a side away from the contact portion between the rotary wheel driving mechanism and the moisture-absorbing rotary wheel assembly.

18. The tableware treating apparatus according to any one of claims 12 to 17, wherein the peripheral roller mechanism comprises a peripheral roller and a per-

ipheral roller support, the peripheral roller is rotatably supported on the peripheral roller support, the peripheral roller support is arranged at an inner periphery of the rotary wheel housing, the peripheral roller is in rolling contact with the auxiliary rotary ring, and at least one of the peripheral roller and the peripheral roller support is an elastic part.

19. The tableware treating apparatus according to claim 18, wherein as viewed in a direction parallel to an axis of rotation of the wheel disk, the peripheral roller is arranged within a size range of the moisture-absorbing rotary wheel assembly in a direction of the axis of rotation; as viewed in a direction perpendicular to the axis of rotation, the peripheral roller is arranged between the moisture-absorbing rotary wheel assembly and the rotary wheel housing; and the peripheral roller is capable of being in rolling contact with an outer peripheral surface of the moisture-absorbing rotary wheel assembly in at least part of time during rotation of the moisture-absorbing rotary wheel assembly.

20. The tableware treating apparatus according to claim 18, wherein the peripheral roller support is integrally molded with the rotary wheel housing or fixedly connected to the rotary wheel housing.

21. The tableware treating apparatus according to claim 18, wherein the peripheral roller support is fixed to the rotary wheel housing by means of a fixing mechanism, and the fixing mechanism is constructed as being capable of adjusting a radial spacing between the peripheral roller support and the moisture-absorbing rotary wheel assembly in an initial mounting position.

22. The tableware treating apparatus according to any one of claims 17 to 19, wherein a bottom roller mechanism is arranged inside the rotary wheel housing, at least a part of the bottom roller mechanism is an elastic part, and the bottom roller mechanism is arranged between the moisture-absorbing rotary wheel assembly and the rotary wheel housing.

23. The tableware treating apparatus according to claim 22, wherein a spacing between the bottom roller mechanism and the moisture-absorbing rotary wheel assembly is smaller than a minimum spacing between the moisture-absorbing rotary wheel assembly and the rotary wheel housing.

24. The tableware treating apparatus according to claim 22, wherein the bottom roller mechanism comprises a bottom roller and a bottom roller support, the bottom roller is rotatably supported on the bottom roller support, the bottom roller support is arranged on the rotary wheel housing, the bottom roller is arranged between the moisture-absorbing rotary wheel assembly and the rotary wheel housing, and a spacing between the bottom roller and the moisture-absorbing rotary wheel assembly is smaller than a minimum spacing between the moisture-absorbing rotary wheel assembly and the rotary wheel housing.

25. The tableware treating apparatus according to claim 22, wherein the bottom roller mechanism is located within a projection of the moisture-absorbing rotary wheel assembly onto the rotary wheel housing.

26. The tableware treating apparatus according to claim 22, wherein the outer peripheral housing part is provided with a pair of end sections extending in a direction perpendicular to the axis of rotation, the bottom roller mechanism is arranged in a region of an inner bottom surface of the rotary wheel housing opposite to the end section of the outer peripheral housing part facing the inner bottom surface, and the end section of the outer peripheral housing part facing the inner bottom surface is capable of be in rolling contact with the bottom roller mechanism.

27. The tableware treating apparatus according to claim 2, wherein the moisture-absorbing and moisture-removing component further comprises a moisture-removing and heating assembly, and a moisture-removing and condensing assembly, the moisture-removing and heating assembly and the moisture-removing and condensing assembly are arranged in the moisture-removing channel, the moisture-removing and heating assembly is configured to heat the moisture-removing airflow in the moisture-removing channel to enable the heated moisture-removing airflow to adsorb moisture in the moisture-absorbing and moisture-removing component, and the moisture-removing and condensing assembly is configured to condense the moisture in the moisture-removing airflow.

28. The tableware treating apparatus according to claim 27, wherein the moisture-removing and heating assembly comprises a moisture-removing and heating assembly housing, a mesh plate and a moisture-removing and heating member, the mesh plate is arranged on a side of the moisture-removing and heating assembly housing and forms, with the moisture-removing and heating assembly housing, a moisture-removing cavity for mounting the moisture-removing and heating member.

29. The tableware treating apparatus according to claim 28, wherein the moisture-removing and heating assembly housing is provided with a moisture-removing airflow inlet and a moisture-removing airflow outlet that are communicated with the moisture-removing channel and the moisture-removing cavity, the

moisture-removing airflow inlet is arranged on a circumferential side wall of the moisture-removing and heating assembly housing, and the moisture-removing airflow outlet is arranged on an end face wall of the moisture-removing and heating assembly housing.

30. The tableware treating apparatus according to claim 29, wherein the mesh plate is provided with a plurality of through holes, and opening diameters of the plurality of through holes gradually increase in a direction approaching the moisture-removing airflow inlet.

31. The tableware treating apparatus according to claim 28, wherein the mesh plate is provided with a plurality of through holes, and opening diameters of the through holes gradually decrease in a flowing direction of the moisture-removing airflow.

32. The tableware treating apparatus according to claim 28, wherein the moisture-removing and heating member is configured to correspond to shapes of a plurality of through holes in the mesh plate, and is partially staggered from the through holes.

33. The tableware treating apparatus according to claim 28, wherein the moisture-removing and heating assembly further comprises a heat conducting sheet and a thermostat, the heat conducting sheet covers the thermostat, and the heat conducting sheet is connected to the moisture-removing and heating assembly housing and extends into the moisture-removing cavity.

