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(54) **HEATING ASSEMBLY AND AIR CONDITIONER HAVING SAME**

(57) A heating assembly (100) includes a refrigerant heat exchanger (1), an electromagnetic heating body subassembly (2), a heat transfer plate (3) and a supporting plate (4), the refrigerant heat exchanger (1) having a refrigerant passage defined therein, the electromagnetic heating body subassembly (2) being provided on a side of the refrigerant heat exchanger (1), the electromagnetic heating body subassembly (1) including an electromagnetic coil disk (21) and being capable of heating a refrigerant in the refrigerant passage, the heat transfer plate (3) being provided between the refrigerant heat exchanger (1) and the electromagnetic heating body subassembly (2), and the supporting plate (4) being provided at another side of the refrigerant heat exchanger (1).

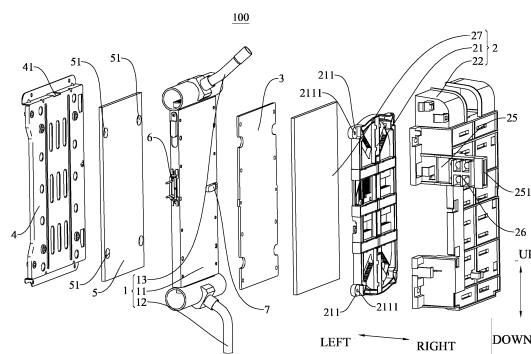


FIG. 1

Description

CROSS-REFERENCE TO RELATED APPLICATION

[0001] The present application is based on and claims priority to Chinese Patent Application Serial Nos. 201920468934.6, 201910277489.X and 201920476549.6, filed on April 08, 2019, the entire content of which is incorporated herein by reference.

TECHNICAL FIELD

[0002] The present application relates to the field of household appliances, and particularly to a heating assembly and an air conditioner having the same.

BACKGROUND

[0003] In a low-temperature environment, most air conditioners, due to their system limitations, are unable to increase heat of a refrigerant quickly in a starting stage and heating speed is low, and indoor temperature is unable to be increased quickly, which cannot satisfy the requirements of users. In a related art, an electric heating method is used to directly heat the refrigerant to realize a rapid indoor temperature rise. Specifically, a heating wire is mounted in a copper tube to directly heat the refrigerant, so as to improve heating efficiency of the refrigerant; however, the copper tube of this structure has a complicated molding manufacturing technology, and a junction of an electric heating portion and the copper tube has a poor sealing performance and a poor reliability, and the electric heating portion is prone to dry heating, and an electric heating tube is in direct contact with the refrigerant, such that electricity is not completely isolated from the refrigerant, and electrical safety problems such as the dry heating of the electric heating portion, a line breakdown, or the like, are unable to be avoided.

SUMMARY

[0004] In view of this, it is desirable to provide a heating assembly in an embodiment of the present application, which has a high mounting and dismounting efficiency, a good heating effect, a low production cost, a high safety and a good heat transfer effect.

[0005] The present application further provides an air conditioner having a heating assembly.

[0006] A heating assembly according to an embodiment of a first aspect of the present application includes a refrigerant heat exchanger, an electromagnetic heating body subassembly, a heat transfer plate and a supporting plate. The refrigerant heat exchanger defines a refrigerant passage therein. The electromagnetic heating body subassembly is provided at a side of the refrigerant heat exchanger, and the electromagnetic heating body subassembly includes an electromagnetic coil disk and is capable of heating a refrigerant in the refrigerant pas-

sage. The heat transfer plate is provided between the refrigerant heat exchanger and the electromagnetic heating body subassembly, and the supporting plate is provided at another side of the refrigerant heat exchanger.

[0007] In the heating assembly according to the embodiment of the present application, the supporting plate may facilitate rapid disassembly and assembly of the heating assembly and an external apparatus, with a high mounting and dismounting efficiency. By energizing the electromagnetic coil disk, the electromagnetic coil disk may generate heat to heat the refrigerant in the refrigerant heat exchanger, and therefore, a heating effect is good; meanwhile, the electromagnetic coil disk has a simple structure, which facilitates production and manufacture and may save a production cost; the electromagnetic coil disk does not come into contact with the refrigerant, and therefore, a safety is high, and the refrigerant has a good sealing effect. The heat generated by the electromagnetic coil disk may be better transferred to the refrigerant through the heat transfer plate, so as to quickly increase a temperature of the refrigerant, which facilitates the refrigerant to rapidly heat a downstream position, with a good heat transfer effect.

[0008] In addition, the heating assembly according to the present application may also have the following additional technical features.

[0009] In the present application, the electromagnetic heating body subassembly further includes a coil disk outer cover, which defines a mounting groove therein with an open end, the electromagnetic coil disk is provided in the mounting groove, and the electromagnetic coil disk is exposed from the mounting groove and provided towards the heat transfer plate.

[0010] In the present application, one of the electromagnetic coil disk and the mounting groove defines a through hole, the other is provided with a fixing column, and the electromagnetic coil disk is connected with the fixing column by a first connecting member passing through the through hole.

[0011] In the present application, a plurality of lugs are provided in a circumferential direction of the electromagnetic coil disk, and each lug defines the through hole, and the mounting groove is provided therein with a plurality of fixing columns in one-to-one correspondence to the plurality of lugs.

[0012] In the present application, the electromagnetic coil disk is approximately rectangular, four corners of the electromagnetic coil disk are each provided with the lug, and corresponding positions in the mounting groove are provided with four fixing columns.

[0013] In the present application, the electromagnetic heating body subassembly further includes a first heat insulation member provided in the mounting groove and arranged closer to the heat transfer plate relative to the electromagnetic coil disk.

[0014] In the present application, the mounting groove is provided therein with a limiting structure to limit a position of the first heat insulation member in the mounting

groove.

[0015] In the present application, the limiting structure includes a first limiting member and a second limiting member provided at an inner side wall of the mounting groove at intervals in a depth direction of the mounting groove, and an edge of the first heat insulation member is positioned between the first limiting member and the second limiting member.

[0016] In the present application, a plurality of first limiting members and a plurality of second limiting members are provided and arranged at intervals at the inner side wall of the mounting groove.

[0017] In the present application, the limiting structure includes a third limiting member provided close to at least one side of the coil disk outer cover in a length direction, and at least one end of the first heat insulation member in a length direction is fitted with the third limiting member.

[0018] In the present application, the coil disk outer cover the coil disk outer cover is provided with a wiring terminal, and an electromagnetic coil leading-out end of the electromagnetic coil disk is connected to the wiring terminal.

[0019] In the present application, the coil disk outer cover defines a positioning groove, the wiring terminal is positioned in the positioning groove, and the wiring terminal is fixed in the positioning groove by a second connecting member.

[0020] In the present application, the coil disk outer cover is provided with an extension portion, the extension portion is provided on an outer wall of the coil disk outer cover and extends in a direction away from the refrigerant heat exchanger, and the positioning groove is defined in the extension portion.

[0021] In the present application, the heat transfer plate and the electromagnetic coil disk define a preset gap H therebetween, and the preset gap H ranges from 1 mm to 20 mm.

[0022] In the present application, an overlapping area of projections of the heat transfer plate and the electromagnetic coil disk are greater than half of an area of the electromagnetic coil disk.

[0023] In the present application, the heat transfer plate is detachably connected with the refrigerant heat exchanger.

[0024] In the present application, the heat transfer plate and the refrigerant heat exchanger are provided with solder or a soldering flake therebetween and connected by welding.

[0025] In the present application, the heat transfer plate and the refrigerant heat exchanger are provided with a heat conducting agent layer therebetween.

[0026] In the present application, the refrigerant heat exchanger and the supporting plate are further provided with a second heat insulation member therebetween, and the second heat insulation member is tightly pressed between the refrigerant heat exchanger and the supporting plate.

[0027] In the present application, the second heat in-

sulation member defines a clearance hole, the refrigerant heat exchanger is connected to the supporting plate through a third connecting member, and the third connecting member passes through the clearance hole.

[0028] In the present application, the supporting plate defines a snapping groove, the refrigerant heat exchanger is provided with a snapping hook, and the snapping hook is fitted in the snapping groove.

[0029] In the present application, the heating assembly further includes a fuse and/or a temperature sensor, the fuse being provided on a side wall surface of the refrigerant heat exchanger with greater refrigerant flow, the fuse being capable of disconnecting an electric connection between the electromagnetic coil disk and a main circuit, the temperature sensor being provided on the refrigerant heat exchanger or the heat transfer plate to detect a temperature of the refrigerant heat exchanger or the heat transfer plate, and the temperature sensor being electrically connected with the electromagnetic coil disk to control a working state of the electromagnetic coil disk.

