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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 in particular to a head assembly for a heat-pump water heater and a heat-pump water heater. The heat-pump water heater includes a base, an upper cover and a top column; the upper cover is located above the base, and an installation space is formed between the upper cover and the base; the top column connects the upper cover and the base. The invention discloses the head assembly for the heat-pump water heater and the heat-pump water heater. An installation space is formed between the upper cover and the base, and the installation space is configured for installation of internal components of the head assembly. A top column plays a role of supporting the upper cover, to improve a structural strength of the head assembly and prevent the upper cover from collapsing to crush and damage internal components of the head assembly.

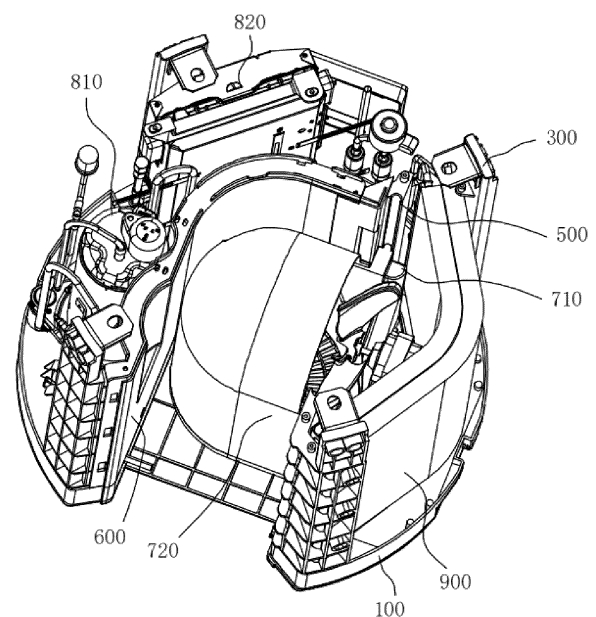


FIG 1

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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 air-source 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. An existing head assembly for the heat-pump water heater comprises a plurality of internal components such as an evaporator, a compressor, and a fan. The head assembly needs to be strong enough to support the internal components.

SUMMARY

[0003] 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 enhance a structural strength.

[0004] According to the invention, a head assembly for a heat-pump water heater is provided, comprising: a base; an upper cover, located above the base, an installation space being formed between the upper cover and the base; and a top column connecting the upper cover and the base.

[0005] Optionally, the number of top columns may be not less than three. At least three top columns are disposed on an edge of the base. The head assembly further comprises an enclosure plate, which is disposed outside of the base to form the installation space among the base, the enclosure plate and the upper cover.

[0006] Optionally, the enclosure plate may be spliced from at least two splice plates, and the splice plate corresponds to at least one of the top columns.

[0007] Optionally, the head assembly may comprise a fix column and internal components. The fix column is disposed on the base, and is suitable for fixing the internal components.

[0008] Optionally, the head assembly may further comprise a partition. At least one end of the partition is connected to the top column or the fix column. The partition is used to divide the installation space into at least two compartments to separate the internal components of the head assembly.

[0009] Optionally, the internal components may com-

prise a fan bracket, an air duct and a compressor. The fix column is disposed on the base. An end of the partition is connected to the top column, and another end of the partition is connected to the fix column. The compartments comprise a first compartment and a second compartment; at least a portion of the fan bracket is fixed between two fix columns. The fan bracket and the air duct are disposed in the first compartment. The air duct is located between the partition and the fan bracket. The compressor is disposed in the second compartment.

[0010] Optionally, the fix column may be provided with a slide groove; and the air duct and/or the fan bracket are/is provided with a slide rail which corresponds to the slide groove.

[0011] Optionally, the internal components may further comprise an evaporator; a clamp gap is formed between the top column and the fix column; an end of the evaporator is disposed at the clamp gap; and the evaporator is connected to the fix column or the top column.

[0012] Optionally, the fix column may have a support wall which is used to abut against side walls of the internal components.

[0013] Optionally, a reinforcement plate may be disposed at a back side of the fix column.

[0014] Optionally, the fix column may be provided with a wire threading hole thereon which is suitable for wires to pass therethrough.

[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] An installation space is formed between the upper cover and the base, and the installation space is used for installation of internal components of the head assembly. A top column plays a role of supporting the upper cover, to improve a structural strength of the head assembly and prevent the upper cover from collapsing to crush and damage internal components of the head assembly.

[0018] Additional aspects and advantages of the invention will be given in part in the following description, and in part 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 accompanying drawings described below are only some embodiments of the invention. For those skilled in the art, other accompanying drawings can be obtained based on these drawings without creative work.

