(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 191 156 A1**

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

(43) Date of publication:
07.06.2023 Bulletin 2023/23

(21) Application number: **21870774.3**

(22) Date of filing: **26.04.2021**

(51) International Patent Classification (IPC):
F24F 13/08 *(2006.01)* ***F24F 13/15*** *(2006.01)*
F24F 1/005 *(2019.01)*

(52) Cooperative Patent Classification (CPC):
F24F 1/005; F24F 13/08; F24F 13/15

(86) International application number:
PCT/CN2021/089749

(87) International publication number:
WO 2022/062385 (31.03.2022 Gazette 2022/13)

(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: **28.09.2020 CN 202011044918**
28.09.2020 CN 202022179996 U

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(54) AIR DIFFUSION APPARATUS AND FLOOR-MOUNTED AIR CONDITIONER

(57) Disclosed by the present application are an air diffusion apparatus and floor-mounted air conditioner; said air diffusion apparatus comprises an air diffusion frame and an air diffusion module; said air diffusion frame comprises a first air diffusion plate and a second air diffusion plate, said first air diffusion plate and said second air diffusion plate forming an air passage chamber therebetween; the first air diffusion plate is provided with air diffusion holes, second air diffusion plate is provided with a ventilation opening; the air diffusion module comprises a dynamic turbine wheel, said dynamic impeller wheel is rotatably configured in the air passage chamber, and the dynamic impeller wheel is used for diffusing the air flow.

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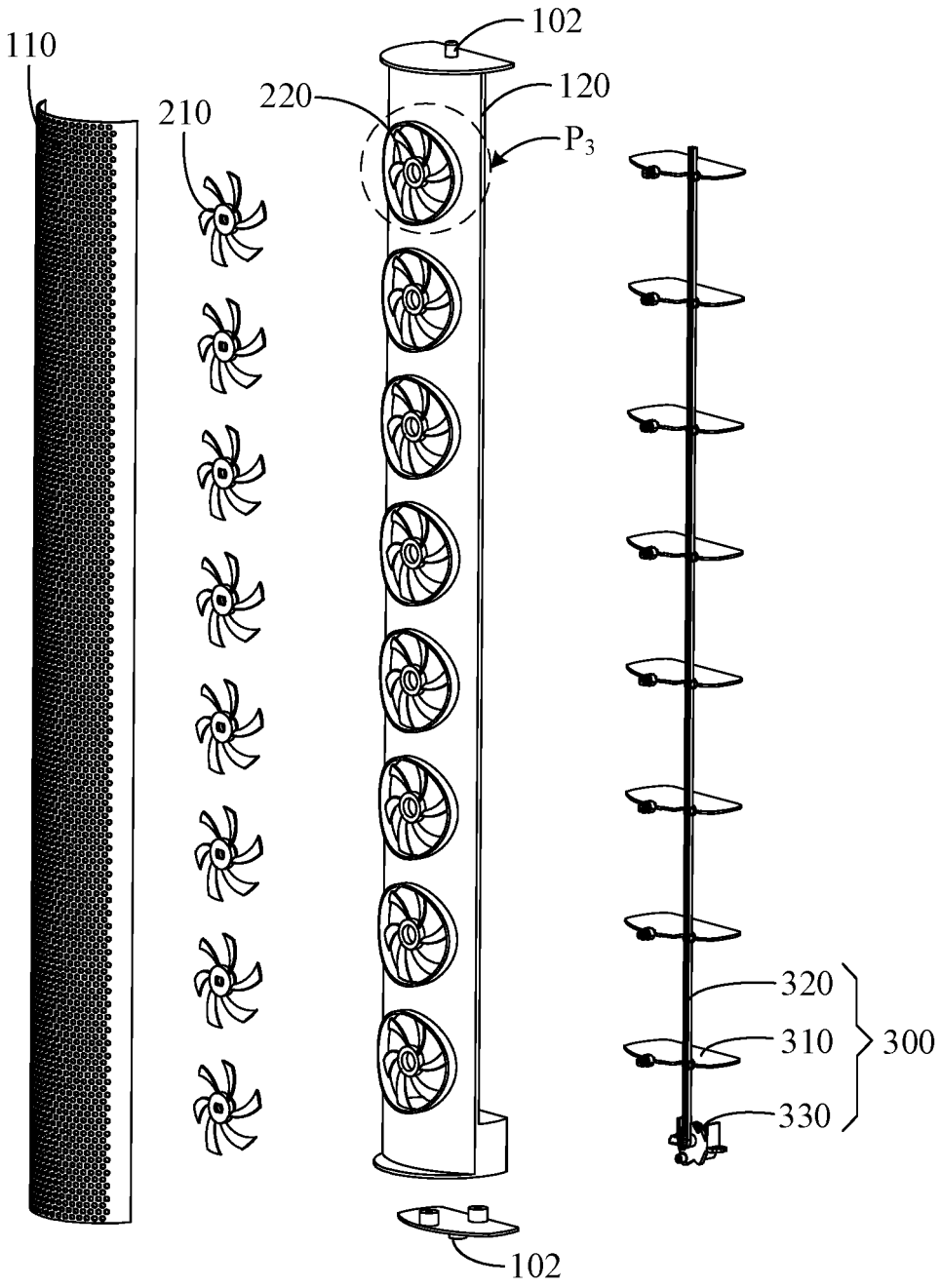

FIG. 15

Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to Chinese Patent Application Nos. 202011044918.8 and 202022179996.0, both filed on September 28, 2020, the entire contents of each of which are incorporated herein by reference.

FIELD

[0002] The present disclosure relates to the field of air conditioners, and in particular to an air dispersing device and a floor-standing air conditioner.

BACKGROUND

[0003] At present, air dispersing plates with micro-holes are usually provided at the air outlet of air conditioners with breezeless functions. The micro-holes on the air dispersing plate intercept the airflow, thereby reducing the air speed. However, when the air is dispersed through a single-layer air dispersing plate, the air dispersing effect in the breezeless mode is unsatisfactory and thus the comfort level of using the air conditioner is unsatisfactory.

SUMMARY

[0004] The main objective of the present disclosure is to at least provide an air dispersing device, aiming to improve the air dispersing effect in the breezeless mode, thereby improving the comfort level of the air conditioner having the air dispersing device.

[0005] In order to achieve at least the above objectives, the present disclosure provides an air dispersing device. The air dispersing device includes an air dispersing frame and an air dispersing module. The air dispersing frame includes a first air dispersing plate and a second air dispersing plate. An air cavity is formed between the first air dispersing plate and the second air dispersing plate. An air dispersing hole is provided on the first air dispersing plate, and a ventilation opening is provided on the second air dispersing plate. The air dispersing module includes a movable impeller, the movable impeller is rotatably provided in the air cavity, and the movable impeller is configured to disperse airflows.

[0006] In an embodiment, the air dispersing module further includes a stationary impeller opposite to the movable impeller. The stationary impeller is provided at the ventilation opening. The stationary impeller and the second air dispersing plate are integrally manufactured, or manufactured separately and subsequently assembled together.

[0007] In an embodiment, the movable impeller is arranged opposite to the stationary impeller.

[0008] In an embodiment, a hub of the movable impeller is provided with an installation portion, and the installation portion is rotatably installed on the hub of the stationary impeller.

[0009] In an embodiment, the air dispersing device further includes a louver assembly, the louver assembly is provided on a side of the second air dispersing plate away from the first air dispersing plate, and louvers of the louver assembly are linked with the movable impeller.

[0010] In an embodiment, the louver assembly includes a connecting rod and the plurality of louvers are linked with one another through the connecting rod, the louver is provided with a connecting shaft, and the connecting shaft is configured to pass through the ventilation opening and connect to the movable impeller, to make the movable impeller link with the louver.

[0011] In an embodiment, a hub of the movable impeller is provided with a connecting hole for connecting the connecting shaft, and the connecting shaft includes two opposite elastic arms, and the two elastic arms are clamped and fixed on an inner wall of the connecting hole.

[0012] In an embodiment, an end of the elastic arm is provided with a clamping hook, the inner wall of the connecting hole is provided with a clamping groove, and the clamping hook is configured to clamp with the clamping groove.

[0013] In an embodiment, the inner wall of the connecting hole is further provided with one of a positioning portion or a positioning groove, a peripheral side of the elastic arm is provided with the other one of a positioning portion or a positioning groove, and the positioning portion is clamped with the positioning groove.

[0014] In an embodiment, a plurality of movable blades of the movable impeller are all bent towards a same circumferential direction, a plurality of stationary blades of the stationary impeller are all bent towards a same circumferential direction, and the bending direction of the stationary blade can be consistent with the bending direction of the movable blade.

[0015] In an embodiment, a side surface of the second air dispersing plate facing the first air dispersing plate is provided with an air guiding ring, and the air guiding ring is configured to protrude from a periphery of the ventilation opening towards the first air dispersing plate.

[0016] In an embodiment, the air dispersing frame is provided with a rotation axis extending along a lengthwise direction of the air dispersing frame, and the rotation axis is provided at the side of the second air dispersing plate away from the first air dispersing plate.

[0017] In an embodiment, the first air dispersing plate is configured to protrude outwards in an arc shape, and the second air dispersing plate is in the form of a flat plate.

[0018] In an embodiment, both the first air dispersing plate and the second air dispersing plate are configured to protrude outwards towards the same side in an arc-shape.

[0019] In an embodiment, the two side edges of the first air dispersing plate extending along a lengthwise direction of the first air dispersing plate and the two side edges of the second air dispersing plate extending along a lengthwise direction of the second air dispersing plate are arranged in a closed manner.

[0020] In an embodiment, a diameter of the air dispersing hole on the first air dispersing plate is in a range of 5 mm to 10 mm.

[0021] The present disclosure further provides a floor-standing air conditioner. The floor-standing air conditioner includes a shell provided with an air outlet and the air dispersing device. The air dispersing device is rotatably installed at the air outlet. The air dispersing device includes an air dispersing frame and an air dispersing module. The air dispersing frame includes a first air dispersing plate and a second air dispersing plate, an air cavity is formed between the first air dispersing plate and the second air dispersing plate. An air dispersing hole is provided on the first air dispersing plate, and a ventilation opening is provided on the second air dispersing plate. The air dispersing module includes a movable impeller, the movable impeller is rotatably provided in the air cavity, and the movable impeller is configured to disperse airflows.

[0022] In the technical solution of the present disclosure, the air dispersing module is provided on the air dispersing frame of the air dispersing device. The air dispersing frame includes the first air dispersing plate and the second air dispersing plate. An air cavity is provided between the first air dispersing plate and the second air dispersing plate. An air dispersing hole is provided on the first air dispersing plate, and a ventilation opening is provided on the second air dispersing plate. The movable impeller of the air dispersing module is rotatably provided in the air cavity. The movable impeller is opposite to the ventilation opening. In this way, when the air dispersing device is working, the movable impeller is configured to rotate to disperse airflows, which not only can disperse the airflow to reduce the air speed, but also can increase the airflow dispersing range.

[0023] Compared with the conventional operation that the air is dispersed by the single-layer air dispersing plate, in the present disclosure, the airflow in the air dispersing device can be dispersed at least twice successively through the air dispersing frame and the air dispersing module. In this way, not only the air speed is effectively reduced and the air supply range is increased, but also the air dispersing effect in the breezeless mode can be improved, thereby improving the comfort effect of the air dispersing device. In addition, the airflow passing through the second air dispersing plate will be rotatedly dispersed by the movable impeller of the air dispersing module. The air speed of the dispersed airflow is reduced, and the airflows will not directly impact the first air dispersing plate in a concentrated manner. In this case, it is not easy for the airflow to impact on the first air dispersing plate and generate noise, which helps to reduce the noise in a breezeless mode.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] To illustrate the technical solutions according to the exemplary embodiments of the present disclosure or the related art more clearly, the accompanying drawings for describing the exemplary embodiments or the related art are introduced briefly in the following. Apparently, the accompanying drawings in the following description are only some embodiments of the present disclosure. Persons of ordinary skill in the art can derive other drawings from the structures of the accompanying drawings without creative efforts.