34. The tableware treating apparatus according to any one of claims 27 to 33, wherein the moisture-removing and condensing assembly comprises a moisture-removing and condensing tube integrated body, a moisture-removing and condensing assembly housing, and a moisture-removing and condensing water outlet pipe, the moisture-removing and condensing tube integrated body is fixed in the moisture-removing and condensing assembly housing, the moisture-removing and condensing water outlet pipe is communicated with the moisture-removing and condensing assembly housing, the moisture-removing and condensing tube integrated body is configured to condense and dehumidify the moisture-removing airflow flowing through the moisture-removing and condensing tube integrated body, and the moisture-removing and condensing water outlet pipe is configured to discharge water condensed by the moisture-removing and condensing tube integrated body out of the moisture-removing and condensing assembly housing; and

the moisture-removing and condensing assembly housing is provided with a baffle, and the baffle shields a gap between an inner wall of the moisture-removing and condensing assembly housing and the moisture-removing and condensing tube integrated body.

35. The tableware treating apparatus according to any one of claims 27 to 33, wherein the rotary wheel housing comprises an upper rotary wheel housing, a lower rotary wheel housing and a moisture-absorbing rotary wheel assembly, the upper rotary wheel housing and the lower rotary wheel housing are connected to each other to form an internal cavity, the moisture-absorbing rotary wheel assembly and the moisture-removing and heating assembly are fixed in the internal cavity, the moisture-removing and heating assembly is fixed to the upper rotary wheel housing, and the moisture-removing and condensing assembly and the moisture-removing rotary wheel assembly are fixed to the lower rotary wheel housing.

36. The tableware treating apparatus according to any one of claims 1 to 35, wherein the drying module is mounted at an upper portion, a lateral portion or a bottom of the cleaning compartment.

37. The tableware treating apparatus according to any one of claims 1 to 35, wherein the cleaning compartment is provided with a cleaning air inlet and a cleaning air outlet, the cleaning air inlet is communicated with the moisture-absorbing channel air outlet, the cleaning air outlet is communicated with the moisture-absorbing channel air inlet, and the cleaning air inlet is arranged at a lateral portion or a bottom of the cleaning compartment.

38. The tableware treating apparatus according to any one of claims 1 to 35, further comprising a controller, wherein the controller is configured to control the drying module to start upon completion of a washing mode of the tableware treating apparatus.

39. The tableware treating apparatus according to claim 38, further comprising a temperature measuring apparatus, wherein the temperature measuring apparatus is configured to detect a real-time temperature value of the cleaning compartment, and the controller is configured to control the drying module to start upon completion of the washing mode when the real-time temperature value is greater than or equal to a set temperature value.

40. The tableware treating apparatus according to any one of claims 1 to 35, further comprising a humidity measuring apparatus and a controller, wherein the humidity measuring apparatus is configured to detect a real-time humidity value of the cleaning compartment, and the controller is configured to control the drying module to stop when the real-time humid-

ity value is less than or equal to a set humidity value.

41. The tableware treating apparatus according to any one of claims 1 to 35, wherein a heater is arranged inside the cleaning compartment.

