



(11)

EP 4 414 624 A1

(12)

EUROPEAN PATENT APPLICATION
published in accordance with Art. 153(4) EPC

(43) Date of publication:
14.08.2024 Bulletin 2024/33

(21) Application number: **22899817.5**

(22) Date of filing: **26.05.2022**

(51) International Patent Classification (IPC):
F24F 13/30 ^(2006.01) **F24F 1/18** ^(2011.01)
F24F 13/22 ^(2006.01) **F28F 9/02** ^(2006.01)

(52) Cooperative Patent Classification (CPC):
F28D 1/0477; F24F 1/18; F24F 13/22; F24F 13/30;
F28F 9/001; F28F 9/0131; F28F 9/02; F28F 17/005;
F28F 21/084; F28F 2225/02; F28F 2275/06

(86) International application number:
PCT/CN2022/095258

(87) International publication number:
WO 2023/097997 (08.06.2023 Gazette 2023/23)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **30.11.2021 CN 202111454989**
30.11.2021 CN 202123024505 U

(71) Applicants:
• **Midea Group Wuhan Refrigeration**
Equipment Co., Ltd.
Wuhan City, Hubei 430056 (CN)

• **GD Midea Air-Conditioning Equipment Co., Ltd.**
Foshan, Guangdong 528311 (CN)

(72) Inventors:
• **ZHAO, Cheng**
Wuhan, Hubei 430056 (CN)
• **XIE, Xinyan**
Wuhan, Hubei 430056 (CN)

(74) Representative: **Ran, Handong et al**
Maucher Jenkins
Seventh Floor Offices
Artillery House
11-19 Artillery Row
London SW1P 1RT (GB)

(54) **HEAT EXCHANGER MOUNTING STRUCTURE AND AIR CONDITIONER**

(57) Provided are a heat exchanger mounting structure and an air conditioner. The heat exchanger mounting structure comprises: a heat exchanger (20), wherein the heat exchanger (20) comprises a heat exchanger body (210) and two side plates (220) respectively arranged on two opposite sides of the heat exchanger body (210), the

same side of each of the two side plates (220) is folded in a first direction to form a first flange (221), two first flanges (221) are configured to be connected to an air duct (10) of the air conditioner, and the structures of the two side plates (220) are arranged in the same manner.

EP 4 414 624 A1

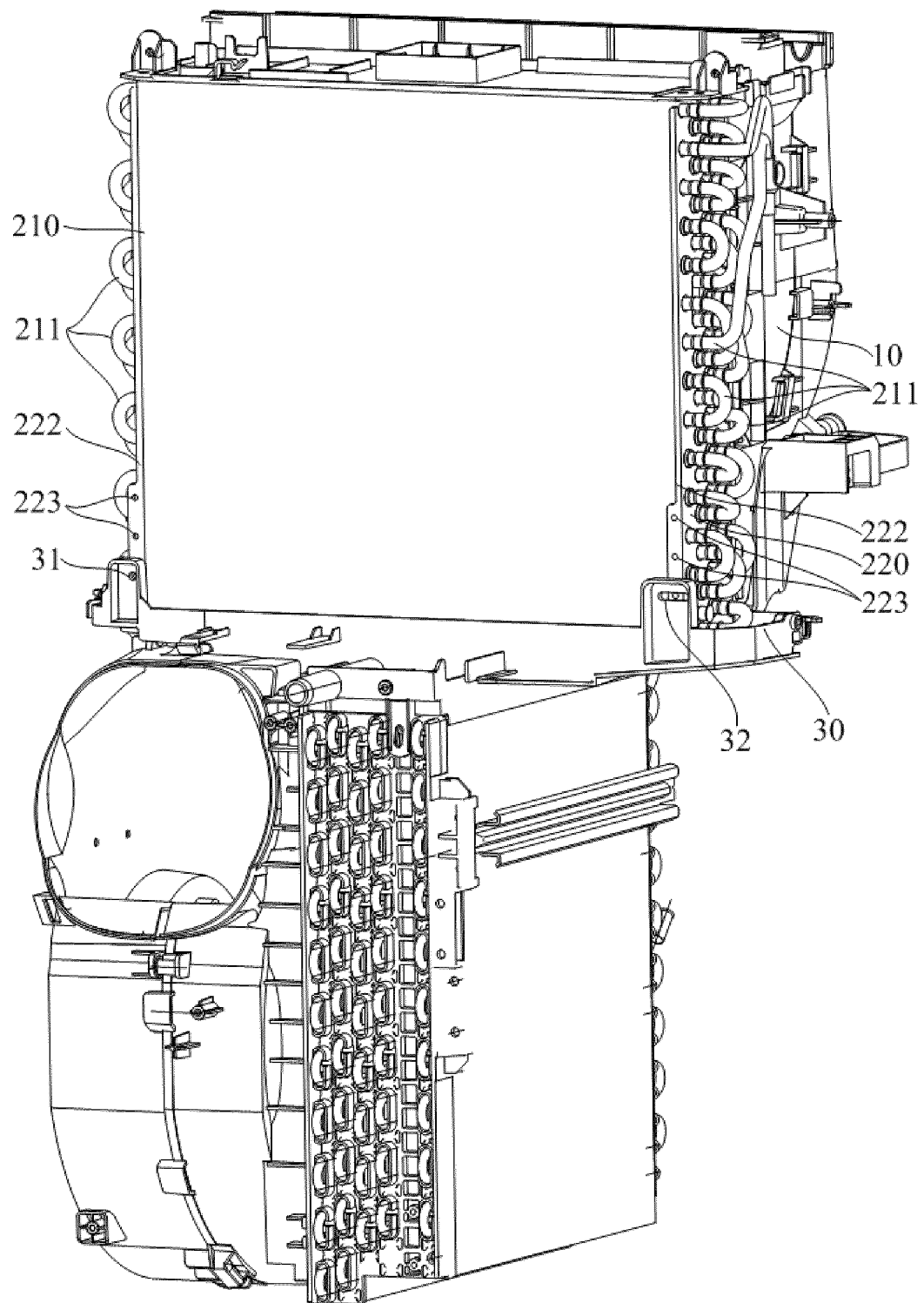


FIG. 1

Description**CROSS-REFERENCE TO RELATED APPLICATIONS**

5 **[0001]** This application claims priority to Chinese Patent Application No. 202111454989.X, filed on November 30, 2021, and Chinese Patent Application No. 202123024505.6, filed on November 30, 2021. The disclosures of the above-mentioned applications are incorporated herein by reference in their entireties.

TECHNICAL FIELD

10 **[0002]** The present application relates to the technical field of air conditioners, and in particular to a heat exchanger installation structure and an air conditioner.

BACKGROUND

15 **[0003]** The heat exchanger of the air conditioner is usually chosen to install together with the air duct, so that more gas after heat exchange in heat exchanger can flow into the air duct and flow through the air duct to the outside of the air conditioner, thereby achieving better heat exchange effect. The existing heat exchangers are usually installed with air ducts by using the side plates on both sides. However, parts of two side plate are usually affected by the layout
20 structure of the heat exchange tube and the installation structure of the air duct, and are provided to be different structures. Since the contours and structures of the two side plates are very similar, workers can easily confuse the two side plates, thus leading to frequent misassembly problems.

SUMMARY

25 **[0004]** The main purpose of the present application is to provide a heat exchanger installation structure, which aims to avoid the problem of misassembly of the two side plates of the heat exchanger and improve the assembly efficiency of the heat exchanger.

30 **[0005]** In order to achieve the above purpose, the heat exchanger installation structure proposed in the present application includes:

a heat exchanger including a heat exchanger body and two side plates respectively provided at two opposite sides of the heat exchanger body, same side edges of the two side plates are each folded toward a first direction to form a first flange, and two first flanges are connected with an air duct of the air conditioner, and structures of the two side plates are identical.

35 **[0006]** In an embodiment, the side plate is further provided with a second flange opposite to the first flange, and the heat exchanger body is provided between the second flange and the first flange.

[0007] In an embodiment, the second flange is provided with a second installation portion, and the second installation portion is connected with a water receiving pan of the air conditioner.

40 **[0008]** In an embodiment, the second flange is provided with a plurality of second installation portions, and the plurality of the second installation portions are provided at intervals along a length direction of the side plate.

[0009] In an embodiment, the second installation portion is provided in a form of a threaded bottom hole, and the heat exchanger installation structure further includes a water receiving pan; the water receiving pan is respectively provided with a positioning hole and an adjusting hole corresponding to two threaded bottom holes, and the adjusting hole and the positioning hole are provided at intervals along the first direction.

45 **[0010]** In an embodiment, the side plate is provided with a first pre-drilled hole area and a second pre-drilled hole area, the first pre-drilled hole area is configured for an installation of the heat exchanger body of a first model, and the first pre-drilled hole area and the second pre-drilled hole area are jointly configured for an installation of the heat exchanger body of a second model.

50 **[0011]** In an embodiment, the first pre-drilled hole area and the second pre-drilled hole area are provided in sequence in a direction from the side plate toward the air duct.

[0012] In an embodiment, the heat exchanger body includes a plurality of heat exchange tubes, and the first pre-drilled hole area is provided with a plurality of pipeline row holes at intervals along a width direction of the side plate; the pipeline row holes include a plurality of pipeline installation holes provided at intervals along a length direction of the side plate, and the pipeline installation holes are configured for the heat exchange tubes to be passed through and installed.

55 **[0013]** In an embodiment, the heat exchanger installation structure further includes an air duct, the air duct includes an air duct body and a chute provided at the air duct body, and two chutes are provided corresponding to the two first flanges; the first flange is slidably inserted into the chute along a second direction, and the second direction is configured to intersect with the first direction.

[0014] The present application further proposes an air conditioner including the aforementioned heat exchanger installation structure.

[0015] In technical solutions of the present application, by providing the first flanges of the two side plates to face the same direction, that is, to fold in the first direction, so that the two side plates have sufficient conditions to have identical structure, that is, the two side plates are identical part. In this embodiment, the structures of two side plates are identical. In this way, after workers get the parts of the side plate, the workers can install the parts of the side plate on the left side of the heat exchanger or the right side of the heat exchanger at will, that is, it can have the effect of preventing misassembly, and improving assembly efficiency. Secondly, it can simplify the material management of the parts of the side plate thereby reducing the material management cost. Furthermore, since only one mold for part is developed, the mold development cost can be reduced, thereby reducing the overall development cost of the air conditioner.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] In order to explain the embodiments of the present application or the technical solutions in the existing technology more clearly, the accompanying drawings needed to be used in the description of the embodiments or the existing technology will be briefly introduced below. Obviously, the accompanying drawings in the following description are only some embodiments of the present application, other accompanying drawings can be obtained based on the provided accompanying drawings without exerting creative efforts for those skilled in the art.