[0030] In the present application, the temperature sensor is provided on the heat transfer plate, and on projection of the electromagnetic coil disk towards the heat transfer plate, the temperature sensor is located in an electromagnetic blind region or a high magnetic field intensity region of the electromagnetic coil disk; the electromagnetic coil disk includes a disk body and an electromagnetic coil provided on the disk body, the electromagnetic coil is annular, a middle of the electromagnetic coil defines a non-winding region, the non-winding region forms the electromagnetic blind region, a preset loop wire is provided between an outer ring and an inner ring of the electromagnetic coil, a distance between the preset loop wire and the outer ring is equal to a distance between the preset loop wire and the inner ring, the high magnetic field intensity region is defined by a region between the outer ring of the electromagnetic coil and the preset loop wire, and a position of a temperature detection member on the heat transfer plate corresponds to the region between the outer ring of the electromagnetic coil and the preset loop wire.

[0031] In the present application, the refrigerant heat exchanger includes a microchannel heat exchanger, an inlet pipe and a discharge pipe, the microchannel heat exchanger defines the refrigerant passage therein, the inlet pipe is provided at an end of the microchannel heat exchanger in a length direction and in communication with the refrigerant passage, and the discharge pipe is provided at the other end of the microchannel heat exchanger in the length direction and in communication with the refrigerant passage.

[0032] The present application further provides an air conditioner having the heating assembly according to the above-mentioned embodiment.

[0033] An air conditioner according to an embodiment of a second aspect of the present application includes a housing, a compressor, a fan, an outdoor heat exchanger and a heating assembly, the housing being internally pro-

vided with a middle partition, the middle partition dividing an internal space of the housing into a first cavity and a second cavity, the compressor being provided in the first cavity, the fan being provided in the second cavity, at least a part of the heat exchanger being arranged corresponding to the fan, the heating assembly being provided on the middle partition, and the refrigerant passage being in communication with a discharge port of the compressor.

[0034] In the air conditioner according to the embodiment of the present application, by providing the heating assembly according to the above-mentioned embodiment, the refrigerant may be rapidly heated when flowing to a condenser from the compressor, and heat of the refrigerant may be increased rapidly, thereby quickly heating an indoor space, resulting in a good heating effect and meeting use requirements of users.

[0035] Additional aspects and advantages of the present application will be given in part in the following descriptions, become apparent in part from the following descriptions, or be learned from the practice of the embodiments of the present application.

BRIEF DESCRIPTION OF THE DRAWINGS

[0036]

FIG. 1 is an exploded view of a heating assembly according to an embodiment of the present application from one angle;

FIG. 2 is an exploded view of the heating assembly according to the embodiment of the present application from another angle;

FIG. 3 is an exploded view of an electromagnetic coil disk of the heating assembly according to the embodiment of the present application;

FIG. 4 is a front view of the heating assembly according to the embodiment of the present application;

FIG. 5 is a left view of the heating assembly according to the embodiment of the present application;

FIG. 6 is a right view of the heating assembly according to the embodiment of the present application;

FIG. 7 is a bottom view of the heating assembly according to the embodiment of the present application;

FIG. 8 is a top view of the heating assembly according to the embodiment of the present application; and

FIG. 9 is a schematic structural diagram of an air conditioner according to an embodiment of the present application.

REFERENCE NUMERALS

[0037]

100: heating assembly;

1: refrigerant heat exchanger; 11: microchannel heat exchanger; 12: inlet pipe; 13: discharge pipe; 14: snapping hook;
2: electromagnetic heating body subassembly; 21: electromagnetic coil disk; 211: lug; 2111: through hole; 212: electromagnetic coil leading-out end; 213: electromagnetic coil; 22: coil disk outer cover; 23: mounting groove; 231: fixing column; 24: limiting structure; 241: first limiting member; 242: second limiting member; 243: third limiting member; 25: extension portion; 251: positioning groove; 26: wiring terminal; 27: first heat insulation member;
3: heat transfer plate; 4: supporting plate; 41: snapping groove;
5: second heat insulation member; 51: clearance hole;
6: fuse;
7: temperature sensor;
1000: air conditioner; 200: housing; 300: middle partition; 400: compressor; 500: fan; 600: outdoor heat exchanger.

DETAILED DESCRIPTION

[0038] Reference will be made in detail to embodiments of the present application, and the examples of the embodiments are illustrated in the drawings, wherein the same or similar elements and the elements having same or similar functions are denoted by like reference numerals throughout the descriptions. The embodiments described herein with reference to drawings are illustrative and are merely used to explain the present application. The embodiments shall not be construed to limit the present application.

[0039] In descriptions of the present application, it should be understood that the directions or positional relationships indicated by terms "upper", "lower", "left", "right" etc. are based on orientations or positional relationships shown in the accompanying drawings, and they are used only for describing the present application and for simplicity of description, but do not indicate or imply that an indicated device or element must have a specific orientation or be constructed and operated in a specific orientation. Therefore, it cannot be understood as a limitation on the present application. Furthermore, the feature defined with "first" and "second" may include one or more of these features explicitly or implicitly. In the description of the present application, "a plurality of" means two or more unless otherwise stated.

[0040] In the description of the present application, it should be noted that unless specified or limited otherwise, the terms "mounted", "connected", and "coupled" and the like are used broadly, and may be, for example, fixed connections, detachable connections, or integral connections; may also be mechanical or electrical connections; may also be direct connections or indirect connections via intervening structures; may also be inner communications of two elements. The above terms can

be understood by those skilled in the art according to specific situations.

[0041] A heating assembly 100 according to an embodiment of the present application will be described below with reference to FIGS. 1 to 9.

[0042] As shown in FIGS. 1 to 3, the heating assembly 100 according to the embodiment of the present application includes a refrigerant heat exchanger 1, an electromagnetic heating body subassembly 2, a heat transfer plate 3, and a supporting plate 4.

[0043] The refrigerant heat exchanger 1 has a refrigerant passage (not shown) defined therein, and a refrigerant may flow in the refrigerant passage to transfer heat.

[0044] The electromagnetic heating body subassembly 2 is provided on a side of the refrigerant heat exchanger 1, and the electromagnetic heating body subassembly 2 includes an electromagnetic coil disk 21 and may heat the refrigerant in the refrigerant passage; that is, the electromagnetic coil disk 21 may generate heat to heat the refrigerant in the refrigerant passage. Specifically, the electromagnetic coil disk 21 may be electrically connected with an external power source, the electromagnetic coil disk 21 may generate heat after energized, and the heat generated by the electromagnetic coil disk 21 may be transferred to the refrigerant heat exchanger 1, so as to rapidly heat the refrigerant in the refrigerant heat exchanger 1. The refrigerant absorbs the heat and then transfers the heat to a downstream position, so as to rapidly raise a temperature of a downstream environment. The downstream position here refers to a position to which the refrigerant subsequently flows in a flow direction of the refrigerant. Further, the electromagnetic coil disk 21 may be formed by winding the electromagnetic coil 213, and therefore, the structure is simple, and the heating effect is good, and production and manufacture are convenient, and a production cost may be saved; meanwhile, the electromagnetic coil disk 21 is not in contact with the refrigerant, thus resulting in a high safety, and facilitating an improvement of a sealing effect of the refrigerant.

[0045] In the present application, the heat transfer plate 3 is provided between the refrigerant heat exchanger 1 and the electromagnetic heating body subassembly 2, and thus, the heat generated by the electromagnetic coil disk 21 may be transferred to the heat transfer plate 3. The heat transfer plate 3 has a high heat transfer efficiency, and the heat generated by the electromagnetic coil disk 21 may be better transferred to the refrigerant heat exchanger 1, thereby better heating the refrigerant in the refrigerant passage, such that the refrigerant has a higher temperature to better increase the temperature of the downstream environment.

[0046] The supporting plate 4 is provided at another side of the refrigerant heat exchanger 1. The supporting plate 4 may be fitted with an external apparatus to facilitate a mounting operation of the heating assembly 100 on the external apparatus, and the mounting and dismounting efficiency of the heating assembly 100 and the

external apparatus may be improved by the supporting plate 4.

[0047] Therefore, in the heating assembly according to the embodiment of the present application, the supporting plate 4 may facilitate rapid disassembly and assembly of the heating assembly 100 and the external apparatus, with a high mounting and dismounting efficiency. By energizing the electromagnetic coil disk 21, the electromagnetic coil disk 21 may generate heat to heat the refrigerant in the refrigerant heat exchanger 1, and therefore, the heating effect is good; meanwhile, the electromagnetic coil disk 21 has a simple structure, which facilitates production and manufacture and may save the production cost; the electromagnetic coil disk 21 does not come into contact with the refrigerant, and therefore, the safety is high, and the refrigerant has a good sealing effect. The heat generated by the electromagnetic coil disk 21 may be better transferred to the refrigerant through the heat transfer plate 3, so as to quickly increase the temperature of the refrigerant, which facilitates the refrigerant to rapidly heat the downstream position, with a good heat transfer effect.

[0048] In the present application, as shown in FIGS. 1 and 2, the electromagnetic heating body subassembly 2 further includes a coil disk outer cover 22. The mounting groove 23 with one open end is defined in the coil disk outer cover 22, and the electromagnetic coil disk 21 is provided in the mounting groove 23, and the electromagnetic coil disk 21 is exposed from the mounting groove 23 and provided towards the heat transfer plate 3. That is, an opening of the coil disk outer cover 22 is opened towards the heat transfer plate 3, the electromagnetic coil disk 21 is provided in the mounting groove 23, and the electromagnetic coil disk 21 is located between the coil disk outer cover 22 and the heat transfer plate 3.

