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(71) Applicants: **DAIKIN INDUSTRIES, LTD.** [JP/JP]; Umeda Center Building, 4-12, Nakazaki-Nishi 2-Chome, Kita-ku, Osaka-shi, Osaka, 5308323 (JP). **DAIKIN EUROPE N.V.** [BE/BE]; Zandvoordestraat 300, Oostende, 8400 (BE).

(72) Inventors: **YOSHIKAWA, Kouta**. **VANSTEENKISTE, Wim**. **HATTIANGADI, Akshay**. **GARCIA LOPEZ, Jose Daniel**. **SURMONT, Tom**. **MEHTA, Rishi**.

(74) Agent: **SHINJYU GLOBAL IP**; South Forest Bldg., 1-4-19, Minamimori-machi, Kita-ku, Osaka-shi, Osaka, 5300054 (JP).

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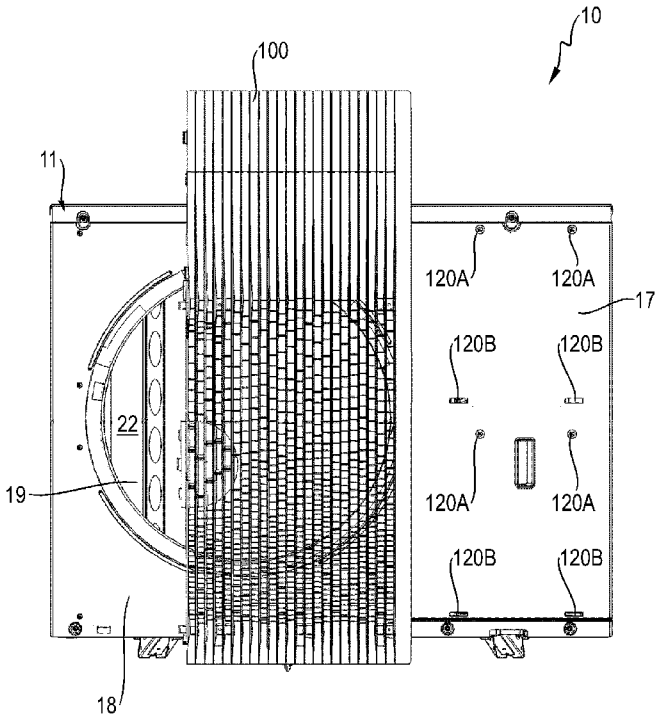

(57) Abstract: Outdoor unit for a heat pump having a refrigerant circuit and methods for servicing an outdoor unit of a heat pump having a refrigerant circuit is provided. An outdoor unit (10) for a heat pump having a refrigerant circuit comprises of a casing (11) comprising a fan chamber (22) and a machine chamber (21) configured to accommodate components of the refrigerant circuit of the heat pump, a fan (50) accommodated in the fan chamber (22), the fan (50) having fan blades (55) rotatable about an axis of rotation (56), and a front panel (100) having at least one engaging member (110, 110A, 110B) for attaching the front panel (100) to the casing (11). The front panel (100) is attachable to the casing (11) in at least two positions, a first position and a second position. In the first position, the front panel (100) is attached to the casing (11) such that the fan blades (55) and at least a part of the machine chamber (21) are covered and in the second position, the front panel (100) is attached to the casing (11) such that at least a part of the fan blades

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(55) is covered and the machine chamber (21) is accessible.

Description

Title of Invention: OUTDOOR UNIT FOR A HEAT PUMP

Technical Field

[0001] The present disclosure concerns outdoor units, in particular outer units for heat pumps having a refrigerant circuit comprising at least a casing, a fan and a front panel.

Background Art

[0002] Outdoor units of heat pumps comprise a casing accommodating a portion of the refrigerant circuit of the heat pump, including a heat source heat exchanger, in a machine chamber and a fan in a fan chamber for inducing an air flow through the heat source heat exchanger enabling heat exchange between the airflow and a refrigerant flowing through the heat source heat exchanger.

[0003] The fan has fan blades rotatable about an axis of rotation. In normal operating condition of the outdoor units, a front panel covering the fan chamber and the machine chamber is attached to the outdoor unit on the front side of the outdoor unit for safety reasons and good aesthetic appearance of the outdoor unit. An example showing such an outdoor unit may be found in JP 2018-035946. The front panel further prevents people from accessing the machine chamber.

[0004] Another example of an outdoor unit may be found in JP 2016-099083, where front panels of an outdoor unit are separated for the fan chamber and the machine chamber. In this case, the front panel for the fan chamber covers the fan and the front panel for the machine chamber, i.e. a cover plate, covers the machine chamber, hence preventing people from accessing the machine chamber.

[0005] When the outdoor unit is in maintenance condition, i.e. under maintenance or getting installed, the front panel or the cover plate is removed to provide access to the machine chamber. For the outdoor units where a front panel covers both the fan chamber and the machine chamber, when the front panel is removed, the fan becomes exposed. While the front panel is still removed from the outdoor unit, the fan may be intentionally turned on for checking during maintenance or the fan may rotate accidentally if the outdoor unit is not disconnected from power and circuits get short-circuited during maintenance. Hence, the fan is potentially dangerous for the person doing the maintenance work. For the outdoor units where separate panels are provided for the fan chamber and the machine chamber, even if the fan is still covered by the corresponding front panel, it can be threatening for the person doing the maintenance work if the fan rotates. In both cases, accidents may happen as a consequence.

[0006] From this perspective, there is a desire to reduce the risk of an accident when the outdoor unit is in maintenance condition.