FIG. 1 is a structural schematic view of a heat exchanger installation structure according to an embodiment of the present application.

FIG. 2 is another structural schematic view of the heat exchanger installation structure in FIG. 1.

FIG. 3 is a front view of the heat exchanger installation structure in FIG. 2.

FIG. 4 is a cross-sectional view of the heat exchanger installation structure in FIG. 3 at A-A.

FIG. 5 is a structural schematic view of the side plate in FIG. 2.

FIG. 6 is a front view of the side plate in FIG. 5.

FIG. 7 is a structural schematic view of a side plate of a heat exchanger installation structure according to another embodiment of the present application.

FIG. 8 is a front view of the side plate in FIG. 7.

FIG. 9 is an installation schematic view of the side plate and the air duct in FIG. 2.

FIG. 10 is a structural schematic view of the air duct in FIG. 9.

FIG. 11 is another structural schematic view of the air duct in FIG. 9.

Explanation of reference numbers:

[0017]

Reference number	Name	Reference number	Name
10	air duct	211	heat exchange tube
11	air duct body	220	side plate
12	chute	221	first flange
111	third flange	222	second flange
112	fourth flange	223	second installation portion
113	first limiting portion	224	first pre-drilled hole area
114	first guide surface segment	225	second pre-drilled hole area
115	avoidance sink groove	226	pipeline installation hole
116	resisting-and-supporting portion	30	water receiving pan
117	second limiting portion	31	positioning hole
118	second guide surface segment	32	adjusting hole
20	heat exchanger	220'	side plate
210	heat exchanger body		

[0018] The realization of the purpose, functional features and advantages of the present application will be further described in conjunction with the embodiments and with reference to the accompanying drawings.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0019] The technical solutions in the embodiments according to the present application will be clearly and completely described below in conjunction with the accompanying drawings in the embodiments according to the present application, and it is clear that the described embodiments are only a part of the embodiments according to the present application, and not all of the embodiments. Based on the embodiments in the present application, all other embodiments obtained by those skilled in the art without making creative labor fall within the scope of the present application.

[0020] It should be noted that if there are directional instructions (such as up, down, left, right, front, back or the like) involved in the embodiments of the present application, the directional indications are only used to explain the relative positional relationship, movement and so on between various components in a specific posture (as shown in the accompanying drawings). If the specific posture changes, the directional indication will also change accordingly.

[0021] In addition, if there are descriptions involving "first", "second" or the like in the embodiments of the present application, the descriptions of "first", "second" or the like are only for descriptive purposes and cannot be understood as indicating or implying the relative importance or implicitly indicating the quantity of the technical features indicated. Therefore, features defined as "first" and "second" may explicitly or implicitly include at least one of these features. In addition, the meaning of "and/or" appearing in the entire text includes three parallel solutions, taking "A and/or B" as an example, it includes solution A, or solution B, or a solution that satisfies both A and B at the same time. In addition, the technical solutions of various embodiments can be combined with each other, but it is based on that those skilled in the art can realize. When the combination of technical solutions is contradictory or cannot be realized, it should be considered that such combination of technical solutions does not exist and is not within the protection scope claimed by the present application.

[0022] The heat exchanger of the air conditioner is usually chosen to install together with the air duct, so that more gas after heat exchange in heat exchanger can flow into the air duct and flow through the air duct to the outside of the air conditioner, thereby achieving better heat exchange effect. The existing heat exchangers are usually installed with air ducts by using the side plates on both sides. However, parts of two side plate are usually affected by the layout structure of the heat exchange tube and the installation structure of the air duct, and are provided to be different structures. Since the contours and structures of the two side plates are very similar, workers can easily confuse the two side plates, thus leading to frequent misassembly problems.

[0023] In view of this, the present application proposes a heat exchanger installation structure. Referring to FIG. 1 to FIG. 4, in FIG. 2, the first direction refers to the direction from the right side of the heat exchanger in the figure to the left side of the heat exchanger in the figure, the second direction refers to the direction from the bottom side of the heat exchanger in the figure to the top side of the heat exchanger in the figure, and the third direction refers to the direction from the air duct to the heat exchanger. In an embodiment of the present application, the heat exchanger installation structure includes a heat exchanger 20.

[0024] The heat exchanger 20 includes a heat exchanger body 210 and two side plates 220 respectively provided at two opposite sides of the heat exchanger body 210, both the two side plates 220 are provided with a side edge close to the air duct 10 of the air conditioner, side edge of the two side plates 220 are both provided with a first flange 221 toward the first direction, two first flanges 221 are connected with an air duct 10 of the air conditioner, and structures of the two side plates 220 are identical.

[0025] In technical solutions of the present application, by providing the first flanges 221 of the two side plates 220 to face the same direction, that is, to fold in the first direction, so that the two side plates 220 have sufficient conditions to be provided to have identical structure, that is, the two side plates 220 are identical part. In this embodiment, the structures of two side plates 220 are identical. In this way, after workers get the parts of the side plate 220, the workers can install the parts of the side plate 220 on the left side of the heat exchanger 20 or the right side of the heat exchanger 20 at will, that is, it can have the effect of preventing misassembly, and improving assembly efficiency. Secondly, it can simplify the material management of the parts of the side plate 220, thereby reducing the material management cost. Furthermore, since only one mold for part is developed, the mold development cost can be reduced, thereby reducing the overall development cost of the air conditioner. Certainly, the structures of the two side plates 220 can also be provided to be different, that is, the two side plates 220 are configured as two different parts. Regardless of whether the structures of the two side plates 220 are identical, the folded first flange 221 can play a role in strengthening the structural strength of the side plate 220 and use the position with higher structural strength to connect with the air duct 10, which can improve the reliability of the installation of the heat exchanger 20 and air duct 10.

[0026] Referring to FIG. 4 and FIG. 5, further, the side plate 220 is further provided with a second flange 222 opposite to the first flange 221, and the heat exchanger body 210 is provided between the second flange 222 and the first flange 221. The second flange 222 can also play a role in strengthening the structural strength of the side plate 220, thereby

making the installation of the side plate 220 and the air duct 10 more reliable, and providing a more reliable installation effect for the heat exchanger body 210.

[0027] In an embodiment, the two side plates 220 include a first side plate and a second side plate provided in sequence along the first direction, a heat exchange tube of the heat exchanger includes a main tube portion and an elbow, the main tube portion is provided with a welded end passing through the first side plate, and the elbow is welded to the welded end. Without loss of generality, material of the heat exchange tube 211 is usually made of copper material or aluminum material, the corresponding heat exchanger is called copper tube heat exchanger or aluminum tube heat exchanger. The side plate of the aluminum tube heat exchanger is usually made of aluminum. In this way, folding both the first flange 221 and the second flange 222 along the direction away from the welded end of the heat exchange tube 211, for the aluminum tube heat exchanger, when performing welding operations to the welded end of the heat exchange tube and the elbow of the heat exchange tube, it can prevent the first flange 221 made of aluminum and the second flange 222 made of aluminum from being melted and damaged by high-temperature welding guns or spatter. It can be understood that the heat exchanger installation structure is also applicable to the copper tube heat exchanger. That is, this side plate can be used not only for air conditioner products of copper tube heat exchanger, but also for air conditioner products of aluminum tube heat exchanger, thereby improving the adaptability of the side plate 220, and then reducing the development cost of the air conditioner.

[0028] Referring to FIG. 1, FIG. 2 and FIG. 5, in an embodiment, the second flange 222 is provided with a second installation portion 223, and the second installation portion 223 is connected with a water receiving pan 30. In this way, adding another installation point to the heat exchanger body 210 by the second installation portion 223, and the second installation portion 223 is installed with the water receiving pan 30, thus, it can further improve the reliability and stability of the installation of the heat exchanger body 210.

[0029] Referring to FIG. 1, FIG. 2 and FIG. 4, in an embodiment, the second installation part 223 is a threaded bottom hole, and the heat exchanger installation structure further includes a water receiving pan 30; the water receiving pan 30 is respectively provided with a positioning hole 31 and an adjusting hole 32 corresponding to two threaded bottom holes, and the adjusting hole 32 and the positioning hole 31 are provided at intervals along the first direction. It should be noted that the size of the positioning hole 31 is adapted to the threaded bottom hole, and the size of the adjusting hole 32 in the first direction is larger than the threaded bottom hole, so that when the side plate 220 and the water receiving pan 30 adapt the screw lock attachment, the adjusting hole 32 can effectively offset the influence of the dimensional manufacturing tolerance of the heat exchanger 20, the assembly tolerance of the heat exchanger 20 and the dimensional manufacturing tolerance of the water receiving pan 30, thus making it easier for workers to install, thereby improving assembly efficiency. Secondly, utilizing the adjusting hole 32, the water receiving pan 30 can further be adapted to the heat exchanger 20 of different models, it is conducive to the platform design of the water receiving pan 30, thereby reducing the product development cost of the air conditioner. Furthermore, adapting the fixation method of screw lock attachment can simplify the installation structure of the second installation portion 223 and the water receiving pan 30, thereby reducing the manufacturing cost of the air conditioner, and the installation operation of the screw connection is simple and convenient, thereby improving the assembly efficiency. Specifically, the positioning hole 31 may be a round hole or a regular polygon hole provided to be adapt to the threaded bottom hole, the adjusting hole 32 may be provided to be a rectangular hole, a waist-shaped hole, or an elliptical hole, and the long axis of the adjusting hole 32 extends along the first direction. However, the present design is not limited to this. In other embodiments, the second installation portion further may be a snap-in protrusion provided on a side of the second flange away from the heat exchanger body, the water receiving pan is provided with a snap-in hole corresponding to the snap-in protrusion, and the snap-in protrusion is snapped in the snap-in hole.

[0030] Referring to FIG. 1, FIG. 3 and FIG. 5, in an embodiment, a plurality of threaded bottom holes are provided, and the plurality of threaded bottom holes are provided at intervals along the second direction. In this way, at least one threaded bottom hole is provided as a reserved installation hole, so that the parts of the side plates 220 with identical structure can be adapted to the heat exchanger body 210 of different models or water receiving pan 30 of different models, thereby facilitating the platform design of the side plate 220, and then reducing the overall development cost of the air conditioner.