[0049] In the present application, one of the electromagnetic coil disk 21 and the mounting groove 23 is provided with a through hole 2111, the other is provided with a fixing column 231, and the electromagnetic coil disk 21 is connected with the fixing column 231 by a first connecting member (not shown) passing through the through hole 2111. In some examples, the electromagnetic coil disk 21 is provided with the through hole 2111, and the mounting groove 23 is provided with the fixing column 231; in some other examples, the electromagnetic coil disk 21 is provided with the fixing column 231, and the mounting groove 23 is provided with the through hole 2111. The first connecting member may be fitted with the fixing column 231 after penetrating through the through hole 2111, such that the electromagnetic coil disk 21 is mounted in the mounting groove 23.

[0050] In the present application, as shown in FIG. 2, the fixing column 231 may be provided between a wall surface of the electromagnetic coil disk 21 facing the coil disk outer cover 22 and a bottom wall of the mounting groove 23, and the fixing column 231 may separate the electromagnetic coil disk 21 from the bottom wall of the mounting groove 23, thus preventing damage to the elec-

tromagnetic heating body subassembly 2 caused by mutual abrasion of the electromagnetic coil disk 21 and the mounting groove 23 in an assembly process.

[0051] In the present application, an internal thread may be formed in the fixing column 231, an external thread may be formed on the first connecting member, and the first connecting member may be in thread fit with the fixing column 231 after penetrating through the through hole 2111, such that a better fitting effect may be achieved between the electromagnetic coil disk 21 and the coil disk outer cover 22.

[0052] In the present application, as shown in FIGS. 1 and 2, a plurality of lugs 211 are provided in a circumferential direction of the electromagnetic coil disk 21, and a through hole 2111 is defined on each lug 211, and the mounting groove 23 is provided therein with the plurality of fixing columns 231 in one-to-one correspondence to the plural lugs 211. That is, the plurality of lugs 211 are provided in the circumferential direction of the electromagnetic coil disk 21, and the through hole 2111 may be defined on the lug 211, which may facilitate a machining operation of the through hole 2111; the machining operation of the through hole 2111 on the lug 211 may reduce a production difficulty of the through hole 2111 to save the production cost. The plurality of lugs 211 are in one-to-one correspondence to the plurality of fixing columns 231, and the electromagnetic coil disk 21 may be better fixed in the mounting groove 23 by the plurality of lugs 211 and the plurality of fixing columns 231. Further, in some examples, each lug 211 may be provided with one through hole 2111 and fixedly connected with the fixing column 231 by the first connecting member; in some other examples, each lug 211 may be provided with a plurality of through holes 2111, the fixing column 231 may be provided with a plurality of internal threads, and a plurality of first connecting members may pass through the plurality of through holes 2111 to be fitted with the plurality of internal threads.

[0053] In the present application, as shown in FIGS. 1 and 2, the electromagnetic coil disk 21 is approximately rectangular, four corners of the electromagnetic coil disk 21 are each provided with the lug, and corresponding positions in the mounting groove 23 are provided with four fixing columns 231. That is, four lugs 211 are provided on the electromagnetic coil disk 21, one through hole 2111 is defined in each of the four lugs 211, and after penetrating through the four through holes 2111 respectively, the four first connecting members are fitted with the four fixing columns 231 respectively, so as to fix the electromagnetic coil disk 21 in the mounting groove 23. Thus, the electromagnetic coil disk 21 is stably mounted in the mounting groove 23.

[0054] In the present application, as shown in FIGS. 1 and 2, the electromagnetic heating body subassembly 2 further includes a first heat insulation member 27, and the first heat insulation member 27 is provided in the mounting groove 23 and disposed closer to the heat transfer plate 3 relative to the electromagnetic coil disk

21. That is, the first heat insulation member 27 is provided in the mounting groove 23; further, the first heat insulation member 27 is provided on a side of the electromagnetic coil disk 21 facing the heat transfer plate 3; thus, the first heat insulation member 27 may block the electromagnetic coil disk 21 in the mounting groove 23 and be fitted with the mounting groove 23 to a certain extent and protect the electromagnetic coil disk 21, thereby preventing the electromagnetic coil disk 21 from being damaged, and prolonging a service life of the electromagnetic coil disk 21. Meanwhile, the first heat insulation member 27 provided between the heat transfer plate 3 and the electromagnetic coil disk 21 may prevent the heat transfer plate 3 from radiating heat to the electromagnetic coil disk 21 after receiving the heat transmitted by the electromagnetic coil disk 21, thus affecting heat generation of the electromagnetic coil disk 21, and then reducing the heating effect of the electromagnetic coil disk 21 on the refrigerant. In addition, the first heat insulation member 27 may also preserve the heat of the heat transfer plate 3, so as to prevent dissipation of the heat of the heat transfer plate 3, which facilitates an improvement of an effect of transferring the heat of the refrigerant by the heat transfer plate 3.

[0055] In the present application, as shown in FIGS. 1 and 2, a limiting structure 24 is provided in the mounting groove 23 to limit a position of the first heat insulation member 27 in the mounting groove 23. Thus, the limiting structure 24 may prevent the first heat insulation member 27 from moving relative to the mounting groove 23 after being mounted in the mounting groove 23, and the movement of the first heat insulation member 27 relative to the mounting groove 23 tends to cause abrasion of the first heat insulation member 27 and a part adjacent to the first heat insulation member 27 in the mounting groove 23, thereby damaging the first heat insulation member 27 and the part to affect a heating effect of the electromagnetic heating body subassembly 2.

[0056] In the present application, the limiting structure 24 includes a first limiting member 241 and a second limiting member 242 formed at an inner side wall of the mounting groove 23 at intervals in a depth direction of the mounting groove 23, and an edge of the first heat insulation member 27 is positioned between the first limiting member 241 and the second limiting member 242. The depth direction here refers to a direction from the mounting groove 23 to the first heat insulation member 27. In the depth direction of the mounting groove 23, the first heat insulation member 27 is provided between the first limiting member 241 and the second limiting member 242, and movement of the first heat insulation member 27 in the depth direction may be restrained by the first limiting member 241 and the second limiting member 242.

[0057] In the examples shown in FIGS. 1 and 2, the depth direction of the mounting groove 23 is the left-right direction in FIG. 1, and after the first heat insulation member 27 is fitted with the limiting structure 24, the first lim-

iting member 241 is located on the left of the first heat insulation member 27, and the second limiting member 242 is located on the right of the first heat insulation member 27; further, as shown in FIG. 2, an inclined surface is formed on a circumferential wall of the first limiting member 241 facing the left side, and the first heat insulation member 27 is moveable along the inclined surface in the process of fitting the first heat insulation member 27 with the first limiting member 241, which may facilitate the cooperation of the first heat insulation member 27 with the first limiting member 241.

[0058] In the present application, a plurality of first limiting members 241 and a plurality of second limiting members 242 are provided and arranged at intervals at the inner side wall of the mounting groove 23. Through the cooperation of the plurality of first limiting members 241 and the plurality of second limiting members 242, the first heat insulation member 27 may be better limited to improve a limiting effect of the limiting structure 24 on the first heat insulation member 27, with a high reliability. Further, in some examples, a number of the first limiting members 241 may be equal to a number of the second limiting members 242, and in some other examples, the number of the first limiting members 241 may be different from the number of the second limiting members 242; for example, the number of the first limiting members 241 is greater or less than the number of the second limiting members 242. Certainly, the first limiting member 241 and the second limiting member 242 may have other layout manners in terms of number and position layout, which is not limited herein.

[0059] In the present application, as shown in FIGS. 1 and 2, the limiting structure 24 includes a third limiting member 243, which is provided adjacent to at least one side of the coil disk outer cover 22 in a length direction, and at least one end of the first heat insulation member 27 in a length direction is fitted with the third limiting member 243. The length direction of the coil disk outer cover 22 here refers to the up-down direction as shown in FIG. 1. In some examples, the third limiting member 243 is provided adjacent to an upper side of the coil disk outer cover 22, and the third limiting member 243 is fitted with an upper end of the first heat insulation member 27 to limit upward movement of the first heat insulation member 27 relative to the coil disk outer cover 22; optionally, in other examples, the third limiting member 243 is provided adjacent to a lower side of the coil disk outer cover 22, and the third limiting member 243 is fitted with a lower end of the first heat insulation member 27 to limit downward movement of the first heat insulation member 27 relative to the coil disk outer cover 22; and in still other examples, the third limiting members 243 are provided adjacent to both the upper end and the lower end of the coil disk outer cover 22, and the third limiting member 243 may limit movement of the first heat insulation member 27 relative to the coil disk outer cover 22 in the up-down direction.

[0060] In the present application, a wiring terminal 26

is provided on the coil disk outer cover 22, and an electromagnetic coil leading-out end 212 of the electromagnetic coil disk 21 is connected to the wiring terminal 26. The wiring terminal 26 may be better fitted with an external line to facilitate an electrical connection of the electromagnetic coil leading-out end 212 and the external line.