Citation List

Patent Literature

[0007] [PTL 1] JP 2018-035946

[PTL 2] JP 2016-099083

Summary of Invention

[0008] Accordingly, it is an object to provide an outdoor unit for a heat pump with reduced accident risk, particularly when the outdoor unit is in maintenance condition.

[0009] This object is solved by outdoor units as defined in claims 1 and 10 as well as methods for servicing such outer units as defined in claims 14 and 15.

[0010] According to a first aspect, an outdoor unit for a heat pump having a refrigerant circuit is suggested, the outdoor unit comprising a casing comprising a fan chamber and a machine chamber configured to accommodate components of the refrigerant circuit of the heat pump, a fan accommodated in the fan chamber, the fan having fan blades rotatable about an axis of rotation and a front panel having at least one engaging member for attaching the front panel to the casing. The front panel is attachable to the casing in at least two positions, a first position and a second position, wherein in the first position, the front panel is attached to the casing such that the fan blades and at least a part of the machine chamber are covered, and wherein in the second position, the front panel is attached to the casing such that at least a part of the fan blades is covered and the machine chamber is accessible.

[0011] Hence, in the first position, the front panel covers the fan and provides protection from the fan, particularly with respect to finger safety. Since at least a part of the machine chamber is also covered by the front panel in the first position, the front panel makes the machine chamber inaccessible in the first position. In particular, the machine chamber which is configured to accommodate components of the refrigerant circuit of the heat pump, i.e. sensitive electronic components such as a terminal block, is protected from the outside environment, such as rain and wind. Also, the front panel prohibits unauthorized people from accessing the machine chamber.

[0012] In the second position, since a part of the fan is covered while the machine chamber is made accessible, a person accessing the machine chamber can be protected from the fan in cases where the fan rotates accidentally due to reasons such as circuits getting short-circuited.

[0013] According to a second aspect, the front panel is in the first position when the outdoor unit is in normal operating condition and in the second position when the outdoor unit is in maintenance condition.

[0014] According to this aspect, in normal operating condition of the outdoor unit, the front panel provides protection from the fan as well as making the machine chamber inac-

cessible. In maintenance condition, the front panel still provides protection from the fan but the machine chamber is accessible.

[0015] According to a third aspect, in the first position, the engaging member is attached to a different position in the casing than in the second position.

[0016] Hence, according to the third aspect, the front panel can be attached to the casing in different positions without the need of an extra engaging means.

[0017] According to a fourth aspect, in the first position, the engaging member is attached to the casing at the machine chamber and in the second position, the engaging member is attached to the casing the fan chamber.

[0018] According to this aspect, in the first position, as the point of attachment is at the machine chamber itself, the front panel is more stably attached to the casing at the machine chamber. This provides the machine chamber a more secure protection from the outside environment. Similarly, in the second position, the point of attachment is at the fan chamber, thus the front panel is more stably attached to the casing at the fan chamber. Hence, the person doing the maintenance work is more safely protected from an accidental operation of the fan.

[0019] According to a fifth aspect, in order to allow air to flow while still providing protection, the front panel has a grille portion having a plurality of openings.

[0020] According to a sixth aspect, the casing has at least two engagement members to receive the engaging member.

[0021] This allows the engaging member to attach to the casing in at least two positions.

[0022] According to a seventh aspect, a first engagement member is to receive the engaging member when the front panel is in the first position and a second engagement member is to receive the engaging member when the front panel is in the second position.

[0023] Having a dedicated engagement member for the engaging member for each position reduces the risk of attaching the engaging member at a wrong position on the casing, hence reducing the risk of attaching the front panel at a wrong position.

[0024] According to an eighth aspect, the first engagement member is associated to the machine chamber and the second engagement member is associated to the fan chamber.

[0025] Hence, according to the eighth aspect, the risk of attaching the engaging member at a wrong position on the casing is reduced and at the same time, the front panel can be more stably attached to the casing at the respective positions.

[0026] According to a ninth aspect, the front panel has a pivoting engaging member and the casing has a pivoting engagement member to receive the pivoting engaging member, wherein the pivoting engaging member and the pivoting engagement member act as a pivot point when the position of the front panel is moved between the first position and the second position.

[0027] According to the ninth aspect, the front panel does not need to be fully detached from the casing when the position of the front panel is being moved. Instead, the front panel pivots around the pivot point created by the pivoting engaging member and the pivoting engagement member. Hence, it makes it easier for the person changing the position of the front panel to move the front panel.

[0028] According to a tenth aspect, an outdoor unit for a heat pump having a refrigerant circuit is suggested, the outdoor unit comprising a casing comprising a fan chamber and a machine chamber configured to accommodate components of the refrigerant circuit of the heat pump, a fan accommodated in the fan chamber, the fan having fan blades rotatable about an axis of rotation, and a cover plate for covering an opening of the machine chamber and having at least one engaging member for attaching the cover plate to the casing. The cover plate is able to attach to the casing in at least two positions, a first position and a second position, wherein in the first position, the cover plate is attached to the casing such that the opening of the machine chamber is covered, and wherein in the second position, the cover plate is attached to the casing such that at least a part of the fan blades is covered.

[0029] According to the tenth aspect, the cover plate makes the machine chamber inaccessible in the first position. In particular, the machine chamber which is configured to accommodate components of the refrigerant circuit of the heat pump, i.e. sensitive electronic components such as a terminal block, is protected from the outside environment, such as rain and wind. Also, the cover plate prohibits unauthorized people from accessing the machine chamber.

[0030] In the second position, since a part of the fan is covered while the machine chamber is made accessible, a person accessing the machine chamber can be protected from the fan in cases where the fan rotates accidentally due to reasons such as circuits getting short-circuited.

