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(54) **AIR CONDITIONER AND AIR DEFLECTOR THEREOF**

(57) An air conditioner and an air deflector thereof. The air deflector comprises a plate-shaped plate body, wherein the plate body is provided with one or a plurality of slits, the slit runs through the plate body, and portions of the plate body located on two sides of the slit are staggered with each other.

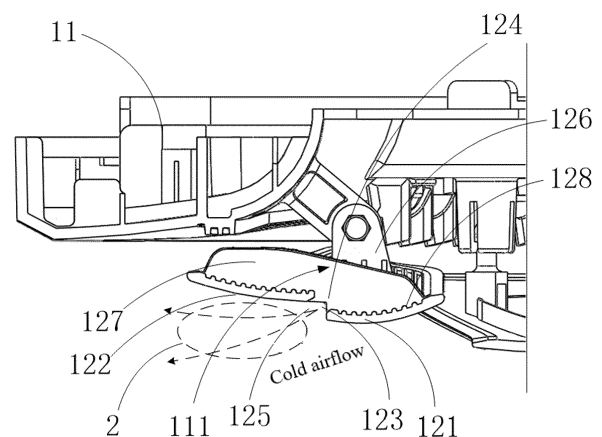


FIG. 8

Description

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims priority to Chinese Patent Application No. 202222856058.9, titled "air conditioner and air deflector thereof", and filed on October 27, 2022, the entire disclosure of which is incorporated herein by reference.

FIELD

[0002] The present disclosure relates to a refrigeration device, and in particular, to an air conditioner and an air deflector thereof.

BACKGROUND

[0003] When the air conditioner performs cooling, cold air expelled from an air outflowing opening passes through an air deflector. In this case, a flow velocity of the cold air is high, which leads to a low-pressure region formed nearby, thereby attracting nearby humid and hot air to gather in a region below the air deflector. The humid and hot air is in contact with the cold air at the air deflector, and therefore condensation is generated on a lower surface of the air deflector, which absorbs dust and thus causes the air deflector to be dirty.

[0004] In addition, when the cold air is blown out along the lower surface of the air deflector, a vortex is formed at a tail end of the air deflector due to a Coanda effect of the air, thereby drawing in nearby warm and humid airflow, which forms the condensation. After the condensation absorbs the dust, it further aggravates the dirtiness of the air deflector.

SUMMARY

[0005] The following is a summary of a subject matter described in detail herein. This summary is not intended to limit the scope of the claims.

[0006] A technical problem to be solved by embodiments of the present disclosure is to reduce dust adsorbed by an air deflector of an air conditioner.

[0007] Technical solutions of embodiments of the present disclosure to solve the above technical problem will be described below.

[0008] There is provided an air deflector. The air deflector comprises a plate-shaped body. The plate-shaped body has one or more slits penetrating the plate-shaped body.

[0009] In an exemplary embodiment, the plate-shaped body comprises a first air deflection part and a second air deflection part disposed at a side of the first air deflection part. The one or more slits has an air inlet end and an air outlet end away from the air inlet end. The one or more slits are provided between the first air deflection part and the second air deflection part. The air inlet end faces

towards closer to the side of the first air deflection part, and the air outlet end faces towards closer to the side of the second air deflection part.

[0010] In an exemplary embodiment, the first air deflection part and the second air deflection part are each constructed into an elongated plate-shaped structure. The first air deflection part, the second air deflection part, and the one or more slits extend in the same direction; and two ends of the first air deflection part are respectively connected to two ends of the second air deflection part.

[0011] In an exemplary embodiment, a cross-section of the first air deflection part and a cross-section of the second air deflection part are each arc-shaped and arch towards the same side.

[0012] In an exemplary embodiment, a ratio of a length of the one or more slits to a length of the plate-shaped body ranges from 0.7 to 0.9.

[0013] In an exemplary embodiment, the one or more slits has a width ranging from 5 mm to 15 mm.

[0014] In an exemplary embodiment, the air deflector further comprises a reinforcement part connected to the parts of the plate-shaped body located at the two sides of the one or more slits.

[0015] In an exemplary embodiment, the reinforcement part is constructed into a plate-shaped structure perpendicular to the plate-shaped body.

[0016] In an exemplary embodiment, a plurality of reinforcement parts is provided and sequentially arranged at an interval along the one or more slits.

[0017] In an exemplary embodiment, the plate-shaped body is further provided with a plurality of protruding ridges arranged side by side at a surface of the plate-shaped body.

[0018] Embodiments of the present disclosure also provide an air conditioner. The air conditioner comprises the air deflector as described above and a body having an air outflowing opening. The air deflector is disposed at the air outflowing opening and rotatably connected to the body.

[0019] In an exemplary embodiment, an extending direction of each of the one or more slits is perpendicular to an air outflowing direction of the air outflowing opening.

[0020] When the air conditioner performs cooling, and the cold air is expelled outward from the air outflowing opening of the body, a part of cold airflow moves along one surface of the plate-shaped body of the air deflector, flows from a front end of the plate-shaped body to a tail end of the plate-shaped body, and finally moves in a direction towards which the tail end faces, thereby changing an air outflowing direction of the air outflowing opening. Simultaneously, a negative-pressure region is formed near the other surface of the plate-shaped body. Another part of the cold airflow expelled from the air outflowing opening passes through the one or more slits when passing by the one or more slits, and the cold airflow is thus sprayed towards the above-described negative-pressure region. The cold airflow sprayed to-

wards the negative-pressure region can prevent humid and hot air around the air deflector from converging to the negative-pressure region, thereby preventing the humid and hot air from coming into contact with the air deflector and generating condensation on the air deflector. In this way, stains on the air deflector caused by the condensation adsorbing dust are greatly reduced.

[0021] Other aspects can be understood after reading and understanding accompanying drawings and detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022]

FIG. 1 is a schematic perspective view of an air conditioner according to an embodiment of the present disclosure.

FIG. 2 is a schematic partial view of an air conditioner according to an embodiment of the present disclosure.

FIG. 3 is a schematic bottom view of an air conditioner according to an embodiment of the present disclosure.

FIG. 4 is a schematic front perspective view of an air deflector according to an embodiment of the present disclosure.