[0061] In the present application, the coil disk outer cover 22 is provided with a positioning groove 251, in which the wiring terminal 26 is positioned, and the wiring terminal is fixed in the positioning groove 251 by a second connecting member. That is, the wiring terminal 26 is detachable from the coil disk outer cover 22, which may facilitate a fitted connection of the wiring terminal 26 and the electromagnetic coil leading-out end 212 as well as a fitted connection of the wiring terminal 26 and the external line. The wiring terminal 26 may be fittingly connected with the positioning groove 251; the wiring terminal 26 may be quickly mounted to the coil disk outer cover 22 by the positioning groove 251, and meanwhile, the positioning groove 251 may further limit relative movement between the wiring terminal 26 and the coil disk outer cover 22. Further, the wiring terminal 26 may be fixed in the positioning groove 251 by the second connecting member, thus prevent the wiring terminal 26 from falling off from the positioning groove 251, with a high reliability. Advantageously, with the cooperation of the second connecting member and the positioning groove 251, the wiring terminal 26 may be better limited, with a good limiting effect.

[0062] In the present application, as shown in FIGS. 1 and 2, the coil disk outer cover 22 is provided with an extension portion 25, which is provided on an outer wall of the coil disk outer cover 22 and extends in a direction away from the refrigerant heat exchanger 1, and the positioning groove 251 is defined on the extension portion 25. Thus, the arrangement of the extension portion 25 may facilitate a machining operation of the positioning groove 251 and reduce a difficulty of a machining technology of the positioning groove 251 and save the production cost; meanwhile, the extension portion 25 is provided on the outer wall of the coil disk outer cover 22 and extends in the direction away from the refrigerant heat exchanger 1; that is, the positioning groove 251 is defined on the outer wall of the coil disk outer cover 22, thus facilitating a fitted connection of the wiring terminal 26 and the positioning groove 251, and improving an assembly efficiency of the wiring terminal 26 and the positioning groove 251.

[0063] In the present application, a preset gap H exists between the heat transfer plate 3 and the electromagnetic coil disk 21, and the preset gap H ranges from 1 mm to 20 mm. That is, the heat transfer plate 3 and the electromagnetic coil disk 21 have a distance of 1 mm to 20 mm. When the heat transfer plate 3 and the electromagnetic coil disk 21 have a distance of 1 mm to 20 mm, the heat radiation by the heat transfer plate 3 to the electromagnetic coil disk 21 may be better reduced, thereby

facilitating heat generation of the electromagnetic coil disk 21.

[0064] In the present application, an overlapping area of projections of the heat transfer plate 3 and the electromagnetic coil disk 21 is greater than half of an area of the electromagnetic coil disk 21. The projection direction here refers to the left-right direction as shown in FIG. 1. In some examples, the projection of the heat transfer plate 3 in the left-right direction is completely superposed with the projection of the electromagnetic coil disk 21, and thus, the area of the projection of the heat transfer plate 3 in the left-right direction is greater than half of the area of the projection of the electromagnetic coil disk 21 in the left-right direction; in some other examples, a part of the projection of the heat transfer plate 3 in the left-right direction is superposed with the projection of the electromagnetic coil disk 21 in the left-right direction. More specifically, an upper end region of the projection of the heat transfer plate 3 in the left-right direction is superposed with the projection of the electromagnetic coil disk 21 in the left-right direction, or a lower end region of the projection of the heat transfer plate 3 in the left-right direction is superposed with the projection of the electromagnetic coil disk 21 in the left-right direction. Certainly, the superposed regions of the projections of the heat transfer plate 3 and the electromagnetic coil disk 21 may have other cases, which is not limited herein.

[0065] In the present application, the heat transfer plate 3 is detachably connected with the refrigerant heat exchanger 1. In some examples, each of the heat transfer plate 3 and the refrigerant heat exchanger 1 may be provided with a screw hole, and the heat transfer plate 3 and the refrigerant heat exchanger 1 may be fixed together by screws; certainly, the heat transfer plate 3 and the refrigerant heat exchanger 1 may also be connected by other connection methods, such as a snapped connection, a rivet connection, or the like, which is not limited herein.

[0066] In the present application, solder or a soldering flake is provided between the heat transfer plate 3 and the refrigerant heat exchanger 1, and a welding connection is performed. Thus, the heat transfer plate 3 and the refrigerant heat exchanger 1 have a stable connection and good consistency.

[0067] In the present application, a heat conducting agent layer is provided between the heat transfer plate 3 and the refrigerant heat exchanger 1. The heat on the heat transfer plate 3 may be well transferred to the refrigerant heat exchanger 1 through the heat conducting agent layer, thereby well heating the refrigerant in the refrigerant heat exchanger 1, with a good heat transfer effect. Optionally, the heat conducting agent layer may be formed of a heat conducting silicone grease layer, or a heat conducting adhesive tape, which is not limited herein.

[0068] In the present application, as shown in FIGS. 1 and 2, a second heat insulation member 5 is further provided between the refrigerant heat exchanger 1 and the

supporting plate 4, and tightly pressed between the refrigerant heat exchanger 1 and the supporting plate 4. Thus, the second heat insulation member 5 may reduce heat flow from the refrigerant heat exchanger 1 to the supporting plate 4, and may avoid that the heat in the refrigerant heat exchanger 1 is transferred to the supporting plate 4 and then dissipated from the supporting plate 4, thereby causing heat loss.

[0069] In the present application, the second heat insulation member 5 is provided with a clearance hole 51, and the refrigerant heat exchanger 1 is connected to the supporting plate 4 through a third connecting member, and the third connecting member penetrates through the clearance hole 51. Thus, the second heat insulation member 5 may be fixed to the supporting plate 4 by the third connecting member. Further, the refrigerant heat exchanger 1 may be provided with a fixing hole, and the third connecting member may sequentially penetrate through the fixing hole and the clearance hole 51 to be connected to the supporting plate 4, such that the refrigerant heat exchanger 1, the second heat insulation member 5, and the supporting plate 4 may be connected together. Optionally, the third connecting member may be configured as a screw or a rivet, which is not limited herein.

[0070] In the present application, the supporting plate 4 is provided with a snapping groove 41, and the refrigerant heat exchanger 1 is provided with a snapping hook 14, and the snapping hook 14 is fitted in the snapping groove 41. That is, with the cooperation of the snapping groove 41 and the snapping hook 14, the refrigerant heat exchanger 1 may be fittingly connected with the supporting plate 4; further, in the process that the snapping groove 41 is fitted with the snapping hook 14, the snapping hook 14 may slide along an inner wall surface of the snapping groove 41, thus resulting in a good stability, and facilitating the snapping groove 41 to be rapidly fitted with the snapping hook 14.

[0071] In the present application, as shown in FIGS. 1 and 2, the heating assembly 100 further includes a fuse 6 and/or a temperature sensor 7. In some examples, the heating assembly 100 includes a fuse 6; in some other examples, the heating assembly 100 includes a temperature sensor 7; in still other examples, the heating assembly 100 includes a fuse 6 and a temperature sensor 7.

[0072] The fuse 6 is provided on a side wall surface of the refrigerant heat exchanger 1, and in the left-right direction as shown in FIGS. 1 and 2, the fuse 6 may be provided on a front or rear side wall surface of the refrigerant heat exchanger 1. The fuse 6 may disconnect an electrical connection between the electromagnetic coil disk 21 and a main circuit; that is, after a temperature on the refrigerant heat exchanger 1 rises to a certain degree, the fuse 6 may disconnect the electrical connection between the electromagnetic coil disk 21 and the main circuit, such that the electromagnetic coil disk 21 is powered off, and stops generating heat.

[0073] The temperature sensor 7 is provided on the

refrigerant heat exchanger 1 or the heat transfer plate 3 to detect the temperature of the refrigerant heat exchanger 1 or the heat transfer plate 3, and the temperature sensor 7 is electrically connected with the electromagnetic coil disk 21 to control a working state of the electromagnetic coil disk 21. In some examples, the temperature sensor 7 is provided on the refrigerant heat exchanger 1 to detect the temperature of the refrigerant heat exchanger 1, and in some other examples, the temperature sensor 7 is provided on the heat transfer plate 3 to detect the temperature of the heat transfer plate 3. Further, the electromagnetic coil disk 21 may be composed of the electromagnetic coil 213, which may be formed by winding a plurality of enameled wire sections, and the temperature sensor 7 may control the amount of the heat generated by the electromagnetic coil disk 21 according to the detected temperature. For example, when the temperature detected by the temperature sensor 7 is low, the plurality of enameled wire sections are all energized to generate high heat, and as the temperature detected by the temperature sensor 7 gradually rises, the temperature sensor 7 controls the electromagnetic coil disk 21 to disconnect part of the enameled wire sections, thereby reducing the heat generated by the electromagnetic coil disk 21, and then saving an electric quantity. Still further, when the temperature detected by the temperature sensor 7 is high, the temperature sensor 7 may control the electromagnetic coil disk 21 to be powered off. Certainly, the present application is not limited thereto, and the electromagnetic coil 213 may also be formed by winding one enameled wire section.

