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(54) **HEAD ASSEMBLY OF HEAT PUMP WATER HEATER AND HEAT PUMP WATER HEATER**

(57) The invention relates to a technical field of heat-pump water heaters, and provides a head assembly for a heat-pump water heater and the heat-pump water heater. The head assembly includes a base and an air duct. The air duct is detachably connected to the base, and the base is formed with a disassembly hole for the air duct. The invention discloses a head assembly for a heat-pump water heater and the heat-pump water heater. The air duct is detachably connected to the base, and the air duct can be removed from the base separately, to facilitate inspecting and repairing the air duct separately. The base is formed with a disassembly hole for the air duct, and the air duct can be installed and detached through the disassembly hole of the base without detaching the heat-pump water heater.

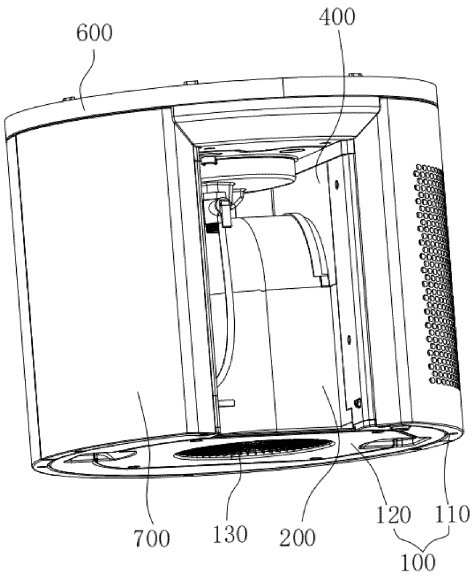

Fig. 1

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Description

TECHNICAL FIELD

[0001] The invention relates to a technical field of heat-pump water heaters, and in particular to a head assembly for a heat-pump water heater and a heat-pump water heater.

BACKGROUND

[0002] Heat-pump water heaters are also called as air-source water heaters. The heat-pump water heater is to transform high-pressure liquid medium into gaseous medium to absorb a large amount of heat energy from the air, and then compress, by a compressor, the gaseous medium into high-temperature and high-pressure liquid medium, and then transfer, by a heat exchanger, the heat energy of the high-temperature and high-pressure liquid medium to water to heat the water.

[0003] As for the heat-pump water heaters in the related art, when an air duct thereof is repaired or inspected, an outer shell is required to be detached first, and then the air duct is detached, so it is inconvenient, time-consuming and effort-consuming.

SUMMARY

[0004] The invention aims to solve at least one of the existing technical problems in the related art. To this end, the invention provides a head assembly for a heat-pump water heater and a heat-pump water heater, to facilitate a detachment and installation of the air duct.

[0005] According to the invention, a head assembly for a heat-pump water heater is provided. The a head assembly for a heat-pump water heater comprises a base, an air duct, detachably connected to the base. The base is formed with a disassembly hole for the air duct.

[0006] Optionally, the head assembly for the heat-pump water heater may further comprise a fan and a fan bracket. The fan is installed at the fan bracket. The fan bracket is installed at the base. The air duct is detachably installed at the fan bracket.

[0007] Optionally, the fan bracket may comprise a bracket body; and a splice plate, fixed to a side of the bracket body facing the air duct. An avoidance notch is disposed at a top of the air duct. The avoidance notch is used to avoid the fan when the air duct is detached and/or installed. In a condition that the air duct is fixed to the bracket body, the splice plate is spliced to the avoidance notch.

[0008] Optionally, first buckles may be disposed at two ends of the splice plate. Two sides of the air duct corresponding to the avoidance notch are provided with second buckles. The first buckle cooperates with the second buckle.

[0009] Optionally, the fan bracket further may comprise a top plate located above the splice plate. In a condition that the splice plate is spliced to the avoidance notch, the top plate overlaps a splice gap.

[0010] Optionally, a connection component may be disposed at a side of the air duct facing the fan bracket. The connection component is provided with an installation portion. The installation portion is disposed corresponding to a bottom surface of the base for fixing the air duct to the base.

[0011] Optionally, a column may be fixed on the base. One of the connection component and the column is provided with an air-duct guide rail; and the other one of the connection component and the column is provided with an air-duct guide groove. The air-duct guide rail is slidably disposed in the air-duct guide groove.

[0012] Optionally, the fan bracket may comprise: a lower bracket; and an upper bracket, formed with a first splice surface and a second splice surface. The first splice surface is attached to an upper end surface of the lower bracket. The second splice surface is attached to an upper end surface of the connection component.

[0013] Optionally, one of the fan bracket and the column may be provided with a bracket guide rail; and the other one of the fan bracket and the column is provided with a bracket guide groove. The bracket guide rail is slidably disposed in the bracket guide groove.

[0014] Optionally, the base may comprise a base body and a base-body cover. The disassembly hole is formed at the base body. The base-body cover is detachably installed at the disassembly hole. A disassembly notch is formed at the base body. The disassembly notch is located above the base-body cover.

[0015] According to the invention, a heat-pump water heater is further provided, comprising the head assembly for the heat-pump water heater.

[0016] The above one or more technical solutions in the embodiments of the invention have at least one of the following technical effects.

[0017] Since the air duct is detachably connected to the base, and the air duct can be removed from the base separately, it facilitates inspecting and repairing the air duct separately. Since the base is formed with a disassembly hole for the air duct, the air duct can be installed and disassembled through the disassembly hole of the base without disassembling the heat-pump water heater as a whole.

[0018] Some of additional aspects and advantages of the invention will be given in the following description, and some will become apparent from the following description, or will be learned through the practice of the invention.

BRIEF DESCRIPTION OF DRAWINGS

[0019] In order to more clearly illustrate the embodiments of the invention or the technical solutions in the related art, the accompanying drawings required for use in the description for the embodiments or the related art will be briefly introduced below. Obviously, the accom-

panying drawings described below are only some embodiments of the invention.

FIG. 1 is a first schematic three-dimensional structural diagram of a head assembly for a heat-pump water heater according to an embodiment of the invention;
FIG. 2 is a schematic three-dimensional structural diagram of a base of the heat-pump water heater according to an embodiment of the invention;
FIG. 3 is a schematic three-dimensional structural diagram of an air duct of the heat-pump water heater according to an embodiment of the invention;
FIG. 4 is a schematic diagram showing an assembly relationship between a fan and a fan bracket of the heat-pump water heater according to an embodiment of the invention;
FIG. 5 is a schematic three-dimensional structural diagram of an upper bracket of the heat-pump water heater according to an embodiment of the invention;
FIG. 6 is a schematic diagram showing an assembly relationship among the fan, fan bracket, air duct and column of the heat-pump water heater according to an embodiment of the invention; and
FIG. 7 is a second schematic three-dimensional structural diagram of the head assembly for the heat-pump water heater according to an embodiment of the invention.