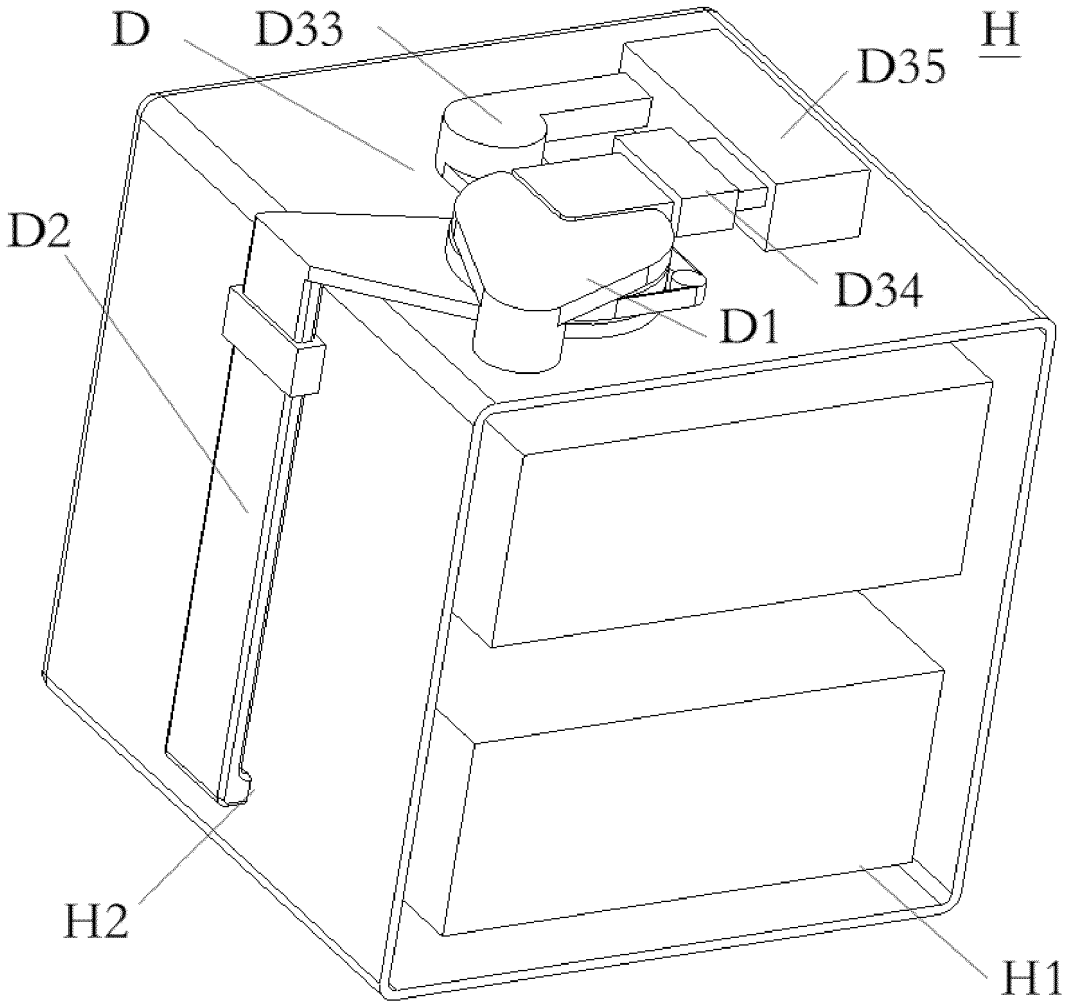

FIG. 1

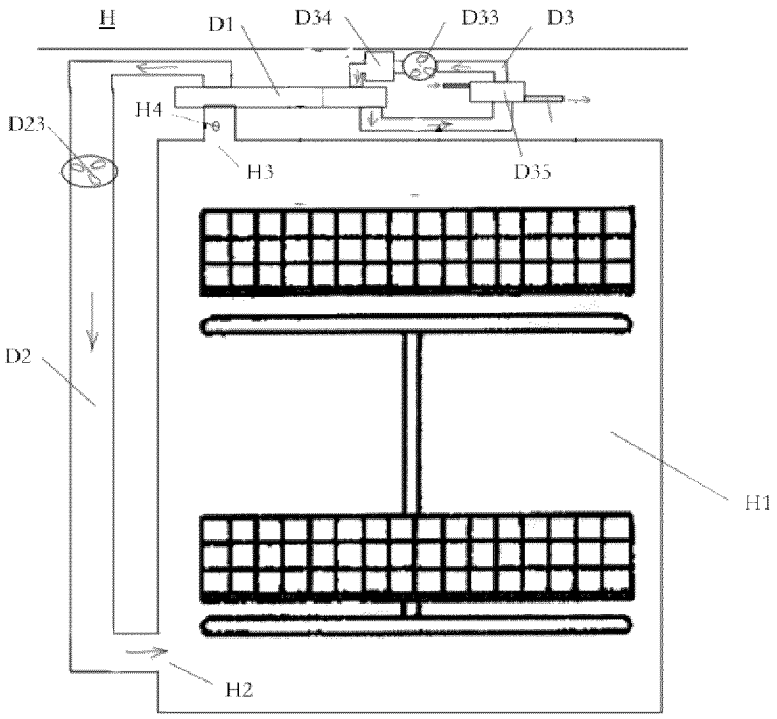
H
D1
D34
D33
D3
H4
D23
H3
D35
D2
H1
H2

FIG. 2

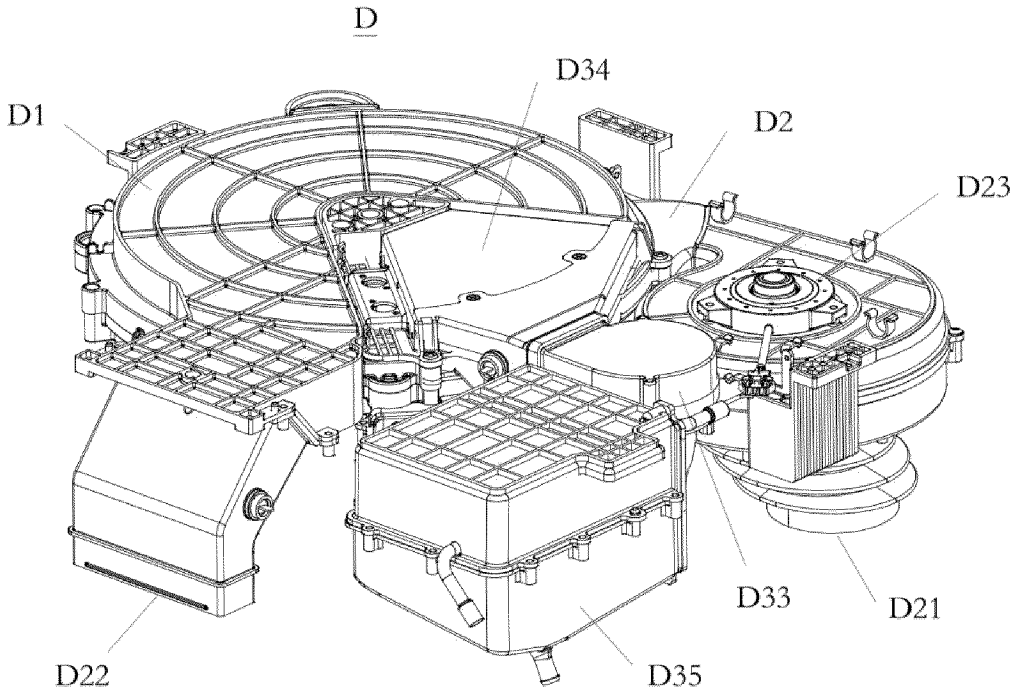
D
D34
D1
D2
D23
D33
D21
D22
D35

FIG. 3

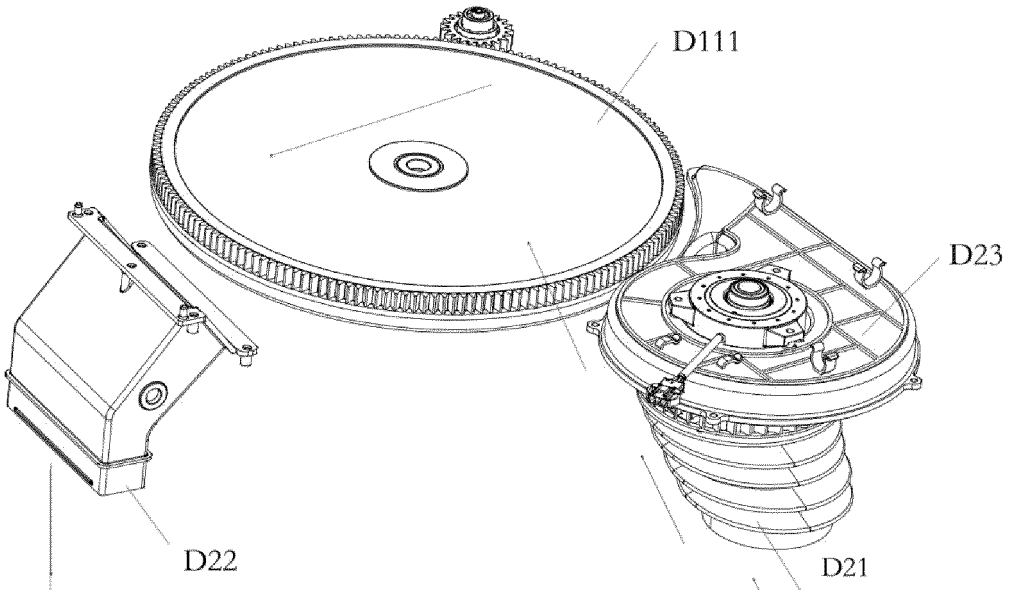