FIG. 1 is an internal structural schematic 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 head assembly for a heat-pump water heater according to an embodiment of the invention;

FIG. 3 is a schematic diagram showing an installation of a top column, a fix column, a partition and a base of a head assembly for a heat-pump water heater according to an embodiment of the invention;

FIG. 4 is a schematic diagram showing an installation of an air duct and a fan bracket and the fix column of the head assembly for the heat-pump water heater according to an embodiment of the invention;

FIG. 5 is a schematic three-dimensional structural diagram of an air duct of a head assembly for a heat-pump water heater according to an embodiment of the invention; and

FIG. 6 is a schematic three-dimensional structural diagram of a fix column of a head assembly for a 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 are as follows:

100, base; 110, installation space; 111, first compartment; 112, second compartment;
200, upper cover;
300, top column;
400, enclosure plate; 410, splice plate;
500, fix column; 510, slide groove; 520, clamp gap;
530, support wall; 540, avoidance notch; 550, reinforcement plate; 560, wire threading hole; 570, stop protrusion;
600, partition; 610, insertion strip; 620, avoidance groove;
710, fan bracket; 720, air duct; 730, slide rail;
810, compressor; 820, electric control box;
900, evaporator.

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, 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 invention can be understood according to specific circumstances.

[0023] 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.

[0024] 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.

[0025] Heat-pump water heaters are also called air-source 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.

[0026] An existing head assembly for the heat-pump water heater comprises a plurality of internal components such as an evaporator, a compressor, and a fan. Therefore, a housing of the head assembly needs sufficient bearing capacity to support the internal components. However, the housing of the head assembly for the heat-pump water heater in the related art is generally composed of an upper cover, a base and an enclosure plate, and the enclosure plate is connected between the upper cover and the base. Since the internal components

of the head assembly are disposed between the upper cover and the base, and the upper cover and the base are only supported by the enclosure plate, the internal components of the head assembly will be crushed and damaged if the enclosure plate deforms. An inner tank of some heat-pump water heaters is disposed above the upper cover. The upper cover and the enclosure plate need to bear a weight of the inner tank. The enclosure plate, after a long period of bearing the weight, is easy to deform, and thus the upper cover is caused to collapse to crush and damage the internal components of the head assembly.

[0027] As shown in FIGs. 1 and 2, a head assembly for a heat-pump water heater is provided according to a first aspect of the invention, comprising a base 100, an upper cover 200 and a top column 300. The upper cover 200 is located above the base 100, and an installation space 110 is formed between the upper cover 200 and the base 100. The top column 300 connects the upper cover 200 to the base 100.

[0028] An installation space 110 is formed between the upper cover 200 and the base 100, and the installation space 110 is used for installing the internal components of the head assembly. The top column 300 plays a role of supporting the upper cover 200 to improve a structural strength of the head assembly and prevent the upper cover 200 from collapsing to crush and damage internal components of the head assembly.

[0029] It can be understood that at least two top columns 300 may be provided, and a plurality of top columns 300 are distributed on the base 100 to support various portions of the upper cover 200 to prevent a local collapse due to local weak strength of the head assembly. The top column 300 may also be provided as one, three or four, and the number of the top columns 300 is not particularly limited here.

[0030] It can be understood that the top column 300 may be disposed at an edge of the base 100 to avoid occupying the installation space 110 for the internal components and affecting installations of the internal components while improving a stability of the head assembly. Optionally, the top columns 300 may provide a support to a portion with relatively weak strength, or to a portion with a larger load, to improve the overall strength. Optionally, the inner tank of the heat-pump water heater refers to a portion that stores hot water inside the water heater. The inner tank of the heat-pump water heater is disposed at the upper cover 200, and the top column 300 is disposed in a middle of the base 100. The top column 300 is connected to the upper cover 200, to improve a bearing capacity of the upper cover 200 to better support the inner tank of the water heater.

[0031] Optionally, the plurality of top columns 300 connecting the upper cover 200 and the base 100 have consistent lengths, to dispose the upper cover 200 and the base 100 in parallel, and thus it is convenient for fixing other components on the base 100 and the upper cover 200. Optionally, the plurality of top columns 300 may have

different lengths to adapt to different structural layouts.

[0032] It is understandable that a cross-section of the top column 300 may be sheet-shaped to avoid affecting the installation of internal components in the installation space 110, or, optionally, the cross-section of the top column 300 may be circular, square and so on.

[0033] Optionally, the number of top columns 300 is not less than three, and at least three top columns 300 are disposed on an edge of the base 100. The head assembly further comprises an enclosure plate 400, which is disposed outside of the base 100 to form an installation space 110 among the base 100, the enclosure plate 400 and the upper cover 200.

[0034] At least three top columns 300 are disposed on the base 100. The three top columns 300 can form a stable structure, to maintain a balance of the upper cover 200, enhance a strength of the head assembly, and prevent the upper cover 200 from collapsing. The top columns 300 are disposed on the edge of the base 100 to avoid occupying the installation space 110 for the internal components and affecting the installation of the internal components. The enclosure plate 400 is disposed outside of the base 100 to form an installation space 110 among the base 100, the enclosure plate 400 and the upper cover 200. The enclosure plate 400 plays a role in protecting the internal components and can also isolate impurities such as dust and water vapor to prevent the impurities such as dust and water vapor from affecting a normal operation of the internal components.

[0035] Optionally, the enclosure plate 400 is cylindrical, and the top column 300 may be an arc-shaped sheet to better fit to the enclosure plate 400.

[0036] As shown in FIG. 2, optionally the enclosure plate 400 is spliced from at least two splice plates 410. The splice plate 410 corresponds to at least one top column 300.