FIG. 1 is a schematic view of a floor-standing air conditioner in a power-off mode according to an embodiment of the present disclosure.

FIG. 2 is a sectional view along line A-A in FIG. 1.

FIG. 3 is a schematic view of the floor-standing air conditioner in a normal air supply mode in FIG. 1.

FIG. 4 is a front view of the floor-standing air conditioner in FIG. 3.

FIG. 5 is a sectional view along line B-B in FIG. 4.

FIG. 6 is a schematic view of the floor-standing air conditioner in a breezeless mode in FIG. 1.

FIG. 7 is a front view of the floor-standing air conditioner in FIG. 6.

FIG. 8 is a sectional view along line C-C in FIG. 7.

FIG. 9 is a schematic view of an air dispersing device according to an embodiment of the present disclosure.

FIG. 10 is a rear view of the air dispersing device in FIG. 9.

FIG. 11 is a sectional view along line D_1-D_1 in FIG. 10.

FIG. 12 is an enlarged view of P_1 in FIG. 11.
FIG. 13 is a sectional view along line D_2-D_2 in FIG. 10.
FIG. 14 is an enlarged view of P_2 in FIG. 13.
FIG. 15 is a schematic exploded structure view of the air dispersing device in FIG. 9.
FIG. 16 is another schematic exploded structure view of the air dispersing device from another perspective in FIG. 15.
FIG. 17 is an enlarged view of P_3 in FIG. 15.
FIG. 18 is a schematic structural view of a movable impeller in FIG. 15.
FIG. 19 is a schematic structural view of a louver in FIG. 15.
FIG. 20 is an enlarged view of P_4 in FIG. 19.
FIG. 21 is a schematic structural view of the air dispersing device after the movable impeller is disassembled in FIG. 15.
FIG. 22 is a schematic view of the air dispersing device from another perspective in FIG. 21.
FIG. 23 is a rear view of the air dispersing device in FIG. 22.
FIG. 24 is a sectional view along line E_1-E_1 in FIG. 23.
FIG. 25 is a sectional view along line E_2-E_2 in FIG. 23.

Description of reference numbers.

[0025]

Reference number	Name	Reference number	Name
100	air dispersing frame	223	installation groove
110	first air dispersing plate	300	louver assembly
120	second air dispersing plate	310	louver
121	ventilation opening	311	connecting shaft
130	air cavity	3111	elastic arm
200	air dispersing module	311a	clamping hook
210	movable impeller	311b	positioning groove
211	hub	3112	separation groove
212	movable blade	320	connecting rod
213	installation portion	330	driver
214	connecting hole	400	floor-standing air conditioner
214a	clamping groove	410	shell
214b	positioning portion	411	air outlet
221	hub	430	turbine
222	stationary blade	440	damper

[0026] The realization of the objective, functional characteristics, and advantages of the present disclosure are further described with reference to the accompanying drawings.

DETAILED DESCRIPTION OF EMBODIMENTS

[0027] The technical solutions of the exemplary embodiments of the present disclosure will be described clearly in the following with reference to the accompanying drawings. It is obvious that these exemplary embodiments described are only some rather than all of the embodiments of the present disclosure. Based on these exemplary embodiments of the present disclosure, all other embodiments obtained by those skilled in the art without creative efforts shall fall within the scope of the present disclosure.

[0028] It should be noted that all the directional indications (such as up, down, left, right, front, rear...) in the embodiments of the present disclosure are only used to explain the relative positional relationship, movement, or the like of the components in a certain posture (as shown in the drawings). If the specific posture changes, the directional indication will change accordingly.

[0029] Besides, the descriptions associated with, e.g., "first" and "second," in the present disclosure are merely for descriptive purposes, and cannot be understood as indicating or suggesting relative importance or impliedly indicating the number of the indicated technical feature. Therefore, the feature associated with "first" or "second" can expressly or impliedly include at least one such feature. In addition, the technical solutions of the various embodiments can be combined with each other, but the combinations must be based on the realization of those skilled in the art. When the combination of technical solutions is contradictory or cannot be achieved, it should be considered that such a combination of technical solutions does not exist, nor does it fall within the scope of the present disclosure.

[0030] The present disclosure provides embodiments of an air dispersing device. The air dispersing device is configured to improve the air dispersing effect in the breezeless mode, thereby improving the comfort of the air dispersing device. The air dispersing device can be used as a device for dispersing airflows outwards in the air-outlet device. The air-outlet device can be an air conditioner, an air cleaner or other equipment with air-outlet functions. To avoid redundant description, in the following embodiments, the air dispersing device applied in the floor-standing air conditioner 400 is mainly used as an example for introduction and description.

[0031] As shown in FIGS. 9 to 11, in the air dispersing device of an embodiment of the present disclosure, the air dispersing device includes an air dispersing frame 100 and an air dispersing module 200. The air dispersing frame 100 includes a first air dispersing plate 110 and a second air dispersing plate 120. An air cavity 130 is formed between the first air dispersing plate 110 and the second air dispersing plate 120. An air dispersing hole is provided on the first air dispersing plate 110, and a ventilation opening 121 is provided on the second air dispersing plate 120. The air dispersing module 200 includes a movable impeller 210, and the movable impeller 210 is rotatably provided in the air cavity 130. The movable impeller 210 is configured to disperse airflows.

[0032] As shown in FIGS. 11 to 13, the air dispersing frame 100 is rotatably installed on the air conditioner. In this way, when it is in operation, the air dispersing frame 100 can be switched to disperse airflows outwards through the first air dispersing plate 110 or the second air dispersing plate 120, thereby to realize working in different breezeless air supply modes. The first air dispersing plate 110 and the second air dispersing plate 120 can be integrally manufactured, or manufactured separately and subsequently assembled together. To reduce the molding difficulty and facilitate the manufacture, the first air dispersing plate 110 and the second air dispersing plate 120 of the air dispersing frame 100 are manufactured separately and subsequently detachably assembled together.

[0033] As for the first air dispersing plate 110, a plurality of air dispersing holes are provided on the first air dispersing plate 110, and the plurality of air dispersing holes are distributed on the surface of the first air dispersing plate 110. After passing through the first air dispersing plate 110, the airflows are dispersed into wisps of filamentous airflows, thereby reducing the air speed of the airflows and making the draft feeling comfortable. It should be noted that the air dispersing holes of the first air dispersing plate 110 are micro holes with small apertures. The diameter of the air dispersing hole can be designed in a range of 2 mm to 5 mm. In this case, the draft feeling of the air dispersed by the first air dispersing plate 110 is relatively comfortable, and a comfortable and breezeless air supply mode can be realized. In some embodiments, the diameter of the air dispersing hole on the first air dispersing plate 110 can be designed in a range of 5 mm to 10 mm. In this case, the draft feeling of the air dispersed by the first air dispersing plate 110 is relatively soft, and a soft and breezeless air supply mode can be realized.

[0034] As for the second air dispersing plate 120, a plurality of ventilation openings 121 are provided on the second air dispersing plate 120, and the plurality of ventilation openings 121 are distributed at intervals along a lengthwise direction of the second air dispersing plate 120. It should be noted that the diameter of the ventilation opening 121 is greater than the opening diameter of the air dispersing hole. The ventilation opening 121 can be in a circular shape, an oval shape or a square shape, which is not limited here. In some embodiments, the ventilation opening 121 is in a circular shape. The number of the ventilation openings 121 can be 2 to 10, which is not limited and can be set according to the size of the air conditioner. In addition, air dispersing holes may also be provided on the second air dispersing plate 120, and the plurality of air dispersing holes are distributed around the ventilation opening 121. In this case, the airflows can not only pass through the ventilation opening 121 of the second air dispersing plate 120, but also can be dispersed through the air dispersing hole on the second air dispersing plate 120.

[0035] For the air dispersing module 200, the movable impeller 210 of the air dispersing module 200 is rotatably provided in the air cavity 130 between the first air dispersing plate 110 and the second air dispersing plate 120. The rotation axis of the movable impeller 210 is configured to extend along a direction from the first air dispersing plate 110 to the second air dispersing plate 120. When the airflow passes through the movable impeller 210, the movable impeller 210 is configured to make the airflows rotatedly dispersed. Thus, the airflow is rotatedly dispersed around the periphery of the movable impeller 210. In this way, the air supply range is effectively increased and the air speed is reduced, thereby effectively reducing the draft feeling and improving the effect of the breezeless feeling.

[0036] For the assembly structure of the movable impeller 210, the movable impeller 210 can be rotatably connected to the first air dispersing plate 110 or the second air dispersing plate 120. Or an installation bracket is provided in the air cavity 130 between the first air dispersing plate 110 and the second air dispersing plate 120, and the movable impeller 210 is rotatably connected to the installation bracket. Optionally, the movable impeller 210 is rotatably connected to the

second air dispersing plate 120, and the movable impeller 210 can be directly connected to the second air dispersing plate 120. Or a supporting structure is provided on the second air dispersing plate 120, and the movable impeller 210 can be rotatably connected to the supporting structure. The supporting structure can be a grilling frame, a cross bracket or a stationary impeller (described in the following paragraphs) and the like.

[0037] In the technical solution of the present disclosure, the air dispersing module 200 is provided on the air dispersing frame 100 of the air dispersing device. The air dispersing frame 100 includes a second air dispersing plate 120 provided with an air cavity 130 between the first air dispersing plate 110 and the second air dispersing plate 120. An air dispersing hole is provided on the first air dispersing plate 110, and a ventilation opening 121 is provided on the second air dispersing plate 120. The movable impeller 210 of the air dispersing module 200 is rotatably provided in the air cavity 130. The movable impeller 210 is opposite to the ventilation opening 121. In this way, when the air dispersing device is working, the movable impeller 210 is configured to rotate to disperse airflows, which not only can disperse the airflow to reduce the air speed, but also can increase the airflow dispersing range.

[0038] Compared with the conventional operation of air being dispersed by the single-layer air dispersing plate, in the present disclosure, the airflow in the air dispersing device can be dispersed at least twice successively through the air dispersing frame 100 and the air dispersing module 200. In this way, not only the air speed is effectively reduced and the air supply range is increased, but also the air dispersing effect in the breezeless mode can be improved, thereby improving the comfort of the air dispersing device. In addition, the airflow passing through the second air dispersing plate 120 will be rotatedly dispersed by the movable impeller 210 of the air dispersing module 200. The air speed of the dispersed airflow is reduced, and the airflows will not directly impact the first air dispersing plate 110 in a concentrated manner. In this case, it is not easy for the airflow to impact on the first air dispersing plate 110 and generate noise, which helps to reduce the noise in a breezeless mode.

[0039] As shown in FIG. 14, FIG. 16 and FIG. 17, based on the above-mentioned embodiments, the movable impeller 210 includes a hub 211 and a plurality of movable blades 212 provided at intervals along the circumference of the hub 211. The plurality of movable blades 212 are all bent towards the same circumferential direction. Thus, after passing through the movable impeller 210, the airflow is guided by the movable blade 212 of the movable impeller 210 to spiral towards the same direction and flow forward, thereby improving the effect of the air dispersing module 200 to disperse the airflow forward. The hub 211 of the movable impeller 210 is rotatably installed on the ventilation opening 121. As mentioned above, the ventilation opening 121 can be provided with a supporting structure, and the movable impeller 210 is rotatably connected to the supporting structure. The supporting structure can be a grilling frame, a cross bracket or a stationary impeller (described in the following paragraphs) and the like.

[0040] As shown in FIG. 15 to FIG. 17, in an embodiment, the air dispersing module 200 further includes a stationary impeller 220 opposite to the movable impeller 210. The stationary impeller 220 is provided at the ventilation opening 121. The stationary impeller and the second air dispersing plate 120 are integrally manufactured, or manufactured separately and subsequently assembled together (the method for manufacturing the stationary impeller and the second air dispersing plate 120 integrally can be referred to FIG. 21 to FIG. 25). That is, the stationary impeller and the second air dispersing plate 120 can be integrally manufactured, or manufactured separately and subsequently assembled together.