[0020] In the accompanying drawings, corresponding relationships between reference signs and component names in FIG. 1 to FIG. 7 are as follows:

100, base; 110, base body; 111, disassembly hole; 112, disassembly notch; 120, base-body cover; 130, exhaust port;
200, air duct; 210, avoidance notch; 220, second buckle; 230, connection component; 231, installation portion; 232, air-duct guide rail; 240, air inlet channel; 250, air outlet channel; 251, air outlet port; 260, avoidance groove;
300, fan;
400, fan bracket; 410, bracket body; 411, lower bracket; 412, upper bracket; 4121, first splice surface; 4122, second splice surface; 4123, bracket guide rail; 420, splice plate; 421, first buckle; 430, top plate; 440, fan port;
500, column; 510, air-duct guide groove;
600, upper cover;
700, enclosure plate; 710, installation space;
810, compressor; 820, evaporator; 830, electric control box.

DESCRIPTION OF EMBODIMENTS

[0021] The embodiments of the invention are further described in detail below in conjunction with the drawings and examples. The following examples are used to illustrate the invention, but are not intended to limit the scope sought for by the invention.

[0022] In the description of the embodiments of the invention, it should be noted that the terms "center", "longitudinal", "lateral", "up", "down", "front", "back", "left", "right", "vertical", "horizontal", "top", "bottom", "inside" and "outside" and so on indicates orientations or positional relationships based on orientations or positional relationships shown in the accompanying drawings, and are only for the convenience of describing the embodiments of the invention and simplifying the description, and do not indicate or imply that the referred device or element must have a specific orientation, be constructed and operated in a specific orientation, and therefore cannot be understood as a limitation at the embodiments of the invention. Furthermore, the terms "first", "second", and "third" are used for descriptive purposes only and should not be understood as indicating or implying relative importance.

[0023] In the description of the embodiments of the present invention, it should be noted that, unless otherwise clearly stipulated and limited, the terms "connected" and "connection" should be understood in a broad sense. For example, it can be a fixed connection, a detachable connection, or an integral connection; it can be a mechanical connection or an electrical connection; it can be a direct connection or an indirect connection through an intermediate medium. For those skilled in the art, the specific meanings of the above terms in the embodiments of the present invention can be understood according to specific circumstances.

[0024] In the embodiments of the invention, unless otherwise clearly specified and limited, a first feature being "at" or "under" a second feature may indicate that the first feature and second feature are in direct contact, or the first feature and second feature are in indirect contact through an intermediate medium. Moreover, a first feature being "above", "over" and "at" the second feature may indicate that the first feature is directly above or obliquely above the second feature, or simply indicates that the first feature is higher in horizontal height than the second feature. A first feature being "below," "beneath," or "under" a second feature may indicate that the first feature is directly below or diagonally below the second feature, or simply indicate that the first feature is lower in horizontal height than the second feature.

[0025] In the description of this specification, the description with reference to the terms "one embodiment", "some embodiments", "example", "specific example", or "some examples" and so on means that the specific features, structures, materials or characteristics described in conjunction with the embodiment or example are comprised in at least one embodiment or example of the invention. In the present specification, the exemplary expressions of the above terms do not necessarily refer to the same embodiment or example. Furthermore, the specific features, structures, materials, or characteristics described may be combined in any suitable manner in

any one or more embodiments or examples. Furthermore, those skilled in the art may combine and associate different embodiments or examples and features of different embodiments or examples described in this specification without mutual contradiction.

[0026] Heat-pump water heaters are also called as "air source heat-pump water heaters" and "air energy water heaters". The heat-pump water heaters are to transform high-pressure liquid medium into gaseous medium to absorb a large amount of heat energy from the air, and then compress, by a compressor, the gaseous medium into high-temperature and high-pressure liquid medium, and then transfer, by a heat exchanger, the heat energy of the high-temperature and high-pressure liquid medium to water to heat the water. Therefore heat-pump water heaters, in comparison with traditional electric water heaters and gas water heaters, have many advantages such as high efficiency, energy saving, environmental protection, and safety.

[0027] During an operation of the heat-pump water heater, the prolonged excessive use or frequent start and stop thereof may cause a fatigue damage to the air duct, alternatively the air duct may be damaged due to the aging of material of the air duct. Optionally, the dust, dirt and so on may accumulate in the air duct, to cause a blockage of the air duct or to affect a normal operation of the air duct. Therefore, the air duct is required to be inspected or repaired regularly. However, As for the heat-pump water heaters in the related art, when an air duct thereof is repaired or inspected, an outer shell is required to be detached first, and then the air duct is detached, so it is inconvenient, time-consuming and effort-consuming.

[0028] As shown in FIG. 1 and FIG. 2, a head assembly for a heat-pump water heater is provided according to an embodiment of the invention. The head assembly comprises a base 100 and an air duct 200. The air duct 200 is detachably connected to the base 100, and the base 100 is formed with a disassembly hole 111 for the air duct 200.

[0029] The air duct 200 is detachably connected to the base 100, and the air duct 200 can be removed from the base 100 separately, to facilitate inspecting and repairing the air duct 200 separately. The base 100 is formed with a disassembly hole 111 for the air duct 200, and thus the air duct 200 can be installed and detached through the disassembly hole 111 of the base 100 without detaching the whole heat-pump water heater.

[0030] It is understandable that the air duct 200, as a portion of an air supply system of the heat-pump water heater, is prone to damage due to a long-term use or material aging thereof. The air duct 200 may therein accumulate dust, dirt and so on, and requires a regular maintenance. By providing the disassembly hole 111 for the air duct 200, a targeted maintenance or regular inspection may be performed on the air duct 200, and thus a safety of the heat-pump water heater is improved. The disassembly hole 111, which is disposed at the base 100, is easier to be hided and thus does not affect an overall appearance.

[0031] It can be understood that, optionally, the base 100 may be disposed at a bottom portion of the heat-pump water heater; an inner tank of the heat-pump water heater is disposed at an upper end for the head assembly; and a disassembly hole 111 is formed at a lower end of the base 100, to realize a disassembly and installation of the air duct 200 from the lower end of the base 100. Optionally, the base 100 may also be disposed at a top portion of the heat-pump water heater; the inner tank of the heat-pump water heater is disposed at a lower end for the head assembly; and the disassembly hole 111 is formed at an upper end of the base 100, to realize the disassembly and installation of the air duct 200 from the upper end of the base 100. Optionally, the base 100 may also have a side wall, and the disassembly hole 111 is disposed at the side wall, and thus regardless of whether the inner tank of the heat-pump water heater is disposed at the upper end or the lower end of the head assembly, the disassembly and installation of the air duct 200 can be implemented.