[0074] In the present application, the temperature sensor 7 is provided on the heat transfer plate 3, and on the projection of the electromagnetic coil disk 21 towards the heat transfer plate 3, the temperature sensor 7 is located in an electromagnetic blind region or a high magnetic field intensity region of the electromagnetic coil disk 21; further, as shown in FIG. 3, the electromagnetic coil disk 21 includes a disk body and the electromagnetic coil 213 provided on the disk body; the electromagnetic coil 213 is annular, and a middle of the electromagnetic coil 213 is provided with a non-winding region, which forms the electromagnetic blind region; a preset loop wire is provided between an outer ring and an inner ring of the electromagnetic coil 213, and a distance between the preset loop wire and the outer ring is equal to a distance between the preset loop wire and the inner ring, and the high magnetic field intensity region is defined by a region between the outer ring of the electromagnetic coil 213 and the preset loop wire.

[0075] In the present application, the temperature sensor 7 is located in the electromagnetic blind region of the electromagnetic coil disk 21, and thus, the temperature sensor 7 may not be affected by a magnetic field generated by the electromagnetic coil disk 21, thereby facilitating temperature detection by the temperature sensor 7. In some other examples, the temperature sensor 7 is located in a high magnetic field region of the electromag-

netic coil disk 21, and it should be noted that a higher temperature may be generated in the high magnetic field region of the electromagnetic coil disk 21, and the temperature sensor 7 may better detect the higher temperature generated after the electromagnetic coil disk 21 is powered on.

[0076] In the present application, the refrigerant heat exchanger 1 includes a microchannel heat exchanger 11, an inlet pipe 12 and a discharge pipe 13. The microchannel heat exchanger 11 has the refrigerant passage defined therein, and the inlet pipe 12 is provided at an end of the microchannel heat exchanger 11 in a length direction and in communication with the refrigerant passage, and the discharge pipe 13 is provided at the other end of the microchannel heat exchanger 11 in the length direction and in communication with the refrigerant passage. That is, the refrigerant may enter the refrigerant passage from the inlet pipe 12, and be heated in the refrigerant passage, and the heated refrigerant may flow from the refrigerant passage to the discharge pipe 13, then flow out of the discharge pipe 13 and continue to flow downstream. Further, the refrigerant flows from an end of the refrigerant heat exchanger 1 to the other end of the refrigerant heat exchanger 1, such that the refrigerant passage may be set to be longer, thereby facilitating the refrigerant in the refrigerant passage to be heated, with a good heating effect.

[0077] The present application further provides an air conditioner 1000 having the heating assembly 100 according to the above-mentioned embodiment.

[0078] As shown in FIG. 9, the air conditioner 1000 according to the embodiment of the present application includes a housing 200, a compressor 400, a fan 500, an outdoor heat exchanger 600, and a heating assembly 100.

[0079] The housing 200 is internally provided with a middle partition 300, which divides an internal space of the housing 200 into a first cavity and a second cavity; the compressor 400 is provided in the first cavity, and the fan 500 is provided in the second cavity; the fan 500 may be separated from the compressor 400 by the middle partition 300, thereby preventing the fan 500 and the compressor 400 from affecting each other.

[0080] At least a part of the outdoor heat exchanger 600 corresponds to the fan 500; in some examples, a part of the outdoor heat exchanger 600 corresponds to the fan 500, and in some other examples, the outdoor heat exchanger 600 completely corresponds to the fan 500. The fan 500 may improve the heat exchange efficiency of the outdoor heat exchanger 600.

[0081] The heating assembly 100 is provided on the middle partition 300, and the refrigerant passage is in communication with a discharge port of the compressor 400. That is, the discharge port of the compressor 400 may be connected with the inlet pipe 12, and the refrigerant in the compressor 400 may flow into the inlet pipe 12 through the discharge port, then flow into the refrigerant passage through the inlet pipe 12, and be further

heated in the refrigerant passage, and the heated refrigerant may be discharged from the discharge pipe 13.

[0082] It may be understood that, when an air conditioner is started to heat an indoor space in a cold environment, heat of a refrigerant is unable to be rapidly increased in a process of just starting the air conditioner, such that a heating efficiency of the air conditioner tends to be low, and an indoor temperature is unable to be increased rapidly, and therefore, requirements of users for a rapid indoor heating effect are unable to be met.

[0083] In the air conditioner 1000 according to the embodiment of the present application, by providing the heating assembly 100 according to the above-mentioned embodiment, the refrigerant may be rapidly heated when flowing to the heat exchanger from the compressor 400, and the heat of the refrigerant may be increased rapidly, thereby quickly heating the indoor space, resulting in a good heating effect and meeting the requirements of the users for the rapid indoor heating effect.

[0084] Other configurations and operations of the air conditioner 1000 according to the embodiment of the present application are known to those skilled in the art and will not be described in detail herein.

[0085] In the description of the present specification, reference to "some embodiments", "optionally", "further", "some example" or "some other examples" means that a particular feature, structure, material, or characteristic described in connection with the embodiment or example is included in at least one embodiment or example of the present application. In the specification, the schematic expressions to the above-mentioned terms are not necessarily referring to the same embodiment or example. Furthermore, the described particular features, structures, materials, or characteristics may be combined in any suitable manner in one or more embodiments or examples.

[0086] Although embodiments of the present application have been shown and illustrated, it shall be understood by those skilled in the art that various changes, modifications, alternatives and variants without departing from the principle and idea of the present application are acceptable. The scope of the present application is defined by the claims and its equivalents.

Claims

1. A heating assembly, comprising:

a refrigerant heat exchanger defining a refrigerant passage therein;
an electromagnetic heating body subassembly provided at a side of the refrigerant heat exchanger, the electromagnetic heating body subassembly comprising an electromagnetic coil disk and being capable of heating a refrigerant in the refrigerant passage;
a heat transfer plate provided between the re-

frigerant heat exchanger and the electromagnetic heating body subassembly; and
a supporting plate provided at another side of the refrigerant heat exchanger.

2. The heating assembly according to claim 1, wherein the electromagnetic heating body subassembly further comprises:
a coil disk outer cover defining a mounting groove therein with an open end, the electromagnetic coil disk being provided in the mounting groove, and the electromagnetic coil disk being exposed from the mounting groove and provided towards the heat transfer plate.
3. The heating assembly according to claim 2, wherein one of the electromagnetic coil disk and the mounting groove defines a through hole, the other is provided with a fixing column, and the electromagnetic coil disk is connected with the fixing column by a first connecting member passing through the through hole.
4. The heating assembly according to claim 3, wherein a plurality of lugs are provided in a circumferential direction of the electromagnetic coil disk, and each lug defines the through hole, and the mounting groove is provided therein with a plurality of fixing columns in one-to-one correspondence to the plurality of lugs.
5. The heating assembly according to claim 4, wherein the electromagnetic coil disk is approximately rectangular, four corners of the electromagnetic coil disk are each provided with the lug, and corresponding positions in the mounting groove are provided with four fixing columns.
6. The heating assembly according to claim 2, wherein the electromagnetic heating body subassembly further comprises:
a first heat insulation member provided in the mounting groove and arranged closer to the heat transfer plate relative to the electromagnetic coil disk.
7. The heating assembly according to claim 6, wherein the mounting groove is provided therein with a limiting structure to limit a position of the first heat insulation member in the mounting groove.
8. The heating assembly according to claim 7, wherein the limiting structure comprises:
a first limiting member and a second limiting member provided at an inner side wall of the mounting groove at intervals in a depth direction of the mounting groove, an edge of the first heat insulation member being positioned between the first limiting member and the second limiting member.