[0037] Since the enclosure plate 400 is spliced from at least two splice plates 410, only the splice plate 410 needs, if an internal component of the head assembly fails, to be detached to check an internal condition of the head assembly without detaching the entire enclosure plate 400, and thus a maintenance time is saved. During maintenance, at least one splice plate 410 may be detached to check the internal condition of the head assembly. If one splice plate 410 is detached, a maintenance port is formed at the enclosure plate 400 for easy maintenance. The splice plate 410, after the maintenance is completed, can be just installed. During the whole maintenance, there is no need to detach other components such as the upper cover 200 or the base 100, nor is there any need to detach entire enclosure plate 400, and thus operations of the maintenance are simple and convenient. Optionally, during the maintenance, according to a specific location of a failed internal component, the splice plate 410 which is located at a corresponding position can be detached for the maintenance without detaching the enclosure plate 400. If a portion of the enclosure plate 400 is damaged, only a

corresponding splice plate 410 needs to be replaced without replacing the entire enclosure plate 400.

[0038] The splice plate 410 corresponds to at least one top column 300, that is, at least one top column 300 is disposed at an inner side of the splice plate 410 to support a corresponding splice plate 410 and prevent the splice plate 410 from deforming. The splice plate 410 may be disposed outside of one or more top columns 300, and the splice plate 410 may also be disposed between two top columns 300, which are not limited here.

[0039] As shown in FIG. 1, the head assembly for the heat-pump water heater according to embodiments of the invention further comprises a fix column 500 and internal components. The fix column 500 is disposed on the base 100, and is suitable for fixing the internal components.

[0040] It can be understood that the fix column 500 is disposed on the base 100 to fix the internal components of the head assembly to provide better support and prevent the internal components from loosening or tilting. The fix column 500 may be connected to the upper cover 200 to support the upper cover 200. Optionally, the fix column 500 may not be connected to the upper cover 200, and only needs to be fixed on the base 100.

[0041] As shown in FIG.s 1 and 3, the head assembly for the heat-pump water heater according to embodiments of the invention further comprises a partition 600. At least one end of the partition 600 is connected to the top column 300 or the fix column 500. The partition 600 is used to divide the installation space 110 into at least two compartments to separate the internal components of the head assembly.

[0042] The partition 600 can be provided to divide the installation space 110 into at least two compartments to separate the internal components of the head assembly, which is advantageous to an internal layout of the installation space 110 and prevents the various components from interfering with each other. An end of the partition 600 may be connected to the top column 300 or the fix column 500. The fix column 500 or the top column 300 can play a role of fixing the partition 600. The partition 600 may be fixed at an end or two ends. A top and bottom of the partition 600 may be respectively provided with an insertion strip 610, and slots which correspond to the insertion strips 610 are disposed on the upper cover 200 and the base 100. With a cooperation of the insertion strip 610 and the slot, the partition 600 is fixed on the base 100. The partition 600 may be curved to facilitate the installation of internal components in the installation space 110, which is conducive to arrangements of various components. With the curved shape of the partition 600 itself, the installation space 110 may be divided into two, three or four compartments to separate the various internal components. Optionally, the partition 600 may also be a straight plate to divide the installation space 110 into two compartments. Optionally, one partition 600 may be provided, and it is not ruled out that a plurality of partitions 600 are provided to better divide the

installation space 110. The embodiment of the invention does not impose any particular limitation on the number and shape of the partitions 600.

[0043] Optionally, the internal components comprise a fan bracket 710, an air duct 720 and a compressor 810, and the fix column 500 is disposed on the base 100. An end of the partition 600 is connected to the top column 300, and another end of the partition 600 is connected to the fix column 500. The compartment comprises a first compartment 111 and a second compartment 112. At least a portion of the fan bracket 710 is fixed between two fix columns 500. The fan bracket 710 and the air duct 720 are disposed in the first compartment 111. The air duct 720 is located between the partition 600 and the fan bracket 710. The compressor 810 is disposed in the second compartment 112.

[0044] The fan bracket 710 is installed with a fan, and the fan at least comprises fan blades. Since the fan will vibrate when working, at least a portion of the fan bracket 710 is fixed between two fix columns 500, and thus the fan bracket 710 can be supported at two sides thereof to fix the fan bracket 710 and prevent the fan bracket 710 from collapsing.

[0045] There is no need for a direct connection between the air duct 720 and the compressor 810, and an air supply work of the air duct 720 is likely to affect a normal operation of the compressor 810. If the air duct 720 is damaged, a direct impact will be imposed on operations of the compressor 810. The fan bracket 710 and the air duct 720 are disposed in the first compartment 111, and the compressor 810 is disposed in the second compartment 112, and thus the compressor 810 can be isolated from the air duct 720 and the fan bracket 710 to avoid mutual interference. The air duct 720 is located between the partition 600 and the fan bracket 710, which is conducive to a separate disassembly and assembly of the air duct 720 and prevents the disassembly and assembly of the air duct 720 from affecting operations of other components.

[0046] As shown in FIG. 1, optionally, the internal components further comprise an electric control box 820. An avoidance groove may be disposed on the partition 600 to avoid the electric control box 820 and other components.