FIG. 5 is a schematic half-cross-sectional front view of an air deflector according to an embodiment of the present disclosure.

FIG. 6 is a schematic back perspective view of an air deflector according to an embodiment of the present disclosure.

FIG. 7 is a schematic partial back view of an air deflector according to an embodiment of the present disclosure.

FIG. 8 is a schematic partial cross-sectional view of an air conditioner according to an embodiment of the present disclosure.

[0023] In the accompanying drawings, a list of components represented by respective reference numerals is as follows:

1, air conditioner; 11, body; 111, air outflowing opening; 12, air deflector; 120, plate-shaped body; 121, first air deflection part; 122, second air deflection part; 123, slit; 124, air inlet end; 125, air outlet end; 126, connector; 127, reinforcement part; 128, protruding ridge.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0024] Principles and features of embodiments of the present disclosure will be described below with reference to the accompanying drawings. Examples given are only used to explain the present disclosure and are not used to limit the scope of the present disclosure.

[0025] As shown in FIGS. 1 to 3, FIGS. 1 to 3 show a structure of an air conditioner 1 in an embodiment. The air

conditioner 1 may be a ceiling cassette air conditioner, a wall-mounted air conditioner, a cabinet air conditioner, etc. The ceiling cassette air conditioner is taken as an example in this embodiment. The ceiling cassette air conditioner, also known as a cassette air conditioner or a flush-mounted ceiling air conditioner, is a built-in air conditioner that can be embedded into a ceiling or a suspended ceiling, which can fully utilize indoor top space and save floor mounting space. Meanwhile, the ceiling cassette air conditioner is embedded into the ceiling or the suspended ceiling, which is aesthetically pleasing.

[0026] The air conditioner 1 comprises a body 11 and an air deflector 12. The body 11 may be constructed into a substantially rectangular-shaped structure. The body 11 has an air outflowing opening 111 configured to allow air to flow outwards. The air outflowing opening 111 may be constructed into a straight elongated opening. The air outflowing opening 111 is formed close to a side of the body 11. In this embodiment, four air outflowing openings 111 are respectively formed along four edges of the body 11, and the four air outflowing openings 111 allow air to flow outwards from four sides of the body 11 respectively.

[0027] As shown in FIGS. 4 to 7, the air deflector 12 is disposed at the air outflowing opening 111. The air deflector 12 comprises a plate-shaped body 120 and a connector 126. The plate-shaped body 120 is constructed into a substantially plate-shaped structure, which may be an elongated plate structure. The connector 126 may be constructed into a straight elongated shape. The connector 126 has an end connected to the plate-shaped body 120. The connector 126 has an end connected to the plate-shaped body 120, and the connector 126 may be perpendicular to the plate-shaped body 120. As shown in FIG. 8, an end of the connector 126 away from the plate-shaped body 120 is rotatably connected to the body 11, and the connector 126 may be articulated to the body 11. In this way, the air deflector 12 is rotatably connected to the body 11, and an inclination of the plate-shaped body 120 can be changed when the air deflector 12 rotates, thereby changing a flowing direction of airflow flowing out of the air outflowing opening 111, i.e., changing an air outflowing direction of the air outflowing opening 111.

[0028] A side of the plate-shaped body 120 is a front end, and another side of the plate-shaped body 120 is a tail end. The front end is closer to the air outflowing opening 111 of the body 11 than a leeward side. The plate-shaped body 120 further has a slit located between the front end and the tail end, and the slit penetrates the plate-shaped body 120 in a thickness direction of the plate-shaped body 120. The plate-shaped body 120 may have one or more slits. The slit may be constructed into an elongated shape, and an extending direction of the slit is preferably perpendicular to the air outflowing direction of the air outflowing opening 111.

[0029] As shown in FIG. 8, when the air conditioner performs cooling, and the cold air is expelled outward

from the air outflowing opening 111 of the body 11, a part of cold airflow moves along one surface of the plate-shaped body 120, flows from the front end of the plate-shaped body 120 to the tail end of the plate-shaped body 120, and finally moves in a direction towards which the tail end faces, thereby changing the air outflowing direction of the air outflowing opening 111. Simultaneously, a negative-pressure region 2 is formed near the other surface of the plate-shaped body 120. Another part of the cold airflow expelled from the air outflowing opening 111 passes through the slit when passing by the slit, and the cold airflow is thus sprayed towards the above-described negative-pressure region 2. The cold airflow sprayed towards the negative-pressure region 2 can prevent humid and hot air around the air deflector 12 from converging to the negative-pressure region 2, thereby preventing the humid and hot air from coming into contact with the air deflector 12 and generating condensation on the air deflector 12. In this way, stains on the air deflector 12 caused by the condensation adsorbing dust are greatly reduced.

[0030] In an exemplary embodiment, the plate-shaped body 120 comprises a first air deflection part 121 and a second air deflection part 122. The first air deflection part 121 and the second air deflection part 122 are each constructed into a plate-shaped structure. The second air deflection part 122 is disposed at a side of the first air deflection part 121 away from the air outflowing opening 111. The first air deflection part 121 is close to the front end of the plate-shaped body 120, and the second air deflection part 122 is close to the tail end of the plate-shaped body 120. The slit is formed between the first air deflection part 121 and the second air deflection part 122.

[0031] As shown in FIG.8, the slit 123 comprises an air inlet end 124 and an air outlet end 125 opposite to the air inlet end 124. The airflow flows into the slit 123 from the air inlet end 124 and then is ejected from the air outlet end 125. An end of the first air deflection part 121 close to the second air deflection part 122 is offset from an end of the second air deflection part 122 close to the first air deflection part 121, and therefore the air inlet end 124 of the slit 123 faces towards a side of the first air deflection part 121 and is located closer to the side of the first air deflection part 121, and the air outlet end 125 of the slit 123 faces towards a side of the second air deflection part 122 and is located closer to the side of the second air deflection part 122.