[0031] Referring to FIG. 5 and FIG. 6, FIG. 5 is a structural schematic view of the side plate 220 of this embodiment, and FIG. 6 is a front view of the side plate 220 in FIG. 5. The side plate 220 of this embodiment is only provided with a pipeline installation hole 226 in the first pre-drilled hole area 224, and can be adapted and installed with the heat exchanger body 210 of the first model. In this embodiment, in an embodiment, the side plate 220 is provided with a first pre-drilled hole area 224 and a second pre-drilled hole area 225, the first pre-drilled hole area 224 is configured for an installation of the heat exchanger body 210 of a first model, and the first pre-drilled hole area 224 and the second pre-drilled hole area 225 are jointly configured for an installation of the heat exchanger body 210 of a second model. It should be noted that, referring to FIG. 2, the heat exchanger body 210 usually includes a plurality of heat exchange tubes 211. Assuming that the heat exchanger body 210 of the first model is provided with a smaller number of heat exchange tube 211, and the heat exchanger body of the second model is provided with a larger number of heat exchange tubes. Then referring

to FIG. 7 and FIG. 8, FIG. 7 is a structural schematic view of the side plate 220' of another embodiment, and FIG. 8 is a front view of the side plate 220' in FIG. 7. The side plate 220' of another embodiment is provided with pipeline installation holes 226 in the first pre-drilled hole area 224 and the second pre-drilled hole area 225, and can be adapted and installed with the heat exchanger body of the second model. It can be understood that both the first pre-drilled hole area 224 and the second pre-drilled hole area 225 can be provided with a plurality of pipeline installation holes 226 for the heat exchange tube 211 to be passed through and installed, and the pipeline installation hole 226 corresponding to the heat exchange tube 211 of the second model product is at least partially identical structure and same installation location as the pipeline installation hole 226 corresponding to the heat exchange tube 211 of the first model product. It can be understood that if the side plate 220 is only provided with the pipeline installation hole 226 in the first pre-drilled hole area 224, then the parts of the side plate 220 of the first model can only be adapted to install the heat exchanger body 210 of the first model; if the side plate 220 is provided with pipeline installation holes 226 in both the first pre-drilled hole area 224 and the second pre-drilled hole area 225, then the parts of the side plate 220 of the second model can be adapted to install the heat exchanger body 210 of the first model, and can also be adapted to install the heat exchanger body 210 of the second model. It can be understood that if directly adapting the parts of the side plate 220 of the second model to install with the heat exchanger body 210 of the first model, then the pipeline installation hole 226 on the second pre-drilled hole area 225 is in an idle state, which will arouse users' suspicion, for example, users may think that the manufacturer secretly lowers the configuration, which will lead to user complaints. Therefore, in order to avoid causing user complaints, aiming that heat exchangers 20 of different models need to use the parts of the side plate 220 of different models, under this premise, the pipeline installation hole 226 on the first pre-drilled hole area 224 is provided to be shared by the heat exchangers of different models, thereby, the forming molds of the side plate 220 and the pipeline installation hole 226 thereon can be at least partially shared, and then the mold development costs can be reduced, and the overall development cost of air conditioners can be reduced.

[0032] Referring to FIG. 2, FIG. 5 and FIG. 6, further, the heat exchanger body 210 includes a plurality of heat exchange tubes 211, and the first pre-drilled hole area 224 is provided with a plurality of pipeline row holes at intervals along a width direction of the side plate 220; the pipeline row holes include a plurality of pipeline installation holes 226 provided at intervals along a length direction of the side plate 220, and the pipeline installation holes 226 are configured for the heat exchange tubes 211 to be passed through and installed. It should be noted that "a plurality of" refers to two or more. In this way, the plurality of pipeline installation holes 226 on the first pre-drilled hole area 224 are arranged in an orderly manner, which not only helps to improve the heat exchange efficiency of the heat exchanger body 210, but also simplifies the mold structure of the side plate 220, thereby reducing the mold development cost.

[0033] Referring to FIG. 7 and FIG. 8, in this embodiment, further, the second pre-drilled hole area 225 is provided with at least one pipeline row hole, the pipeline row hole includes a plurality of pipeline installation holes 226 provided at intervals along the length direction of the side plate 220. In this way, the plurality of pipeline installation holes 226 on the second pre-drilled hole area 225 are arranged in an orderly manner, which not only helps to improve the heat exchange efficiency of the heat exchanger body 210, but also simplifies the mold structure of the side plate 220, thereby reducing the mold development cost.

[0034] In an embodiment, the pipeline installation hole 226 on the side plate 220 is provided to be formed by punching adopting a stamping forming process. In this way, the pipeline installation hole 226 on the first pre-drilled hole area 224 and the pipeline installation hole 226 on the second pre-drilled hole area 225 can be divided into two punching processes for forming, the pipeline installation hole 226 on the second pre-drilled hole area 225 is selectively formed according to product requirements, so that the parts of the side plate 220 with different structures can share a part of the forming molds, thus reducing the mold development cost, thereby reducing the overall development cost of the air conditioner. Specifically, the side plate 220 can use a stamping drawing process or extrusion molding process to form the first flange 221 and the second flange 222, and then the side plate 220 is sent to the first punching process, using the first punching mold to punch out the pipeline installation hole 226 on the first pre-drilled hole area 224, and then directly obtaining the parts of the side plate 220 of the first model that can be adapted to install the heat exchanger body 210 of the first model. If you want to get the parts of the side plate 220' of the second model that can be adapted to install the second heat exchanger body of the second model, you can continue to send the parts of the side plate 220 of the first model to the second punching process, and use the second punching mold to punch out the pipeline installation hole 226 on the second pre-drilled hole area 225. In this way, the side plate 220 of the first model and the side plate 220' of the second model at least share a drawing forming mold or an extrusion forming mold and a first punching mold, thus achieving the purpose of reducing mold development costs, thereby reducing the overall development cost of air conditioners. However, the present design is not limited to this. In other embodiments, the side plate can further be provided by adopting injection forming, the female mold of the injection mold of the parts of two side plate of the first model and the second model can achieve full sharing, while the male mold of the injection mold can achieve partial structure sharing.

[0035] Referring to FIG. 6 and FIG. 8, in an embodiment, the first pre-drilled hole area 224 and the second pre-drilled hole area 225 are provided in sequence in a direction from the side plate 220 toward the air duct 10. Without loss of generality, the air duct 10 is usually provided inside the air conditioner, so the side of the heat exchanger body 210 close

to the air duct 10 is hidden in the air conditioner, while the side of the heat exchanger body 210 away from the air duct 10 can be seen by the user. By providing the second pre-drilled hole area 225 at a position close to the air duct 10, the second pre-drilled hole area 225 can be hidden, that is, for air conditioner products of different models, the appearance of the heat exchanger 20 when viewed from the outside is the same. For example, as shown in FIG. 4, the side of the heat exchanger body 210 of the first model away from the air duct 10 is nearly flush with the end surface of the second flange 222, and the side of the heat exchanger body of the second model away from the air duct can also achieve this state. However, the present design is not limited to this. In other embodiments, it further can be that the second pre-drilled hole area is provided in the first pre-drilled hole area.

[0036] Referring to FIG. 9 to FIG. 11, in an embodiment, the heat exchanger installation structure further includes an air duct 10, the air duct 10 includes an air duct body 11 and a chute 12 provided at the air duct body 11, two chutes 12 are provided corresponding to the two first flanges 221; the first flange 221 is slidably inserted into the chute 12 along a second direction, and the second direction is configured to intersect with the first direction. It should be noted that the second direction refers to the length direction of the side plate 220, and the first direction is the thickness direction of the side plate 220. In this way, the installation structure of the heat exchanger 20 and the air duct 10 can be simplified, thereby reducing the manufacturing cost. Moreover, the installation that the first flange 221 slidably inserted into the chute 12 is easy to operate, thereby improving the assembly efficiency. However, the present design is not limited to this. In other embodiments, it further can be that the heat exchanger installation structure may further include an air duct, the air duct includes an air duct body and a snap-in protrusion provided at the side edge of the air duct body, the first flange is provided with a snap-in hole corresponding to the snap-in protrusion, and the snap-in protrusion is snapped in the snap-in hole.

[0037] Referring to FIG. 10 and FIG. 11, in an embodiment, the side edge of the air duct body 11 is provided with a third flange 111 extending along the first direction, the third flange 111 is provided with a fourth flange 112 extending along the direction toward the heat exchanger body 210, and the fourth flange 112 is provided with a first limiting portion 113 protruding along a direction away from the first direction. The third flange 111, the fourth flange 112 and the first limiting portion 113 jointly define the chute 12. In this way, using the third flange 111 and the fourth flange 112 can not only strengthen the structural strength of the side edge of the air duct body 11, it further can cooperate with the first limiting portion 113 to limit the first flange 221 in the chute 12. The molding structure of the chute 12 is not only simple in structure, which is beneficial to reducing the manufacturing cost of the air duct 10, but also has good structural strength, thereby improving the stability and reliability of installation of the air duct 10 and the heat exchanger 20. However, the design is not limited to this. In other embodiments, it further can be that the end surface of the side edge facing the heat exchanger body of the air duct body may be provided with a groove. The groove is provided with a first end and a second end distributed in sequence in the second direction, and the edge of the mouth of the groove of the second end is provided with a limiting convex portion protruding toward the center of the mouth of the groove, and the limiting convex portion is abutted against a side of the first flange away from the air duct body.

[0038] Referring to FIG. 10, in an embodiment, the first limiting portion 113 is provided with a first side edge and a second side edge distributed in sequence in the second direction, and the side surface of the first limiting portion 113 facing the third flange 111 includes a first guide surface segment 114 close to the first side edge. In the second direction, the first guide surface segment 114 extends obliquely in a direction close to the fourth flange 112. In this way, the first guide surface segment 114 can play a good guiding role, thereby making it convenient for workers to operate the first flange 221 to slide and insert into the chute 12 along the second direction.