[0032] Optionally, a shape of the air duct 200 may be a curved-tube shape. Referring to FIG. 1 and FIG. 3, an air inlet channel 240 and an air outlet channel 250 are formed inside the air duct 200. An airflow in the air inlet channel 240 flows horizontally, and an airflow in the air outlet channel 250 flows vertically. The airflow horizontally flowing enters the air inlet channel 240 and flows out from the air outlet channel 250. Since the airflow for the air inlet channel 240 flows horizontally and the airflow for the air outlet channel 250 flows vertically, an airflow horizontally flowing is converted into an airflow vertically flowing. Optionally, the base 100 may be provided with an exhaust port 130, and the air outlet port 251 of the air outlet channel 250 faces the exhaust port 130 to guide the airflow to the exhaust port 130 of the base 100, to change a flow direction of the airflow and avoid the airflow horizontally flowing from being directly discharged from the heat-pump water heater which will cause damage to a wall. Optionally, the air duct 200 in the curved-tube shape can more effectively utilize a limited space to reduce a noise and vibration of the heat-pump water heater. Optionally, the air duct 200 may also be in a straight-tube shape to simplify a structure thereof, as long as the air duct 200 can be detached and installed from the disassembly hole 111. Optionally, a cross section of the air duct 200 may be circular or square.

[0033] As shown in FIG. 1 and FIG. 4, the head assembly for a heat-pump water heater according to an embodiment of the invention further comprises a fan 300 and a fan bracket 400. The fan 300 is installed at the fan bracket 400, and the fan bracket 400 is installed at the base 100. The air duct 200 is detachably installed at the fan bracket 400.

[0034] The fan bracket 400 is used to fix the fan 300. The air duct 200 can be detachably installed at the fan bracket 400. When the air duct 200 is detached or installed, the air duct 200 can be separately detached or

installed. Optionally, "the air duct 200 can be detachably installed at the fan bracket 400" comprises a situation that the air duct 200 and the fan bracket 400 are not directly connected. At this time, the air duct 200 may be fixed to the base 100 or other fixed objects, as long as an air inlet of the air duct 200 faces the fan 300.

[0035] Optionally, when the fan 300 is inspected and repaired, the fan bracket 400 can also be detached and installed separately. The fan bracket 400 can be detached without detaching the air duct 200.

[0036] Optionally, the fan bracket 400 may be detachably installed at the base 100. If the fan 300 needs to be detached, the fan bracket 400 can be directly detached. There is no need to disassemble the fan 300 separately, and thus screws and other fixings of the fan 300 can be avoided from becoming loose after several disassembles and assemblies to affect a normal operation of the fan 300. After the fan bracket 400 is detached, the fan bracket 400 still serves as a support for the fan 300, and the fan 300 can be repaired or inspected directly when the fan 300 is still installed at the fan bracket 400. At the same time, the fan 300 can be directly placed on a table or the ground for repair due to a support function of the fan bracket 400, which is convenient to operate. During a detachment process, detachment operations will not be directly performed on the fan 300, to prevent the fan 300 from being damaged during the detachment process.

[0037] As shown in FIG. 3 to FIG. 5, optionally, the fan bracket 400 comprises a bracket body 410 and a splice plate 420. The splice plate 420 is fixed to a side of the bracket body 410 facing the air duct 200. An avoidance notch 210 is disposed at a top of the air duct 200, and is used to avoid the fan 300 when the air duct 200 is detached and installed. In a condition that the air duct 200 is fixed to the bracket body 410, the splice plate 420 is spliced to the avoidance notch 210.

[0038] To better introduce an airflow into the air duct 200, blades of the fan 300 are at least partially extended into the air duct 200. Since the disassembly hole 111 is disposed at the base 100, the air duct 200, when removed, needs to be taken out along a direction from top to bottom. Therefore, with an avoidance notch 210 disposed at a top of the air duct 200, when the air duct 200 is removed, the blades of the fan 300 can pass through the avoidance notch 210 to prevent the fan 300 from obstructing the detachment of the air duct 200.

[0039] In a condition that the air duct 200 is fixed to the bracket body 410, the splice plate 420 is spliced to the avoidance notch 210, to connect the splice plate 420 to the air duct 200 to appropriately extend the air duct 200.

[0040] As shown in FIG. 1 and FIG. 2, optionally, the base 100 comprises a base body 110 and a base-body cover 120. The disassembly hole 111 is formed at the base body 110. The base-body cover 120 is detachably installed at the disassembly hole 111.

[0041] The base-body cover 120 is detachably installed at the disassembly hole 111, to enable the base-body cover 120 to realize an opening and closing of the disassembly hole 111. A shape of the base-body cover 120 can match the disassembly hole 111 to close the disassembly hole 111. A shape of the base-body cover 120 can also not match the disassembly hole 111, as long as the opening and closing of the disassembly hole 111 can be realized by installing and detaching the base-body cover 120. The base-body cover 120 can be directly connected to the base 100, or be indirectly connected to the base 100. Optionally, the base-body cover 120 can be installed at the fan bracket 400. Optionally, the base-body cover 120 may be rotatably connected to the base body 110, and the disassembly hole 111 may be opened and closed by rotating the base-body cover 120.

[0042] Optionally, a disassembly notch 112 is formed at the base body 110, and is located above the base-body cover 120. When the base-body cover 120 is detached, just fasten your fingers on the disassembly notch 112 and remove the base-body cover 120 to complete the detachment.

[0043] It is understandable that the disassembly notch 112 may be in communication with the disassembly hole 111 to facilitate processing. The disassembly notch 112 may also not be in communication with the disassembly hole 111, as long as disassembly notch 112 is located above the base-body cover 120.

[0044] As shown in FIG. 3 and FIG. 5, optionally, first buckles 421 are disposed at two ends of the splice plate 420. Two sides of the air duct 200 corresponding to the avoidance notch 210 are provided with second buckles 220. The first buckle 421 cooperates with the second buckle 220.