[0031] According to an eleventh aspect, the cover plate is in the first position when the outdoor unit is in normal operating condition and in the second position when the outdoor unit is in maintenance condition.

[0032] In accordance with a twelfth aspect, the casing has at least two engagement members to receive the engaging member.

[0033] According to a thirteenth aspect, a first engagement member is to receive the engaging member when the cover plate is in the first position and a second engagement member is to receive the engaging member when the cover plate is in the second position.

[0034] According to a fourteenth aspect, a method for servicing an outdoor unit of a heat pump having a refrigerant circuit is suggested, wherein the outdoor unit comprises a casing having a fan chamber accommodating a fan having fan blades and a machine

chamber accommodating the refrigerant circuit and a front panel being attached to the casing in a first position covering the fan blades and at least a part of the machine chamber. In the method, the front panel is detached from the casing and the front panel is attached to the casing in a second position such that at least a part of the fan blades is covered and the machine chamber is accessible.

[0035] According to a fifteenth aspect, a method for servicing an outdoor unit of a heat pump having a refrigerant circuit is suggested, wherein the outdoor unit comprises a casing having a fan chamber accommodating a fan having fan blades and a machine chamber accommodating the refrigerant circuit and a cover plate being attached to the casing in a first position covering an opening of the machine chamber. The method comprises detaching the cover plate from the casing and attaching the cover plate to the casing in a second position such that at least a part of the fan blades is covered.

Brief Description of Drawings

[0036] A more complete appreciation of the present disclosure and many of the attendant advantages thereof will be readily obtained as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings.

[0037] [fig.1]Figure 1 shows a perspective view of an outdoor unit in accordance with a first embodiment of the present disclosure;

[fig.1a]Figure 1a shows cross section along a horizontal plane 1a-1a of the outdoor unit in Figure 1;

[fig.2]Figure 2 shows a rear view of a front panel of the first embodiment of the present disclosure;

[fig.2a]Figure 2a shows a rear view of the front panels in figure 2 assembled to form a single front cover;

[fig.3a]Figure 3a shows a close up view of engaging members of the front panel of figure 2a;

[fig.3b]Figure 3b shows a close up view of engaging members of the front panel of figure 2a;

[fig.4]Figure 4 shows a perspective view of the casing of the outdoor unit in accordance with the first embodiment of the present disclosure without the front panels;

[fig.5]Figure 5 shows a close up view of an engagement member of the outdoor unit in accordance with a first embodiment of the present disclosure;

[fig.6a]Figure 6a shows a perspective front view of the outdoor unit in accordance with the first embodiment of the present disclosure, when the front panels are in a first position;

[fig.6b]Figure 6b shows a perspective front view of the outdoor unit in accordance

with the first embodiment of the present disclosure, when the front panel is in a second position;

[fig.7a]Figure 7a shows a perspective front view of the outdoor unit in accordance with a second embodiment of the present disclosure, when the cover plate is in a first position;

[fig.7b]Figure 7b shows a perspective front view of the outdoor unit in accordance with the second embodiment of the present disclosure, when the cover plate is in a second position;

[fig.8a]Figure 8a shows a perspective front view of the outdoor unit in accordance with a third embodiment of the present disclosure, when the front cover is in a first position;

[fig.8b]Figure 8b shows a perspective front view of the outdoor unit in accordance with the third embodiment of the present disclosure, when the front cover is in a second position.

Description of Embodiments

[0038] Embodiments will now be explained with reference to the drawings. It will be apparent to those skilled in the field of heat pumps from this disclosure that the following description of the embodiment is provided for illustration only and not for the purpose of limiting the invention as defined by the appended claims. In addition, the same or similar reference numerals are used when describing different examples of the present disclosure and a repetitive description is omitted.

[0039] <First embodiment>

Figure 1 shows a perspective view of an outdoor unit 10 of a split type heat pump. The heat pump comprises a refrigerant circuit, at least comprising a heat source heat exchanger 30, a compressor (not visible), a heat consumer heat exchanger (not shown), such as an indoor heat exchanger, and an expansion valve connected by refrigerant pipes.

[0040] The shown outdoor unit 10 comprises a casing 11. The casing 11 has a bottom plate 12. Feet 13 for mounting the outdoor unit on a horizontal surface or via brackets to a vertical wall are fixed to the bottom plate 12. Further, the casing 11 has a top plate 14 and a side plate 15. In the shown embodiment, the side plate 15 extends around a rearward corner of the outdoor unit being connected to (integrally formed with/forming a one piece structure with) a back plate 16 of the casing 11.

[0041] As will be best visible from Figure 1a, having the top plate 14 removed, the heat source heat exchanger 30 occupies a part of the rear side of the casing 11 and the side of the casing 11 opposite to the side plate 15. The heat source heat exchanger 30 is "L"-shaped in a top view.

[0042] The front side of the casing 11 is closed by a cover plate 17 and a bell mouth 18. The

cover plate 17 also extends around the forward corner of the casing 11 forming part of the side of the casing 11. The bell mouth 18 defines an air flow opening 19 (shown in Figure 4). In the shown embodiment, the air flow opening 19 is circular.

[0043] Further and as best visible in Figure 1a, the casing 11 is separated by a partition wall 20 into a machine chamber 21 and a fan chamber 22 (heat exchanging area). In the shown configuration, the separation is in a horizontal direction, that is from the left to the right, wherein the machine chamber 21 is disposed on the right and the fan chamber 22 is disposed on the left.