[0041] In some embodiments, the stationary impeller includes a hub 221 and a plurality of stationary blades 222 provided at intervals along the circumference of the hub 221. The plurality of stationary blades 222 are all bent towards a same circumferential direction. Ends of the plurality of stationary blades 222 are connected to the peripheral wall of the ventilation opening 121. In this way, the stationary impeller and the second air dispersing plate 120 can be disassembled or assembled integrally.

[0042] Further, a plurality of movable blades 212 of the movable impeller 210 are all bent towards the same circumferential direction. A plurality of stationary blades 222 of the stationary impeller are all bent towards the same circumferential direction, and a bending direction of the stationary blade 222 is consistent with a bending direction of the movable blade 212. In this way, after the airflow passes through the movable impeller 210, the rotating and dispersing direction of the airflows can be consistent with the rotating and dispersing direction of the airflows guided by the stationary blades 222. Thus, the airflow is first guided by the stationary blades 222 and thus has the rotating and dispersing potential energy. Driven by the rotating and dispersing potential energy, the airflow enters the movable impeller 210 smoothly. Then driven by the movable blades 212 of the movable impeller 210 successively, the airflow is rotatedly dispersed along the same direction. In this way, the airflow not only has the potential energy to flow forward, but also has the potential energy to rotate and disperse around the circumference of the movable impeller 210, thereby realizing an effect that the larger air volume is blown out forward but the draft feeling is soft.

[0043] In an embodiment, a side surface of the second air dispersing plate 120 facing the first air dispersing plate 110 is provided with an air guiding ring, and the air guiding ring is configured to protrude from a periphery of the ventilation opening 121 towards the first air dispersing plate 110. The air guiding ring can guide more air into the ventilation opening 121, to increase the air flow of airflows passing through the stationary impeller and increase the air dispersing amount in a breezeless mode. In addition, the inner wall of the air guiding ring has a larger surface area, on which the stationary

impeller can be installed, thereby reducing the installation difficulty of the stationary impeller.

[0044] Further, the movable impeller 210 is opposite to the stationary impeller. When the breezeless mode is turned on, the airflow is first introduced from the ventilation opening 121 of the second air dispersing plate 120 to the air cavity 130 by the stationary impeller. During this process, the airflow flows along the rotation direction of the stationary blade 222 of the stationary impeller. Subsequently the airflow is guided to spiral along a same direction and flow forward. Thus, the airflow has a rotation potential energy before entering the movable impeller 210. Further, the airflow with the rotation potential energy continues to flow into the movable impeller 210, subsequently the airflow is forcefully driven by the rotation of the movable impeller 210 and further rotatedly dispersed, thereby effectively improving the rotating and dispersing effect of the airflows, and greatly improving the comfort when the air is dispersed in a breezeless mode. By a cooperation of the stationary impeller and the movable impeller 210, more airflows can be guided to pass through the air dispersing device, thereby effectively increasing the air output in the breezeless mode.

[0045] As shown in FIG. 16 to FIG. 18, based on this, the hub 211 of the movable impeller 210 can be rotatably installed on the hub 221 of the stationary impeller. Thus, no additional installation bracket for installing the movable impeller 210 is required. In an embodiment, a hub 211 of the movable impeller 210 is provided with an installation portion 213, and the installation portion 213 is rotatably installed on a hub 221 of the stationary impeller. The hub 221 of the stationary impeller is provided with an installation groove 223 for installing the installation portion 213 of the movable impeller 210. During assembly, the installation portion 213 of the movable impeller 210 is rotatably installed in the installation groove 223 of the stationary impeller, to enable the movable impeller 210 to rotate around the installation groove 223 of the stationary impeller through the installation portion 213.

[0046] As for the rotating and driving manner of the movable impeller 210, the movable impeller 210 may be driven to rotate by the airflow entering the ventilation opening 121. Or a driver 330 is provided in the movable impeller 210 and configured to drive the movable impeller 210 to rotate. As shown in FIG. 13 to FIG. 15, in this embodiment, the air dispersing device further includes a louver assembly 300. The louver assembly 300 is provided on a side of the second air dispersing plate 120 away from the first air dispersing plate 110, and louvers 310 of the louver assembly 300 are linked with the movable impeller 210. That is, the movable impeller 210 can be driven to rotate by the louver assembly 300.

[0047] As shown in FIG. 13, FIG. 15 and FIG. 19, in an embodiment, the louver assembly 300 includes a connecting rod 320 and a plurality of louvers 310 linked with one another through the connecting rod 320. The louver 310 is provided with a connecting shaft 311, and the connecting shaft 311 is configured to pass through the ventilation opening 121 and connect to the movable impeller 210, to make the movable impeller 210 link with the louver 310. Since the stationary impeller is provided at the ventilation opening 121, to avoid interference between the two, the connecting shaft 311 configured to pass through the stationary impeller is connected to the hub 211 of the movable impeller 210.

[0048] In some embodiments, a plurality of louvers 310 are distributed at intervals along the lengthwise direction of the air dispersing frame 100. The connecting rod 320 is shaped as a long strip and is configured to extend along the lengthwise direction of the air dispersing frame 100 and connect the plurality of louvers 310 sequentially. Each movable impeller 210 corresponds to at least one of the louvers 310, and the movable impeller 210 is connected to the corresponding louver 310. When the connecting rod 320 moves upward and downward, the louver 310 is driven to swing upward and downward to discharge air in an up-down direction. During the swinging of louvers 310 upward and downward, the connecting shaft 311 of the louvers 310 rotates relative to the stationary impeller, and the movable impeller 210 is driven by the connecting shaft 311 to rotate synchronously. In this way, no additional driver for driving the movable impeller 210 is required, thereby the air conditioner can help to save costs by reducing the number of drivers 330 used by the air dispersing device.

[0049] As shown in FIG. 14, FIG. 18 and FIG. 19, in an embodiment, to facilitate the connection between the louvers 310 and the movable impeller 210, in an embodiment, a hub 211 of the movable impeller 210 is provided with a connecting hole 214 for connecting the connecting shaft 311. The connecting shaft 311 is provided with a separation groove 3112 along an axial direction of the connecting shaft 311. The separation groove 3112 is configured to divide the connecting shaft 311 into two opposite elastic arms 3111, and the two elastic arms 3111 are clamped and fixed on an inner wall of the connecting hole 214.

[0050] In some embodiments, the connecting shaft 311 is provided with a separation groove 3112, which can make the two elastic arms 3111 of the connecting shaft 311 elastically deform along the radial direction of the connecting shaft 311, to obtain a better tensioning effect. When the louvers 310 and the movable impeller 210 are connected to each other, the two elastic arms 3111 can be pinched first to make the two elastic arms 3111 close to each other and the diameter of the connecting shaft 311 decreased, thereby reducing resistance of the connecting shaft 311 extending into the connecting hole 214 of the movable impeller 210. In this case, the connecting shaft 311 can be inserted into the connecting hole 214 accurately and smoothly. After the connecting shaft 311 is inserted in place, the two elastic arms 3111 are released and have a tendency to expand outwards. Subsequently the two elastic arms 3111 are clung to the inner wall of the connecting hole 214, as well as being clamped to the inner wall of the connecting hole 214, which makes it difficult for the connecting shaft 311 to fall off from the connecting hole 214.

[0051] As for the clamp manner and the connection manner between the elastic arms 3111 and the connecting hole

214, a buckle structure that cooperates with each other may be provided on the elastic arm 3111 and the connecting hole 214, to make the elastic arm 3111 and the connecting hole 214 clamped and matched with each other. In this embodiment, optionally, an end of the elastic arm 3111 is provided with a clamping hook 311a, and the inner wall of the connecting hole 214 is provided with a clamping groove 214a. The clamping hook 311a is configured to clamp with the clamping groove 214a.

[0052] In the above-mentioned process of connecting the louvers 310 and the movable impeller 210, when the clamping hook 311a at the end of the connecting shaft 311 of the louver 310 reaches the clamping groove 214a, the connecting shaft 311 is inserted in place. At this time, the two elastic arms 3111 are released, subsequently the two elastic arms 3111 expand outwards to make the clamping hook 311a at the end of the connecting shaft 311 clamped into the clamping groove 214a. In this case, it is difficult for the connecting shaft 311 to overcome the binding force of the clamping groove 214a and fall off reversely. When the louver 310 needs to be disassembled, the two elastic arms 3111 of the connecting shaft 311 are pinched again to make the diameter of the connecting shaft 311 decreased and the clamping hooks 311a of the two elastic arms 3111 separated from the side surfaces of the clamping groove 214a. In this case, the elastic arm 3111 can be pulled out smoothly from the connecting hole 214, that is, the louver 310 can be disassembled from the movable impeller 210.

[0053] Further, to improve the firmness of the connection between the louver 310 and the movable impeller 210, the inner wall of the connecting hole 214 is further provided with one of a positioning portion 214b or a positioning groove 311b. A peripheral side of the elastic arm 3111 is provided with the other one of a positioning portion 214b or a positioning groove 311b. The positioning portion 214b is clamped and matched with the positioning groove 311b.In some embodiments, the inner wall of the connection hole is provided with a positioning portion 214b, and the inner wall of the connection hole is provided with a positioning groove 311b. In the above description, after the clamping hook 311a of the elastic arm 3111 is clamped with the side surface of the clamping groove 214a, the positioning portion 214b on the top surface of the lug boss is just clamped into the positioning groove 311b on the side surface of the elastic arm 3111. Thus, the axial movement of the connecting shaft 311 is double restricted, and the firmness of the connection between the louver 310 and the movable impeller 210 is greatly improved.

[0054] In an embodiment, for driving the louvers 310 to swing conveniently, the louver assembly 300 further includes a driver 330. The driver 330 is installed on the air dispersing frame 100 and connected to the connecting rod 320. The driver 330 is configured to drive the connecting rod 320 to move upward and downward, and subsequently the louver 310 is driven to swing by the connecting rod 320.

[0055] As shown in FIG. 10, FIG.11 and FIG. 13, based on any one of the above embodiments, the air dispersing frame 100 is provided with a rotation axis extending along the lengthwise direction of the air dispersing frame 100. The air dispersing frame 100 is rotatably installed on the air outlet 411 of the floor-standing air conditioner 400 around the rotation axis. In an embodiment, the rotation axis is provided on the side of the second air dispersing plate 120 away from the first air dispersing plate 110, to make the distance between the air dispersing module 200 and the first air dispersing plate 110 relatively small. In this case, after the airflow passing through one of the air dispersing module 200 and the first air dispersing plate 110 is dispersed, the airflow reaches the other one of the air dispersing module 200 and the first air dispersing plate 110 as soon as possible to be further dispersed, thereby effectively improving the breezeless feeling effect.

[0056] In an embodiment, as for the first air dispersing plate 110 and the second air dispersing plate 120, both the first air dispersing plate 110 and the second air dispersing plate 120 can be shaped in flat plates, or arc plates. In this embodiment, the first air dispersing plate 110 and the second air dispersing plate 120 are configured to protrude outwards towards a same side and are arc-shaped. The first air dispersing plate 110 is taken as an example. The plate surface of the first air dispersing plate 110 is arc-shaped to make the first air dispersing plate 110 obtain a larger air dispersing area. In this way, the air dispersing area of the first air dispersing plate 110 can be effectively increased, thereby increasing the air dispersing range of the first air dispersing plate 110. Of course, in other embodiments, the first air dispersing plate 110 is configured to protrude outwards and is arc-shaped, and the second air dispersing plate 120 is plate-shaped.

[0057] As shown in FIG. 13, in an embodiment, two side edges of the first air dispersing plate 110 extending along a lengthwise direction of the first air dispersing plate 110 correspond to two side edges of the second air dispersing plate 120 extending along a lengthwise direction of the second air dispersing plate 120, and the first air dispersing plate 110 and the second air dispersing plate 120 are closed, to form an air cavity 130 between the first air dispersing plate 110 and the second air dispersing plate 120. On the cross-section of the air dispersing frame 100 cut by a plane perpendicular to the lengthwise direction of the air dispersing frame 100, the air cavity 130 is crescent-shaped. The airflow can only enter from the air dispersing module 200 and pass through the air cavity 130, and is subsequently dispersed from the first air dispersing plate 110.