[0032] The cold airflow expelled from the air inlet sequentially flows along the first air deflection part 121 and the second air deflection part 122. When the cold airflow flows through the air inlet of the slit 123, since the air inlet end 124 of the slit 123 faces towards the side of the first air deflection part 121 and is located closer to the side of the first air deflection part 121, more cold airflow flows into the slit 123. The cold airflow flowing into the slit 123 is then ejected towards the side of the second air deflection part 122 and closer to the side of the second air deflection part 122 from the air outlet end 125 of the slit 123. This stream

of cold airflow can also prevent the generation of a vortex at a back of the end of the second air deflection part 122 away from the first air deflection part 121, thereby avoiding generation of vortex condensation at the tail end of the plate-shaped body 120, which in turn reduces adsorption of the dust at the tail end of the plate-shaped body 120.

[0033] In an exemplary embodiment, the first air deflection part 121 and the second air deflection part 122 each have an elongated plate-shaped structure. Cross-sections of the first air deflection part 121 and the second air deflection part 122 are arc-shaped and arched toward the same side. The first air deflection part 121 and the second air deflection part 122 each may be constructed into a straight elongated plate-shaped structure with two narrow ends and a wide middle part. The first air deflection part 121 and the second air deflection part 122 extend in the same direction. Two opposite ends of the first air deflection part 121 are respectively connected to two opposite ends of the second air deflection part 122. The slit 123 is provided between the first air deflection part 121 and the second air deflection part 122, and the slit 123 extends in the same direction as the first air deflection part 121.

[0034] Since the two ends of the first air deflector 12 are connected to the two ends of the second air deflection part 122, and the slit 123 is provided between the first air deflection part 121 and the second air deflection part 122, the air deflector 12 is simple in structure and easy to process and manufacture. Meanwhile, the slit 123 extends in the same direction as each of the first air deflection part 121 and the second air deflection part 122, and the cold airflow ejected from the slit 123 can cover the negative-pressure region 2 below the second air deflection part 122 as widely as possible, further reducing the generation of condensation.

[0035] In an exemplary embodiment, the first air deflection part 121, the second air deflection part 122, and the slit 123 extend in the same direction, and the plate-shaped body 120 extends in the same direction as the slit 123. A ratio of a length of the slit 123 to a length of the plate-shaped body 120 ranges from 0.7 to 0.9, and preferably 0.8.

[0036] When the ratio of the length of the slit 123 to the length of the plate-shaped body 120 ranges from 0.7 to 0.9, the length of the slit 123 is as long as possible while the plate-shaped body 120 has sufficient structural strength. In this case, the air deflector 12 has a better anti-condensation effect.

[0037] In an exemplary embodiment, a width of the slit 123 ranges from 5 mm to 15 mm.

[0038] The width of the slit 123 can adjust a flow volume of cold air passing through the slit 123. The wider the width of the slit 123, the greater the flow rate of the cold air passing through the slit 123, and the better the anti-condensation effect of the air deflector 12. However, if the slit 123 on the air deflector 12 is too large, the guidance of the air deflector 12 on the cold airflow expelled from the air outflowing opening 111 will be poor.

However, when the width of the slit 123 ranges from 5 mm to 15 mm, the air deflector 12 has good guidance for the air flow while also having good anti-condensation effect.

[0039] In an exemplary embodiment, the air deflector 12 further comprises a reinforcement part 127. The reinforcement part 127 may be constructed into an elongated shape. The reinforcement part 127 extends across the slit 123. The reinforcement part 127 has an end connected to the first air deflection part 121 and another end connected to the second air deflection part 122.

[0040] Since the slit 123 is formed between the first air deflection part 121 and the second air deflection part 122, which weakens structural strength of the plate-shaped body 120, the plate-shaped body 120 is easily deformed or damaged under an action of external force, and may also vibrates with relatively large amplitude under an action of the airflow. However, since the first air deflection part 121 is connected to the second air deflection part 122 by the reinforcement part 127 that can enhance the structural strength of the plate-shaped body 120 at the slit 123, the plate-shaped body 120 is not easily deformed and damaged, and the vibration amplitude of the air deflector 12 is weakened.

[0041] In an exemplary embodiment, the reinforcement part 127 is constructed into an elongated plate-shaped structure. The reinforcement part 127 has a surface perpendicular to the surface of the plate-shaped body 120.

[0042] Since the reinforcement part 127 has the plate shape, and the surface of the reinforcement part 127 is perpendicular to the surface of the plate-shaped body 120, the reinforcement part 127 can further enhance the structural strength of the plate-shaped body 120 and thus enhance bending moment resistance of the plate-shaped body 120. The surface of the reinforcement part 127 is also preferably parallel to the air outflowing direction of the air outflowing opening 111. In this way, the reinforcement part 127 has less obstruction to the airflow expelled from the air outflowing opening 111.

[0043] In an exemplary embodiment, the air deflector 12 further comprises a plurality of reinforcement parts 127, for example, six reinforcement parts 127 are provided. The plurality of reinforcement parts 127 may be arranged at one side of the plate-shaped body 120. The plurality of reinforcement parts 127 are sequentially arranged in the extending direction of the slit 123, and two adjacent reinforcement parts 127 among the plurality of reinforcement parts 127 are separated from each other and evenly spaced from each other.

[0044] The plurality of reinforcement parts 127 are sequentially arranged along the slit 123, which can strengthen the structural strength of the plate-shaped body 120 along the slit 123. In this way, the structural strength of the plate-shaped body 120 is greater.

[0045] In an exemplary embodiment, the first air deflection part 121 and the second air deflection part 122 are each provided with a plurality of protruding ridges 128 at respective surfaces of the first air deflection part 121

and the second air deflection part 122. Each of the plurality of protruding ridges 128 is constructed into an elongated protrusion. The plurality of protruding ridges 128 are arranged side by side at each of the first air deflection part 121 and the second air deflection part 122 and are parallel to each other. Two adjacent protruding ridges 128 among the plurality of protruding ridges 128 are spaced apart from each other. Each of the plurality of protruding ridges 128 extends in the same direction as the slit 123. Each of the plurality of protruding ridges 128 can reduce generation of condensation on each of the first air deflection part 121 and the second air deflection part 122.