[0047] As shown in FIG. 4 and FIG. 5, optionally, the fix column 500 is provided with a slide groove 510. At least one of the air duct 720 and the fan bracket 710 is provided with a slide rail 730 which corresponds to the slide groove 510.

[0048] A cooperation between the slide rail 730 and the slide groove 510 facilitates the air duct 720 or the fan bracket 710 to be fixed between two fix columns 500. During disassembly and assembly, the air duct 720 or the fan bracket 710 can be pulled along the slide groove 510 to facilitate the disassembly and installation.

[0049] As shown in FIG.s 1 and 3, optionally, the internal components further comprise an evaporator 900. A clamp gap 520 is formed between the top column 300 and

the fix column 500. An end of the evaporator 900 is disposed at the clamp gap 520. The evaporator 900 is connected to the fix column 500 or the top column 300.

[0050] The clamp gap 520 which is formed between the top column 300 and the fix column 500 serves to fix the evaporator 900. The evaporator 900 is connected to the fix column 500 or the top column 300 to fix the evaporator 900. Side plates may be disposed at two sides of the evaporator 900, and a connection plate may be disposed at at least one side of the side plate. The connection plate is used to connect the fix column 500 or the top column 300. The connection plates may be disposed at two sides of the side plate to connect the fix column 500 and the top column 300. The side plates may be threadedly connected to the fix column 500 or the top column 300. Through holes may be disposed on the side plate to allow heat exchange tubes of the evaporator 900 to pass through.

[0051] As shown in FIG. 6, optionally, the fix column 500 has a support wall 530 which is used to abut against side walls of the internal components to provide a further support.

[0052] Optionally, as shown in FIG. 1, at least a portion of the air duct 720 and at least a portion of the fan bracket 710 are fixed between same two fix columns 500. While the air duct 720 and the fan bracket 710 are fixed, relative positions of the air duct 720 and the fan bracket 710 can be kept unchanged, which is advantageous for the fan on the fan bracket 710 to deliver air into the air duct 720. The air duct 720 and the fan bracket 710 may be directly connected. A first buckle may be disposed at two sides of the air duct 720, and a second buckle may be disposed at two sides of the air duct 720 which correspond to the avoidance notch 540. The first buckle and the second buckle cooperate with each other. The cooperation between the first buckle and the second buckle facilitates an assembly and detachment of the air duct 720 and the fan bracket 710. An avoidance notch 540 may be disposed on the fix column 500 to avoid the first buckle or the second buckle; or, optionally, the air duct 720 and the fan bracket 710 may also be indirectly connected through the fix column 500. As shown in FIG.s 1 and 6, the support wall 530 comprises a first wall and a second wall. The first wall supports a side wall of the fan bracket 710, and the second wall supports a side wall of the air duct 720, to increase stabilities of the air duct 720 and the fan bracket 710.

[0053] As shown in FIG. 6, optionally, a reinforcement plate 550 is disposed at a back side of the fix column 500 to enhance a strength of the fix column 500. A plurality of reinforcement plates 550 may be provided to further improve the strength of the fix column 500. The reinforcement plate 550 may be disposed horizontally, and the reinforcement plate 550 connects the first wall and the second wall to support the first wall and the second wall, to improve a support capacity of the first wall and the second wall. Optionally, the reinforcement plate 550 may also be disposed vertically.

[0054] As shown in FIG. 6, optionally, the fix column 500 is provided with a wire threading hole 560 thereon which is suitable for wires to pass therethrough.

[0055] As shown in FIG. 6, optionally, the wire threading hole 560 may be disposed on the fix column 500 which is connected to an end of the fan bracket 710, and the wires of the fan can pass through the wire threading hole 560 to prevent the wires from contacting with the evaporator 900 which may cause a safety accident. A stop protrusion 570 may be disposed at a side of the wire threading hole 560 close to the evaporator 900 to further guide a routing of the wires. The stop protrusion 570 may be an arc piece or a protrusion block and so on.

[0056] A heat-pump water heater is also provided according to a second aspect of the invention, comprising a head assembly for a heat-pump water heater.

[0057] 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);
 - an upper cover (200) located above the base (100), an installation space (110) being formed between the upper cover (200) and the base (100); and
 - a top column (300) connecting the upper cover (200) and the base (100).
2. The head assembly for the heat-pump water heater according to claim 1, wherein the number of top columns (300) is not less than three, the at least three top columns (300) being disposed at an edge of the base (100), and the head assembly further comprising an enclosure plate (400), wherein the enclosure plate (400) is disposed outside of the base (100) to form the installation space (110) among the base (100), the enclosure plate (400) and the upper cover (200).
3. The head assembly for the heat-pump water heater according to claim 2, wherein the enclosure plate (400) is spliced from at least two splice plates (410), and the splice plate (410) corresponds to at least one of the top columns (300).
4. The head assembly for the heat-pump water heater according to any one of claims 1 to 3, wherein the head assembly comprises a fix column (500) and

internal components, and the fix column (500) being disposed on the base (100), and being suitable for fixing the internal components.