[0044] The machine chamber 21 is, thus formed by the back plate 16, the side plate 15, the cover plate 17 and the partition wall 20. The fan chamber 22 is formed by the heat source heat exchanger 30, the bell mouth 18 and the partition wall 20.

[0045] The machine chamber 21 may accommodate components of the refrigerant circuit such as the compressor and the expansion valve and/or portions of the control of the heat pump. In addition, the heat source heat exchanger 30 may at one end extend into the machine chamber 21 so as to connect refrigerant pipes of the heat source heat exchanger 30 to the remainder of the refrigerant circuit.

[0046] The casing 11 further accommodates a fan 50. The fan 50 is accommodated in the fan chamber 22. More particularly, the fan 50 is supported on the bottom plate 12 via a support structure 51. A fan motor (not shown in the figures) is mounted to the support structure 51. The fan 50 further comprises a fan rotor (not shown in the figures) having a fan hub 54 mounted to the fan motor. A plurality of fan blades 55 (in the present embodiment three) extend radially outwardly from the fan hub 54. The fan rotor and, hence, the fan blades 55 are rotatable about an axis of rotation 56 by the fan motor. The fan 50 is mounted with the axis of rotation 56 concentric to the air flow opening 19 of the bell mouth 18.

[0047] A front panel 100 is, as a fan guard, attached to the casing 11 opposite to the back plate 16/a back side of the casing 11 and a front side of the casing 11. In particular, the front panel 100 is mounted to the bell mouth 18 and the cover plate 17. One purpose of the front panel is to meet e.g. the standard EN 60335-1:2012, relating to finger safety, that is to prevent that a finger comes into contact with the fan blades 55 of the fan 50 and consequently to avoid injuries.

[0048] Referring to Figure 2, the front panel 100 is divided into a grille portion 101 covering the fan 50 or more particularly the bell mouth 18 and a machine chamber portion 102 covering a portion of the casing 11 defining the machine chamber 21.

[0049] As shown in Figures 2 and 2a, the front panel 100 comprises, in the grille portion 101, at least in the area of the air flow opening 19, a plurality of openings 103 (see also Fig. 6a). The openings 103 allow air to flow through the front panel 100 and, hence, through the heat source heat exchanger 30. Thus, the size of the openings 103 in-

fluences the flow resistance of the air flow through the front panel 100.

[0050] In the particular embodiment, the openings 103 are defined by a plurality of parallel horizontal ribs 104 (see also Fig. 6a) and a plurality of vertical ribs 105 (see also Fig. 6a) and are rectangular, particularly slot shaped.

[0051] The openings 103 are designed to comply with the standard EN 60335-1:2012 for mechanical finger safety.

[0052] Figure 2a represents that a plurality of front panels 100 can be assembled to form a single front cover.

[0053] Having a single front cover formed from a plurality of front panels 100 simplifies the moulding process. The front panels 100 are respectively connected to the casing 10. The front panels 100 could also be mounted independently from each other.

[0054] Figures 3a and 3b each shows an example of engaging members 110A, 110B. Each of the engaging members 110A, 110B comprises an engaging portion 111A, 111B and a body frame 112A, 112B. In Figure 3a, the engaging portion 111A is fixed to the body frame 112A and the body frame 112A is fixed to the front panel 100. In Figure 3b, the engaging portion 111B and the body frame 112B are integrally formed. In both Figures, the body frame 112A, 112B is fixed to the front panel 100 by screws, but other means of fixing known in the art, such as fixing using an adhesive, is also possible.

[0055] The engaging members 110A, 110B are used to attach the front panels 100 to the casing 11. In the example shown in Figure 4, the cover plate 17 and the bell mouth 18 each comprises engagement members 120A, 120B to receive the engaging members 110A, 110B of the front panels 100. Specifically, the engagement member 120A is configured to receive the engaging member 110A and the engagement member 120B is configured to receive the engaging member 110B.

[0056] In this particular example, the engaging members 110A, 110B engage with the engagement members 120A, 120B of the cover plate 17 when attaching the front panel 100 in the first position and the engaging members 110A, 110B engage with the engagement members 120A, 120B of the bell mouth 18 when attaching the front panel 100 in the second position.

[0057] Figure 5 depicts the engagement member 120A in more detail. The engagement portion 121A receives the engaging portion 111A of the engaging member 110A. In particular, the engagement portion 121A comprises a hole 122A to receive the sphere-like portion of the engaging portion 111A. The hole 122A in the engagement portion 121A provides an interference fit for the sphere-like portion of the engaging portion 111A, such that the sphere-like portion of the engaging portion 111A can be pushed into the hole 122A when enough force is applied. Then, the engagement portion 121A locks the movement of the engaging portion 111A.

[0058] In this particular example, the front panel 100 is attached to the casing 11 by first inserting the engaging members 110B into the engagement members 120B and then pushing in the engaging members 110A into the respective hole 122A of the engagement portion 121A of the engagement members 120A.

[0059] It will be clear for the skilled person in the art that other types of engaging members and engagement members can be used for the same purpose described above.

[0060] Figure 6a shows the front panels 100 in a first position. Specifically, the front panels 100 are attached to the casing 11 such that the fan blades 55, and a part of the opening of the machine chamber 21 are covered. In particular, the front panels 100 are attached to the casing 11 in the first position when the outdoor unit is in normal operating condition.

[0061] Figure 6b shows the front panel 100 in a second position. Specifically, the front panel 100 is attached to the casing 11 such that the machine chamber 21 is accessible and at least a part of the fan blades 55 (not shown in figure 6b), i.e. at least a part of the air flow opening 19 in the bell mouth 18 is covered. In particular, the front panel 100 is attached to the casing 11 in the second position when the outdoor unit is in maintenance condition. In this context, "maintenance condition" refers to conditions when the outdoor unit is not being operated, such as when the outer unit is under maintenance, being installed for the first time or being assembled.