[0046] In the description of the present disclosure, it is to be understood that, terms such as "center", "longitudinal", "lateral", "length", "width", "thickness", "over", "below", "front", "back", "left", "right", "vertical", "horizontal", "top", "bottom", "in", "out", "clockwise", "anticlockwise", "axial", "radial" and "circumference" refer to the directions and location relations which are the directions and location relations shown in the drawings, and for describing the present disclosure and for describing in simple, and which are not intended to indicate or imply that the device or the elements are disposed to locate at the specific directions or are structured and performed in the specific directions, which could not to be understood to the limitation of the present disclosure.

[0047] In addition, the terms such as "first" and "second" are used herein for purposes of description and are not intended to indicate or imply relative importance, or to implicitly show the number of technical features indicated. Thus, the feature defined with "first" and "second" may explicitly or implicitly comprise one or more this feature. In the description of the present disclosure, "a plurality of" means at least two, for example, two or three, unless specified otherwise.

[0048] In the present disclosure, unless specified or limited otherwise, the terms "mounted," "connected," "coupled", and "fixed" are understood broadly, such as fixed, detachable mountings, connections and couplings or integrated, and can be mechanical or electrical mountings, connections and couplings, and also can be direct and via media indirect mountings, connections, and couplings, and further can be inner mountings, connections and couplings of two components or interaction relations between two components. For those skilled in the art, the specific meaning of the above-mentioned terms in the embodiments of the present disclosure can be understood according to specific circumstances.

[0049] In the present disclosure, unless specified or limited otherwise, the first characteristic is "on" or "under" the second characteristic refers to the first characteristic and the second characteristic may be direct or via media indirect mountings, connections, and couplings. And, the first characteristic is "on", "above", "over" the second characteristic may refer to the first characteristic is right over the second characteristic or is diagonal above the second characteristic, or just refer to the horizontal height

of the first characteristic is higher than the horizontal height of the second characteristic. The first characteristic is "below" or "under" the second characteristic may refer to the first characteristic is right over the second characteristic or is diagonal under the second characteristic, or just refer to the horizontal height of the first characteristic is lower than the horizontal height of the second characteristic.

[0050] Reference throughout this specification to "an embodiment," "some embodiments," "an example," "a specific example," or "some examples," means that a particular feature, structure, material, or characteristic described in connection with the embodiment or example is comprised in at least one embodiment or example of the present disclosure. The appearances of the above phrases in various places throughout this specification are not necessarily referring to the same embodiment or example of the present disclosure. Furthermore, the particular features, structures, materials, or characteristics may be combined in any suitable manner in one or more embodiments or examples. In addition, different embodiments or examples and features of different embodiments or examples described in the specification may be combined by those skilled in the art without mutual contradiction.

[0051] Although embodiments of present disclosure have been shown and described above, it should be understood that above embodiments are just explanatory, and cannot be construed to limit the present disclosure, for those skilled in the art, changes, alternatives, and modifications can be made to the embodiments without departing from spirit, principles and scope of the present disclosure.

Claims

1. An air deflector, applied in an air conditioner, the air deflector comprising a plate-shaped body, wherein the plate-shaped body has one or more slits penetrating the plate-shaped body in a thickness direction of the plate-shaped body, parts of the plate-shaped body located at two sides of the one or more slits being offset from each other.

2. The air deflector according to claim 1, wherein:

the plate-shaped body comprises a first air deflection part and a second air deflection part disposed at a side of the first air deflection part; the one or more slits has an air inlet end and an air outlet end away from the air inlet end; and the one or more slits are provided between the first air deflection part and the second air deflection part, the air inlet end faces towards closer to a side of the first air deflection part, and the air outlet end faces towards closer to a side of the second air deflection part.

3. The air deflector according to claim 2, wherein:

the first air deflection part and the second air deflection part are each constructed into an elongated plate-shaped structure; the first air deflection part, the second air deflection part, and the one or more slits extend in a same direction; and two ends of the first air deflection part are respectively connected to two ends of the second air deflection part.

4. The air deflector according to claim 3, wherein a cross-section of the first air deflection part and a cross-section the second air deflection part are each arc-shaped and arch towards a same side.

5. The air deflector according to any one of claims 1 to 4, wherein a ratio of a length of the one or more slits to a length of the plate-shaped body ranges from 0.7 to 0.9.

6. The air deflector according to any one of claims 1 to 4, wherein a width of the one or more slits ranges from 5 mm to 15 mm.

7. The air deflector according to claim 1, further comprising a reinforcement part connected to the parts of the plate-shaped body located at the two sides of the one or more slits .

8. The air deflector according to claim 7, wherein the reinforcement part is constructed into a plate-shaped structure perpendicular to the plate-shaped body.

9. The air deflector according to claim 7 or 8, wherein a plurality of reinforcement parts is provided and sequentially arranged at an interval along the one or more slits .

10. The air deflector according to any one of claims 1 to 4, wherein the plate-shaped body is further provided with a plurality of protruding ridges arranged side by side at a surface of the plate-shaped body.

11. An air conditioner, comprising:

an air deflector according to any one of claims 1 to 10; and a body having an air outflowing opening, the air deflector being disposed at the air outflowing opening and rotatably connected to the body.

12. The air conditioner according to claim 11, wherein an extending direction of each of the one or more slits is perpendicular to an air outflowing direction of the air outflowing opening.