[0058] Based on any one of the above-mentioned embodiments, two ends of the air dispersing frame 100 are provided with a rotation shaft extending along the lengthwise direction of the air dispersing frame 100. The air dispersing frame 100 is rotatably installed on the air conditioner through the rotation shaft. In this way, the air dispersing direction of the air dispersing frame 100 can be adjusted through the rotation of the air dispersing frame 100.

[0059] As shown in FIG. 1 and FIG. 2, the present disclosure further provides a floor-standing air conditioner 400. The floor-standing air conditioner 400 includes a shell 410 and an air dispersing device. The shell 410 is provided with an air outlet 411, and the air outlet 411 is provided with a damper 440. The air dispersing device is rotatably installed on the air outlet 411. The rotation axis of the air dispersing device is configured to extend along the lengthwise direction of the air outlet 411. The specific structure of the air dispersing device can be referred to the above-mentioned embodiments. Since the floor-standing air conditioner 400 adopts all the technical solutions of all the above-mentioned embodiments, the floor-standing air conditioner 400 also has all the beneficial effects brought by the technical solutions of the above-mentioned embodiments, which will not be repeated here.

[0060] As shown in FIG. 1 and FIG. 2, in an embodiment, the floor-standing air conditioner 400 further includes a heat exchanger and a turbine 430. The heat exchanger provided between the air inlet and the turbine 430 is configured to partially surround the turbine 430. The number of turbines 430 may be one or two. As shown in FIG. 1 and FIG. 2, the number of turbines 430 is two, and the two turbines 430 are respectively configured to disperse air to the two corresponding air outlets 411. Each air outlet 411 in the air outlet flue is provided with an air dispersing device. In an embodiment, the floor-standing air conditioner 400 has a power-off mode, a normal air supply mode, and a breezeless mode.

[0061] As shown in FIG. 1 and FIG. 2, in the power-off mode, the air dispersing device is configured to rotate until the first air dispersing plate 110 is located at the innermost side of the air outlet 411. At this time, both the first air dispersing plate 110 and the second air dispersing plate 120 of the air dispersing frame 100 of the air dispersing device are stored inside the air outlet 411, to prevent the air dispersing frame 100 from interfering with the damper 440 to close the air outlet 411.

[0062] As shown in FIG. 3 and FIG. 4, in the normal air supply mode, the air dispersing device is configured to rotate until the first air dispersing plate 110 and the second air dispersing plate 120 are located on opposite sides of the air outlet 411. At this time, the first air dispersing plate 110 and the second air dispersing plate 120 are stored near the inner wall of the air outlet 411, and the ventilation cross-section area of the air outlet flue occupied by the first air dispersing plate 110 and the second air dispersing plate 120 is small, which is not easy to prevent the airflow from blowing out, thereby realizing the conventional air supply.

[0063] As shown in FIG. 5 and FIG. 9, in the breezeless mode, the air dispersing device is configured to rotate until the first air dispersing plate 110 faces the outside of the air outlet 411. At this time, the first air dispersing plate 110 and the second air dispersing plate 120 are unfolded on the ventilation cross-section of the air outlet flue. In this case, the airflow blown out from the air outlet flue is configured to pass through the second air dispersing plate 120, the air dispersing module 200, the first air dispersing plate 110. The air gets intercepted along the way, thereby realizing the breezeless air supply mode.

[0064] The above are only some embodiments of the present disclosure, and do not limit the scope of the present disclosure thereto. Under the inventive concept of the present disclosure, any equivalent mechanism transformation made according to the description and drawings of the present disclosure, or direct/indirect application in other related technical fields fall within the scope of the present disclosure.

Claims

1. An air dispersing device, installed at an air outlet of an air conditioner, **characterized by** comprising: an air dispersing frame comprising a first air dispersing plate and a second air dispersing plate, wherein an air cavity is formed between the first air dispersing plate and the second air dispersing plate, an air dispersing hole is provided on the first air dispersing plate, and a ventilation opening is provided on the second air dispersing plate; and an air dispersing module comprising a movable impeller, wherein the movable impeller is rotatably provided in the air cavity, and the movable impeller is configured to disperse airflows.

2. The air dispersing device of claim 1, wherein: the air dispersing module further comprises a stationary impeller provided at the ventilation opening, and the stationary impeller and the second air dispersing plate are integrally manufactured, or manufactured separately and assembled together.

3. The air dispersing device of claim 2, wherein the movable impeller is opposite to the stationary impeller.

4. The air dispersing device of claim 3, wherein: a hub of the movable impeller is provided with an installation portion, and the installation portion is rotatably installed on a hub of the stationary impeller.

5. The air dispersing device of claim 1, further comprising a louver assembly, wherein: the louver assembly is provided on a side of the second air dispersing plate away from the first air dispersing plate, and louvers of the louver assembly are linked with the movable impeller.

6. The air dispersing device of claim 5, wherein: the louver assembly comprises a connecting rod and a plurality of louvers linked with one another through the connecting rod, the louver is provided with a connecting shaft, and the connecting shaft is configured to pass through the ventilation opening and connect to the movable impeller, to make the movable impeller link with the louver.

7. The air dispersing device of claim 6, wherein: a hub of the movable impeller is provided with a connecting hole for connecting the connecting shaft; and the connecting shaft is provided with a separation groove along an axial direction of the connecting shaft, the separation groove is configured to divide the connecting shaft into two opposite elastic arms, and the two opposite elastic arms are clamped and fixed on an inner wall of the connecting hole.

8. The air dispersing device of claim 7, wherein: an end of an elastic arm of the two opposite elastic arms is provided with a clamping hook, the inner wall of the connecting hole is provided with a clamping groove, and the clamping hook is configured to clamp with the clamping groove.

9. The air dispersing device of claim 8, wherein: the inner wall of the connecting hole is further provided with one of a positioning portion or a positioning groove, a peripheral side of the elastic arm is provided with the other one of a positioning portion or a positioning groove, and the positioning portion is clamped with the positioning groove.

10. The air dispersing device of any one of claims 2 to 4, wherein: a plurality of movable blades of the movable impeller are all bent towards a same circumferential direction, a plurality of stationary blades of the stationary impeller are all bent towards a same circumferential direction, and a bending direction of the stationary blade is consistent with a bending direction of the movable blade.

11. The air dispersing device of any one of claims 2 to 9, wherein: a side surface of the second air dispersing plate facing the first air dispersing plate is provided with an air guiding ring, and the air guiding ring is configured to protrude from a periphery of the ventilation opening towards the first air dispersing plate.

12. The air dispersing device of any one of claims 1 to 9, wherein: a plate surface of the second air dispersing plate is provided with a plurality of air dispersing holes, and the plurality of air dispersing holes are distributed around the ventilation opening.

13. The air dispersing device of any one of claims 1 to 9, wherein: the air dispersing frame is provided with a rotation axis extending along a lengthwise direction of the air dispersing frame, and the rotation axis is provided at a side of the second air dispersing plate away from the first air dispersing plate.

14. The air dispersing device of claim 13, wherein: the first air dispersing plate is configured to protrude outwards and is arc-shaped, and the second air dispersing plate is plate-shaped.

15. The air dispersing device of claim 13, wherein both the first air dispersing plate and the second air dispersing plate are configured to protrude outwards towards a same side and are arc-shaped.

16. The air dispersing device of claim 14 or claim 15, wherein: two side edges of the first air dispersing plate extending along a lengthwise direction of the first air dispersing plate correspond to two side edges of the second air dispersing plate extending along a lengthwise direction of the second air dispersing plate, and the first air dispersing plate and the second air dispersing plate are arranged in a closed manner.

17. The air dispersing device of any one of claims 1 to 9, wherein a diameter of the air dispersing hole on the first air dispersing plate is in a range of 5 mm to 10 mm.

18. A floor-standing air conditioner **characterized by** comprising: a shell provided with an air outlet; and the air dispersing device of claim 1 to 17, wherein the air dispersing device is rotatably installed at the air outlet.

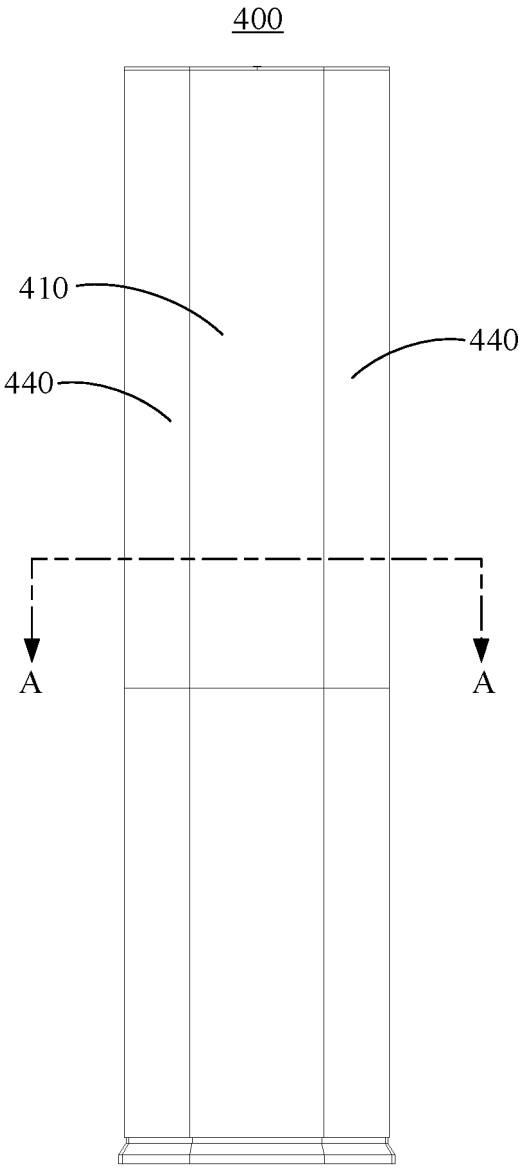

FIG. 1

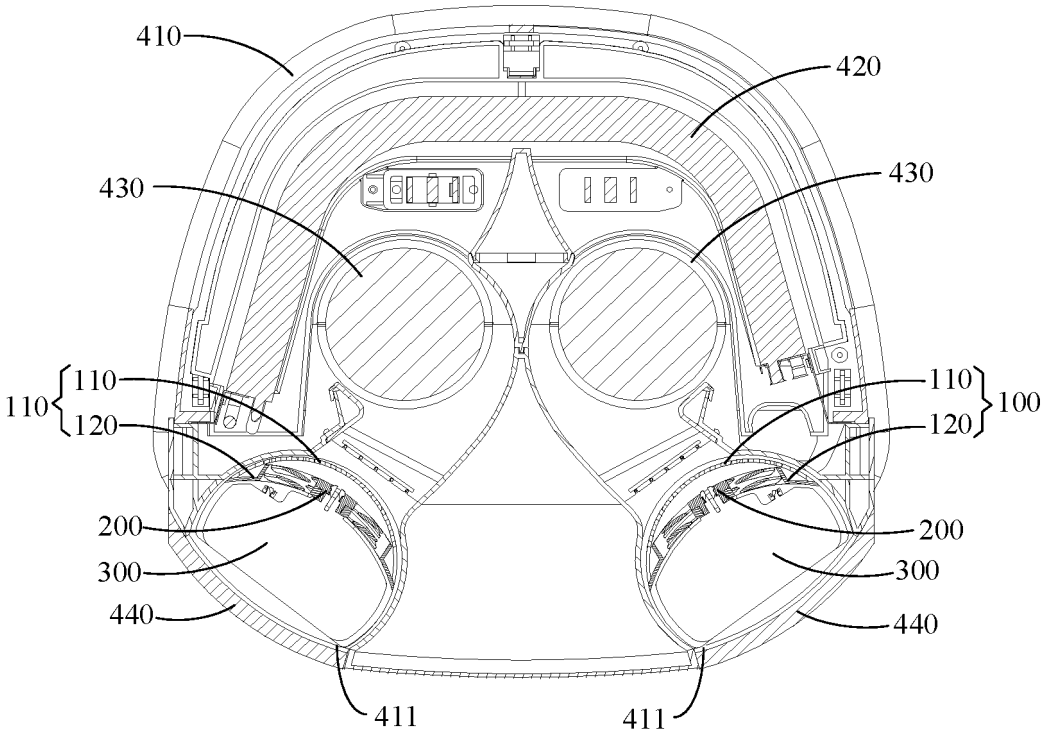
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FIG. 2