[0045] A cooperation of the first buckle 421 and the second buckle 220 facilitates the assembly and detachment of the air duct 200 and the fan bracket 400. The air duct 200 is taken out from the disassembly hole 111, and the air duct 200 can be detached by disconnecting the first buckle 421 and the second buckle 220 without detaching the fan 300 and the air duct 200 together. The first buckle 421 is a clip disposed at the splice plate 420, and a notch is formed between the clip and the splice plate 420. The second buckle 220 is a protrusion. When the air duct 200 is installed, a side wall of the air duct 200 corresponding to the avoidance notch 210 is inserted into the notch between the clip and the splice plate 420, and the protrusion pushes the notch to be widened to fix the air duct 200. The protrusion has an arc-shaped surface, and the clip has an arc-shaped end, to facilitate insertion and installment. The first buckle 421 may also be two clips disposed opposite to each other, and a notch is formed between the two clips. Optionally, the first buckle 421 may also be disposed at a top plate 430. The air duct 200 and the fan bracket 400 may also be connected by means of a threaded connection or the like.

[0046] As shown in FIG. 3 and FIG. 5, optionally, the fan bracket 400 also comprises a top plate 430 which is located above the splice plate 420. In a condition that the splice plate 420 is spliced to the avoidance notch 210,

the top plate 430 overlaps a splice gap to avoid an air leakage. When the splice plate 420 is spliced to the avoidance notch 210, the top plate 430 plays a limiting role, and thus the air duct 200 can be installed in a correct position. The top plate 430 has a shape that matches the air duct 200. If the air duct 200 is a square air duct 200, a groove can be disposed at a lower end of the top plate 430 to match a shape of the air duct 200. If the air duct 200 is a circular air duct 200, the top plate 430 can be a corresponding arc shape to attach the air duct 200.

[0047] As shown in FIG. 3 and FIG. 6, optionally, a connection component 230 is disposed at a side of the air duct 200 facing the fan bracket 400. The connection component 230 is provided with an installation portion 231. The installation portion 231 corresponds to a bottom surface of the base 100 for fixing the air duct 200 to the base 100. To facilitate installing and fixing the air duct 200 from a bottom of the base 100, a fixation groove may be disposed at the installation portion 231, and a fixation protrusion may be disposed at a corresponding position of the base 100. The air duct 200 can be fixed to the base 100 through a cooperation of the fixation protrusion and the fixation groove. Optionally, a through hole may also be disposed at the installation portion 231, and a corresponding threaded hole may be disposed at the base 100. A fastening screw can pass through the through hole and the threaded hole in sequence to achieve a connection effect.

[0048] As shown in FIG. 3 and FIG. 6, optionally, a column 500 is fixed on the base 100. One of the connection component 230 and the column 500 is provided with an air-duct guide rail 232 thereon, and the other one of the connection component 230 and the column 500 is provided with an air-duct guide groove 510. The air-duct guide rail 232 is slidably disposed in the air-duct guide groove 510. The air-duct guide rail 232 may be slidably disposed in the air-duct guide rail 232. An installation error can be reduced and an installation accuracy can be improved through a cooperation between the air-duct guide rail 232 and the air-duct guide rail 232. It is more easily to determine an installation position of the air duct 200 and fix the air duct 200 during an the installation process, and thus it is ensured a stability of an installation and an easier detachment and installation is achieved.

[0049] As shown in FIG. 4 and FIG. 5, optionally the fan bracket 400 comprises a lower bracket 411 and an upper bracket 412. The upper bracket 412 is formed with a first splice surface 4121 and a second splice surface 4122. The first splice surface 4121 is attached to an upper end surface of the lower bracket 411, and the second splice surface 4122 is attached to an upper end surface of the connection component 230.

[0050] It can be understood that the first splice surface 4121 is attached to the upper end surface of the lower bracket 411, and the second splice surface 4122 is attached to the upper end surface of the connection component 230, to support the upper bracket 412. Through a surface contact between the first splice surface 4121 and the upper end surface of the lower bracket 411 and a surface contact between the second splice surface 4122 and the upper end surface of the connection component 230, a pressure on the upper bracket 412 can be more evenly dispersed to reduce a possibility of local stress concentration. The upper bracket 412 is provided with a first recess on a side away from the splice plate 420, and the lower bracket 411 is provided with a second recess in correspondence to the first recess. The first recess is connected to the second recess to form a fan port 440. The fan port 440 is in communication with an air inlet of the air duct 200. The fan 300 is installed on the fan bracket 400, and the fan 300 extends into the fan port 440 to facilitate an introduction of an airflow into the air duct 200. The first recess may be flush with the splice plate 420 to avoid obstructing the airflow.

[0051] As shown in FIG. 5, optionally, one of the fan bracket 400 and the column 500 is provided with a bracket guide rail 4123, and the other one of the fan bracket 400 and the column 500 is provided with a bracket guide groove. The bracket guide rail 4123 is slidably disposed in the bracket guide groove. Through a cooperation of the bracket guide rail 4123 and the bracket guide groove, an installation error can be reduced and an installation accuracy can be improved. The bracket guide rail 4123 may be disposed at the upper bracket 412, and the bracket guide groove may be disposed at the column 500. During an installation process, it is easier to determine an installation position of the upper bracket 412 and fix the upper bracket 412, to ensure a stability of the installation, and an easier detachment and installation is achieved.

[0052] To facilitate the installation, the bracket guide groove and the air-duct guide groove 510 may be disposed at the column 500; the air-duct guide rail 232 may be disposed at the connection component 230 of the air duct 200; and the bracket guide rails 4123 may be disposed at two sides of the upper bracket 412. The bracket guide groove and the air-duct guide groove 510 may be in communication with each other to facilitate processing and facilitate an attachment of the second splice surface 4122 with the upper end surface of the connection component 230.

[0053] As shown in FIG. 3, optionally, a side of the air duct 200 facing away from the fan bracket 400 is formed with an avoidance groove 260. The avoidance groove 260 is used to avoid internal components of the heat-pump water heater.

[0054] As shown in FIG. 1 to FIG. 7, the head assembly for the heat-pump water heater comprises an upper cover 600 located above the base 100 and an enclosure plate 700. The enclosure plate 700 is disposed between the base 100 and the upper cover 600 to form an installation space 710. An interior of the installation space 710 is provided with a compressor 810, an evaporator 820, an electric control box 830 and numerous internal components. The avoidance groove 260 is disposed at the air duct 200, and thus the installation space 710 can be

effectively utilized to facilitate arrangements of various internal components. Optionally, as a capacitor of the electric control box 830 protrudes from a surface thereof, the capacitor is disposed toward the air duct 200, and thus the avoidance groove 260 can avoid the capacitor and use a portion of a space of the air duct 200. Thus a plurality of internal components can be installed in the installation space 710 without expanding a volume of the heat-pump water heater.