9. The heating assembly according to claim 8, wherein a plurality of first limiting members and a plurality of second limiting members are provided and arranged at intervals at the inner side wall of the mounting groove. 5
10. The heating assembly according to claim 7, wherein the limiting structure comprises a third limiting member provided close to at least one side of the coil disk outer cover in a length direction, and at least one end of the first heat insulation member in a length direction is fitted with the third limiting member. 10
11. The heating assembly according to claim 2, wherein the coil disk outer cover is provided with a wiring terminal, and an electromagnetic coil leading-out end of the electromagnetic coil disk is connected to the wiring terminal. 15
12. The heating assembly according to claim 11, wherein the coil disk outer cover defines a positioning groove, the wiring terminal is positioned in the positioning groove, and the wiring terminal is fixed in the positioning groove by a second connecting member. 20
13. The heating assembly according to claim 12, wherein the coil disk outer cover is provided with an extension portion, the extension portion is provided on an outer wall of the coil disk outer cover and extends in a direction away from the refrigerant heat exchanger, and the positioning groove is defined in the extension portion. 25
14. The heating assembly according to claim 1, wherein the heat transfer plate and the electromagnetic coil disk defines a preset gap H therebetween, and the preset gap H ranges from 1 mm to 20 mm. 30
15. The heating assembly according to claim 1, wherein an overlapping area of projections of the heat transfer plate and the electromagnetic coil disk is greater than half of an area of the electromagnetic coil disk. 35
16. The heating assembly according to claim 1, wherein the heat transfer plate is detachably connected with the refrigerant heat exchanger. 40
17. The heating assembly according to claim 1, wherein the heat transfer plate and the refrigerant heat exchanger are provided with solder or a soldering flake therebetween and connected by welding. 45
18. The heating assembly according to claim 1, wherein the heat transfer plate and the refrigerant heat exchanger are provided with a heat conducting agent layer therebetween. 50
19. The heating assembly according to claim 1, wherein the refrigerant heat exchanger and the supporting plate are further provided with a second heat insulation member therebetween, and the second heat insulation member is tightly pressed between the refrigerant heat exchanger and the supporting plate. 55
20. The heating assembly according to claim 19, wherein the second heat insulation member defines a clearance hole, the refrigerant heat exchanger is connected to the supporting plate through a third connecting member, and the third connecting member passing through the clearance hole.
21. The heating assembly according to claim 1, wherein the supporting plate defines a snapping groove, the refrigerant heat exchanger is provided with a snapping hook, and the snapping hook is fitted in the snapping groove.
22. The heating assembly according to claim 1, further comprising:
a fuse provided on a side wall surface of the refrigerant heat exchanger with greater refrigerant flow, the fuse being capable of disconnecting an electric connection between the electromagnetic coil disk and a main circuit; and/or
a temperature sensor provided on the refrigerant heat exchanger or the heat transfer plate to detect a temperature of the refrigerant heat exchanger or the heat transfer plate, the temperature sensor being electrically connected with the electromagnetic coil disk to control a working state of the electromagnetic coil disk.
23. The heating assembly according to claim 22, wherein the temperature sensor is provided on the heat transfer plate, and on projection of the electromagnetic coil disk towards the heat transfer plate, the temperature sensor is located in an electromagnetic blind region or a high magnetic field intensity region of the electromagnetic coil disk;
the electromagnetic coil disk comprises a disk body and an electromagnetic coil provided on the disk body, the electromagnetic coil is annular, a middle of the electromagnetic coil defines a non-winding region, and the non-winding region forms the electromagnetic blind region;
a preset loop wire is provided between an outer ring and an inner ring of the electromagnetic coil, a distance between the preset loop wire and the outer ring is equal to a distance between the preset loop wire and the inner ring, the high magnetic field intensity region is defined by a region between the outer ring of the electromagnetic coil and the preset loop wire, and a position of a temperature detection member on the heat

transfer plate corresponds to the region between the outer ring of the electromagnetic coil and the preset loop wire.

- 24.** The heating assembly according to claim 1, wherein the refrigerant heat exchanger comprises: 5

a microchannel heat exchanger defines the refrigerant passage therein; and
 an inlet pipe and a discharge pipe, the inlet pipe being provided at an end of the microchannel heat exchanger in a length direction and in communication with the refrigerant passage, and the discharge pipe being provided at the other end of the microchannel heat exchanger in the length direction and in communication with the refrigerant passage. 10 15

- 25.** An air conditioner, comprising: 20

a housing internally provided with a middle partition, the middle partition dividing an internal space of the housing into a first cavity and a second cavity;
 a compressor provided in the first cavity; 25
 a fan and an outdoor heat exchanger, the fan being provided in the second cavity, and at least a part of the heat exchanger being arranged corresponding to the fan; and
 a heating assembly according to any one of claims 1 to 24, the heating assembly being provided on the middle partition, and the refrigerant passage being in communication with a discharge port of the compressor. 30 35

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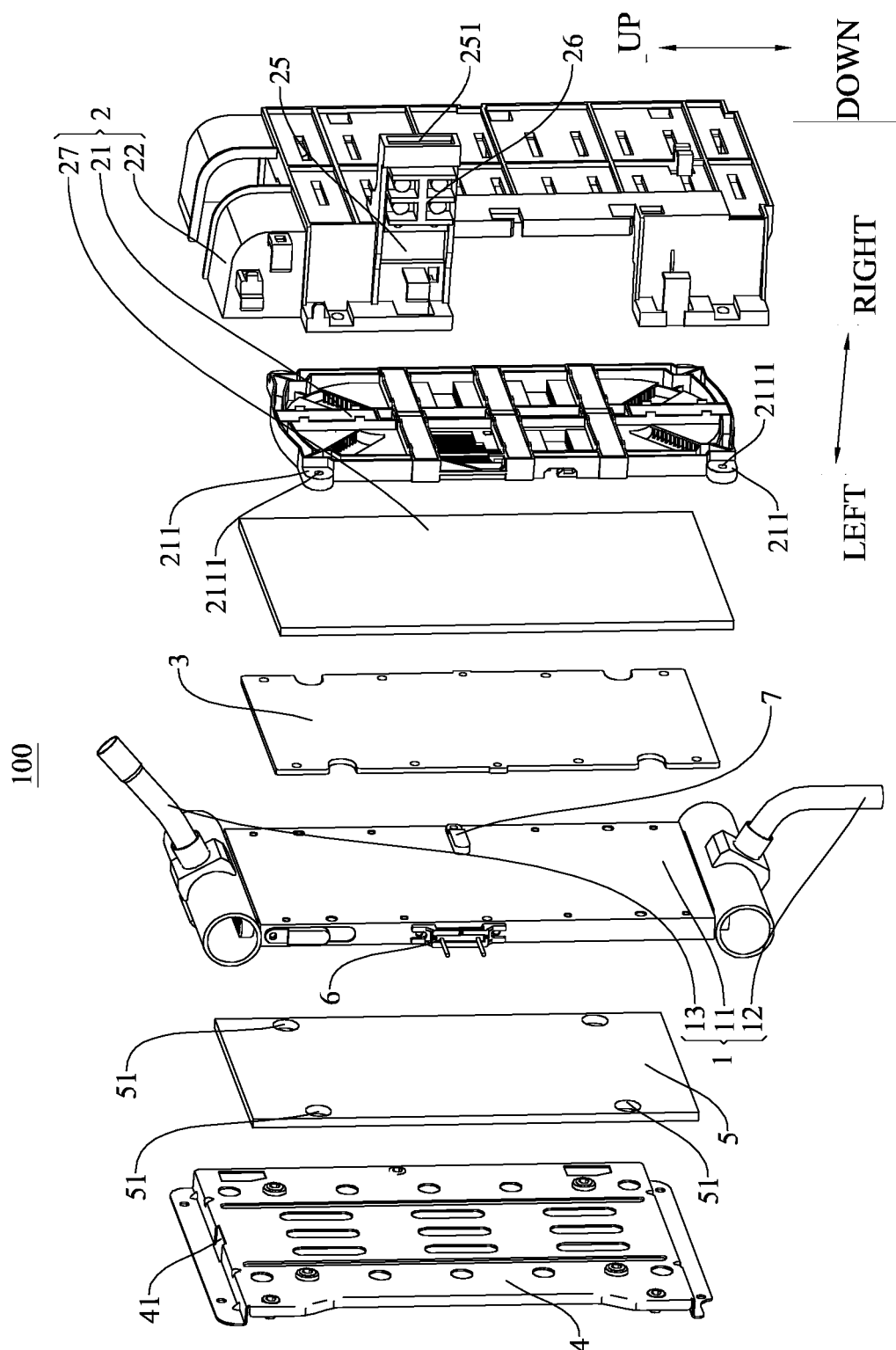