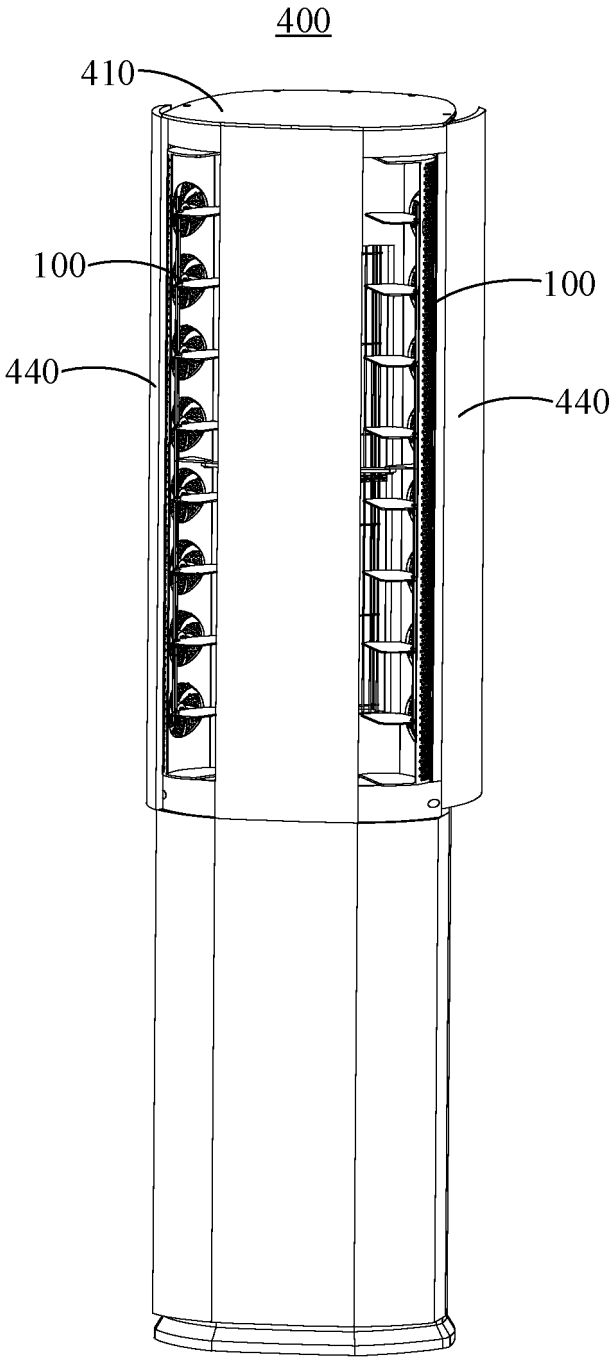

FIG. 3

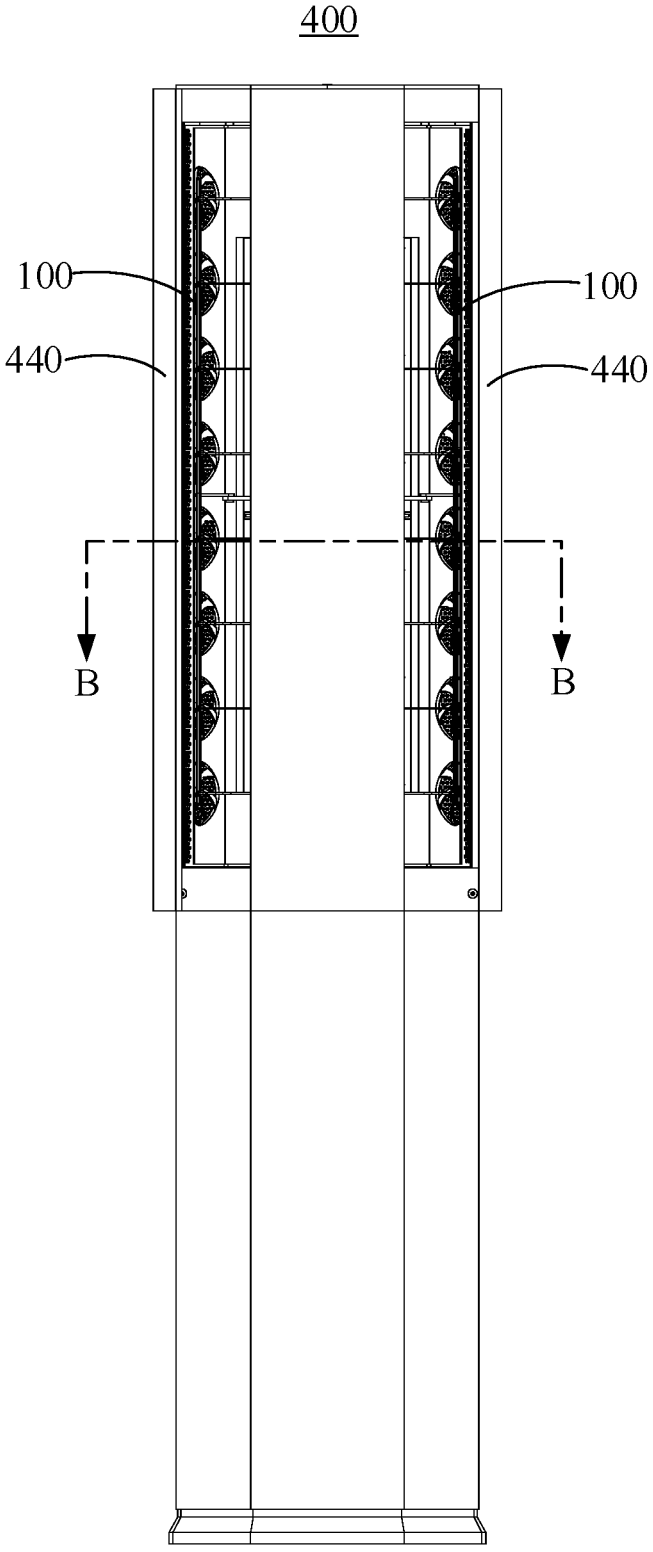

FIG. 4

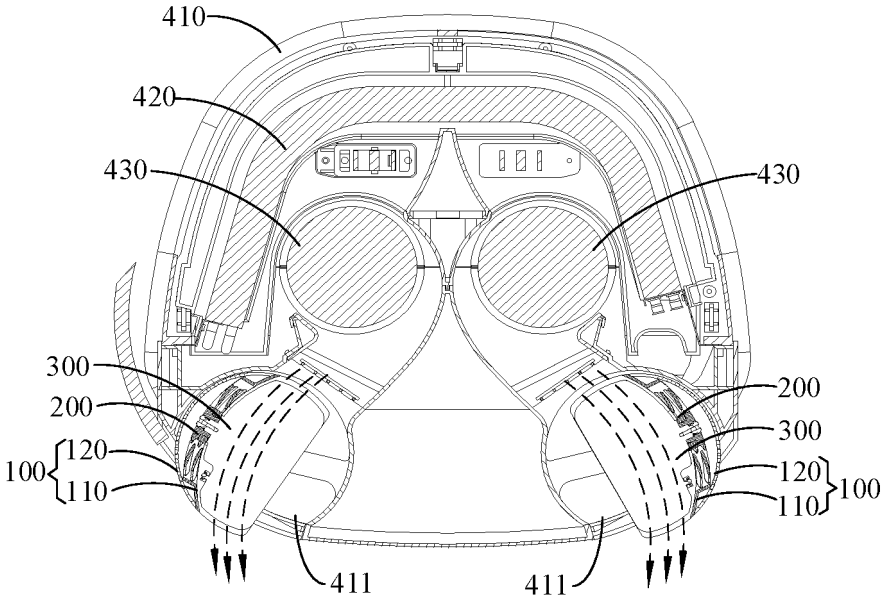
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FIG. 5

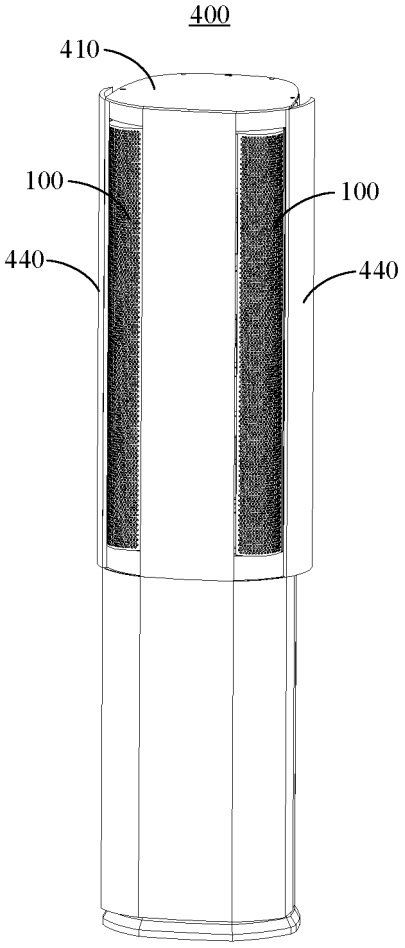
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FIG. 6

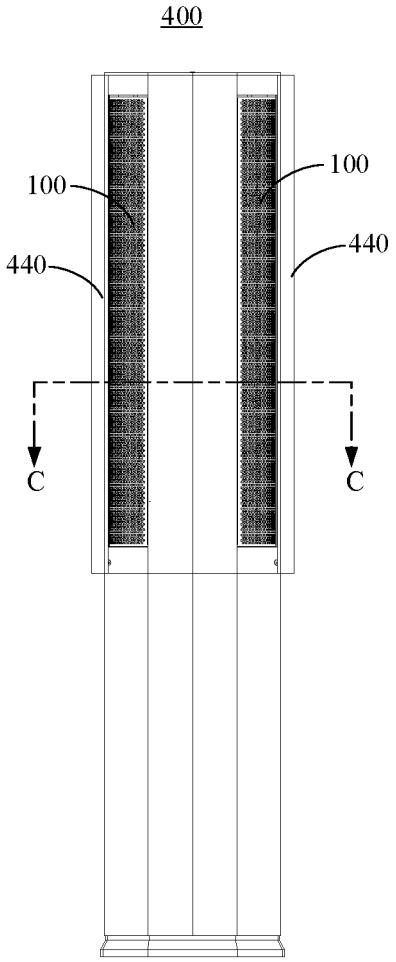

FIG. 7

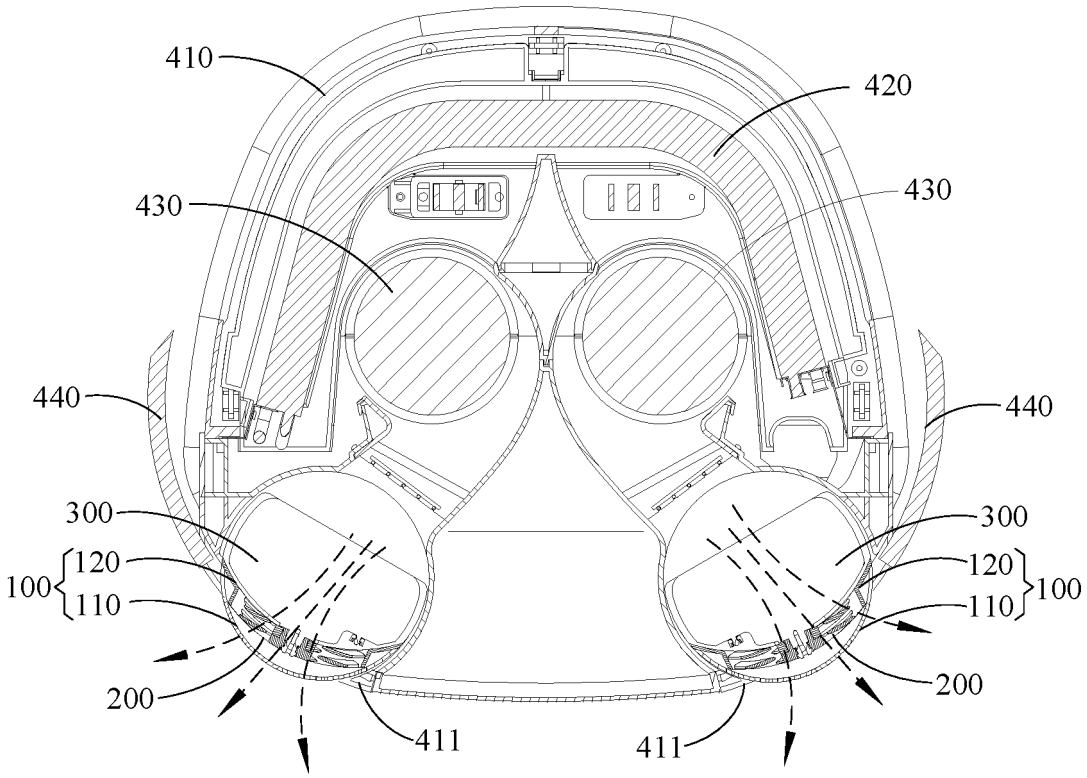
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FIG. 8