[0062] <Second embodiment>

In the first embodiment described above, the front panel 100 was used to partly cover the fan blades 55 in the maintenance condition. Alternatively and as will be explained with respect to figures 7a and 7b relating to the second embodiment, the cover plate 17 may be used for this purpose.

[0063] In this context, figure 7a shows the cover plate 17 in a first position. In particular, the cover plate 17 is attached to the casing 11 such that the opening of the machine chamber is covered. The cover plate 17 is attached to the casing 11 in the first position when the outdoor unit is in normal operating condition.

[0064] Figure 7b shows the cover plate 17 in a second position. In particular, the cover plate 17 is attached to the casing 11 such that the machine chamber 21 is accessible and at least a part of the fan blades (not shown in the figure) is covered. The cover plate 17 is attached to the casing 11 in the second position when the outdoor unit is in maintenance condition.

[0065] <Third embodiment>

In the first embodiment described above, the front panel 100 was used to partly cover the fan blades 55 in the maintenance condition. Alternatively and as will be explained with respect to figures 8a and 8b relating to the third embodiment, the front cover 100A, which may be a one piece component or assembled from a plurality of front

panels 100 as explained above, is used for at least partly covering the fan blades 55 in the maintenance condition.

[0066] In particular, figure 8a shows a front cover 100A in a first position. The front cover 100A is attached to the casing 11 such that the opening of the machine chamber is covered. The front cover 100A is attached to the casing 11 at least by a pivoting engaging member 130 and a pivoting engagement member 140. The front cover 100A may additionally be attached to the casing 11 by an engaging member 110 and an engagement member 120 of the cover plate 17 so that the front cover 100A is more stably attached to the casing 11.

[0067] Figure 8b shows the front cover 100A in a second position. The front cover 100A is attached to the casing 11 such that the machine chamber is accessible and at least a part of the fan blades 55 is covered. From the first position, the front cover 100A can be rotated about a pivot point defined by the pivoting engaging member 130 and the pivoting engagement member 140 to the second position without being completely detached from the casing 11. As such, when the position of the front cover 100A is moved between the first position and the second position, the front cover 100A does not need to be removed completely, which prevents the front cover 100A from dropping while being repositioned. This is particularly advantageous when the outdoor unit is installed in places which are hard to reach, i.e. when the outdoor unit is wall mounted. In the second position, the front cover 100A is attached to the casing 11 at least by the pivoting engaging member 130 and the pivoting engagement member 140. To ensure stability of the front cover 100A in the second position, the engaging member 110 is engaged with an engagement member 120 of the bell mouth 18.

Reference Signs List

[0068] 10 outdoor unit
11 casing
12 bottom plate
13 feet
14 top plate
15 side plate
16 back plate
17 cover plate
18 bell mouth
19 air flow opening
20 partition wall
21 machine chamber
22 fan chamber

30 heat source heat exchanger
50 fan
51 support structure
54 fan hub
55 fan blades
56 axis of rotation
100 front panel
100A front cover
101 grille portion
102 machine chamber portion
103 openings
104 horizontal ribs
105 vertical ribs
110, 110A, 110B engaging member
111A, 111B engaging portion
112A, 112B body frame
120, 120A, 120B engagement member
121A engagement portion
122A hole
130 pivoting engaging member
140 pivoting engagement member

Claims

[Claim 1] Outdoor unit (10) for a heat pump having a refrigerant circuit, the outdoor unit (10) comprising:
a casing (11) comprising:
a fan chamber (22), and
a machine chamber (21) configured to accommodate components of the refrigerant circuit of the heat pump,
a fan (50) accommodated in the fan chamber (22), the fan (50) having fan blades (55) rotatable about an axis of rotation (56), and
a front panel (100) having at least one engaging member (110, 110A, 110B) for attaching the front panel (100) to the casing (11),
characterised in that
the front panel (100) is attachable to the casing (11) in at least two positions, a first position and a second position,
wherein in the first position, the front panel (100) is attached to the casing (11) such that the fan blades (55) and at least a part of the machine chamber (21) are covered, and
wherein in the second position, the front panel (100) is attached to the casing (11) such that at least a part of the fan blades (55) is covered and the machine chamber (21) is accessible.

[Claim 2] Outdoor unit according to claim 1, wherein the front panel (100) is in the first position when the outdoor unit (10) is in normal operating condition and in the second position when the outdoor unit (10) is in maintenance condition.

[Claim 3] Outdoor unit according to claim 1 or 2, wherein in the first position, the engaging member (110, 110A, 110B) is attached to a different position in the casing (11) than in the second position.

[Claim 4] Outdoor unit according to claim 3, wherein in the first position, the engaging member (110, 110A, 110B) is attached to the casing (11) at the machine chamber (21) and in the second position, the engaging member (110, 110A, 110B) is attached to the casing (11) at the fan chamber (22).

[Claim 5] Outdoor unit according to any one of the preceding claims, wherein the front panel (100) has a grille portion (101) having a plurality of openings (103).

[Claim 6] Outdoor unit according to any one of the preceding claims, wherein the casing (11) has at least two engagement members (120, 120A, 120B) to

receive the engaging member (110, 110A, 110B).

[Claim 7] Outdoor unit according to claim 6, wherein a first engagement member (120, 120A, 120B) is to receive the engaging member (110, 110A, 110B) when the front panel (100) is in the first position and a second engagement member (120, 120A, 120B) is to receive the engaging member (110, 110A, 110B) when the front panel (100) is in the second position.