5. The head assembly for the heat-pump water heater according to claim 4, further comprising a partition (600), wherein at least one end of the partition (600) is connected to the top column (300) or the fix column (500), and the partition (600) being used to divide the installation space (110) into at least two compartments to separate the internal components of the head assembly. 5
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6. The head assembly for the heat-pump water heater according to claim 5, wherein the internal components comprises a fan bracket (710), an air duct (720) and a compressor (810), the fix column (500) being disposed on the base (100), an end of the partition (600) being connected to the top column (300), and another end of the partition (600) being connected to the fix column (500), the compartments comprising a first compartment (111) and a second compartment (112), at least a portion of the fan bracket (710) being fixed between two fix columns (500), the fan bracket (710) and the air duct (720) being disposed in the first compartment (111), the air duct (720) being located between the partition (600) and the fan bracket (710), and the compressor (810) being disposed in the second compartment (112). 15
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7. The head assembly for the heat-pump water heater according to claim 6, wherein, the fix column (500) is provided with a slide groove (510) and the air duct (720) and/or the fan bracket (710) being provided with a slide rail (730) which corresponds to the slide groove (510). 35
8. The head assembly for the heat-pump water heater according to any one of claims 4 to 7, wherein the internal components further comprising an evaporator (900), a clamp gap (520) being formed between the top column (300) and the fix column (500), an end of the evaporator (900) is disposed at the clamp gap (520), and the evaporator (900) being connected to the fix column (500) or the top column (300). 40
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9. The head assembly for the heat-pump water heater to any one of claims 4 to 8, wherein the fix column (500) has a support wall (530), wherein the support wall (530) is used to abut against side walls of the internal components; and/or 50
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a reinforcement plate (550) is disposed at a back side of the fix column (500); and/or
the fix column (500) is provided with a wire threading hole (560) thereon, wherein the wire threading hole (560) is suitable for wires to pass therethrough.

10. A heat-pump water heater, comprising a head assembly for the heat-pump water heater according to any one of claims 1 to 9.