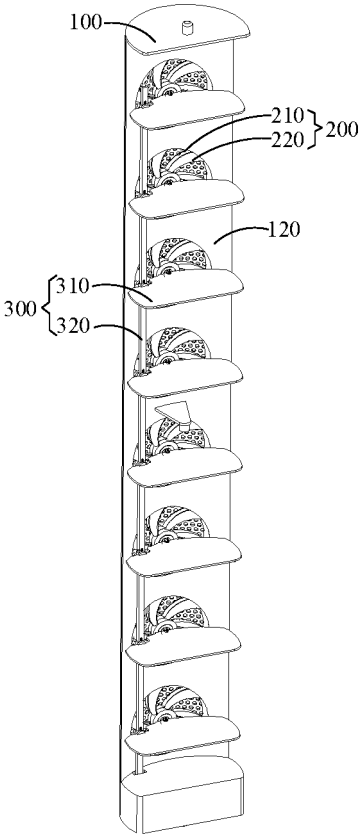

FIG. 9

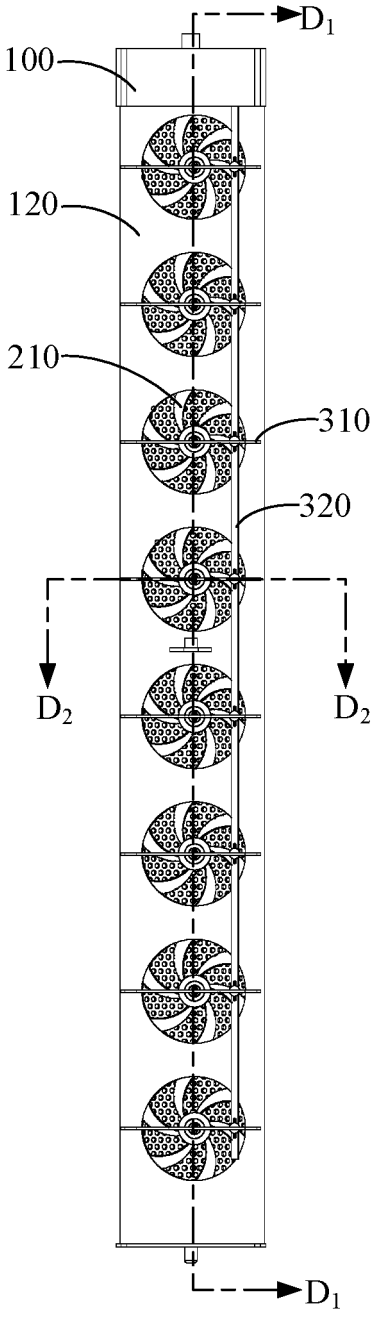

FIG. 10

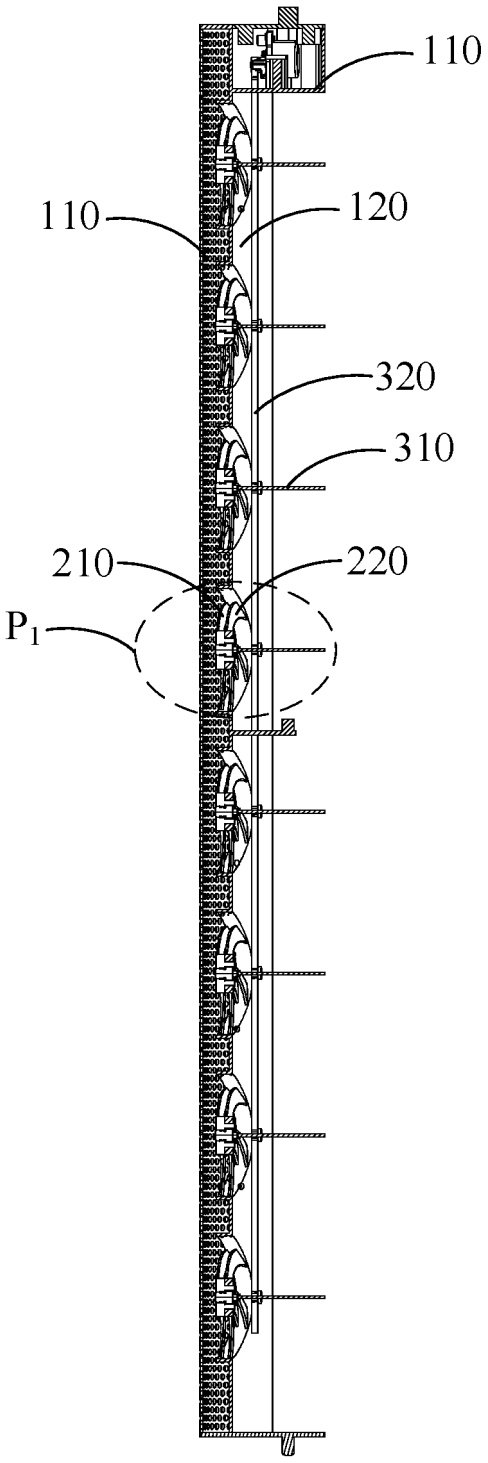

FIG. 11

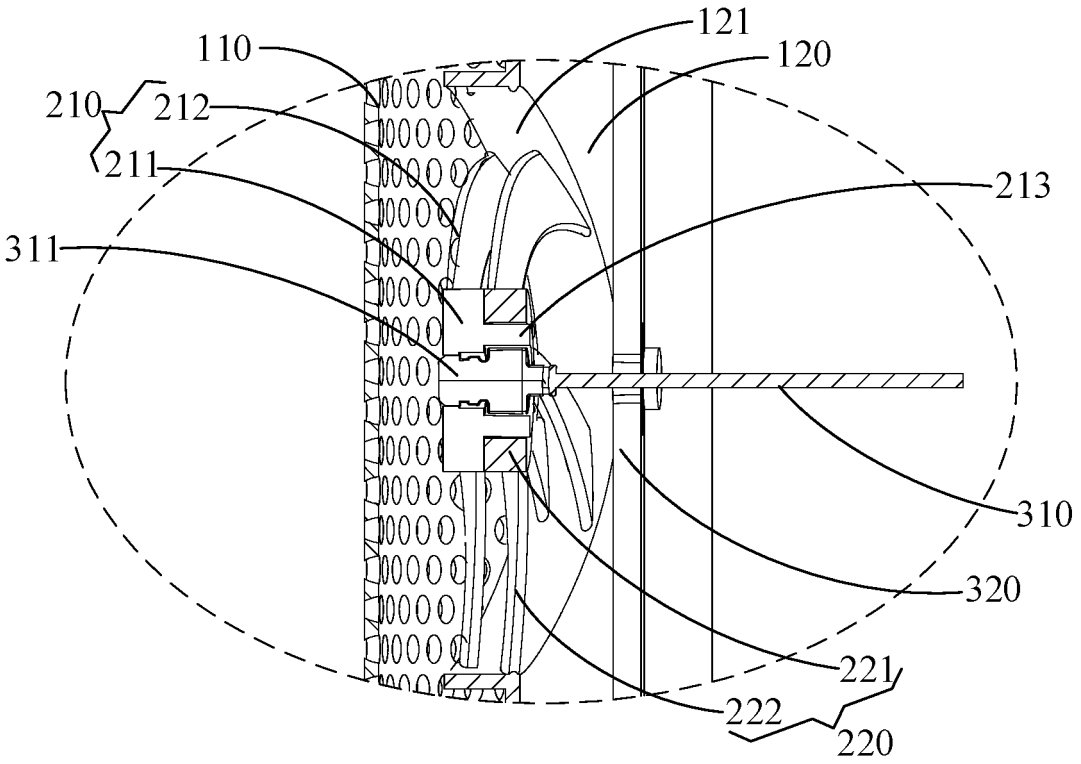

FIG. 12

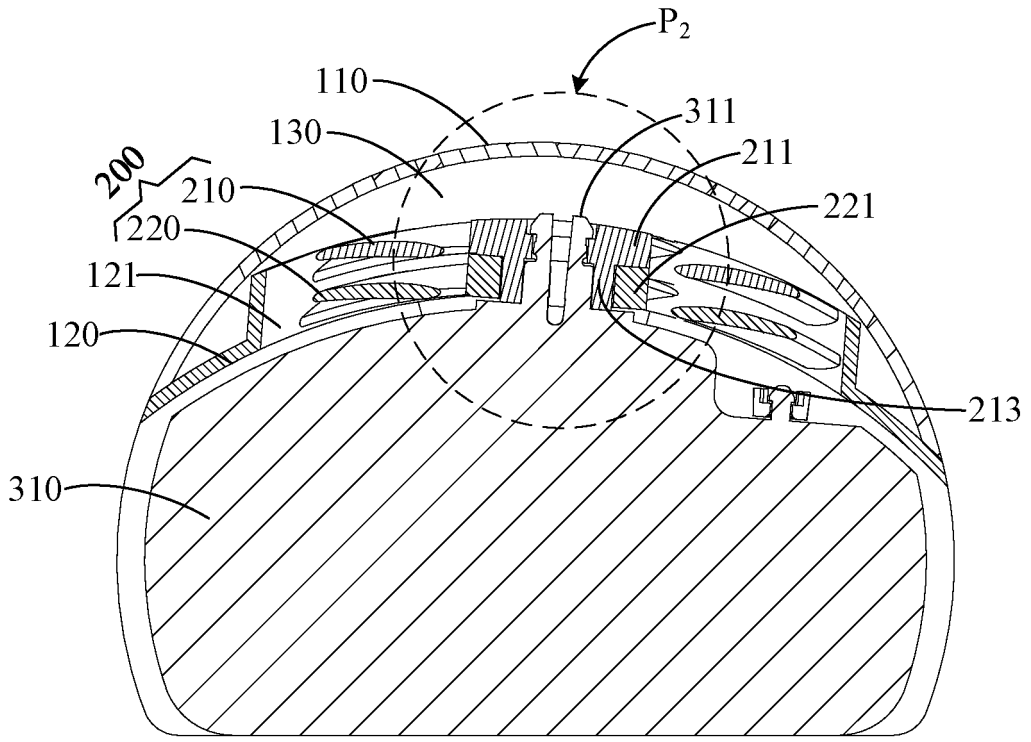
P2
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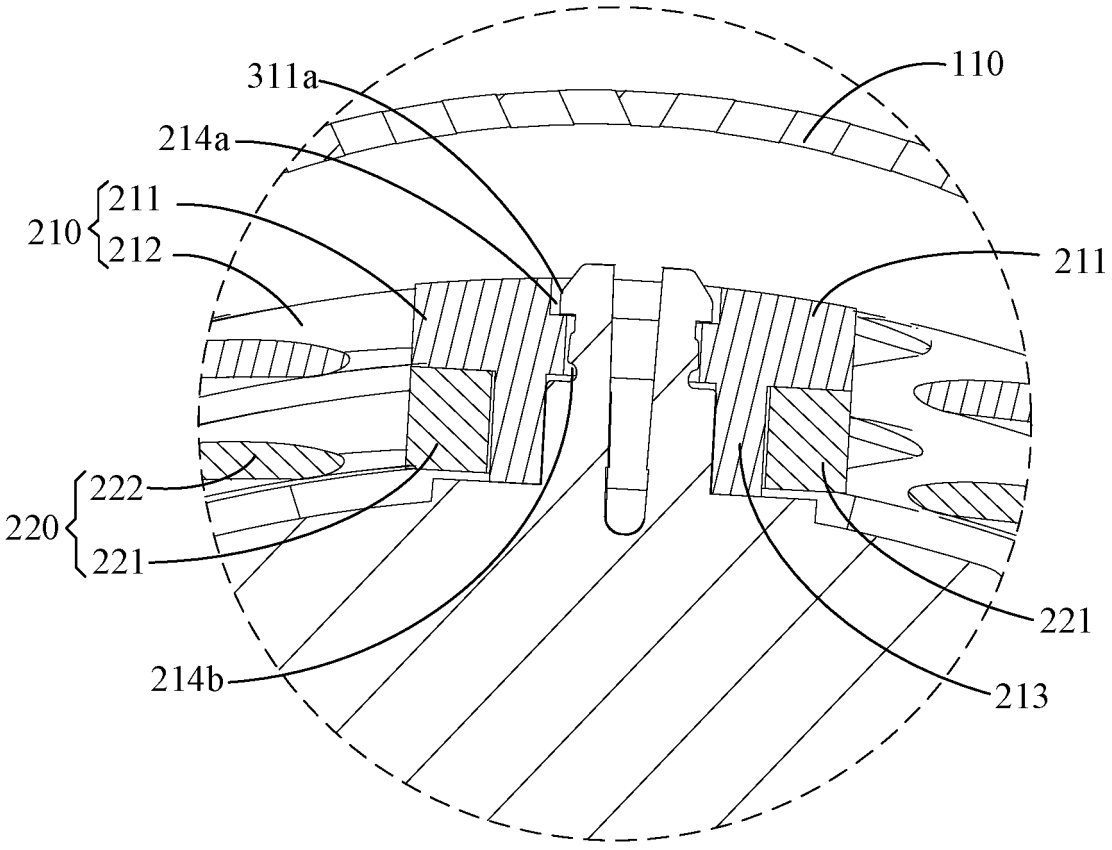
FIG. 13