FIG. 4

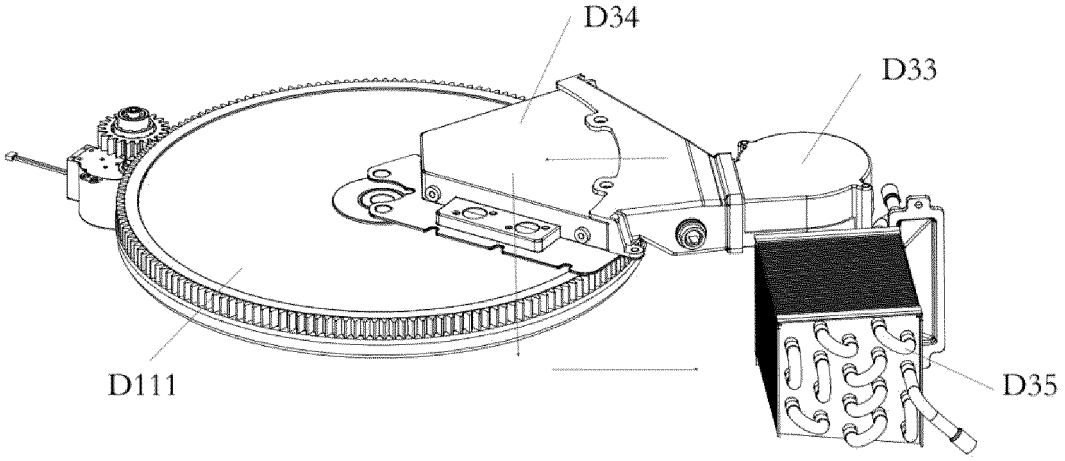

FIG. 5

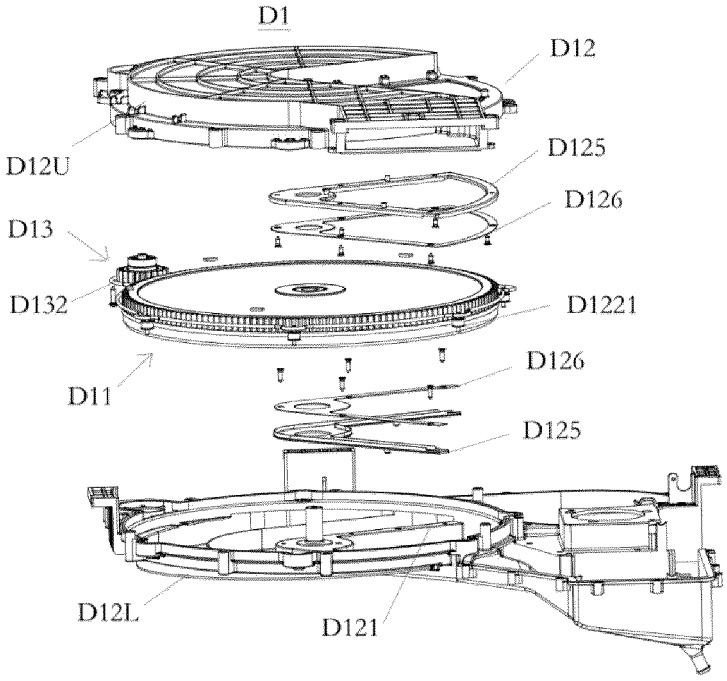
D1
D12
D12U
D125
D126
D13
D132
D1221
D126
D11
D125
D12L
D121

FIG. 6

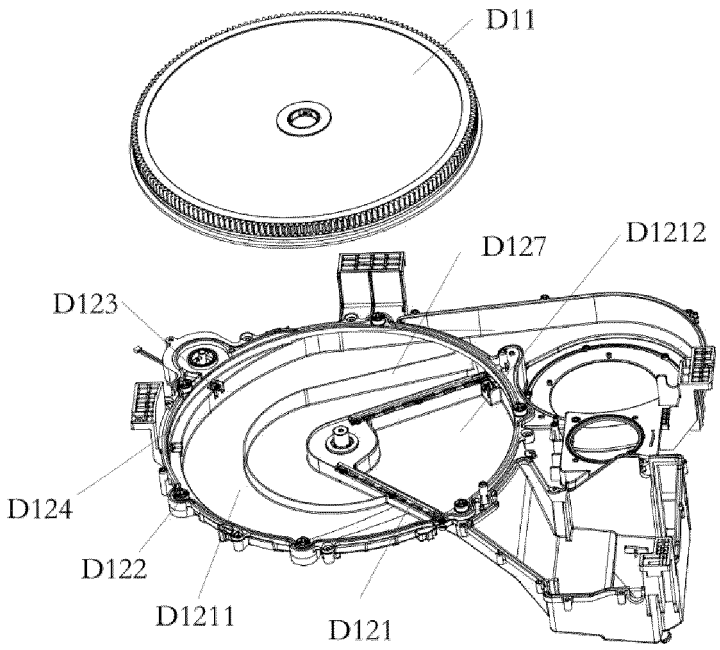
D11
D127
D1212
D123
D124
D122
D1211
D121