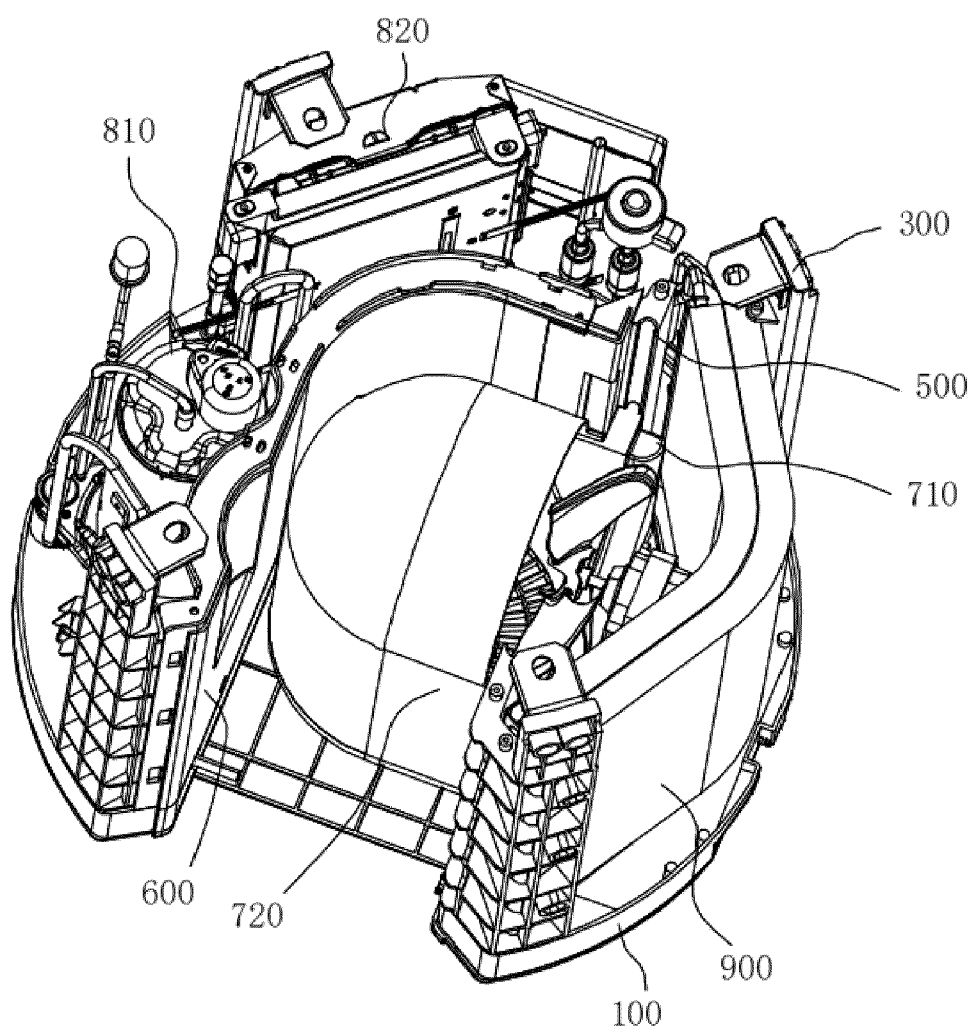


FIG 1

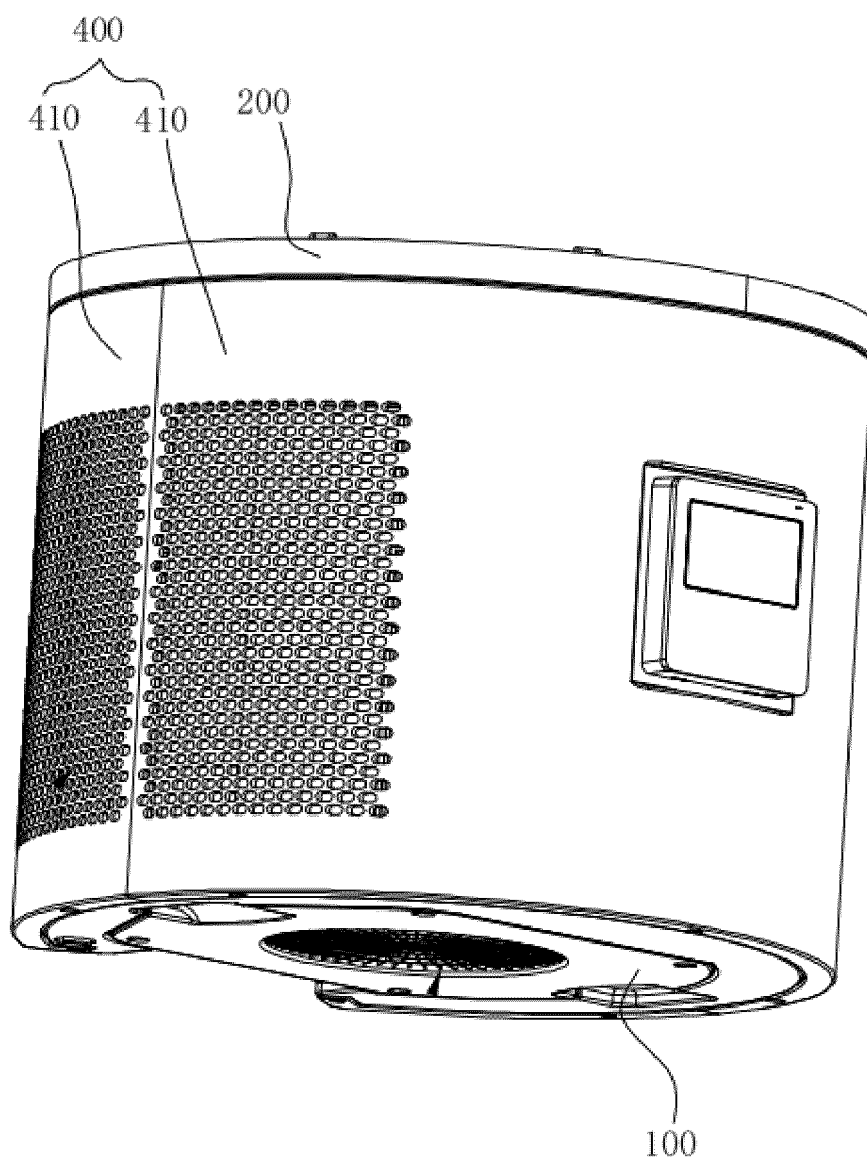


FIG 2

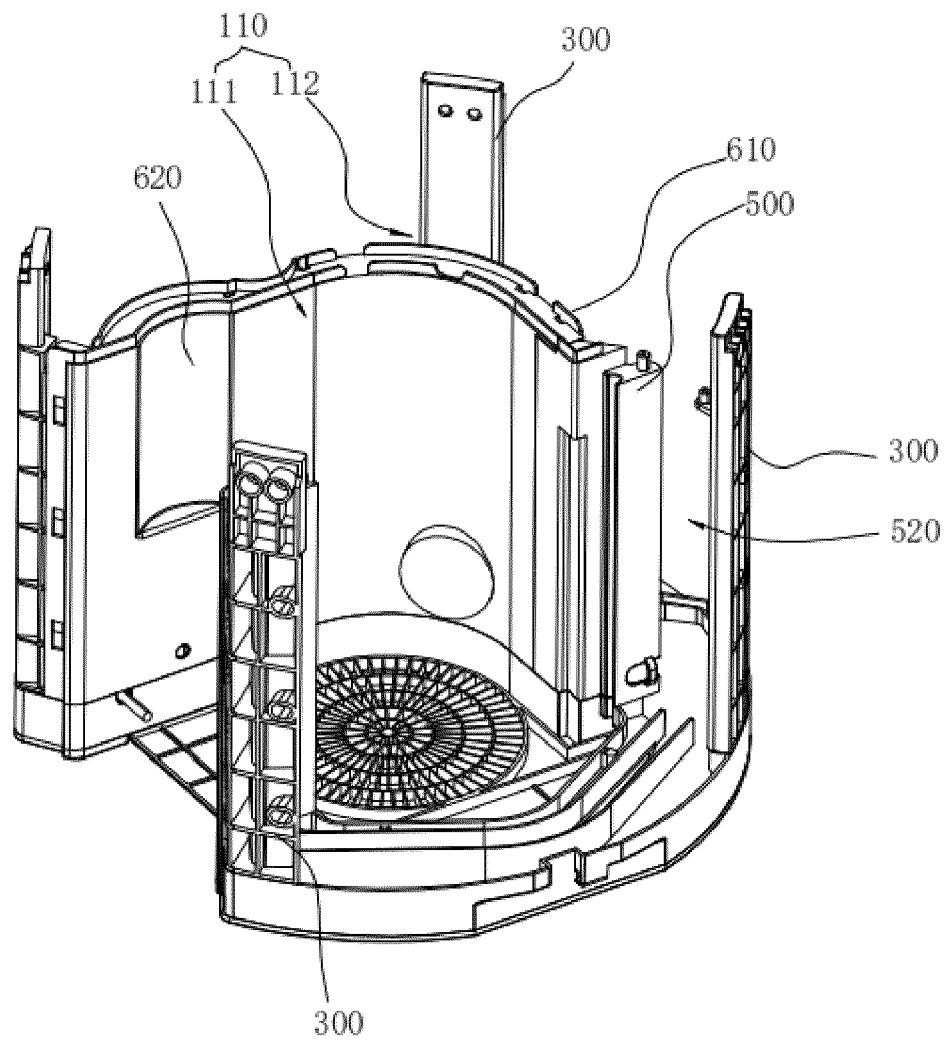


FIG 3

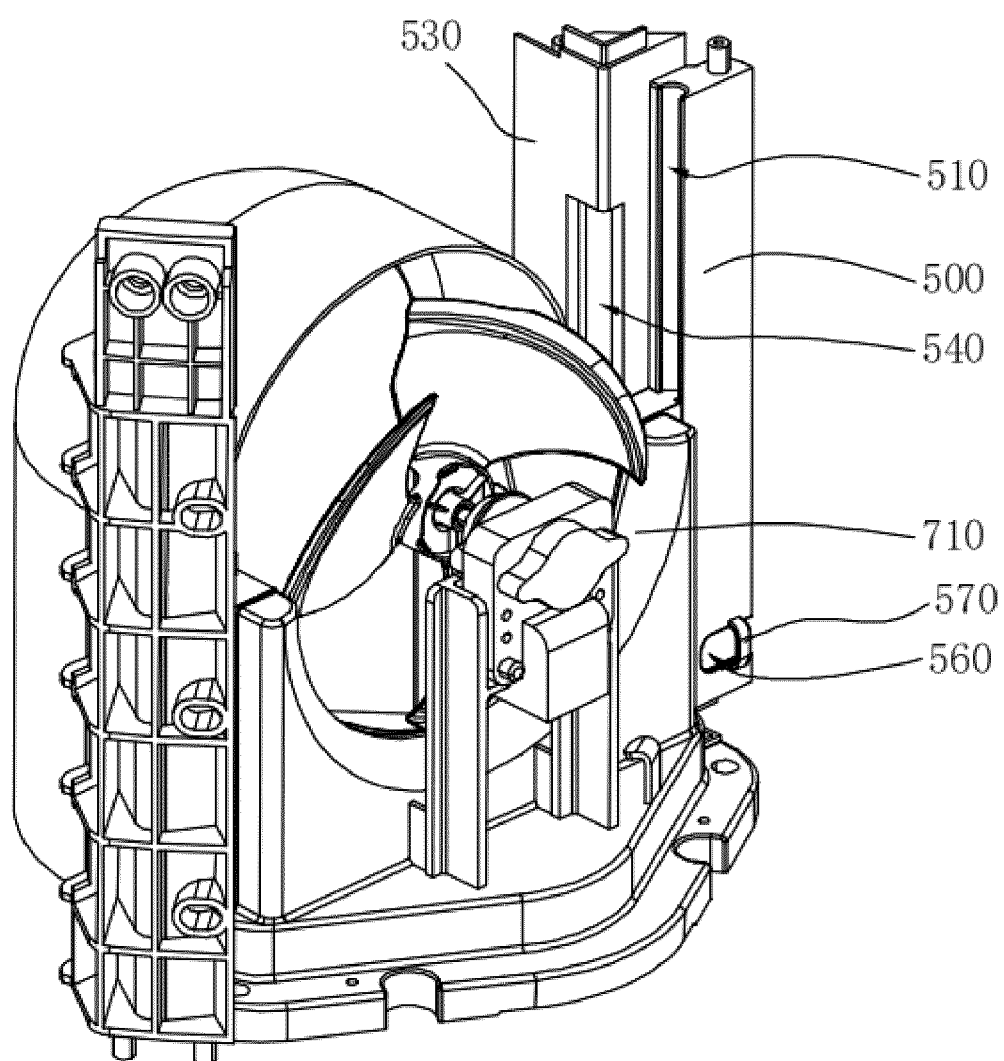


FIG 4

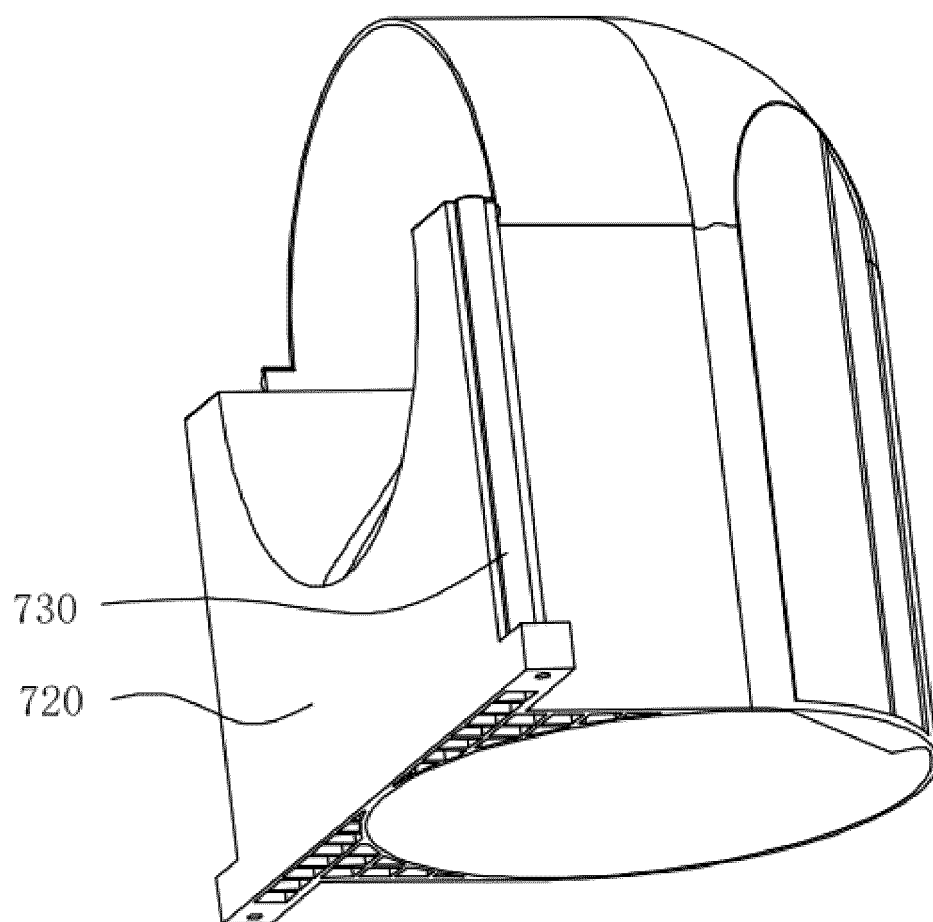


FIG 5

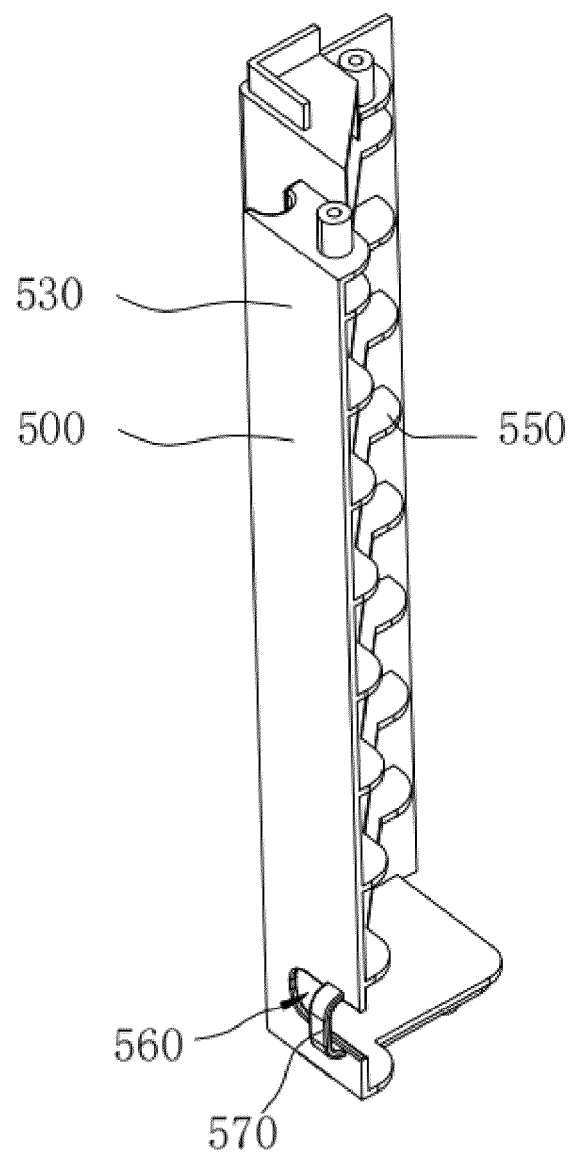


FIG 6



EUROPEAN SEARCH REPORT

Application Number

EP 24 21 6324

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 3 462 106 A1 (DAIKIN IND LTD [JP]; DAIKIN EUROPE NV [BE]) 3 April 2019 (2019-04-03) * paragraphs [0036] - [0093]; figures 1,3,9,12 *	1-10	INV. F24H4/02 F24H4/04 F24H9/02
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Place of search		Date of completion of the search	Examiner
Munich		11 April 2025	Hoffmann, Stéphanie
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X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			
T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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