311a
214a
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214b
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FIG. 14

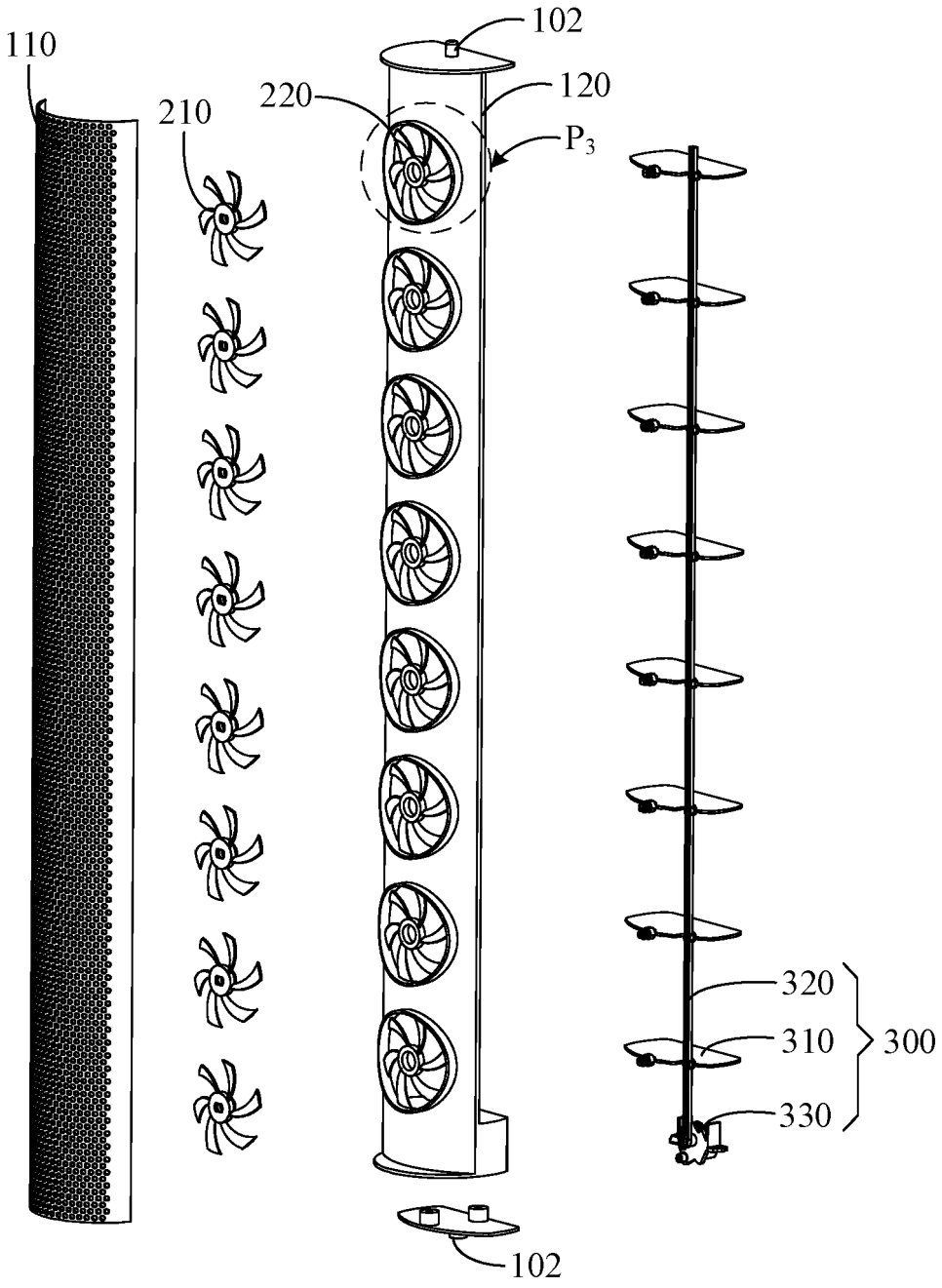

FIG. 15

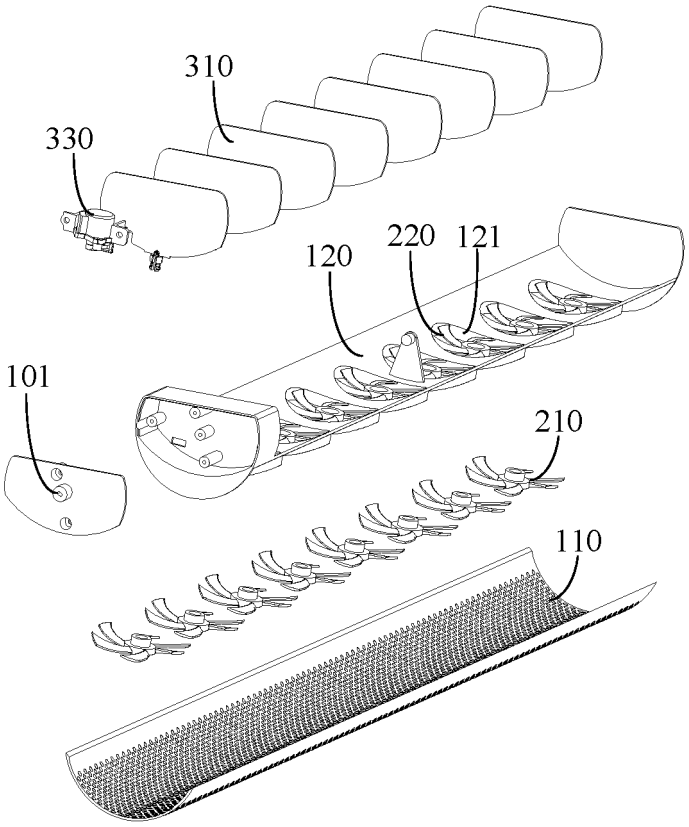

FIG. 16

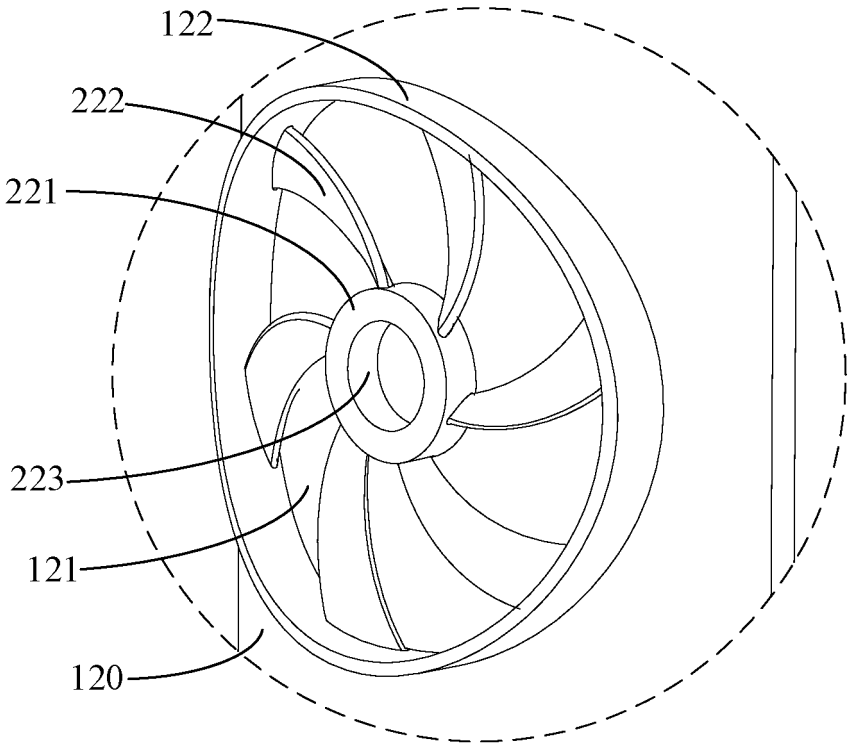

FIG. 17

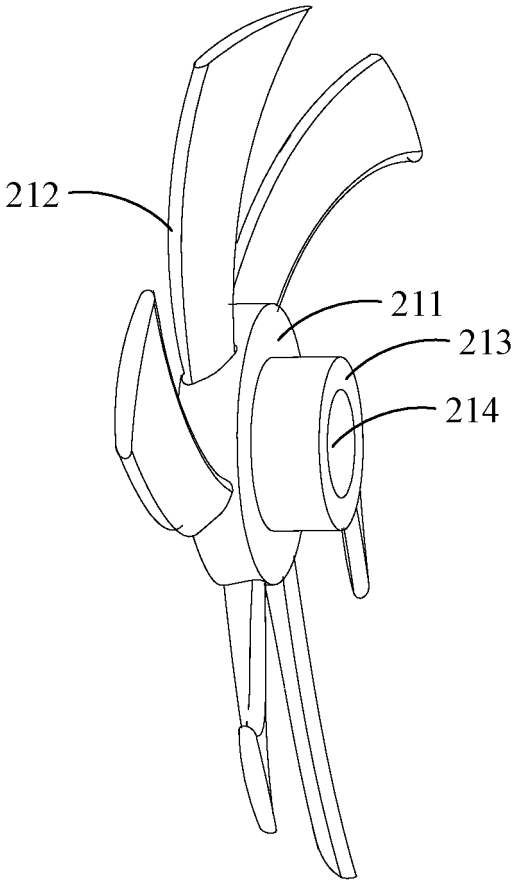

FIG. 18

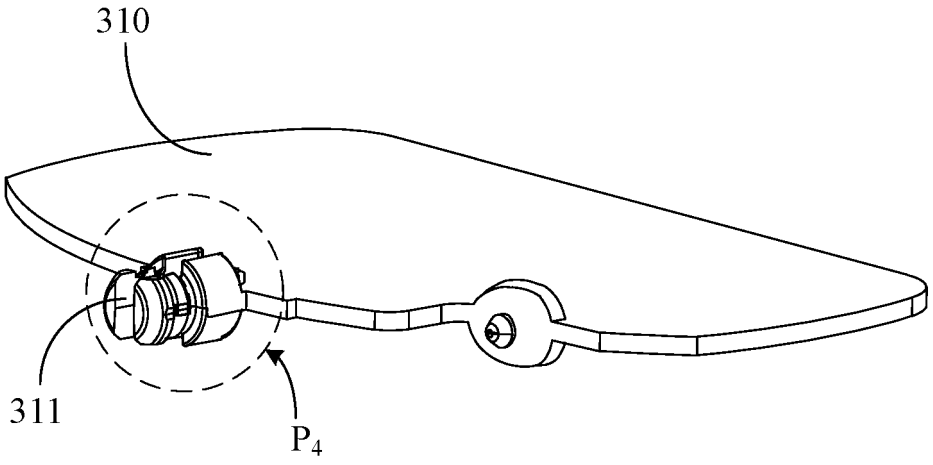

FIG. 19

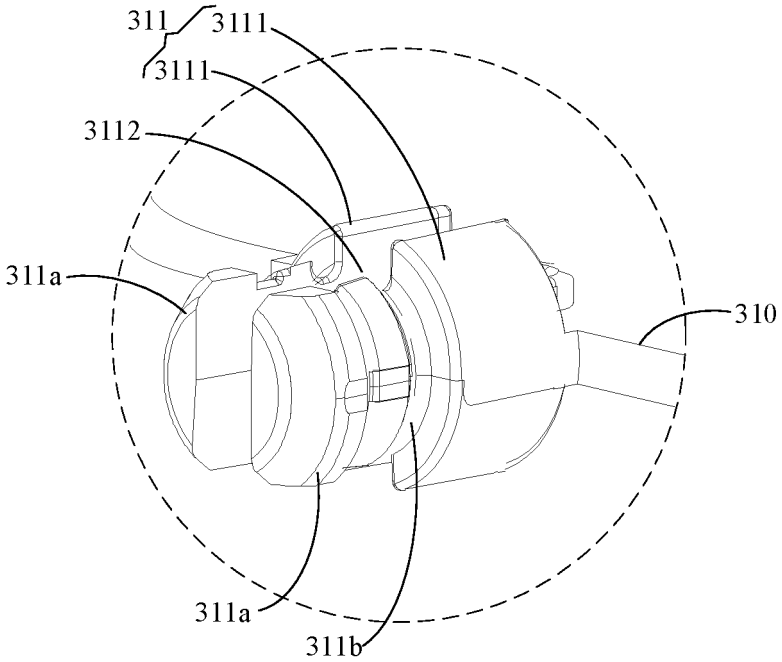

FIG. 20

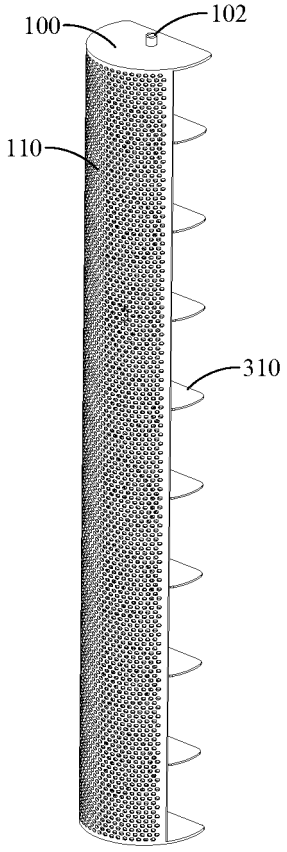

FIG. 21

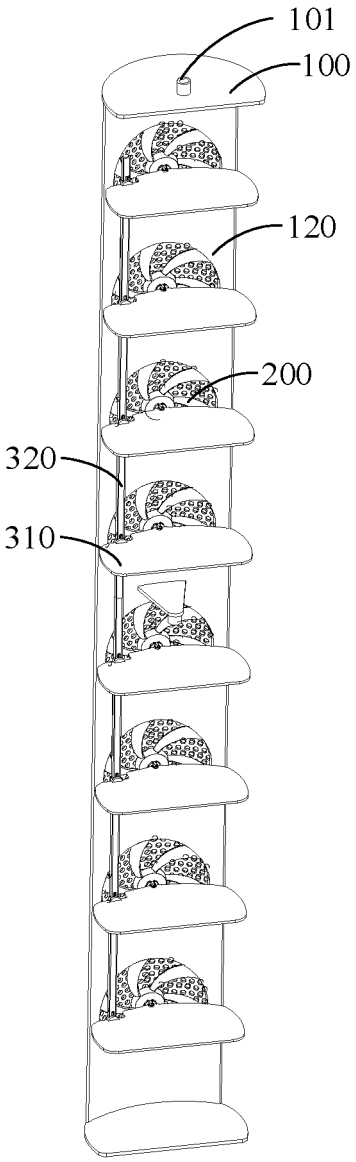

FIG. 22

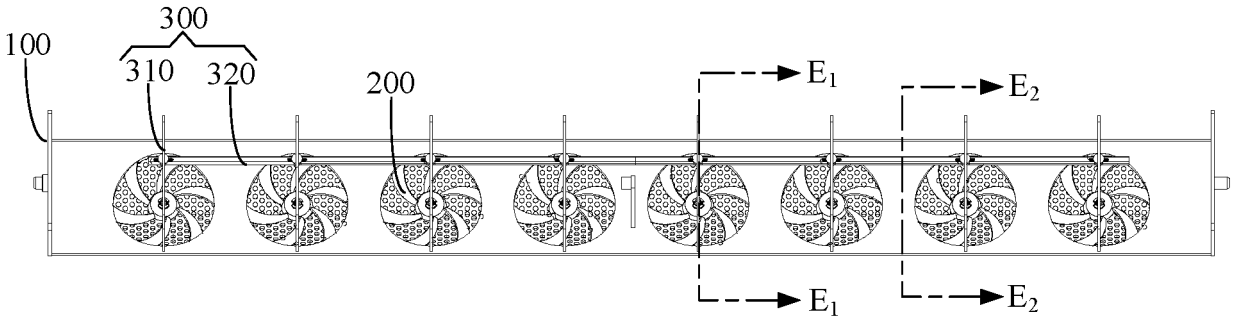

FIG. 23

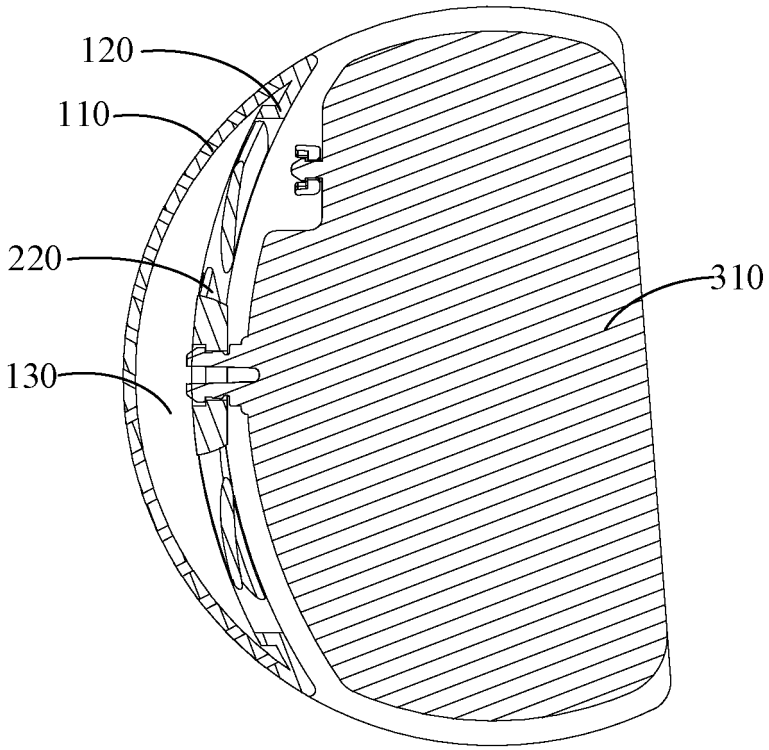

FIG. 24

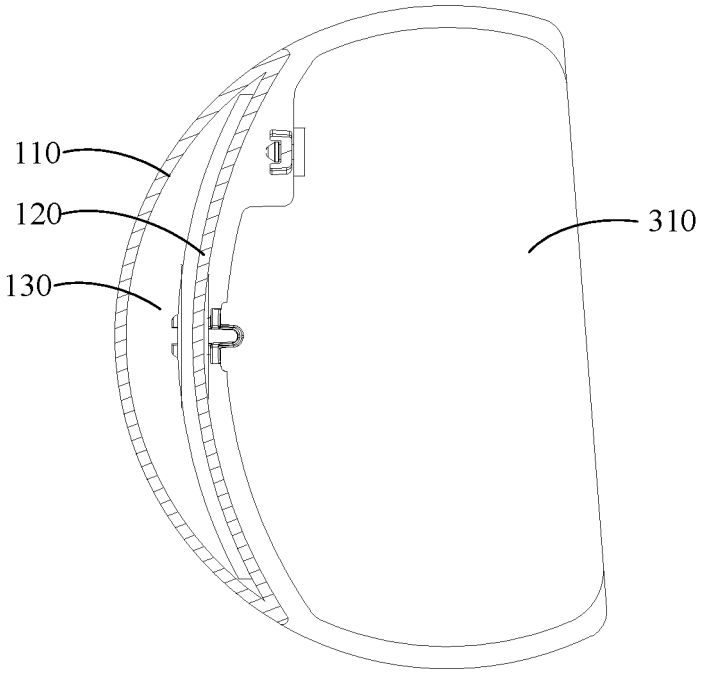

FIG. 25

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2021/089749

A. CLASSIFICATION OF SUBJECT MATTER

F24F 13/08(2006.01)i; F24F 13/15(2006.01)i; F24F 1/005(2019.01)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

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: 空调, 导风板, 散风, 通风, 孔, air conditioner, wind deflector, diffuse wind, ventilat+, hole, opening, aperture

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 212511728 U (GUANGDONG MIDEA REFRIGERATION EQUIPMENT CO., LTD. et al.) 09 February 2021 (2021-02-09) claims 1-18	1-18
X	CN 111189117 A (GUANGDONG MIDEA REFRIGERATION EQUIPMENT CO., LTD. et al.) 22 May 2020 (2020-05-22) description, paragraphs [0069]-[0110], and figures 1-20	1-18