[0055] The air duct 200 may be disposed at a middle of the base 100, and the internal components such as the compressor 810, the evaporator 820, and the electric control box 830 are disposed to surround the air duct 200. If the installation space 710 is not sufficient in size to accommodate other internal components, an avoidance groove 260 can be disposed at a corresponding position of the air duct 200 to facilitate installations of other internal components.

[0056] Optionally, the avoidance groove 260 may be in communication with a top of the air duct 200 to avoid hindering the air duct 200 from being taken out from the disassembly hole 111 of the base 100 along a direction from top to bottom.

[0057] A shape of the enclosure plate 700 may be cylindrical. An internal space formed by a cylindrical shape is larger than that of other shapes such as a square shape when surface areas thereof are the same, and thus materials can be saved.

[0058] A heat-pump water heater is also provided according to a second aspect of the invention, comprising a head assembly for the heat-pump water heater.

[0059] It can be understood that as the head assembly for the heat-pump water heater has advantageous effects mentioned in the above embodiments, the heat-pump water heater correspondingly has the advantageous effects of the above embodiments. The embodiments of the heat-pump water heater can refer to the above embodiments, which are not repeated here.

Claims

1. A head assembly for a heat-pump water heater, comprising:

   a base (100); and
   an air duct (200) detachably connected to the base (100), wherein the base (100) is formed with a disassembly hole (111) for the air duct (200).

2. The head assembly according to claim 1, further comprising a fan (300) and a fan bracket (400), wherein the fan (300) is installed at the fan bracket (400), the fan bracket (400) being installed at the base (100), and the air duct (200) being detachably installed at the fan bracket (400).

3. The head assembly according to claim 2, wherein the fan bracket (400) comprises:

   a bracket body (410);
   a splice plate (420) fixed to a side of the bracket body (410) facing the air duct (200);
   an avoidance notch (210) is disposed at a top of the air duct (200), and is used to avoid the fan (300) when the air duct (200) is detached and/or installed; and
   in a condition that the air duct (200) is fixed to the bracket body (410), the splice plate (420) is spliced to the avoidance notch (210).

4. The head assembly according to claim 3, first buckles (421) being disposed at two ends of the splice plate (420), two sides of the air duct (200) corresponding to the avoidance notch (210) being provided with second buckles (220), and the first buckles (421) cooperating with the second buckles (220).

5. The head assembly according to claim 4, wherein the fan bracket (400) further comprises:
   a top plate (430) located above the splice plate (420), in a condition that the splice plate (420) being spliced to the avoidance notch (210), the top plate (430) overlappping a splice gap.

6. The head assembly according to claim 2, wherein a connection component (230) is disposed at a side of the air duct (200) facing the fan bracket (400), the connection component (230) being provided with an installation portion (231), and the installation portion (231) being disposed corresponding to a bottom surface of the base (100) for fixing the air duct (200) to the base (100).

7. The head assembly according to claim 6, wherein a column (500) is fixed on the base (100), one of the connection component (230) and the column (500) being provided with an air-duct guide rail (232), and the other one of the connection component (230) and the column (500) being provided with an air-duct guide groove (510), and the air-duct guide rail (232) being slidably disposed in the air-duct guide groove (510).

8. The head assembly according to claim 6, wherein the fan bracket (400) comprises:

   a lower bracket (411); and
   an upper bracket (412) formed with a first splice surface (4121) and a second splice surface (4122), wherein the first splice surface (4121) is attached to an upper end surface of the lower bracket (411), and the second splice surface (4122) being attached to an upper end surface

of the connection component (230).

9. The head assembly according to claim 7, wherein one of the fan bracket (400) and the column (500) is provided with a bracket guide rail (4123), and the other one of the fan bracket (400) and the column (500) being provided with a bracket guide groove, and the bracket guide rail (4123) being slidably disposed in the bracket guide groove.

10. The head assembly according to any one of claims 1 to 9, wherein the base (100) comprises a base body (110) and a base-body cover (120), the disassembly hole (111) being formed at the base body (110), the base-body cover (120) being detachably installed at the disassembly hole (111), and a disassembly notch (112) being formed at the base body (110), and being located above the base-body cover (120).

11. A heat-pump water heater, comprising a head assembly for the heat-pump water heater according to any one of claims 1 to 10.