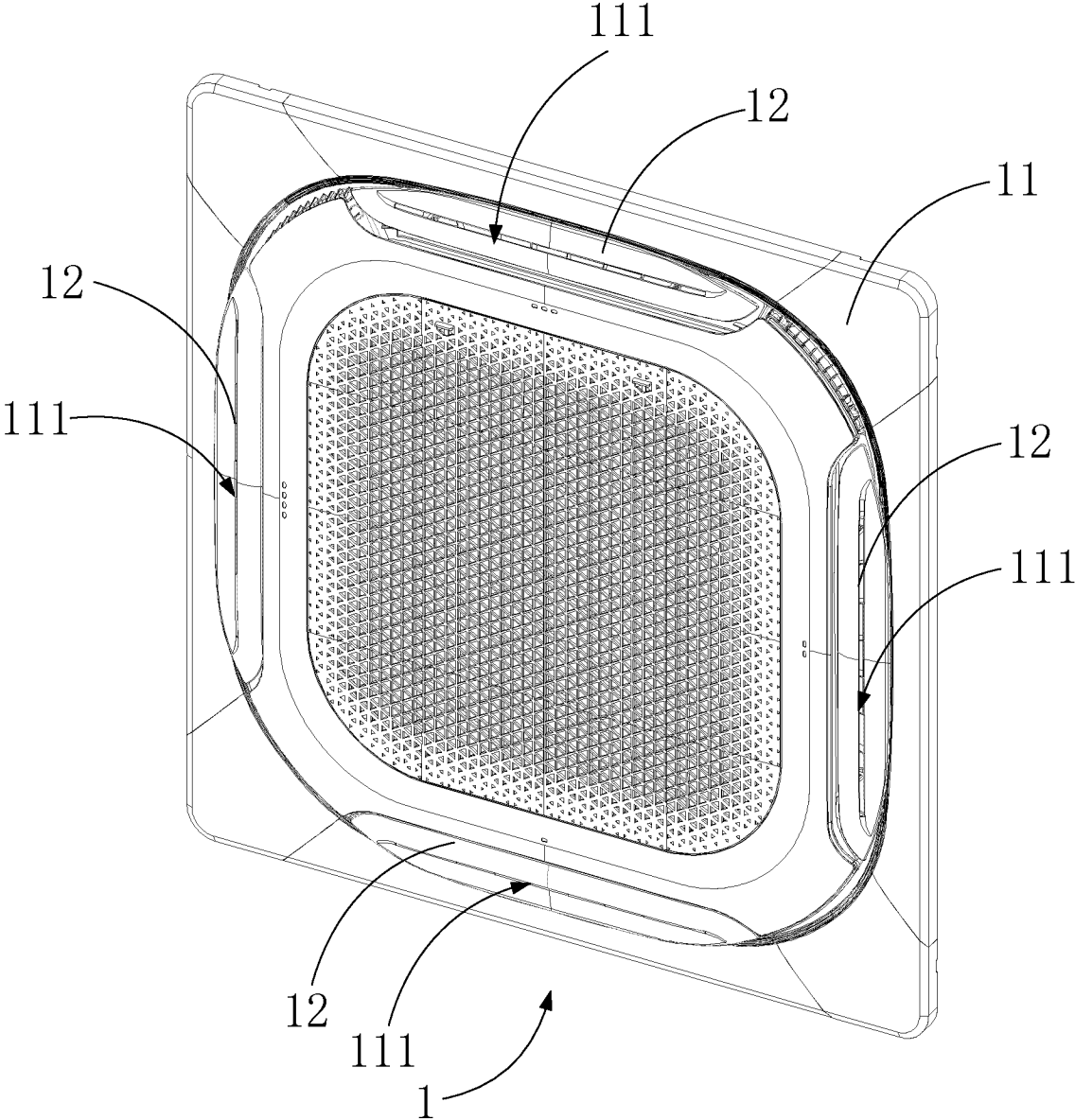


FIG. 1

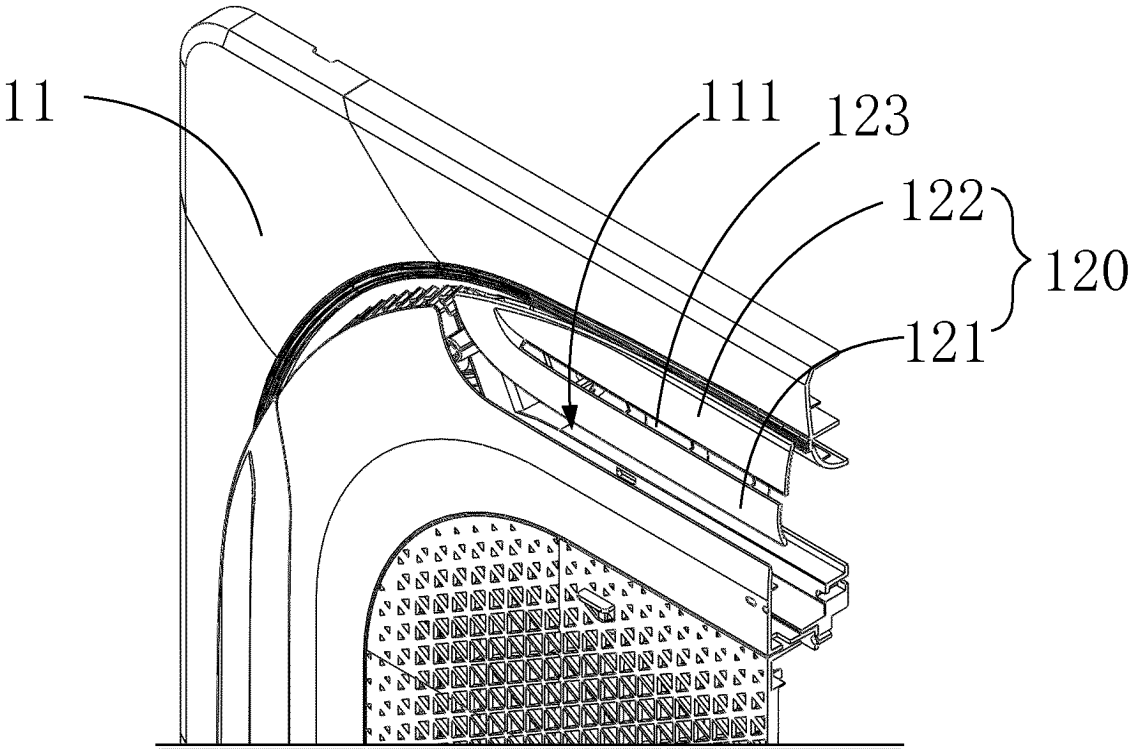


FIG. 2

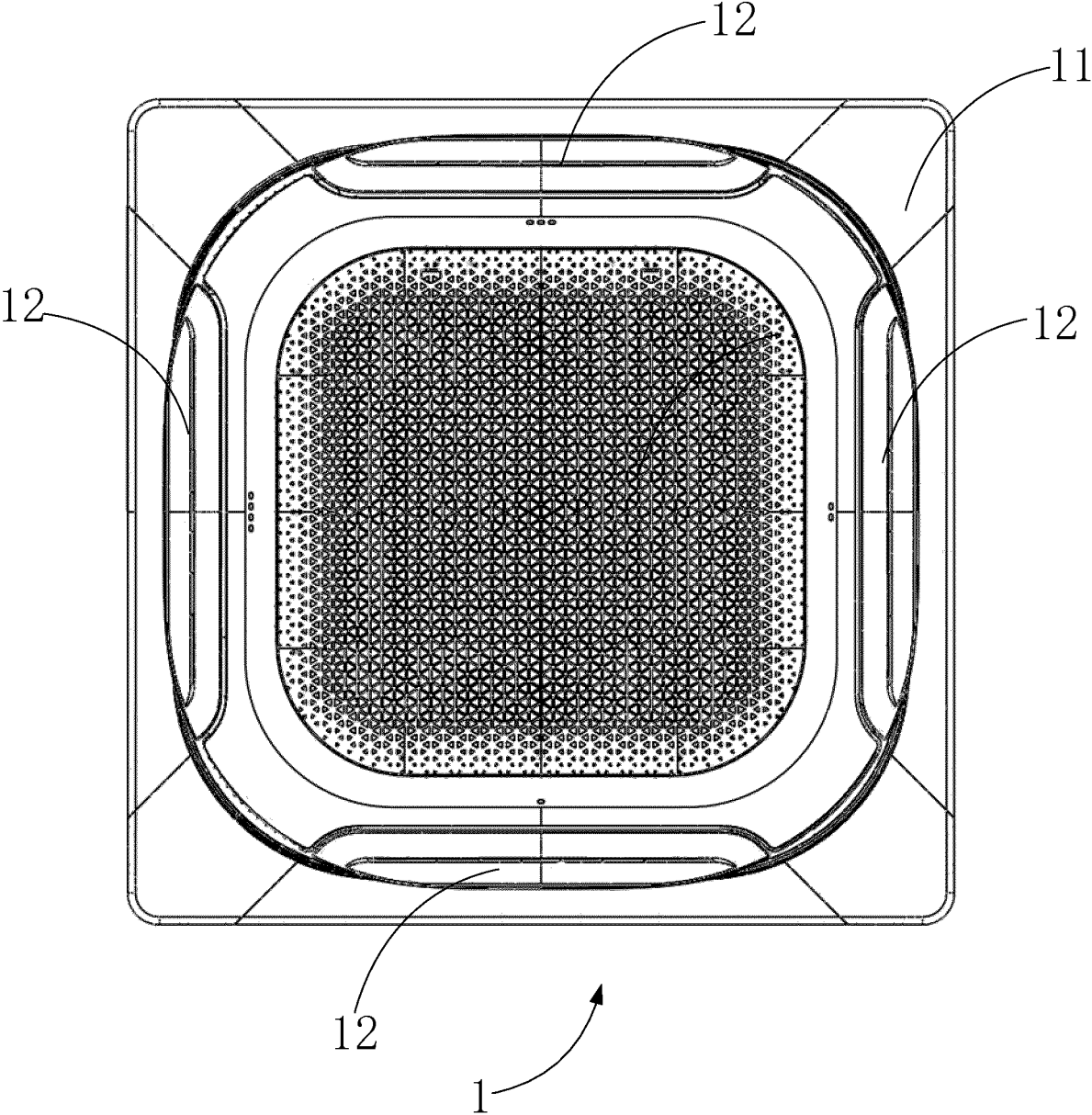


FIG. 3

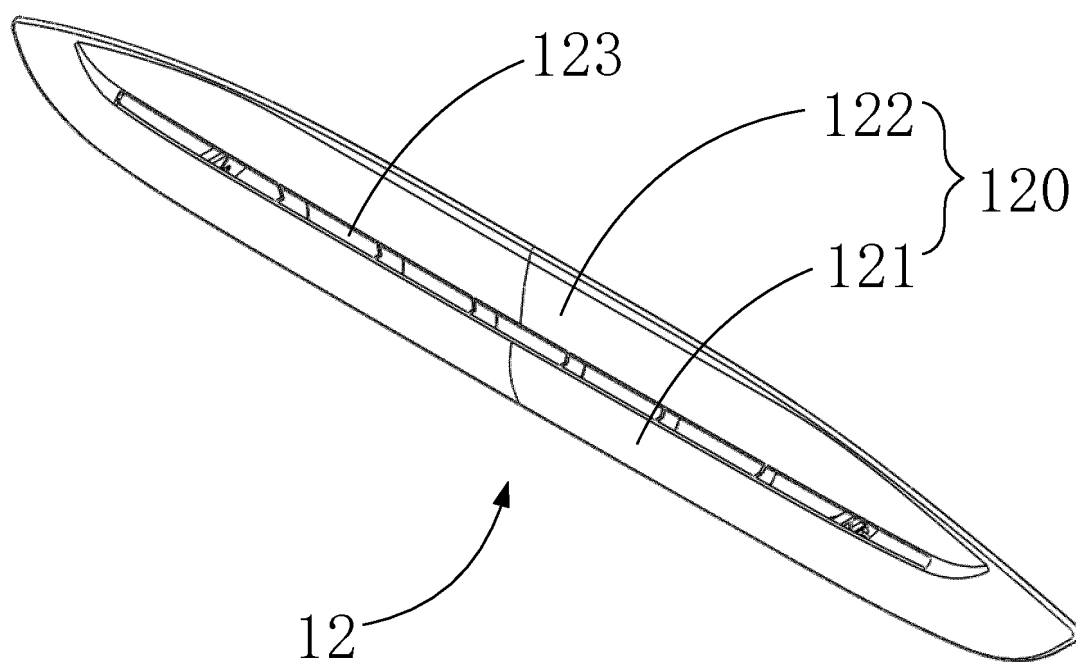


FIG. 4

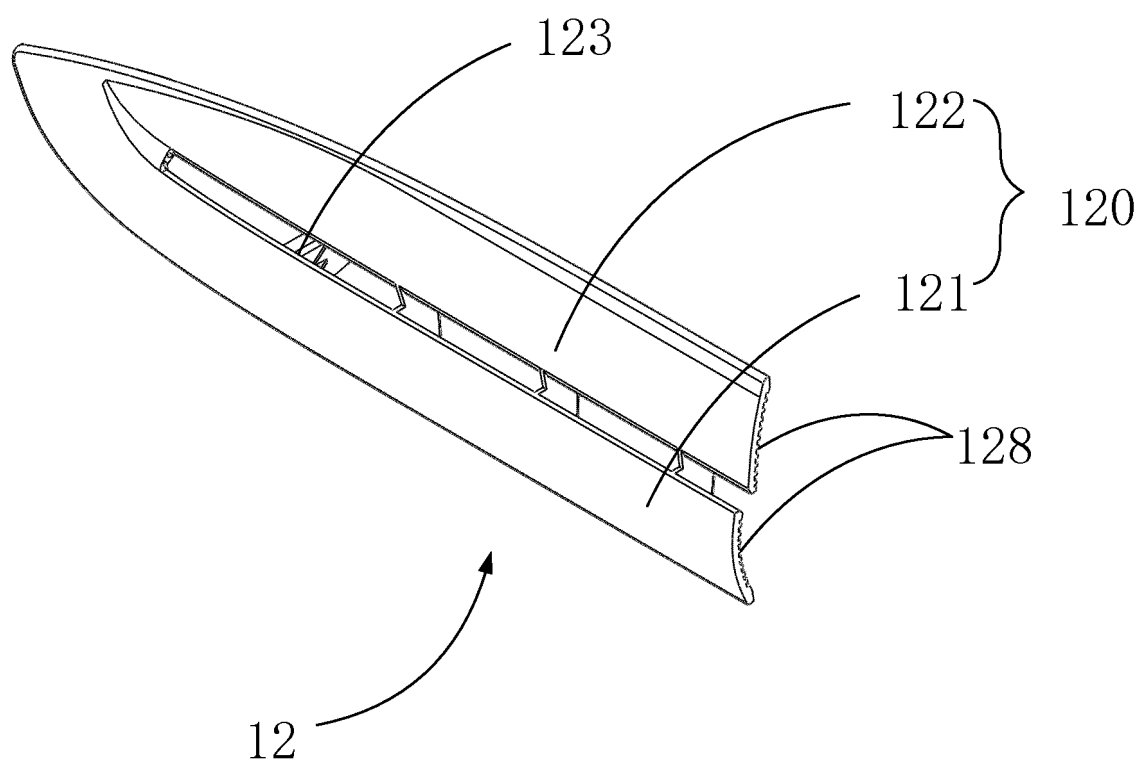


FIG. 5

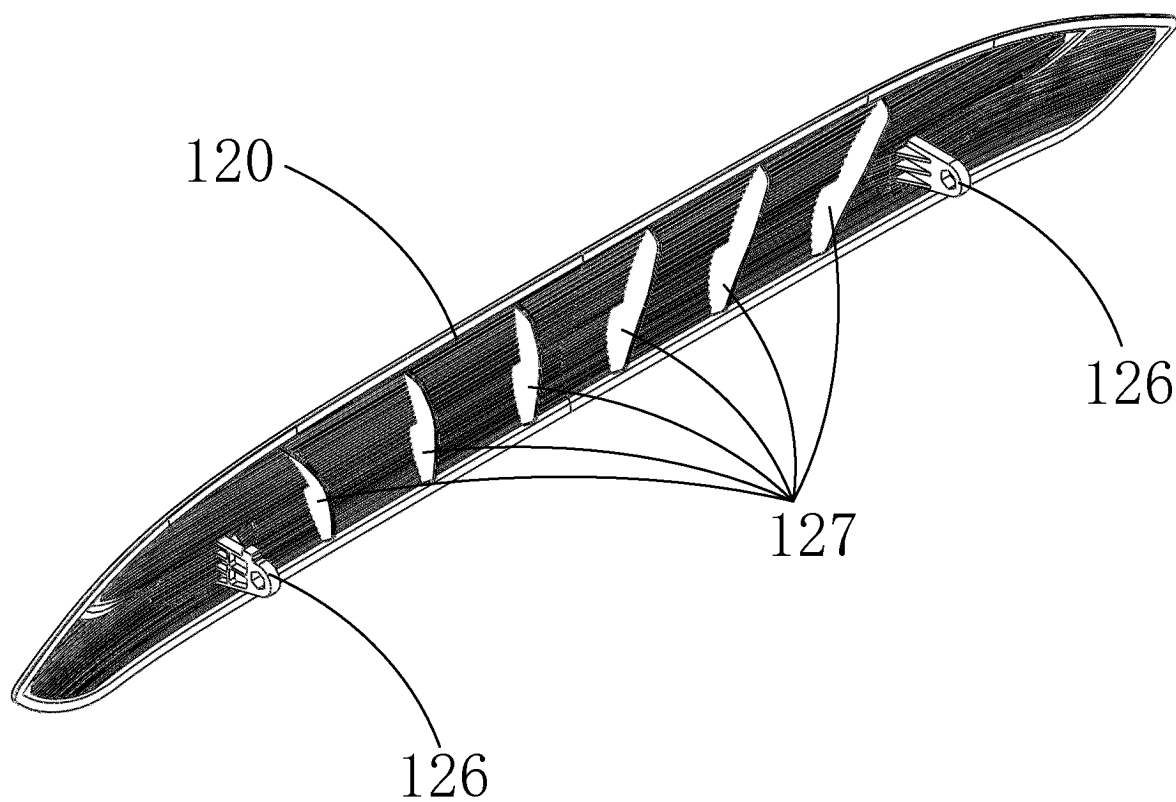


FIG. 6

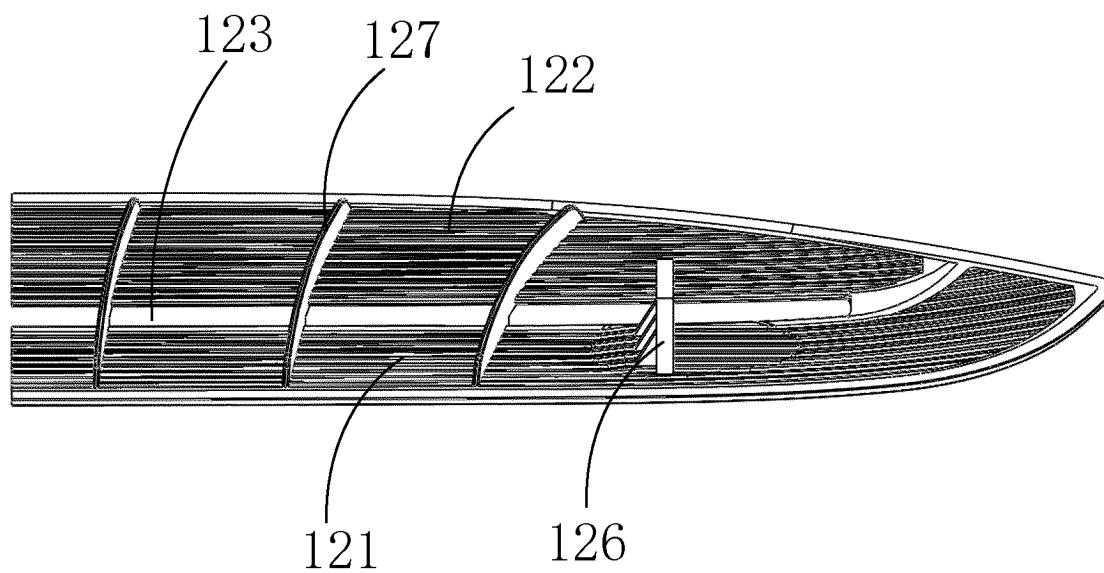


FIG. 7

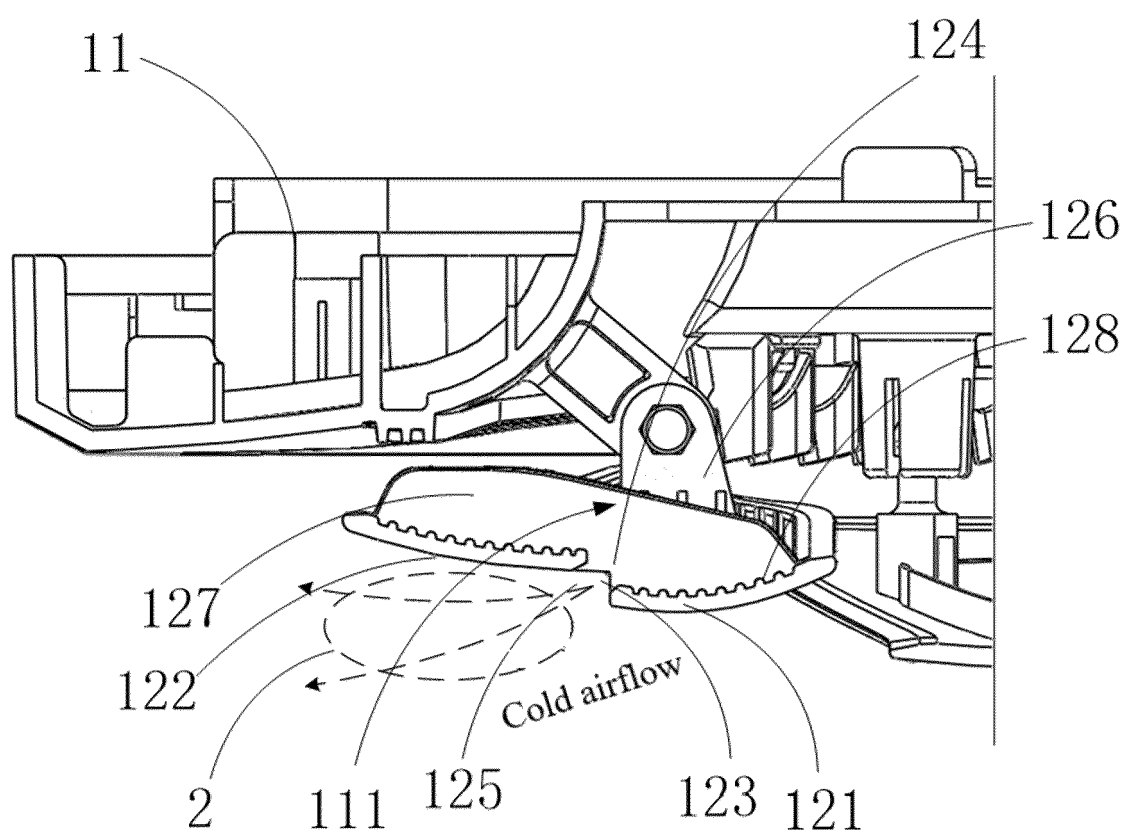


FIG. 8

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2023/114065