[0039] Referring to FIG. 9 and FIG. 10, in an embodiment, the third flange 111 is provided with an avoidance sink groove 115 corresponding to the first limiting portion 113. Without loss of generality, the air duct 10 is usually manufactured adopting an injection molding process due to its relatively complex structure and relatively high structural strength requirements. It can be understood that in the direction from the side plate 220 toward the air duct 10, the smaller the width of the chute 12 is, the more conducive it is to limit the displacement of the side plate 220 in this direction, therefore, the amount of shaking of the side plate 220 in this direction can be reduced, making the installation of the side plate 220 and the air duct 10 more stable and reliable. Since the thickness of the first flange 221 in this direction is usually relatively small, which can meet the installation strength requirements, the width of the chute 12 is provided to be relatively small concomitantly. However, if the distance between the third flange 111 and the first limiting portion 113 is too small, the mold structure corresponding thereto will be relatively thin, resulting in the mold structure being prone to problems and having a short service life. Therefore, by partially sinking the area of the third flange 111 corresponding to the first limiting portion 113, that is, providing a structure of the avoidance sink groove 115, the mold structure corresponding to this place can achieve a thickening effect, thereby reducing the probability of mold errors, and increasing the service life of the mold.

[0040] In an embodiment, the third flange 111 is recessed with a stepped portion corresponding to the first limiting portion 113, and the avoidance sink groove 115 is provided on the bottom wall of the stepped portion. In this way, by providing the stepped portion, it can not only strengthen the mold structure corresponding to the avoidance sink groove 115, but also further strengthen the structural strength of the third flange 111 itself, thereby improving the structural

strength of the chute 12, and then improving the stability and reliability of the installation of the heat exchanger 20 and the air duct 10.

[0041] Referring to FIG. 9 and FIG. 10, in an embodiment, a resisting-and-supporting portion 116 protrudes from the middle portion of the groove bottom of the avoidance sink groove 115 toward the first limiting portion 113, and the side of the first flange 221 facing the avoidance sink groove 115 is abutted against the resisting-and-supporting portion 116. In this way, on the premise of improving the structural strength of the mold, the resisting-and-supporting portion 116 and the first limiting portion 113 are configured to jointly play a limiting role in the first flange 221, thus improving the limiting effect of the chute 12 on the first flange 221, thereby reducing the probability of the side plate 220 loosening and shaking after installation.

[0042] Referring to FIG. 10 and FIG. 11, in an embodiment, the peripheral surface of the resisting-and-supporting portion 116 is provided in an arc surface. In this way, the resisting-and-supporting portion 116 can play a good guiding role, thereby facilitating the worker to operate the first flange 221 to slide across the avoidance sink groove 115 along the second direction and insert it deeper. However, the present design is not limited to this. In other embodiments, it further can be that the resisting-and-supporting portion is provided with a fifth side edge and a sixth side edges distributed in sequence in the second direction, and the side surface of the resisting-and-supporting portion facing the first limiting portion includes a third guide surface segment close to the fifth side edge; in the second direction, the third guide surface segment extends obliquely in a direction close to the first limiting portion.

[0043] In an embodiment, the resisting-and-supporting portion 116 is provided to be protruded from the bottom surface of the groove of the third flange 111. In this way, the resisting-and-supporting portion 116 and the first limiting portion 113 can better limit the first flange 221 of the side plate 220 in the chute 12, thus further reducing the probability of side plate 220 loosening and shaking after installation, thereby improving the stability and reliability of the installation of heat exchanger 20 and air duct 10.

[0044] Referring to FIG. 10 and FIG. 11, in an embodiment, a plurality of first limiting portions 113 are provided, and the plurality of first limiting portions 113 are provided at intervals along the second direction. In this way, the first flange 221 can be better limited in the chute 12, thus reducing the probability of side plate 220 loosening and shaking after installation, thereby improving the stability and reliability of the installation of heat exchanger 20 and air duct 10.

[0045] Referring to FIG. 9, FIG. 10 and FIG. 11, in an embodiment, the two chute 12 include a first chute 12 and a second chute 12 provided in sequence along the first direction, the third flange 111 on the first chute 12 protrudes toward the heat exchanger body 210 with a second limiting portion 117, and the side of the second limiting portion 117 facing the first chute 12 is abutted against the side plate 220. In this way, the second limiting portion 117 is used to abut against the side plate 220, which can prevent the side plate 220 from slipping out of the first chute 12 along a direction away from the first direction, thereby improving the reliability and stability of the installation of heat exchanger 20 and air duct 10. It can be understood that since both side plates 220 are fixed relative to the heat exchanger body 210, and only one of the side plates 220 is limited so that it will not slip along a direction away from the first direction. Thus, it can ensure that the other side plate 220, the heat exchanger body 210, and the air duct 10 maintain a good connection relationship. In this way, the installation structure of the air duct 10 can be simplified, thereby reducing the manufacturing cost of the air duct 10. However, the present design is not limited to this. In other embodiments, it further can be that both the third flange on the first chute and the third flange on the second chute may be provided with a second limiting portion, and the side of the second limiting portion facing the fourth flange is abutted against the side plate.

[0046] Referring to FIG. 10 and FIG. 11, in an embodiment, the second limiting portion 117 is provided with a third side edge and a fourth side edge distributed in sequence in the second direction, and the side surface of the second limiting portion 117 facing the fourth flange 112 includes a second guide surface segment 118 close to the first side edge; in the second direction, the second guide surface segment 118 extends obliquely in a direction close to the fourth flange 112. In this way, the second guide surface segment 118 can play a good guiding role, thereby making it convenient for workers to operate the first flange 221 to slide and insert into the chute 12 along the second direction.

[0047] Referring to FIG. 10 and FIG. 11, in an embodiment, the second limiting portion 117 and the first limiting portion 113 are provided in a staggered arrangement in the second direction. In this way, the forming mold structure of the air duct 10 can be simplified, thereby reducing the mold development cost of the air duct 10.

[0048] Referring to FIG. 10 and FIG. 11, in an embodiment, a plurality of second limiting portions 117 are provided, and the plurality of second limiting portions 117 are provided at intervals along the second direction. The first flange 221 can be better limited in the chute 12, thus reducing the probability that the side plate 220 will accidentally slip out of the chute 12 after installation, thereby improving the stability of the installation of the heat exchanger 20 and the air duct 10.

[0049] The present application further proposes an air conditioner including the aforementioned heat exchanger installation structure. The specific structure of the heat exchanger installation structure refers to the above embodiment. Since this air conditioner adopts all the technical solutions of all the above-mentioned embodiments, it has at least all the beneficial effects brought by the technical solutions of the above-mentioned embodiments, which will not be described again here.

[0050] The above are only some embodiments of the present application, and are not intended to limit the scope of

the present application. Under the concept of the present application, any equivalent structure transformation made by using the description and accompanying drawings of the present application, or directly or indirectly applied in other related technical fields, is included within the scope of the present application.

5

Claims

1. A heat exchanger installation structure, applied to an air conditioner, comprising:

10 a heat exchanger comprising a heat exchanger body and two side plates respectively provided at two opposite sides of the heat exchanger body,
wherein same side edges of the two side plates are each folded toward a first direction to form a first flange,
wherein the two first flanges are configured to be connected with an air duct of the air conditioner, and structures
of the two side plates are identical.

15 2. The heat exchanger installation structure according to claim 1, wherein each of the side plates is further provided with a second flange opposite the first flange, and the heat exchanger body is provided between the second flanges and the first flanges.

20 3. The heat exchanger installation structure according to claim 2, wherein each of the second flanges is provided with a second installation portion, and the second installation portions are configured to be connected with a water receiving pan of the air conditioner.

25 4. The heat exchanger installation structure according to claim 3, wherein each of the second flanges is provided with a plurality of second installation portions, and the plurality of the second installation portions are provided at intervals along a length direction of the side plate.

30 5. The heat exchanger installation structure according to claim 3, wherein each of the second installation portions is provided in a form of a threaded bottom hole, and the heat exchanger installation structure further comprises the water receiving pan; the water receiving pan is provided with a positioning hole and an adjusting hole corresponding to the two threaded bottom holes respectively, and the adjusting hole and the positioning hole are provided at an interval along the first direction.

35 6. The heat exchanger installation structure according to claim 1, wherein each of the side plates is provided with a first pre-drilled hole area and a second pre-drilled hole area, the first pre-drilled hole area is configured for installation of the heat exchanger body of a first model, and the first pre-drilled hole area and the second pre-drilled hole area are jointly configured for installation of the heat exchanger body of a second model.

40 7. The heat exchanger installation structure according to claim 6, wherein the first pre-drilled hole area and the second pre-drilled hole area are provided in sequence in a direction from the side plate to the air duct.

45 8. The heat exchanger installation structure according to claim 6, wherein the heat exchanger body comprises a plurality of heat exchange tubes, and the first pre-drilled hole area is provided with a plurality of pipeline row holes at intervals along a width direction of the side plate; the pipeline row holes comprise a plurality of pipeline installation holes provided at intervals along a length direction of the side plate, and the pipeline installation holes are configured for the heat exchange tubes to be passed through and installed.

9. The heat exchanger installation structure according to claim 1, further comprising:

50 the air duct comprising an air duct body and a chute provided at the air duct body,
wherein two chutes are provided corresponding to the two first flanges; each of the first flanges is slidably inserted into a corresponding chute along a second direction, and the second direction is configured to intersect with the first direction; and/or
the two side plates comprise a first side plate and a second side plate provided in sequence along the first
55 direction, a heat exchange tube of the heat exchanger comprises a main tube portion and an elbow, the main tube portion is provided with a weld end passing through the first side plate, and the elbow is welded to the weld end.