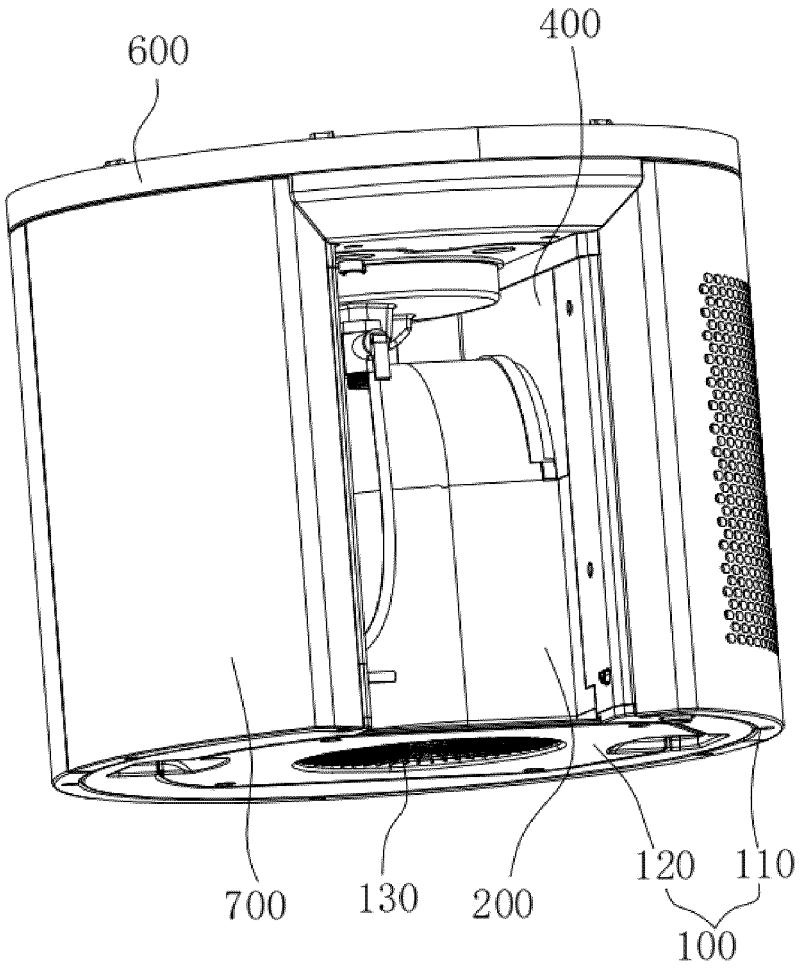

Fig. 1

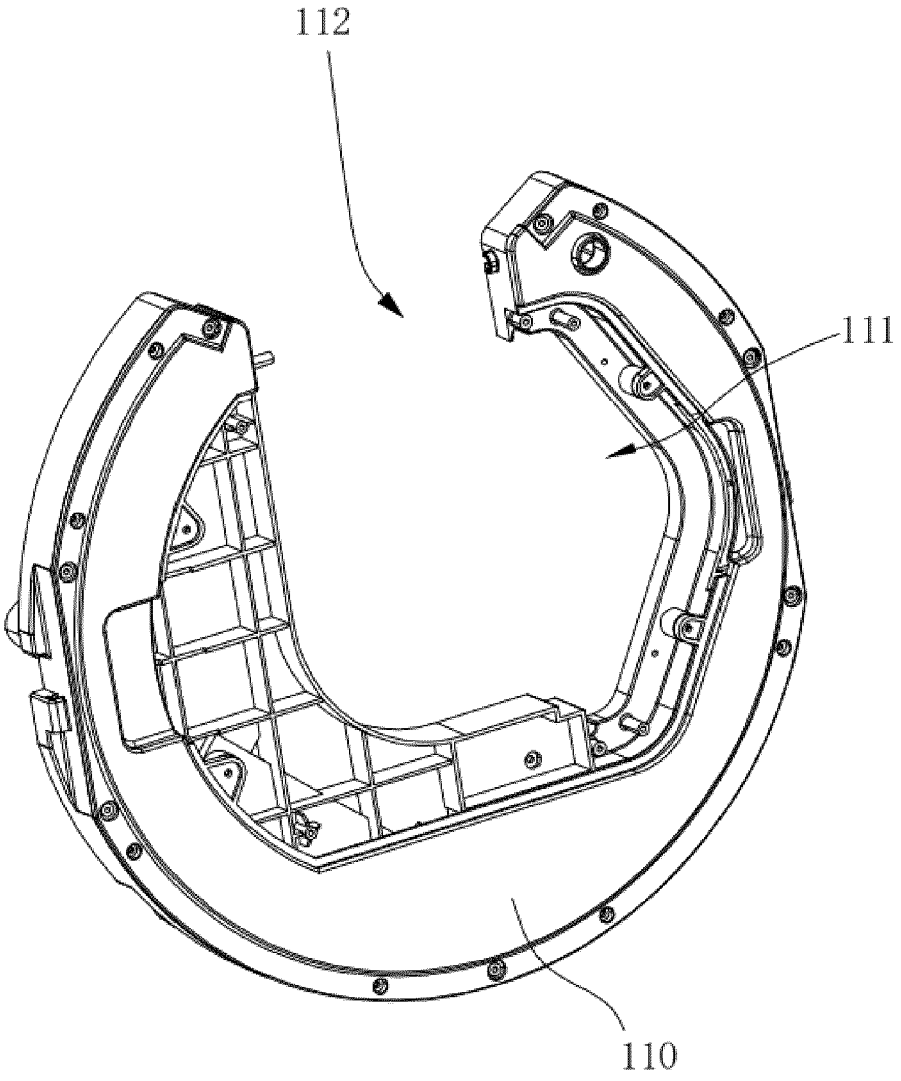

Fig. 2

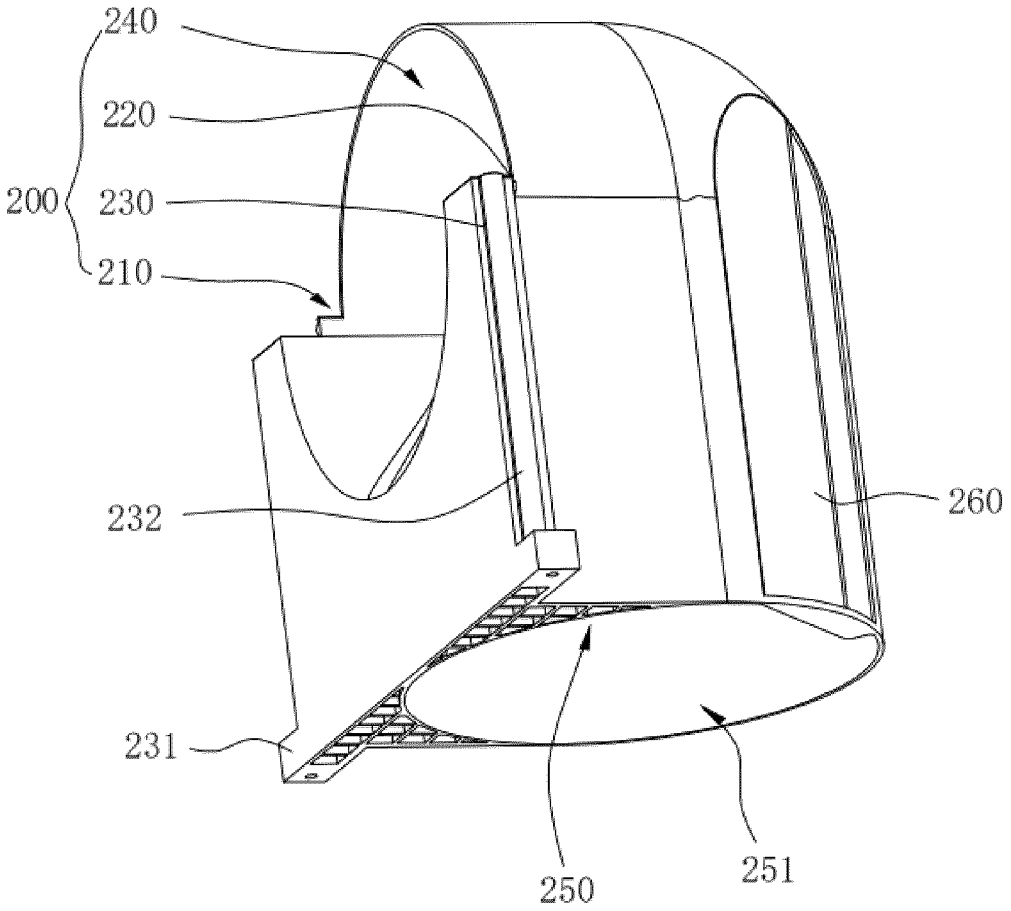

Fig. 3

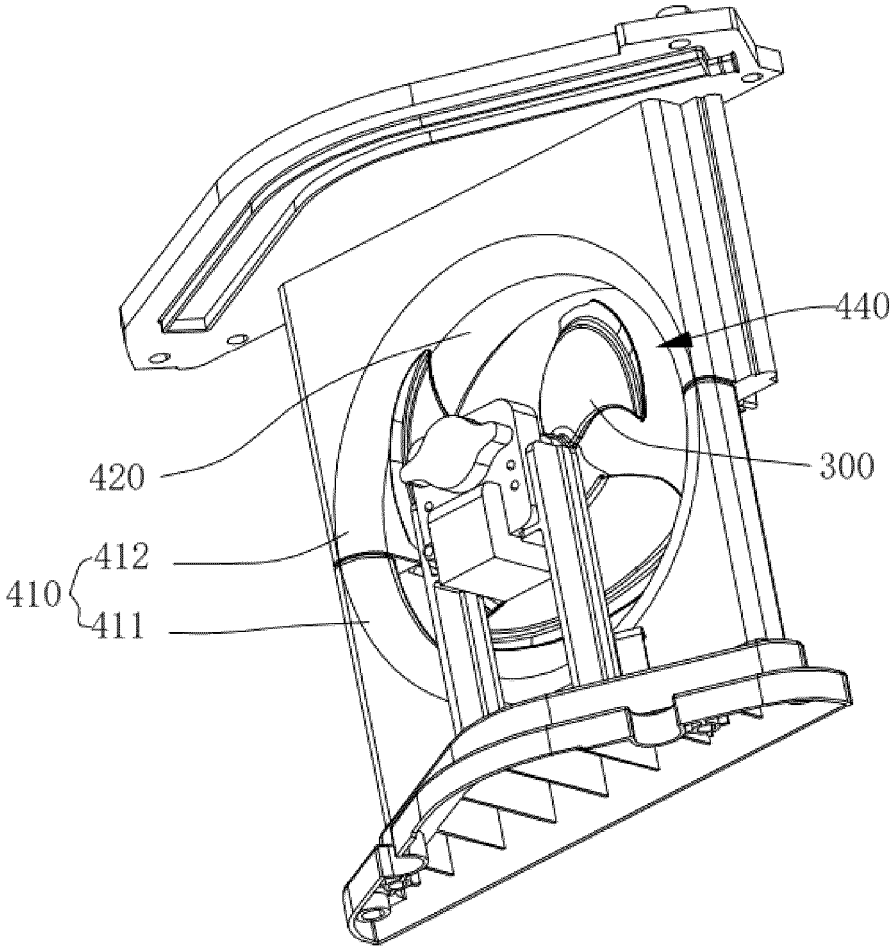

Fig. 4

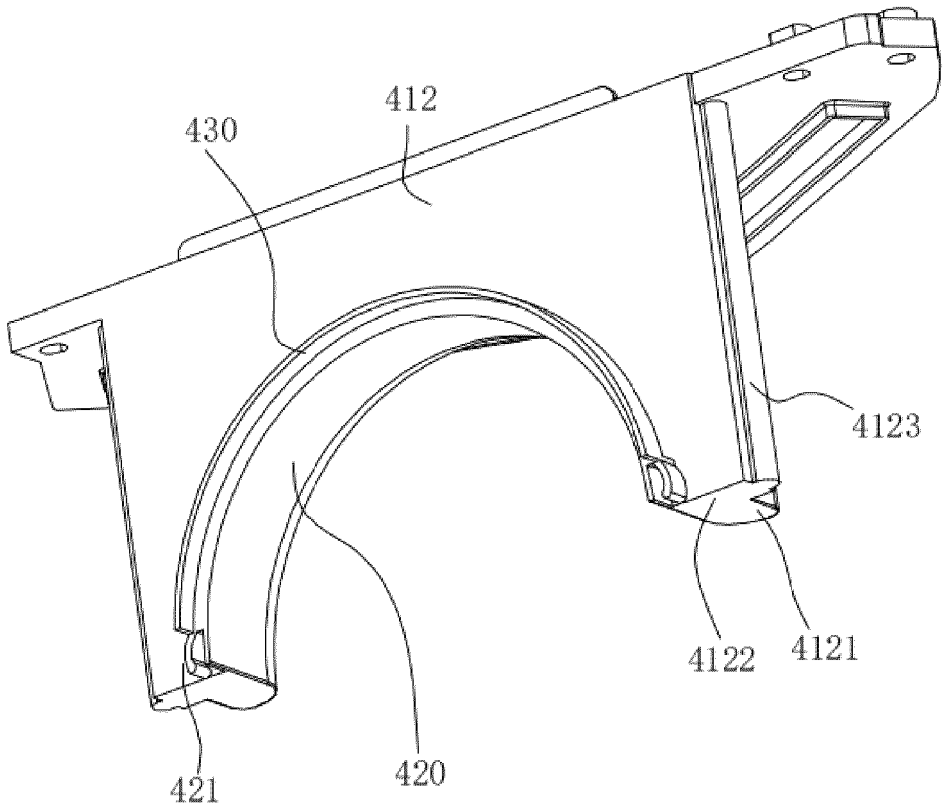

Fig. 5

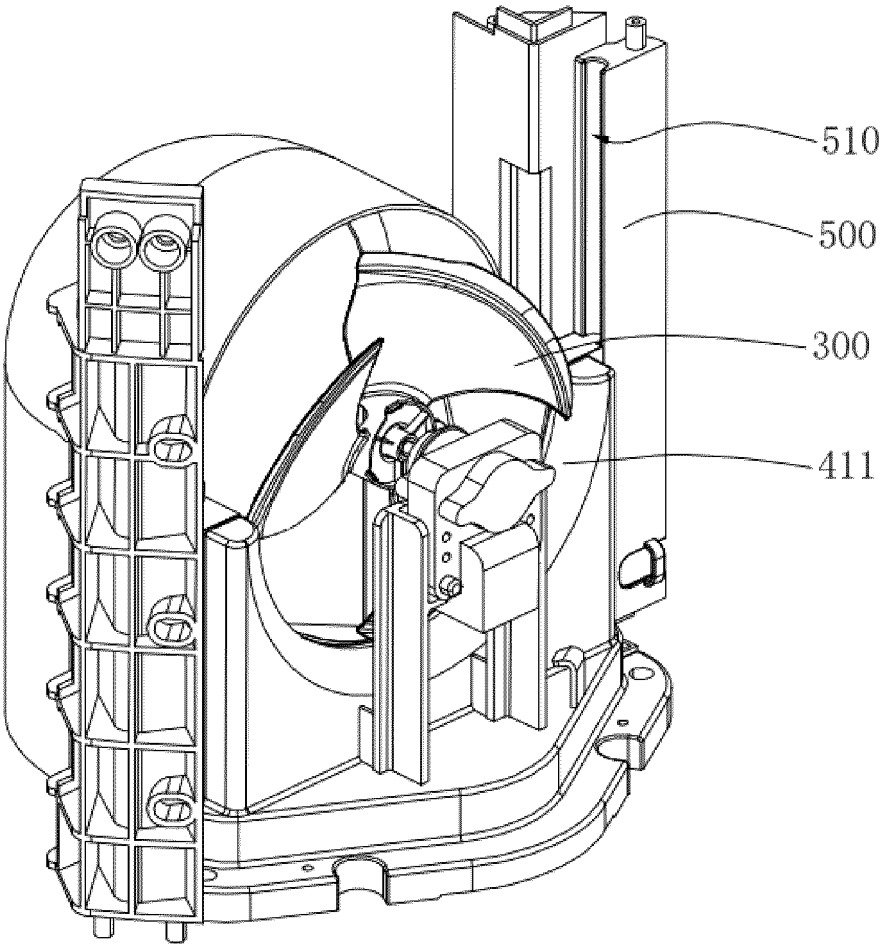

Fig. 6

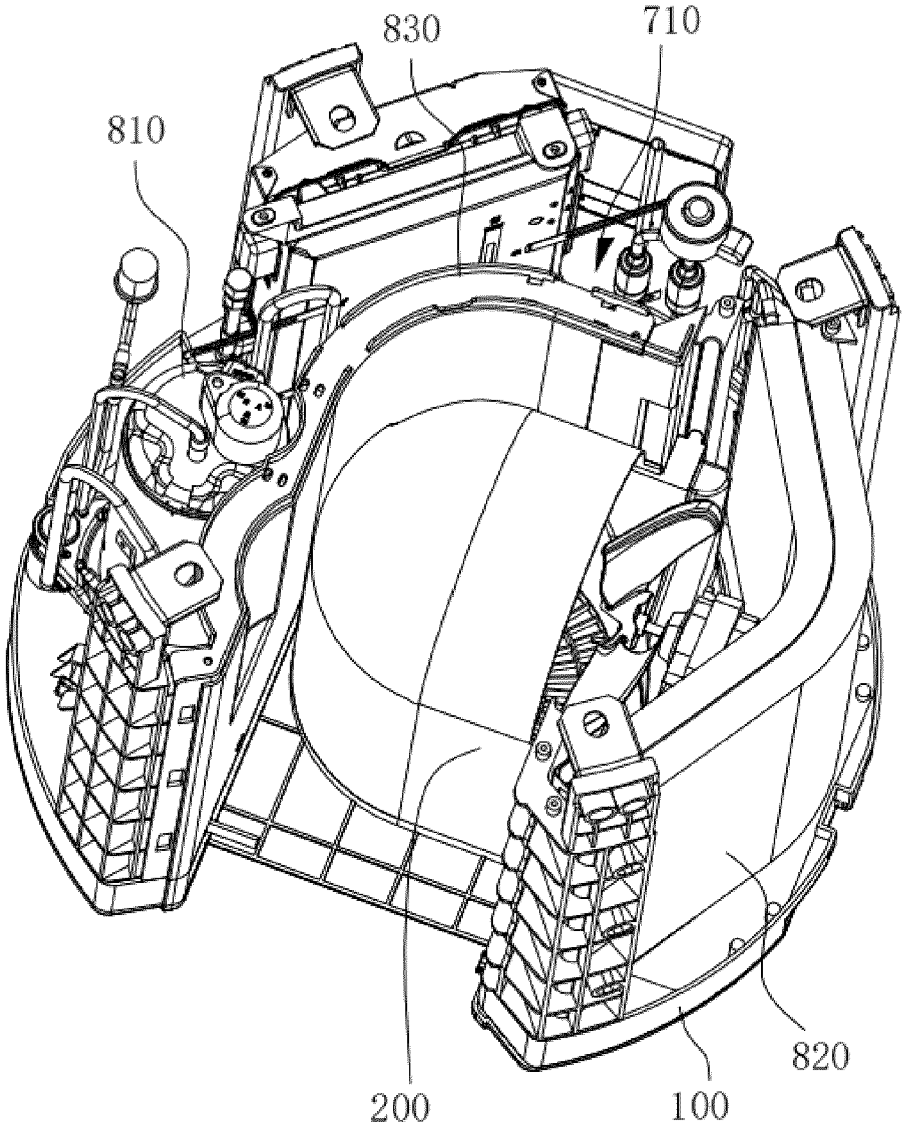

Fig. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 24 21 5284

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 3 940 311 A1 (BOSCH TERMOTECNOLOGIA SA [PT]) 19 January 2022 (2022-01-19) * paragraphs [0023] - [0052]; figures 1-5,8 *	1,11	INV. F24H4/04 F24H9/14 F24H4/02 F24H9/02