[Claim 8] Outdoor unit according to claim 7, wherein the first engagement member (120, 120A, 120B) is associated to the machine chamber (21) and the second engagement member (120, 120A, 120B) is associated to the fan chamber (22).

[Claim 9] Outdoor unit according to any one of claims 6-8, wherein the front panel (100) has a pivoting engaging member (130) and the casing (11) has a pivoting engagement member (140) to receive the pivoting engaging member (130),
wherein the pivoting engaging member (130) and the pivoting engagement member (140) act as a pivot point when the position of the front panel (100) is moved between the first position and the second position.

[Claim 10] Outdoor unit (10) for a heat pump having a refrigerant circuit, the outdoor unit (10) comprising:
a casing (11) comprising:
a fan chamber (22), and
a machine chamber (21) configured to accommodate components of the refrigerant circuit of the heat pump,
a fan (50) accommodated in the fan chamber (22), the fan (50) having fan blades (55) rotatable about an axis of rotation (56), and
a cover plate (17) for covering an opening of the machine chamber (21) and having at least one engaging member (110, 110A, 110B) for attaching the cover plate (17) to the casing (11),
characterised in that
the cover plate (17) is able to attach to the casing (11) in at least two positions, a first position and a second position,
wherein in the first position, the cover plate (17) is attached to the casing (11) such that the opening of the machine chamber (21) is covered, and
wherein in the second position, the cover plate (17) is attached to the casing (11) such that at least a part of the fan blades (55) is covered.

[Claim 11] Outdoor unit according to claim 10, wherein the cover plate (17) is in the first position when the outdoor unit (10) is in normal operating condition and in the second position when the outdoor unit (10) is in maintenance condition.

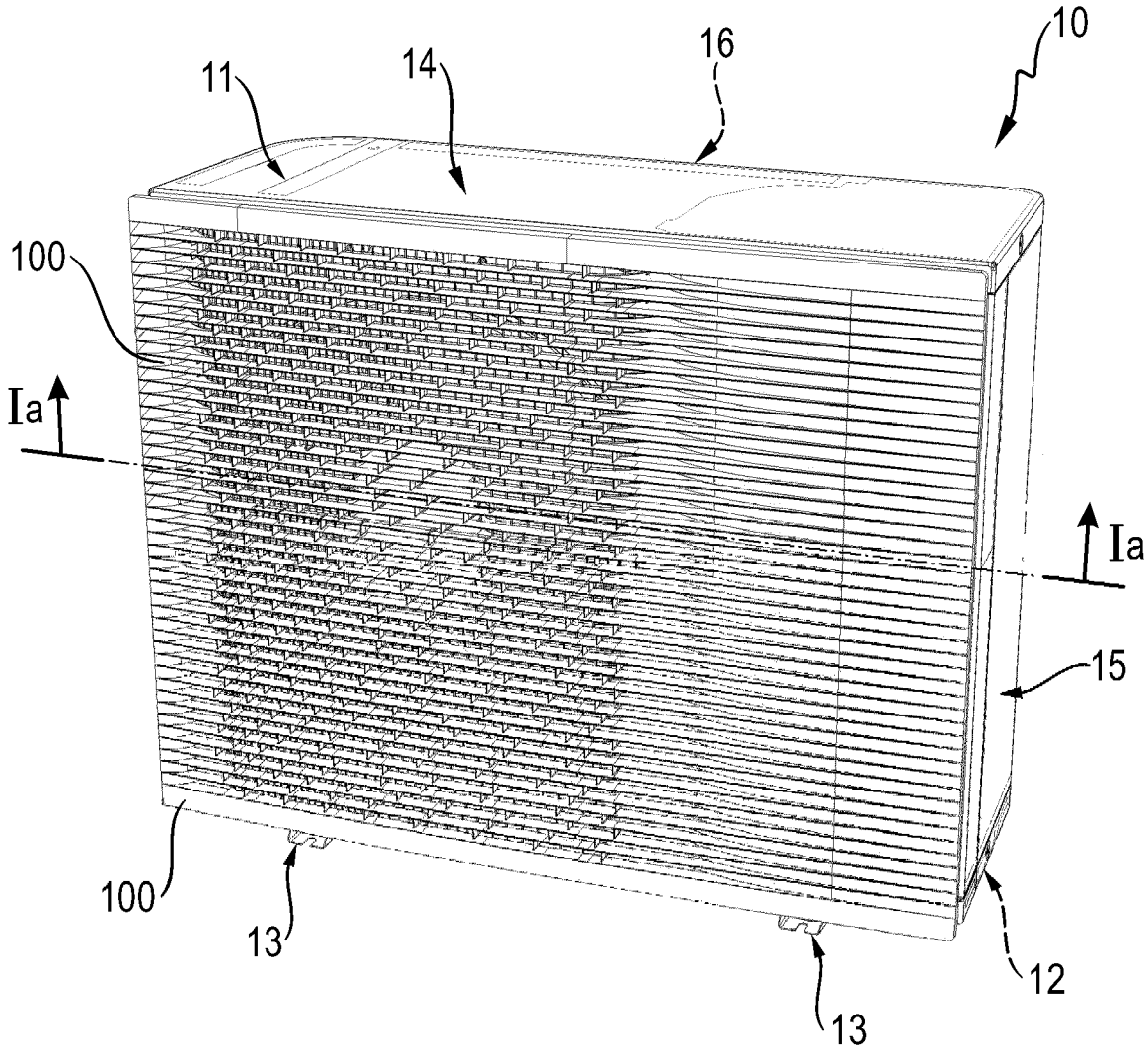
[Claim 12] Outdoor unit according to claim 10 or 11, wherein the casing (11) has at least two engagement members (120, 120A, 120B) to receive the engaging member (110, 110A, 110B).