10. An air conditioner, comprising the heat exchanger installation structure according to any one of claims 1 to 9.

5

10

15

20

25

30

35

40

45

50

55

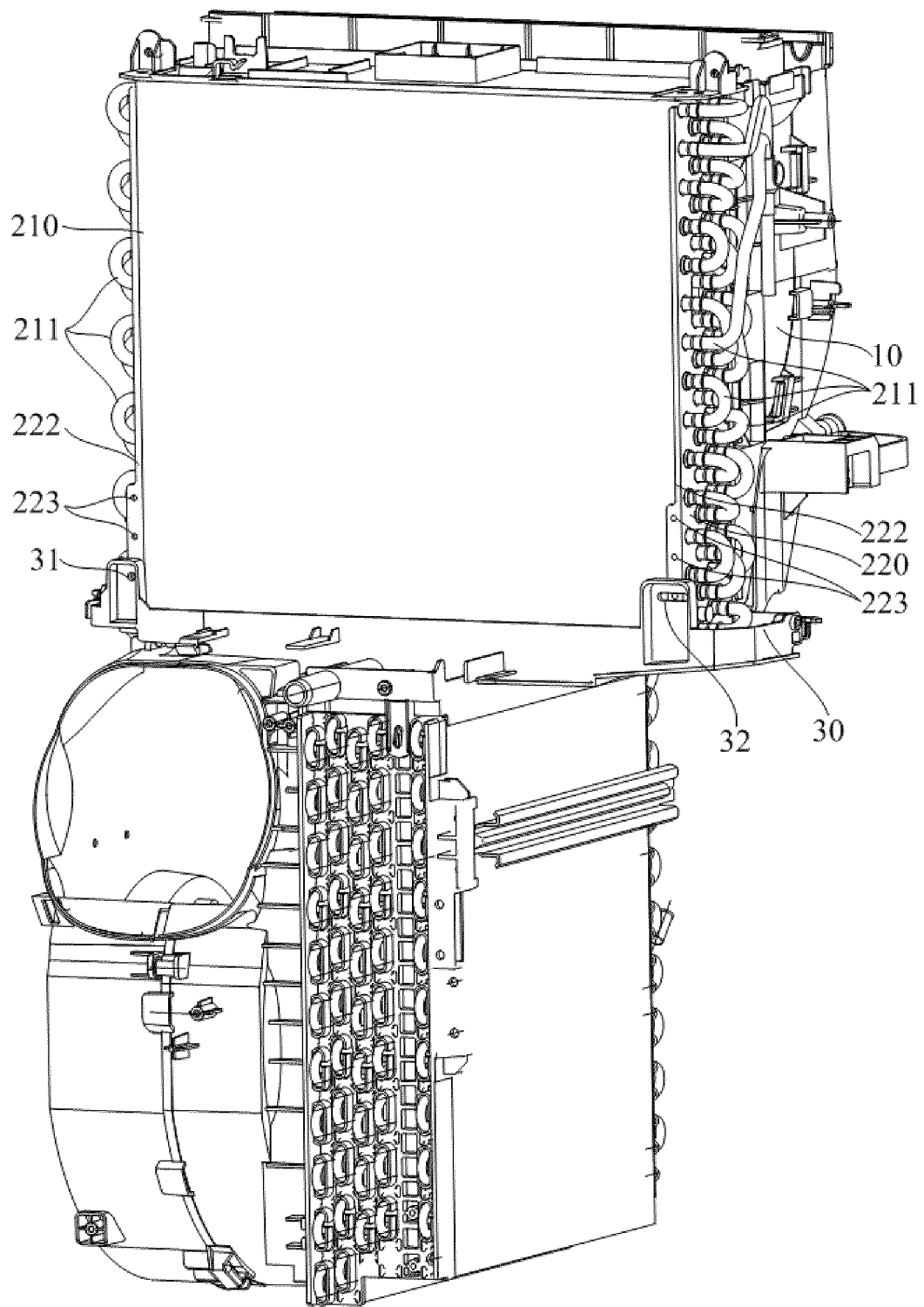


FIG. 1

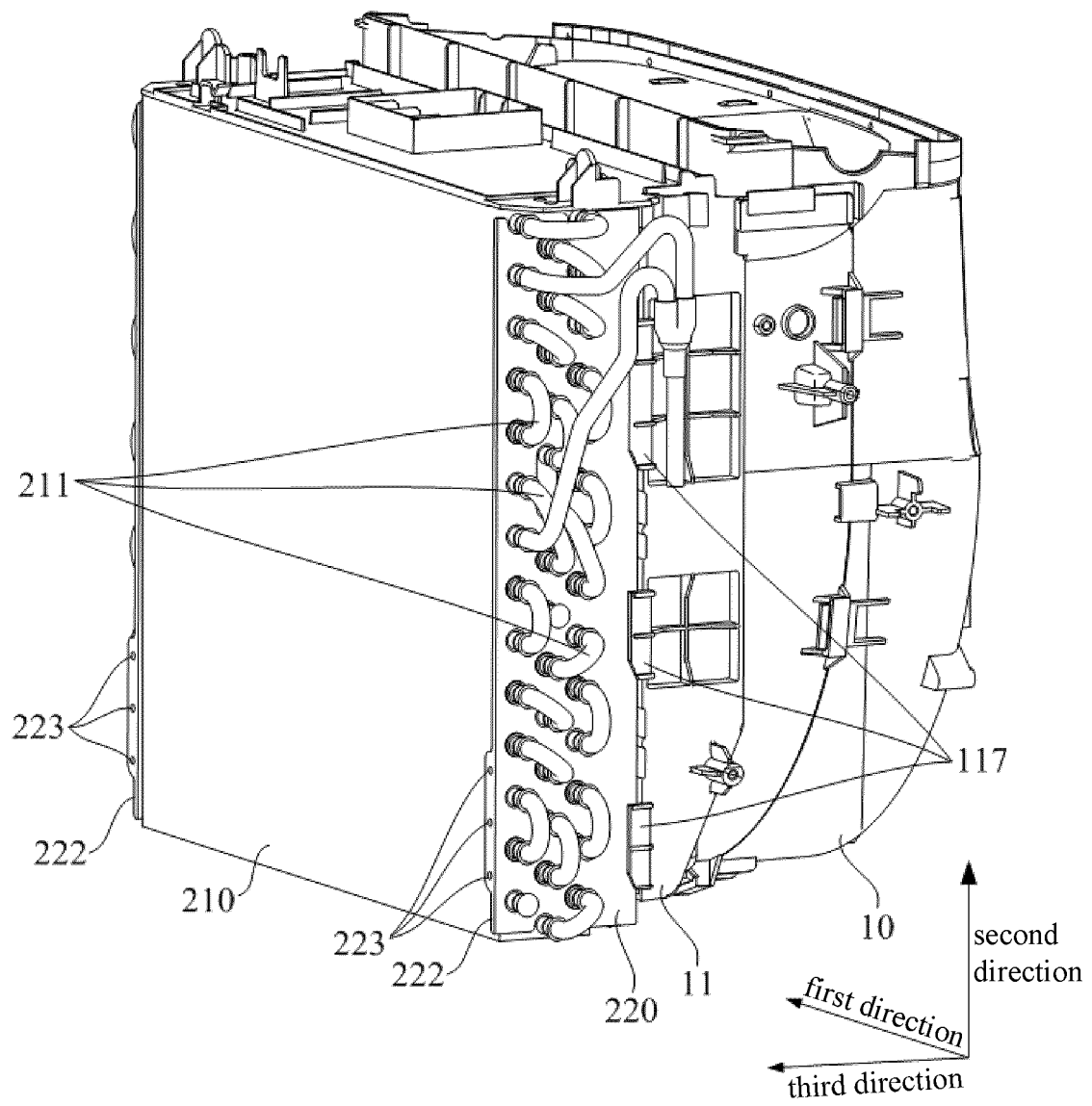


FIG. 2

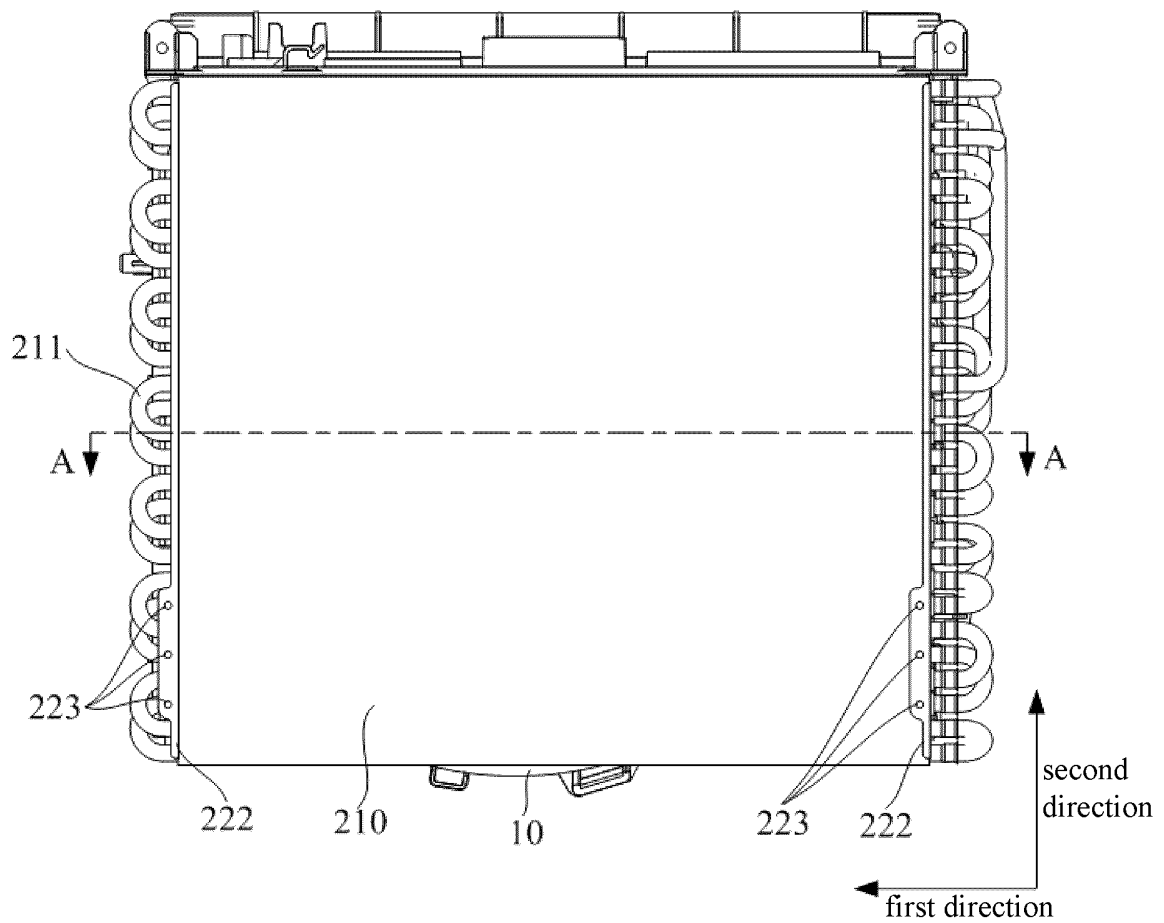


FIG. 3

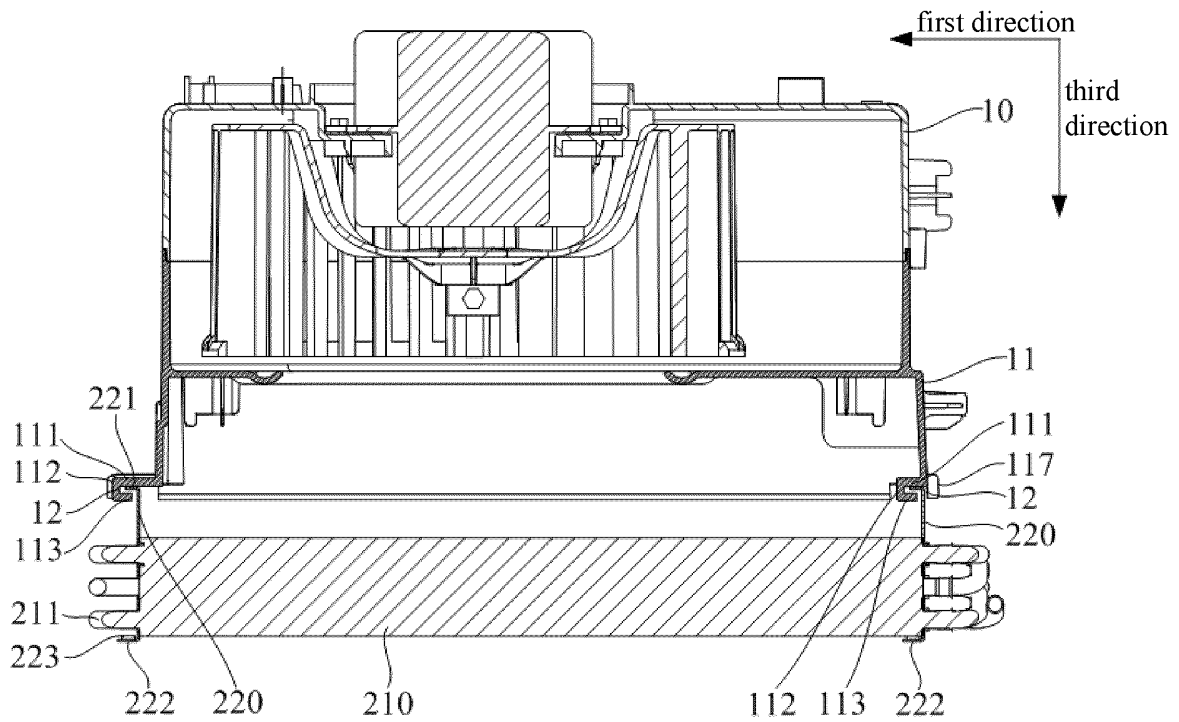


FIG. 4

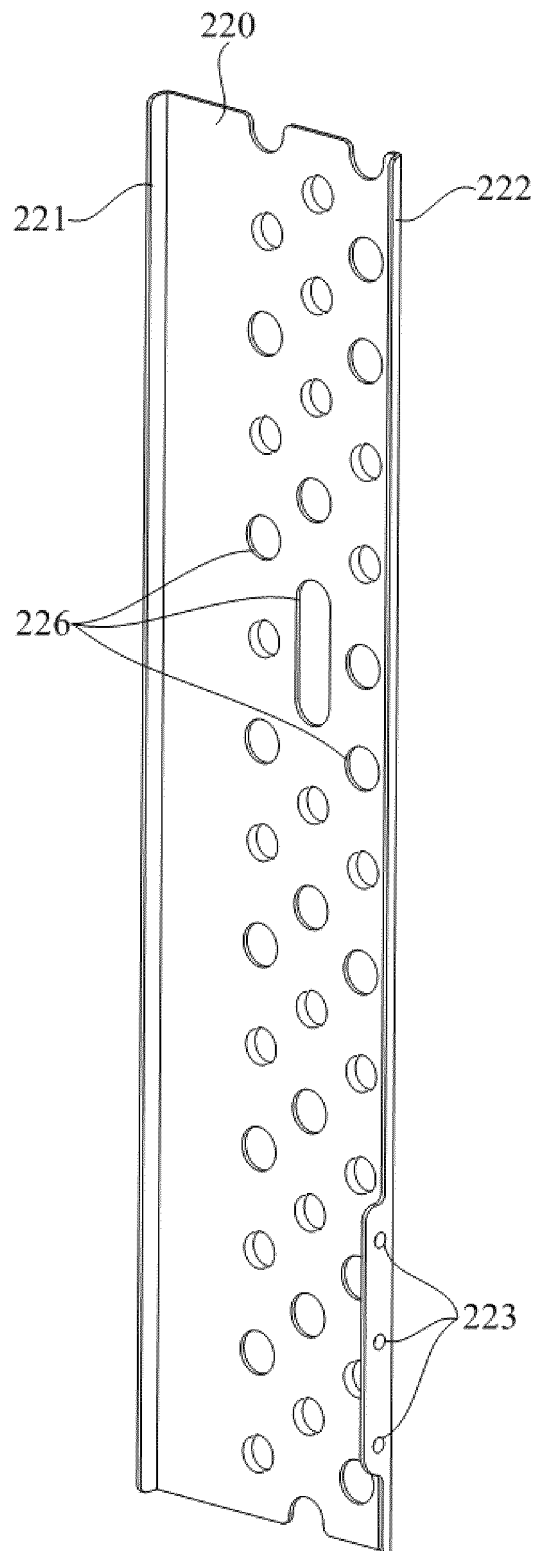


FIG. 5

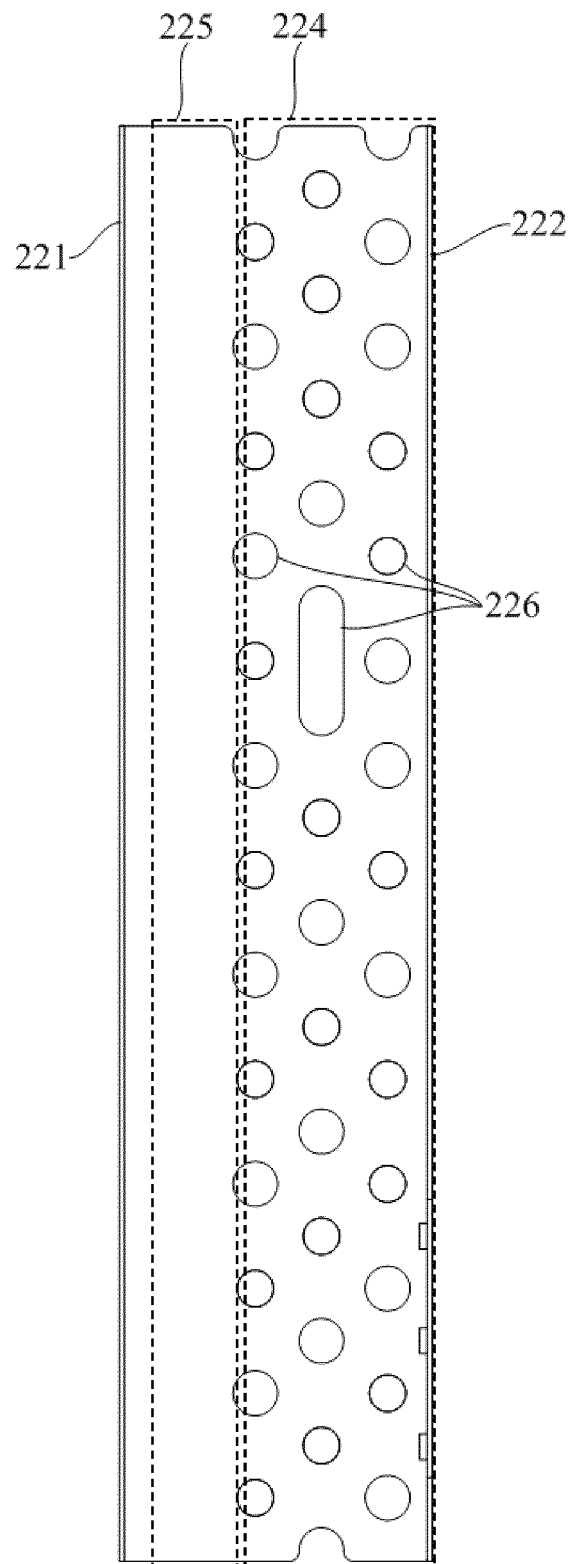


FIG. 6

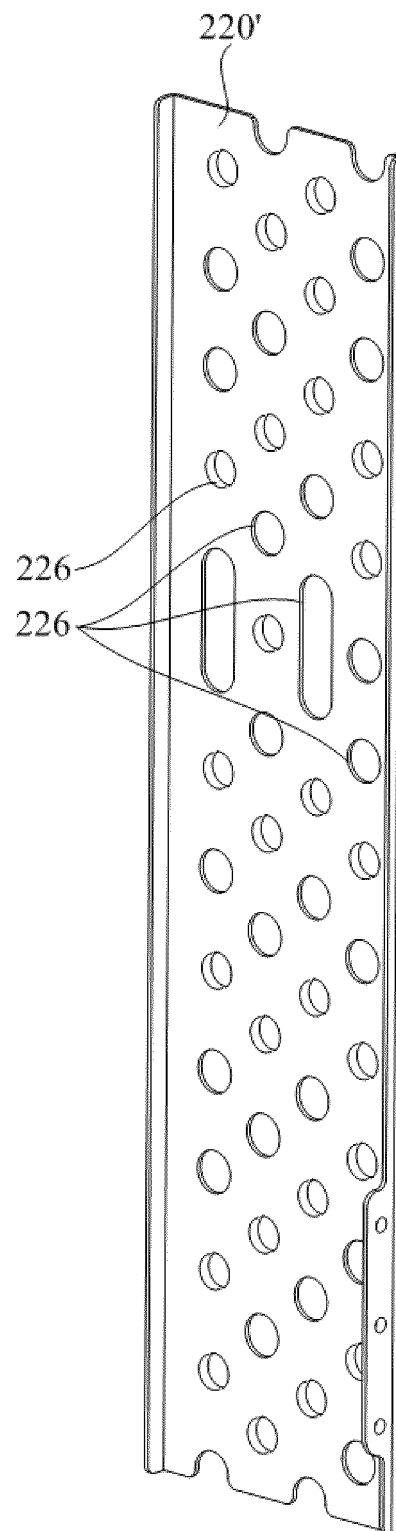


FIG. 7

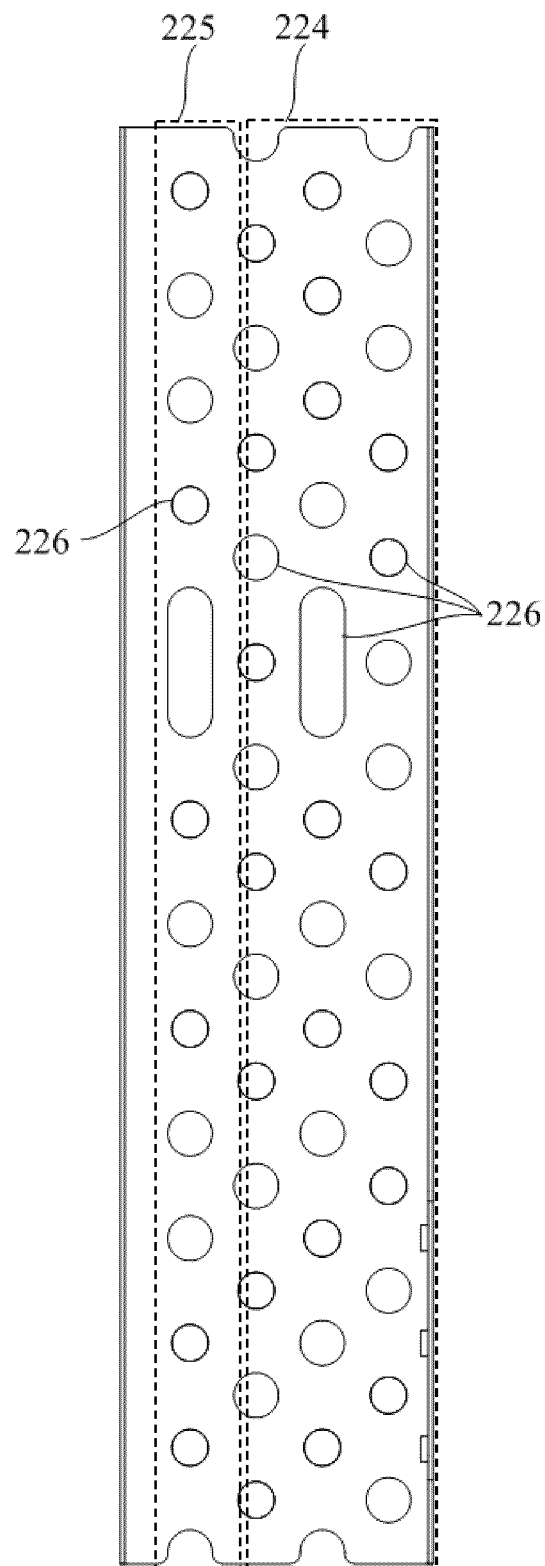


FIG. 8

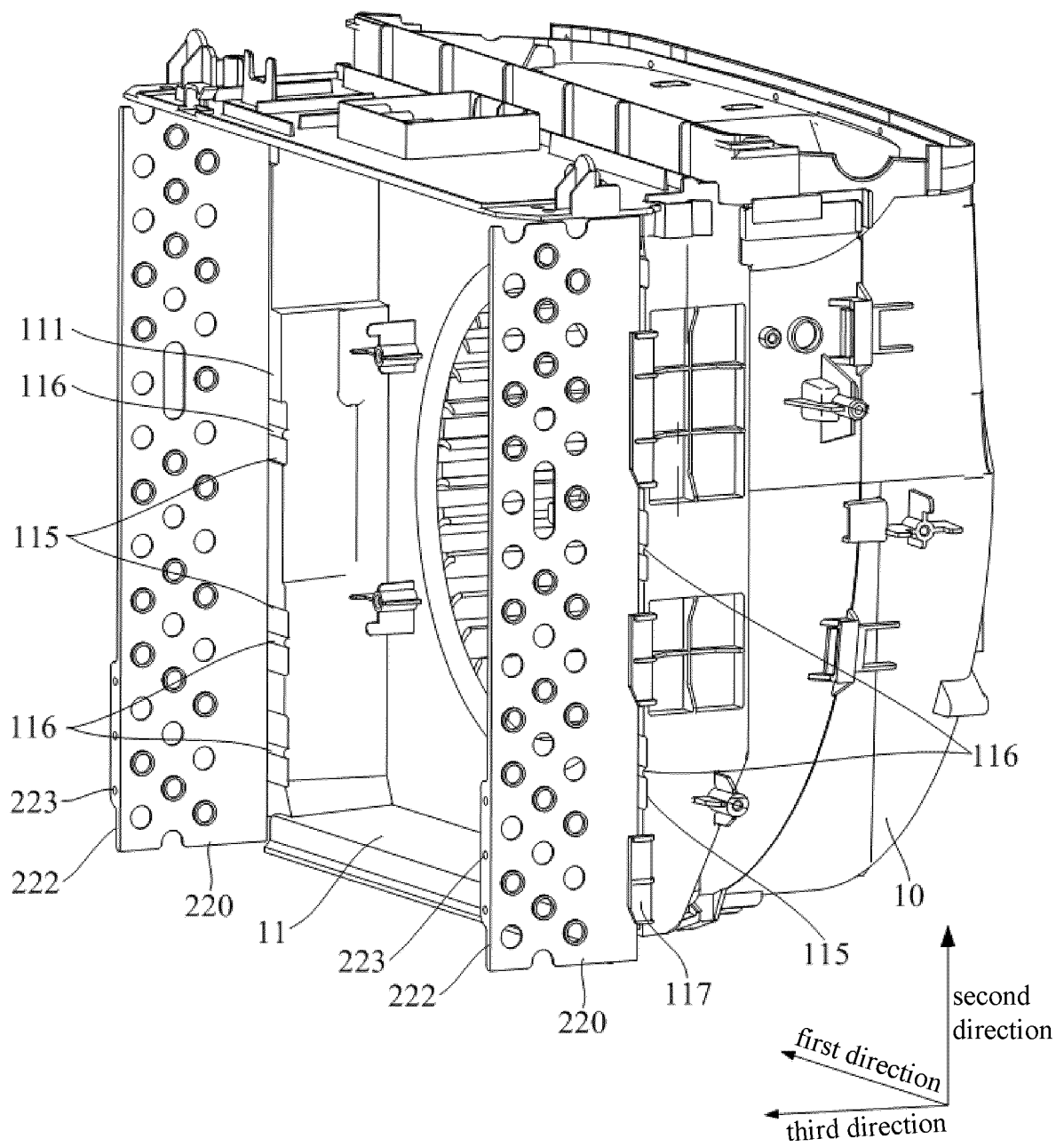


FIG. 9

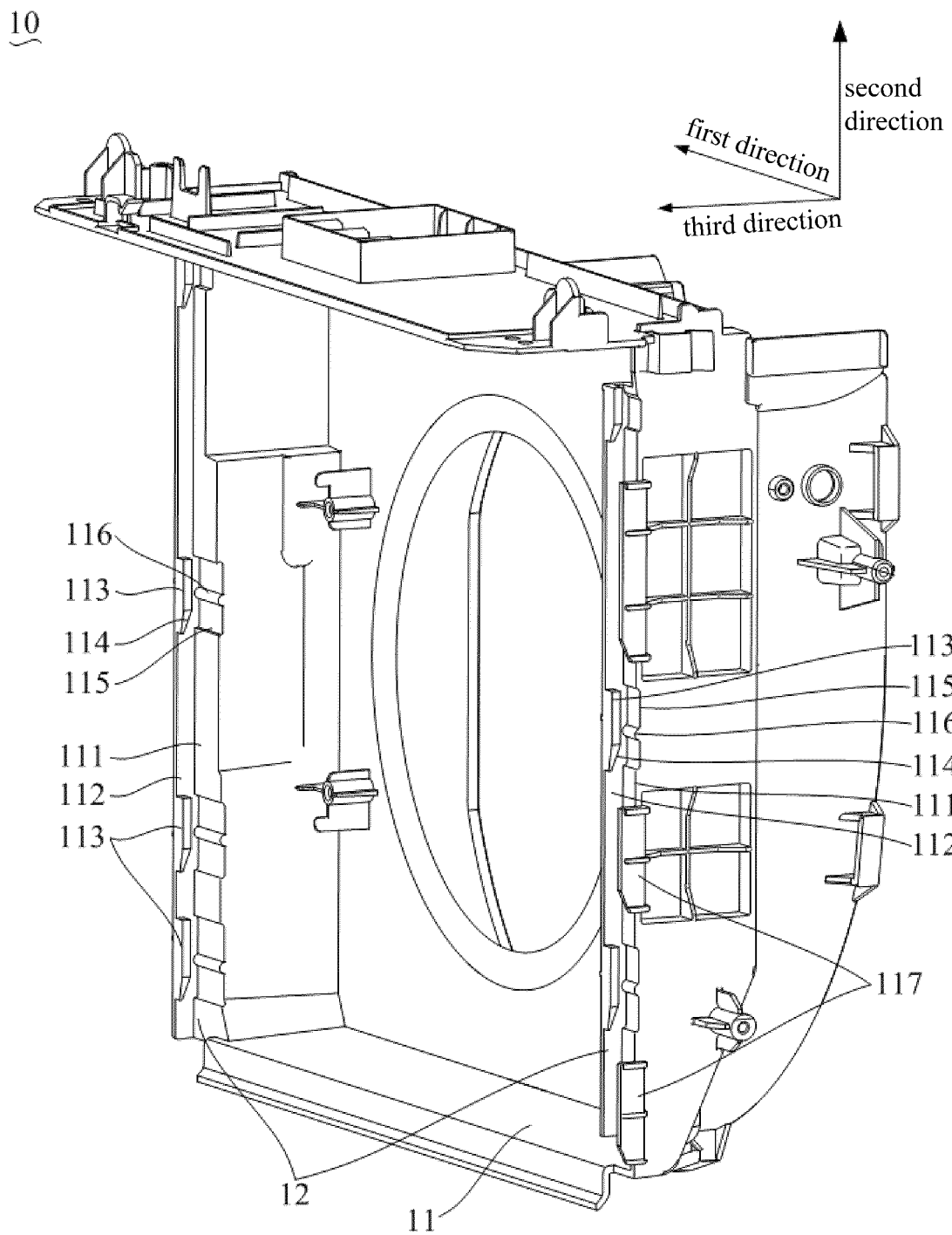


FIG. 10

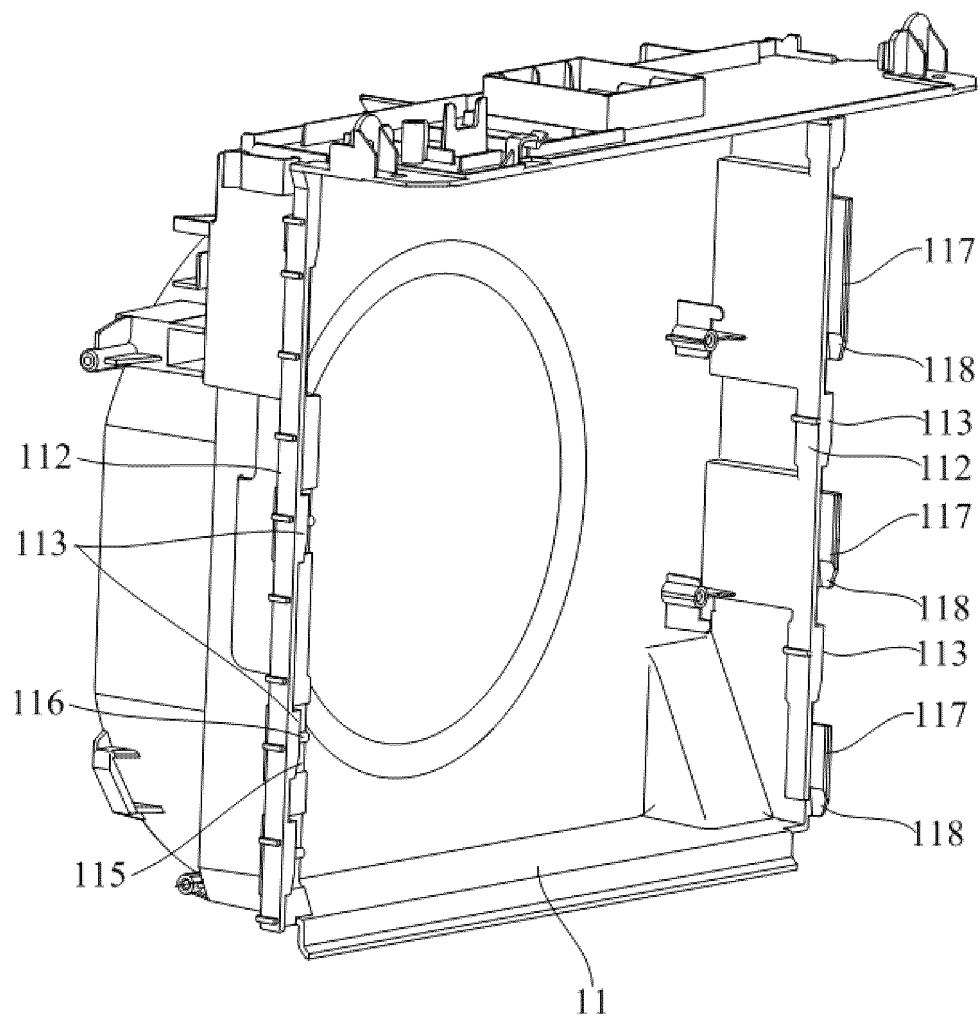


FIG. 11

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2022/095258

A. CLASSIFICATION OF SUBJECT MATTER F24F 13/30(2006.01)i; F24F 1/18(2011.01)i; F24F 13/22(2006.01)i; F28F 9/02(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; F28F 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, CNTXT, VEN, WOTXT, EPTXT, USTXT, CNKI: 换热器, 热交换, 边板, 管板, 端板, 翻边, 卷边, 弯折, 翻折, 限位槽, 滑槽, 相同, 同样, 一样, 一致, 空调, 蒸发器, air conditioner, heat exchanger, side plate, edge plate, flap, bend, chute, limit slot, same																					
C. DOCUMENTS CONSIDERED TO BE RELEVANT																					
<table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>X</td> <td>CN 208952386 U (NINGBO AUX ELECTRIC CO., LTD. et al.) 07 June 2019 (2019-06-07) description, paragraphs 0038-0045, and figures 1-7</td> <td>1-10</td> </tr> <tr> <td>PX</td> <td>CN 216308007 U (WUHAN REFRIGERATION EQUIPMENT CO., LTD. OF MIDEA GROUP et al.) 15 April 2022 (2022-04-15) description, paragraphs 0036-0039, and figures 1-9</td> <td>1-10</td> </tr> <tr> <td>PX</td> <td>CN 216244829 U (GUANGDONG MIDEA REFRIGERATION EQUIPMENT CO., LTD.) 08 April 2022 (2022-04-08) description, paragraphs 0054-0058, and figures 1-9</td> <td>1-10</td> </tr> <tr> <td>A</td> <td>CN 106403696 A (ZHUHAI GREE ELECTRIC APPLIANCES INC.) 15 February 2017 (2017-02-15) entire document</td> <td>1-10</td> </tr> <tr> <td>A</td> <td>EP 0547450 A2 (HITACHI LTD.) 23 June 1993 (1993-06-23) entire document</td> <td>1-10</td> </tr> <tr> <td>A</td> <td>US 2013074340 A1 (KEIHIN THERMAL TECHNOLOGY CORP.) 28 March 2013 (2013-03-28) entire document</td> <td>1-10</td> </tr> </tbody> </table>	Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	X	CN 208952386 U (NINGBO AUX ELECTRIC CO., LTD. et al.) 07 June 2019 (2019-06-07) description, paragraphs 0038-0045, and figures 1-7	1-10	PX	CN 216308007 U (WUHAN REFRIGERATION EQUIPMENT CO., LTD. OF MIDEA GROUP et al.) 15 April 2022 (2022-04-15) description, paragraphs 0036-0039, and figures 1-9	1-10	PX	CN 216244829 U (GUANGDONG MIDEA REFRIGERATION EQUIPMENT CO., LTD.) 08 April 2022 (2022-04-08) description, paragraphs 0054-0058, and figures 1-9	1-10	A	CN 106403696 A (ZHUHAI GREE ELECTRIC APPLIANCES INC.) 15 February 2017 (2017-02-15) entire document	1-10	A	EP 0547450 A2 (HITACHI LTD.) 23 June 1993 (1993-06-23) entire document	1-10	A	US 2013074340 A1 (KEIHIN THERMAL TECHNOLOGY CORP.) 28 March 2013 (2013-03-28) entire document	1-10
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.																			
X	CN 208952386 U (NINGBO AUX ELECTRIC CO., LTD. et al.) 07 June 2019 (2019-06-07) description, paragraphs 0038-0045, and figures 1-7	1-10																			
PX	CN 216308007 U (WUHAN REFRIGERATION EQUIPMENT CO., LTD. OF MIDEA GROUP et al.) 15 April 2022 (2022-04-15) description, paragraphs 0036-0039, and figures 1-9	1-10																			
PX	CN 216244829 U (GUANGDONG MIDEA REFRIGERATION EQUIPMENT CO., LTD.) 08 April 2022 (2022-04-08) description, paragraphs 0054-0058, and figures 1-9	1-10																			
A	CN 106403696 A (ZHUHAI GREE ELECTRIC APPLIANCES INC.) 15 February 2017 (2017-02-15) entire document	1-10																			
A	EP 0547450 A2 (HITACHI LTD.) 23 June 1993 (1993-06-23) entire document	1-10																			
A	US 2013074340 A1 (KEIHIN THERMAL TECHNOLOGY CORP.) 28 March 2013 (2013-03-28) entire document	1-10																			
☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.																					
<table border="0"> <tr> <td>* Special categories of cited documents:</td> <td>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</td> </tr> <tr> <td>"A" document defining the general state of the art which is not considered to be of particular relevance</td> <td>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</td> </tr> <tr> <td>"E" earlier application or patent but published on or after the international filing date</td> <td>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</td> </tr> <tr> <td>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</td> <td>"&" document member of the same patent family</td> </tr> <tr> <td>"O" document referring to an oral disclosure, use, exhibition or other means</td> <td></td> </tr> <tr> <td>"P" document published prior to the international filing date but later than the priority date claimed</td> <td></td> </tr> </table>	* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention	"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone	"E" earlier application or patent but published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art	"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family	"O" document referring to an oral disclosure, use, exhibition or other means		"P" document published prior to the international filing date but later than the priority date claimed										
* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention																				
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone																				
"E" earlier application or patent but published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art																				
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family																				
"O" document referring to an oral disclosure, use, exhibition or other means																					
"P" document published prior to the international filing date but later than the priority date claimed																					
Date of the actual completion of the international search 22 July 2022	Date of mailing of the international search report 04 August 2022																				
Name and mailing address of the ISA/CN China National Intellectual Property Administration (ISA/CN) No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088, China Facsimile No. (86-10)62019451	Authorized officer Telephone No.																				

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2022/095258

C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2009180443 A (SHARP K. K.) 13 August 2009 (2009-08-13) entire document	1-10
A	CN 106568186 A (ZHUHAI GREE ELECTRIC APPLIANCES INC.) 19 April 2017 (2017-04-19) entire document	1-10
A	CN 206926479 U (YUXIN AUTOMOTIVE AIR CONDITIONER CO., LTD.) 26 January 2018 (2018-01-26) entire document	1-10
A	CN 213990078 U (NANTONG DATONG ELECTRIC CO., LTD.) 17 August 2021 (2021-08-17) entire document	1-10

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2022/095258

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 208952386 U	07 June 2019	None	
CN 216308007 U	15 April 2022	None	
CN 216244829 U	08 April 2022	None	
CN 106403696 A	15 February 2017	None	
EP 0547450 A2	23 June 1993	CN 1075780 A	01 September 1993
		JP H05164348 A	29 June 1993
		ES 2085541 T3	01 June 1996
		MY 114233 A	30 September 2002
		EP 0547450 A3	24 November 1993
		CN 1028181 C	12 April 1995
		EP 0547450 B1	06 March 1996
		JP 2001050554 A	23 February 2001
		JP 2004093132 A	25 March 2004
US 2013074340 A1	28 March 2013	DE 102012217409 A1	28 March 2013
		CN 103105080 A	15 May 2013
		JP 2013072607 A	22 April 2013
		US 8935854 B2	20 January 2015
		CN 103105080 B	16 March 2016
JP 2009180443 A	13 August 2009	None	
CN 106568186 A	19 April 2017	None	
CN 206926479 U	26 January 2018	None	
CN 213990078 U	17 August 2021	None	

Form PCT/ISA/210 (patent family annex) (January 2015)

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- CN 202111454989X [0001]
- CN 202123024505 [0001]