X A	WO 2023/232506 A1 (BDR THERMEA GROUP B V [NL]) 7 December 2023 (2023-12-07) * page 2, line 14 - page 6, line 34; figures 1-3 *	1,2,10, 11 3-9	
X,P	CN 118 347 147 A (WUHU MIDEA SMART KITCHEN APPLIANCE MFG CO LTD) 16 July 2024 (2024-07-16) * paragraphs [0001] - [0114]; figures 1-9 *	1-11	

TECHNICAL FIELDS SEARCHED (IPC)

F24H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	11 April 2025	Hoffmann, Stéphanie

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11-04-2025

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 3940311 A1	19-01-2022	EP 3940311 A1	19-01-2022
		PT 116573 A	13-01-2022
WO 2023232506 A1	07-12-2023	EP 4532990 A1	09-04-2025
		EP 4532992 A1	09-04-2025
		EP 4532993 A1	09-04-2025
		EP 4532994 A1	09-04-2025
		EP 4532997 A1	09-04-2025
		EP 4532999 A1	09-04-2025
		WO 2023232501 A1	07-12-2023
		WO 2023232502 A1	07-12-2023
		WO 2023232503 A1	07-12-2023
		WO 2023232504 A1	07-12-2023
		WO 2023232505 A1	07-12-2023
		WO 2023232506 A1	07-12-2023
		WO 2023232508 A1	07-12-2023
		WO 2023232509 A1	07-12-2023
CN 118347147 A	16-07-2024	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82