[Claim 13] Outdoor unit according to any one of claims 10-12, wherein a first engagement member (120, 120A, 120B) is to receive the engaging member (110, 110A, 110B) when the cover plate (17) is in the first position and a second engagement member (120, 120A, 120B) is to receive the engaging member (110, 110A, 110B) when the cover plate (17) is in the second position.

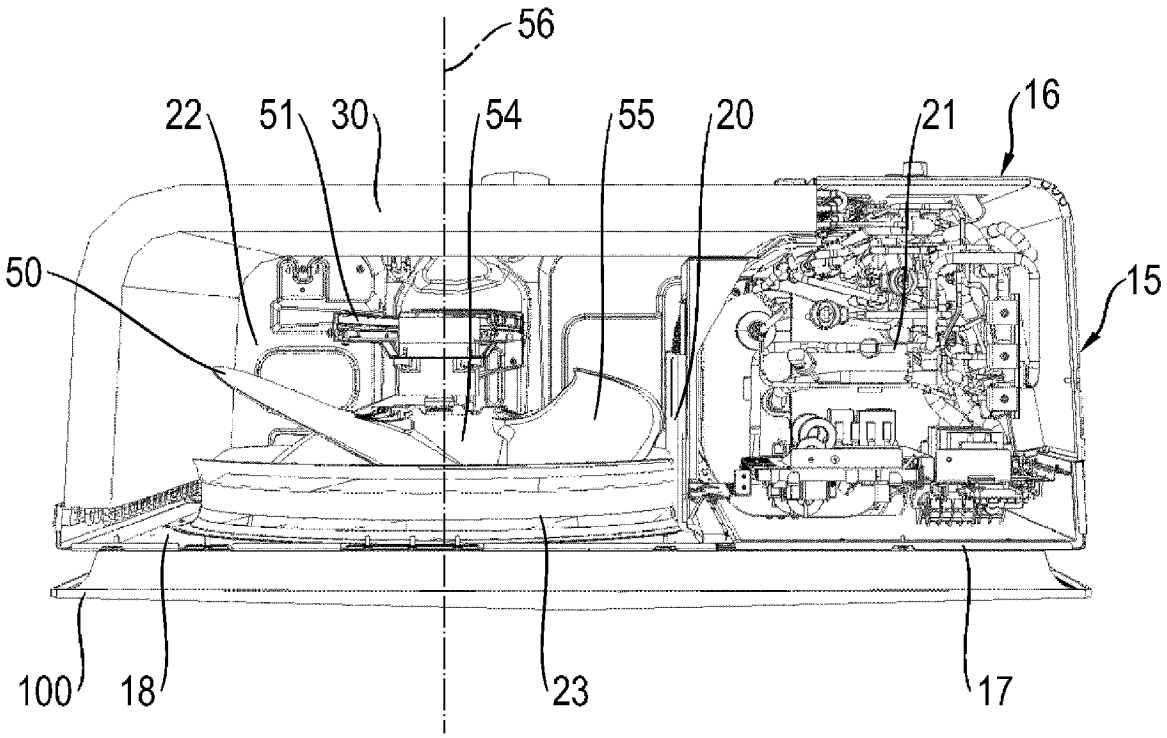
[Claim 14] Method for servicing an outdoor unit of a heat pump having a refrigerant circuit, wherein the outdoor unit comprises a casing having a fan chamber accommodating a fan having fan blades and a machine chamber accommodating the refrigerant circuit and a front panel being attached to the casing in a first position covering the fan blades and at least a part of the machine chamber, the method comprising:
detaching the front panel (100) from the casing (11), and
attaching the front panel (100) to the casing (11) in a second position such that at least a part of the fan blades (55) is covered and the machine chamber (21) is accessible.

[Claim 15] Method for servicing an outdoor unit of a heat pump having a refrigerant circuit, wherein the outdoor unit comprises a casing having a fan chamber accommodating a fan having fan blades and a machine chamber accommodating the refrigerant circuit and a cover plate being attached to the casing in a first position covering an opening of the machine chamber, the method comprising:
detaching the cover plate (17) from the casing (11), and
attaching the cover plate (17) to the casing (11) in a second position such that at least a part of the fan blades (55) is covered.

[Fig. 1]