FIG. 7

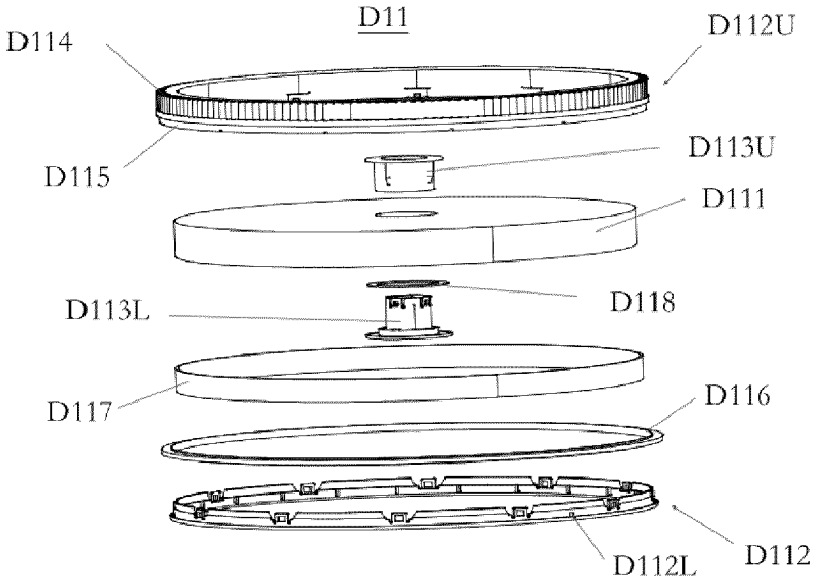
D11
D114
D112U
D115
D113U
D111
D113L
D118
D117
D116
D112L
D112