A. CLASSIFICATION OF SUBJECT MATTER

F24F13/14(2006.01)i; F24F13/22(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

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)

CNTXT, ENTXTC, VEN, DWPI: 空调, 空气调和, 空气调节, 导风板, 缝隙, 板体, air condition+, air guid+ plate, air deflect + plate, gap+, plate body

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2021169403 A1 (QINGDAO HAIER AIR CONDITIONER GENERAL CORP., LTD. et al.) 02 September 2021 (2021-09-02) description, pages 4-9, and figures 1-10	1-12
X	CN 208296096 U (GD MIDEA AIR-CONDITIONING EQUIPMENT CO., LTD. et al.) 28 December 2018 (2018-12-28) description, pages 2-4, and figures 1-2	1-12
PX	CN 218672593 U (GD MIDEA HEATING & VENTILATING EQUIPMENT CO., LTD. et al.) 21 March 2023 (2023-03-21) claims 1-12	1-12
A	WO 2022089395 A1 (GD MIDEA AIR-CONDITIONING EQUIPMENT CO., LTD. et al.) 05 May 2022 (2022-05-05) entire document	1-12
A	WO 2021169803 A1 (QINGDAO HAIER AIR CONDITIONER GENERAL CORP., LTD. et al.) 02 September 2021 (2021-09-02) entire document	1-12

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

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2023/114065

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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REFERENCES CITED IN THE DESCRIPTION

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