X	CN 111380106 A (GUANGDONG MIDEA REFRIGERATION EQUIPMENT CO., LTD. et al.) 07 July 2020 (2020-07-07) description, paragraphs [0053]-[0087], and figures 1-11	1-18
X	CN 211575272 U (GUANGDONG MIDEA REFRIGERATION EQUIPMENT CO., LTD. et al.) 25 September 2020 (2020-09-25) description, paragraphs [0062]-[0100], and figures 1-15	1-18
X	CN 211575290 U (GUANGDONG MIDEA REFRIGERATION EQUIPMENT CO., LTD. et al.) 25 September 2020 (2020-09-25) description, paragraphs [0053]-[0087], and figures 1-11	1-18

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

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

Date of the actual completion of the international search	Date of mailing of the international search report
17 July 2021	**26 July 2021**

Name and mailing address of the ISA/CN	Authorized officer
China National Intellectual Property Administration (ISA/CN) **No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088** **China**	
Facsimile No. **(86-10)62019451**	Telephone No.

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

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2021/089749

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 211575289 U (GUANGDONG MIDEA REFRIGERATION EQUIPMENT CO., LTD. et al.) 25 September 2020 (2020-09-25) description, paragraphs [0069]-[0110], and figures 1-20	1-18
A	CN 108534229 A (MIDEA GROUP CO., LTD. et al.) 14 September 2018 (2018-09-14) entire document	1-18
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