FIG. 8

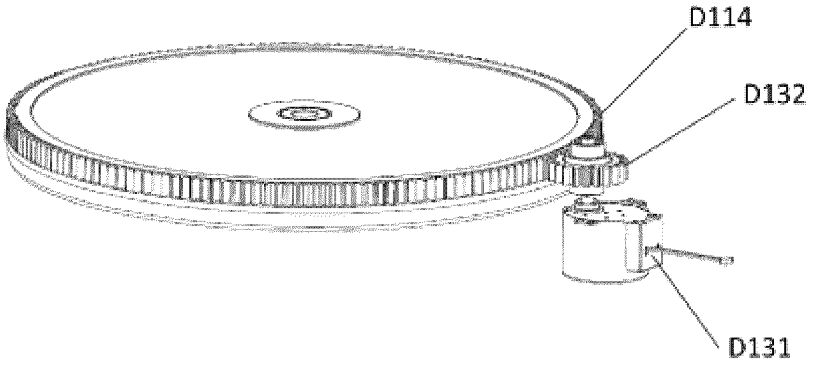
D114
D132
D131

FIG. 9

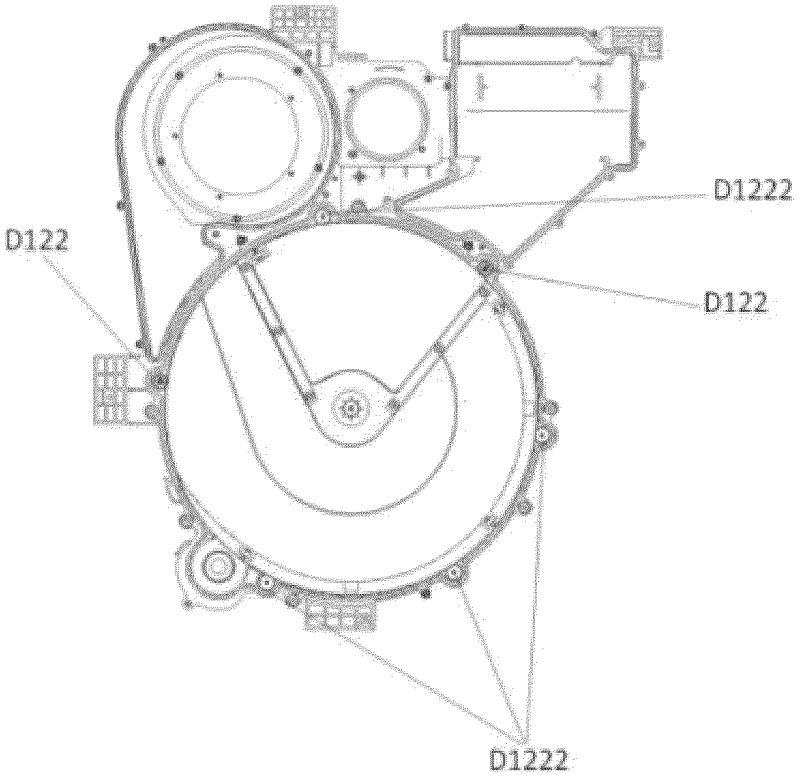

FIG. 10

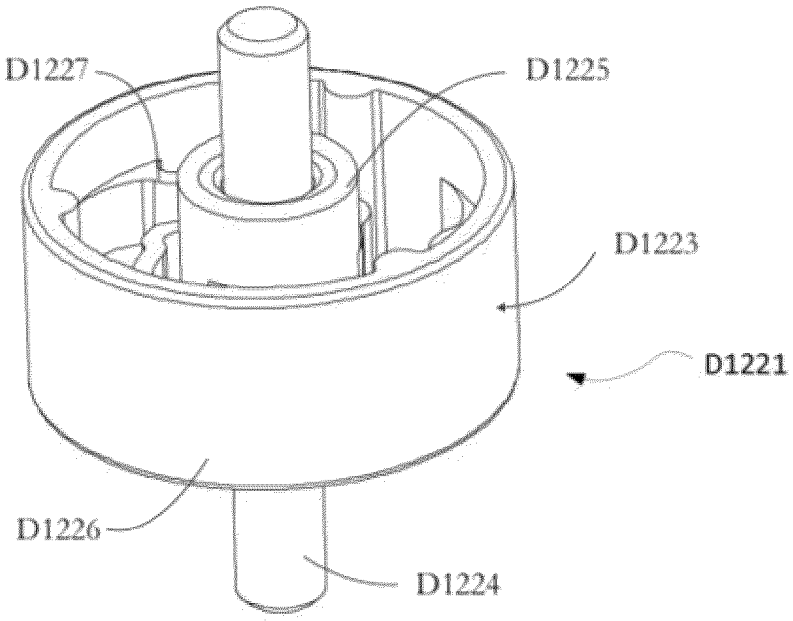

FIG. 11

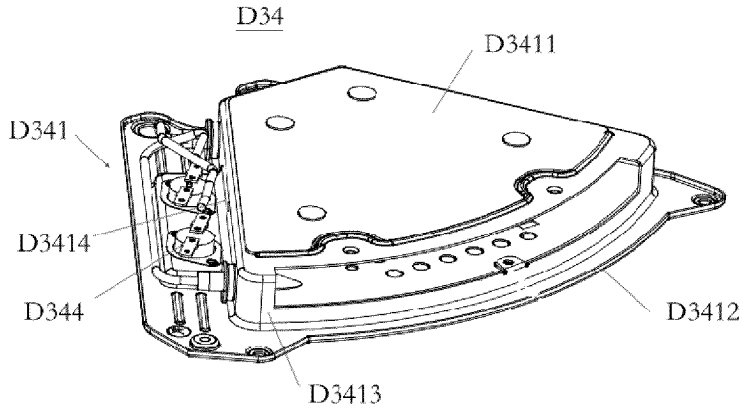

FIG. 12

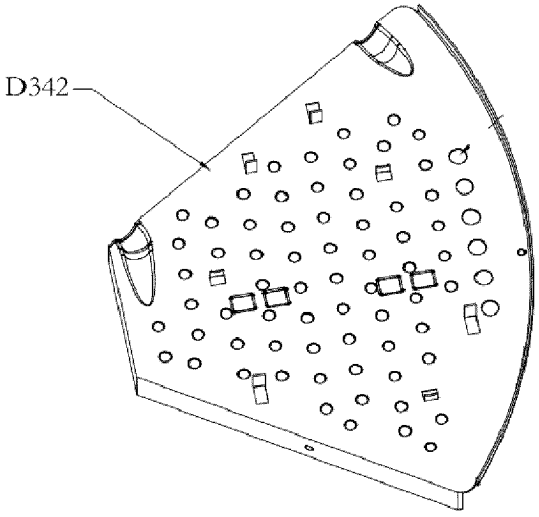

FIG. 13

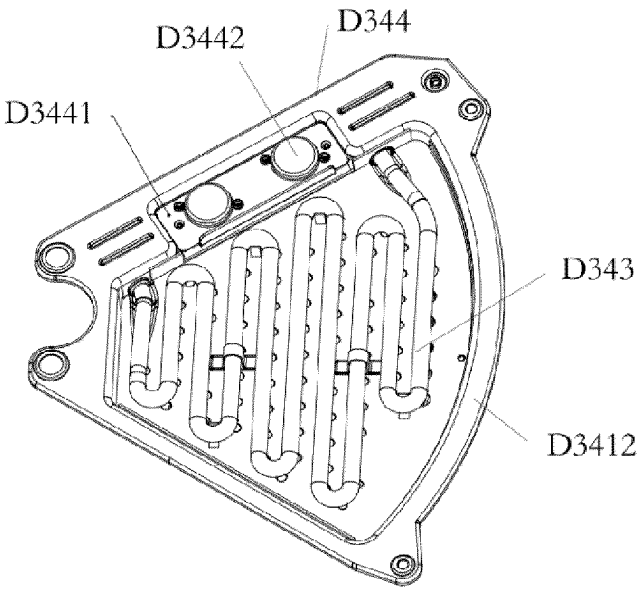

FIG. 14

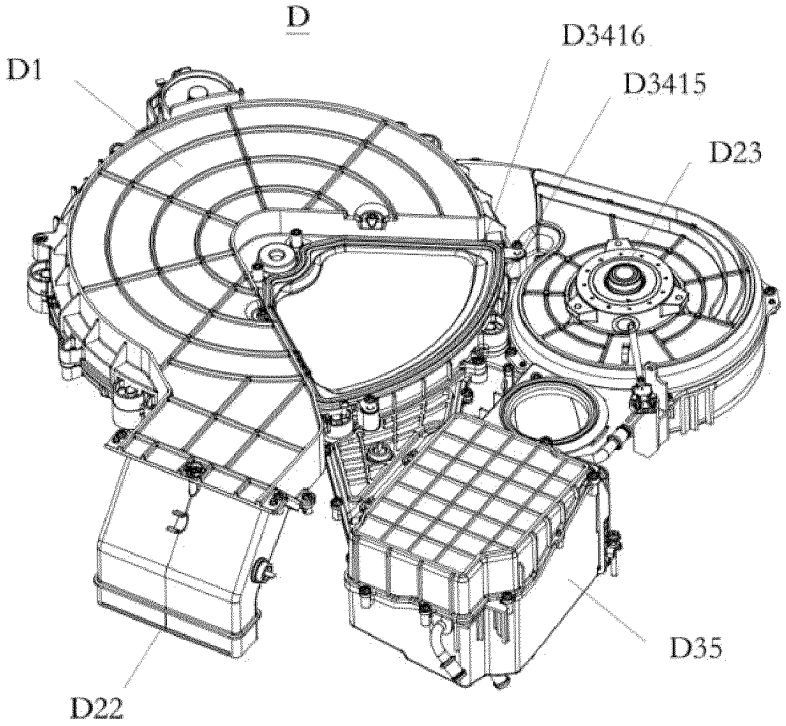

FIG. 15

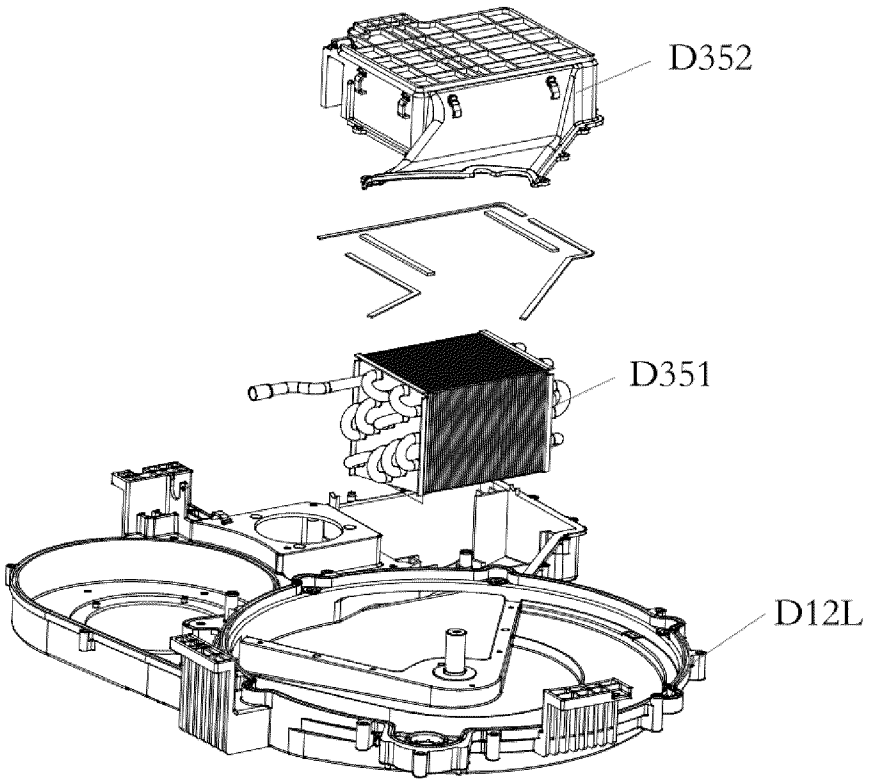

FIG. 16

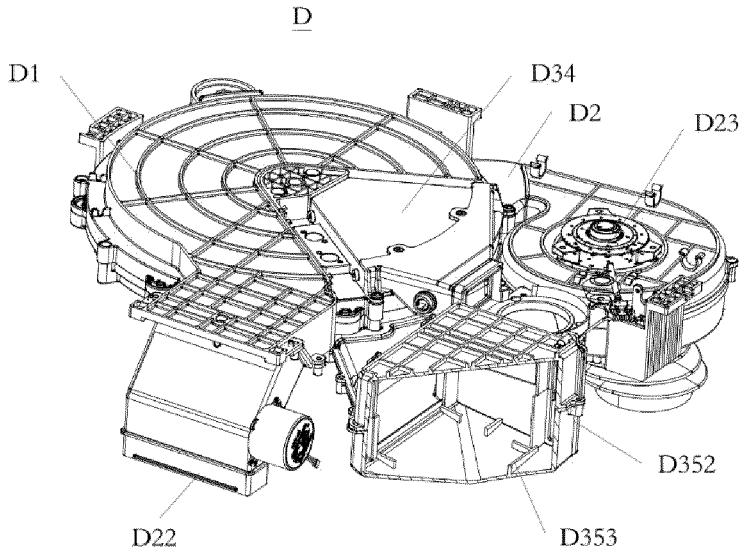

FIG. 17

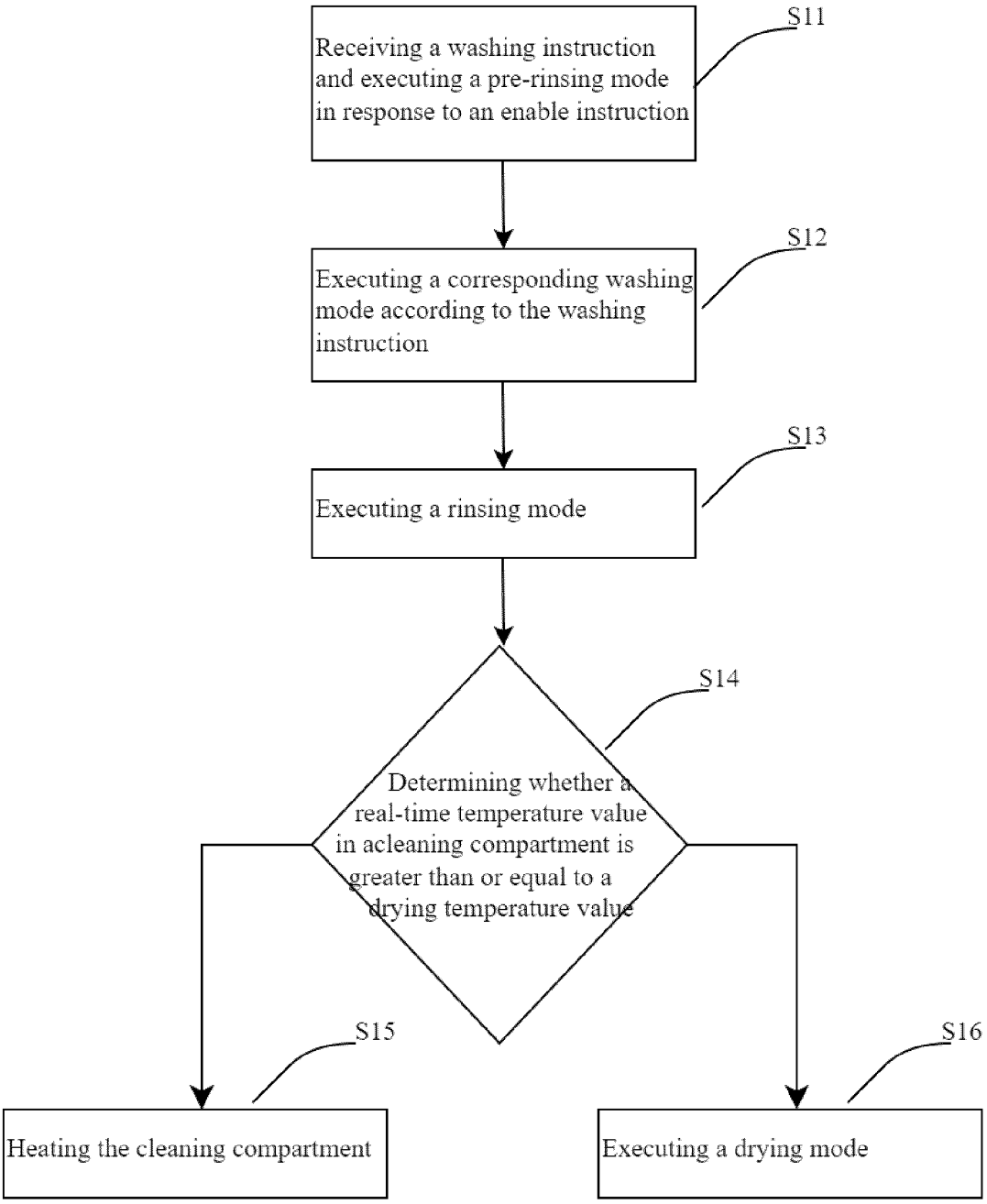
S11
Receiving a washing instruction and executing a pre-rinsing mode in response to an enable instruction
S12
Executing a corresponding washing mode according to the washing instruction
S13
Executing a rinsing mode
S14
Determining whether a real-time temperature value in acleaning compartment is greater than or equal to a drying temperature value
S15
Heating the cleaning compartment
S16
Executing a drying mode

FIG. 18

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2023/115561

A. CLASSIFICATION OF SUBJECT MATTER

A47L15/48(2006.01)i; A47L15/00(2006.01)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)

IPC:A47L,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, ENTXTC, DWPI, CNKI: 餐具, 除湿, 干燥, 烘干, 排湿, 气流, 通道, 碗, 洗碗机, dishware, dehumidification, drying, airflow, passage, bowl, dishwasher