FIG. 1

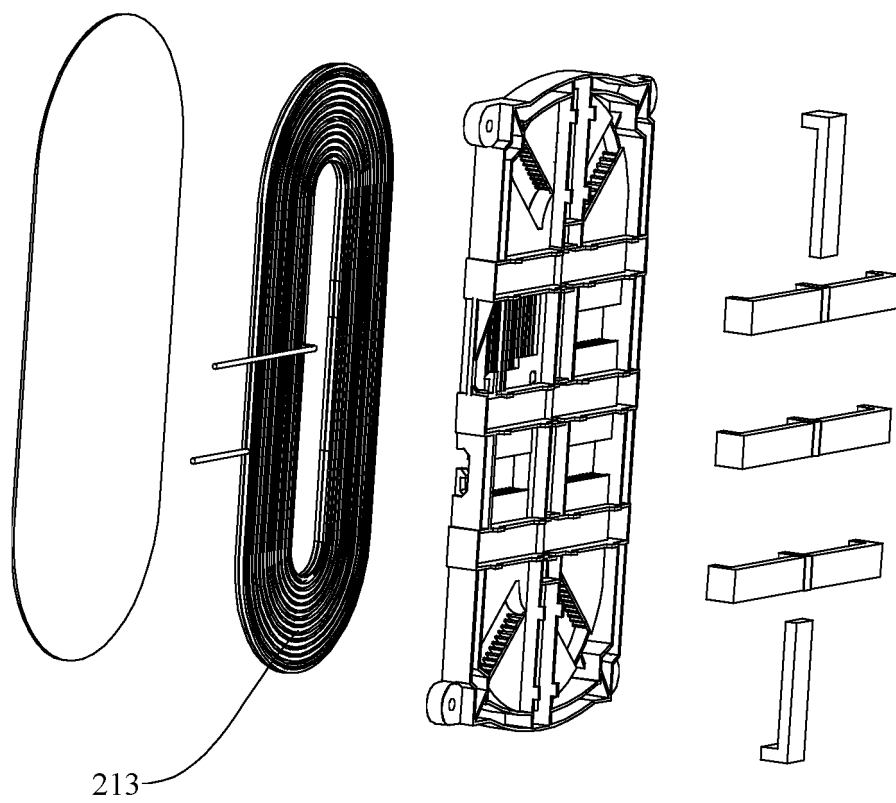


FIG. 3

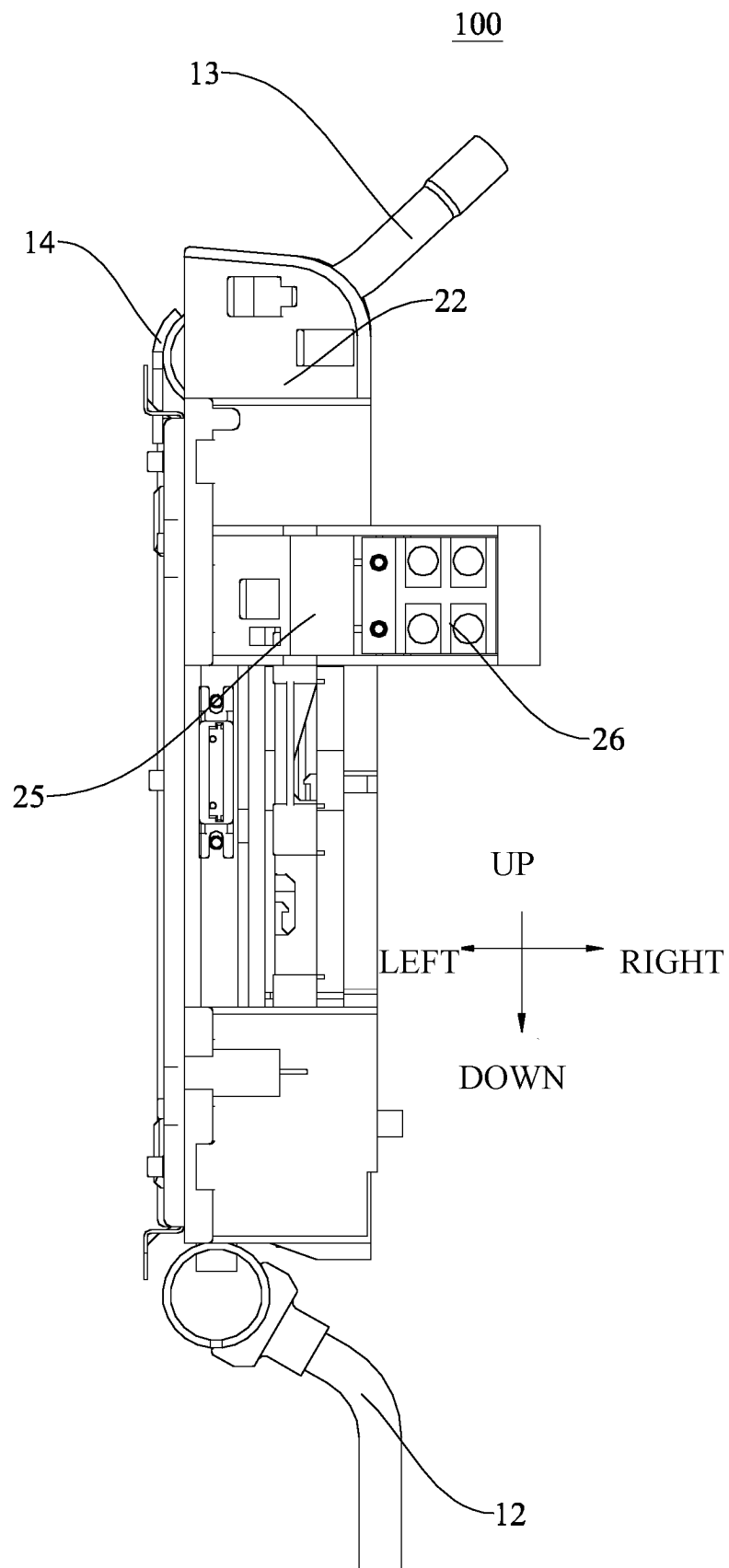


FIG. 4

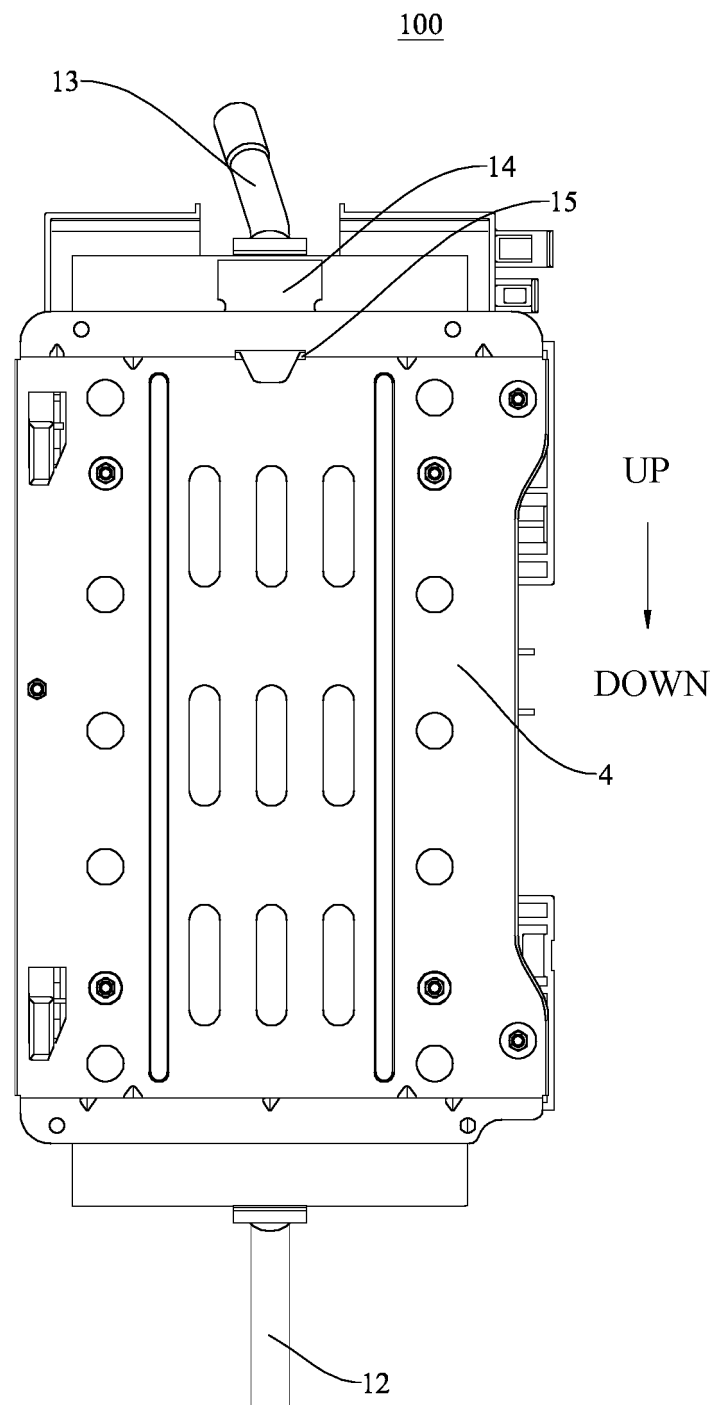


FIG. 5

100

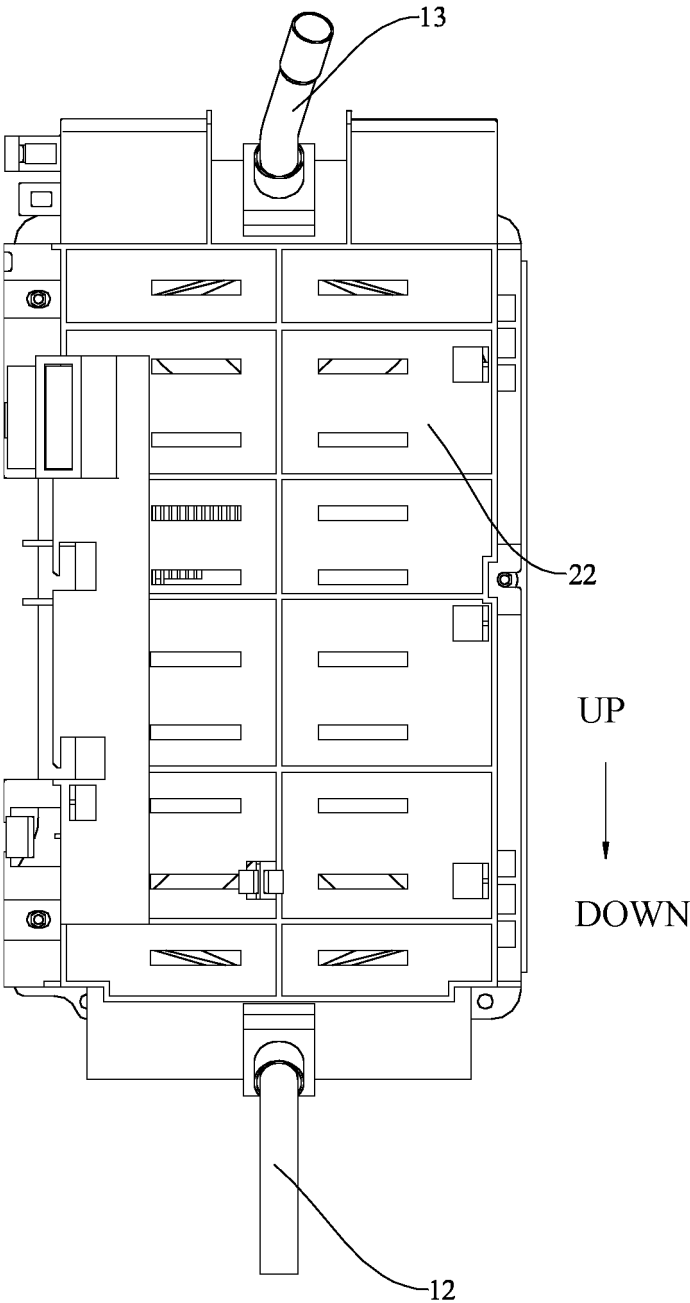


FIG. 6

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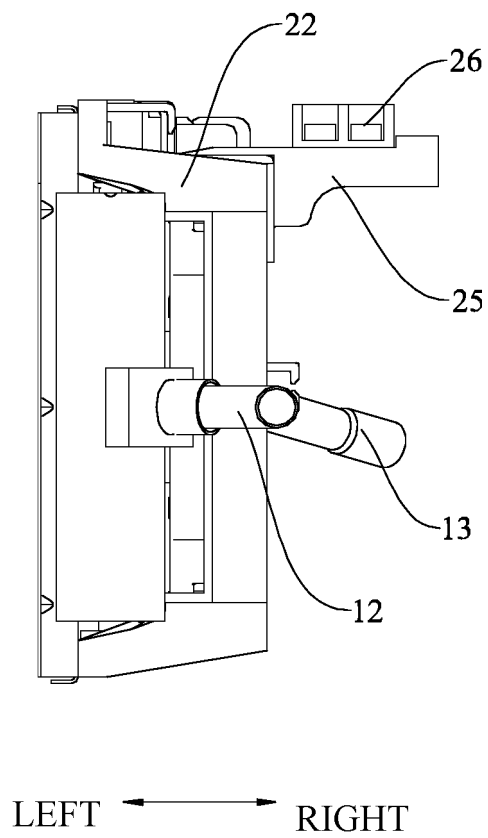


FIG. 7

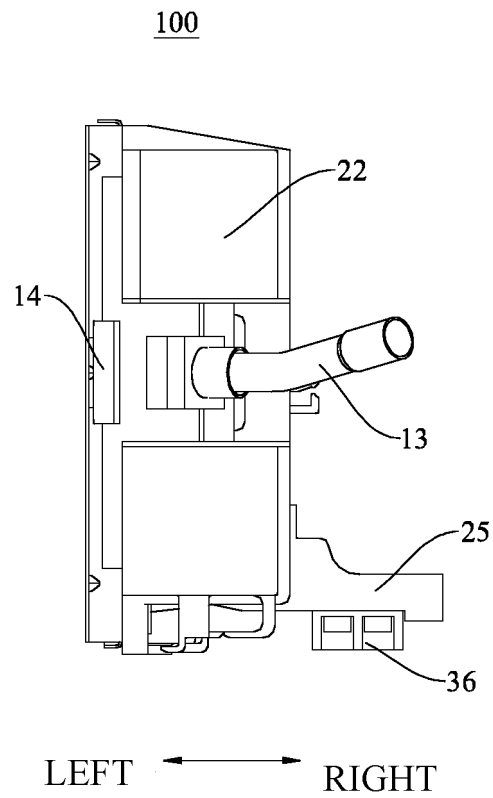


FIG. 8

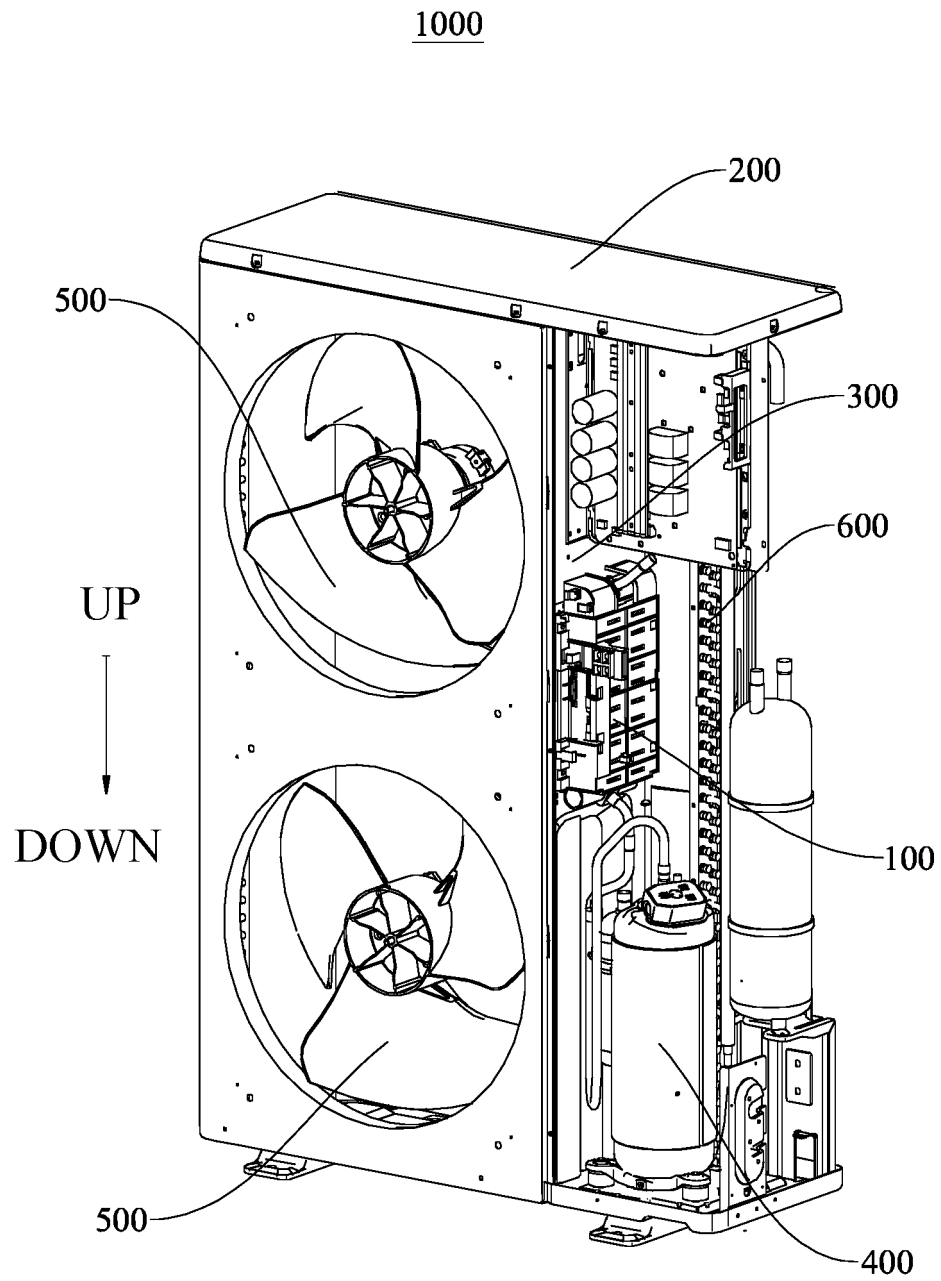


FIG. 9

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2020/080047

A. CLASSIFICATION OF SUBJECT MATTER

F24F 1/06(2011.01)i; F24F 11/89(2018.01)i; F24F 11/873(2018.01)i; H05B 6/36(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)

F24F, F25B, F24H, H05B

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)

CNABS, CNKI, DWPI, SIPOABS, EPODOC: 电磁, 线圈, 冷媒, 制冷剂, 加热, 传热, 导热, 板, electromagnetic, solenoid, coil, refrigerant, heat, transfer, conduct-, plate, board

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Y	CN 207649034 U (GREE ELECTRIC APPLIANCES, INC. OF ZHUHAI) 24 July 2018 (2018-07-24) description, paragraphs [0031]-[0043], and figures 1-4	1-25
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☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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Date of the actual completion of the international search

09 June 2020

Date of mailing of the international search report

15 June 2020

Name and mailing address of the ISA/CN

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2020/080047

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C. DOCUMENTS CONSIDERED TO BE RELEVANT		
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