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	1-41
X	CN 216585700 U (BEIJING ROBOROCK TECHNOLOGY CO., LTD.) 24 May 2022 (2022-05-24) description, specific embodiments, and figures 1-6	1-41
PX	CN 218842642 U (SHENZHEN LUOKE INNOVATION TECHNOLOGY CO., LTD.) 11 April 2023 (2023-04-11) description, specific embodiments, and figures 1-4	1-41
PX	CN 115247341 A (SHENZHEN LUOKE INNOVATION TECHNOLOGY CO., LTD.) 28 October 2022 (2022-10-28) description, specific embodiments, and figures 1-7	1-41
PX	CN 218861140 U (SHENZHEN LUOKE INNOVATION TECHNOLOGY CO., LTD.) 14 April 2023 (2023-04-14) description, specific embodiments, and figures 1-6	1-41

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

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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
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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
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
25 October 2023	**04 November 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/CN2023/115561

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 218621460 U (SHENZHEN LUOKE INNOVATION TECHNOLOGY CO., LTD.) 14 March 2023 (2023-03-14) description, specific embodiments, and figures 1-4	1-41
PX	WO 2023030375 A1 (SHENZHEN ROBOROCK INNOVATION TECHNOLOGY CO., LTD.) 09 March 2023 (2023-03-09) description, specific embodiments, and figures 1-19	1-41
A	CN 107773187 A (NINGBO JIAINUO ENERGY SAVING TECHNOLOGY CO., LTD.) 09 March 2018 (2018-03-09) entire document	1-41
A	WO 2007077072 A1 (BSH BOSCH & SIEMENS HAUSGERAETE GMBH) 12 July 2007 (2007-07-12) entire document	1-41

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2023/115561

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 218842642 U	11 April 2023	None	
CN 115247341 A	28 October 2022	None	
CN 218861140 U	14 April 2023	None	
CN 218621460 U	14 March 2023	None	
WO 2023030375 A1	09 March 2023	WO 2023030421 A1	09 March 2023
		WO 2023030394 A1	09 March 2023
		WO 2023031837 A1	09 March 2023
		TW 202311594 A	16 March 2023
CN 107773187 A	09 March 2018	None	
WO 2007077072 A1	12 July 2007	DE 102005062938 A1	05 July 2007

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REFERENCES CITED IN THE DESCRIPTION

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- CN 202211059244 **[0001]**
- CN 202211068418 **[0001]**
- CN 2022116142 W **[0001]**
- CN 202222326904 **[0001]**
- CN 202222324363 **[0001]**
- CN 202222327022 **[0001]**