[Fig. 1a]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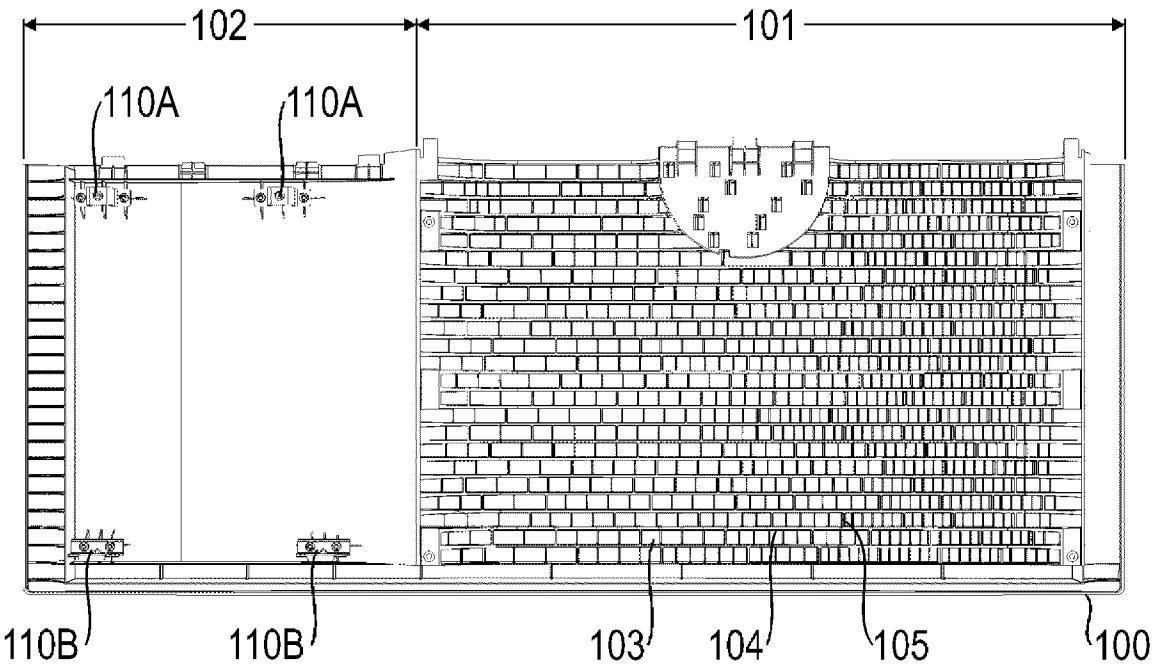
22
51
30
54
55
20
21
16
50
15
100
18
23
17

[Fig. 2]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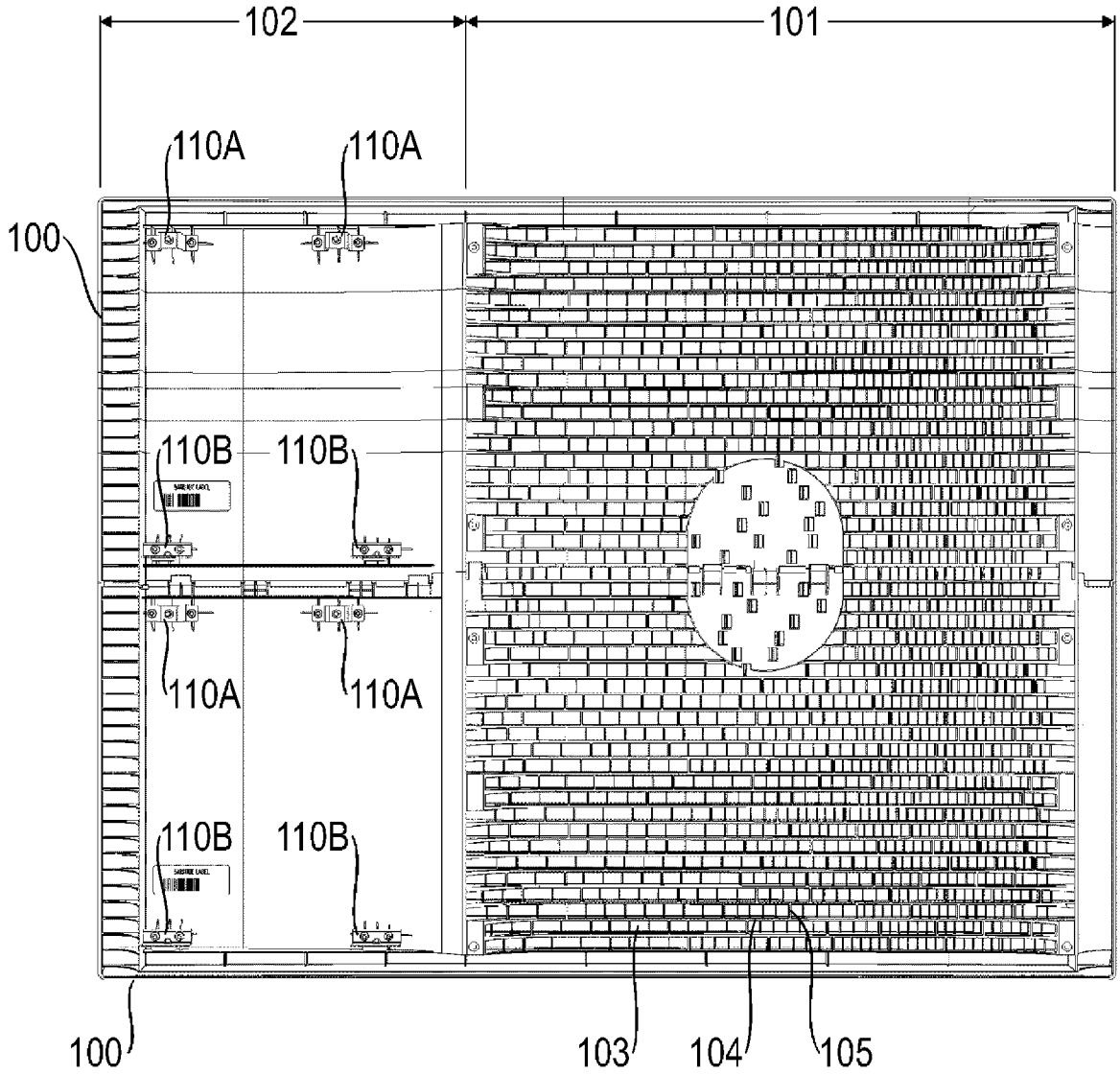
101
110A
110A
110B
110B
103
104
105
100

[Fig. 2a]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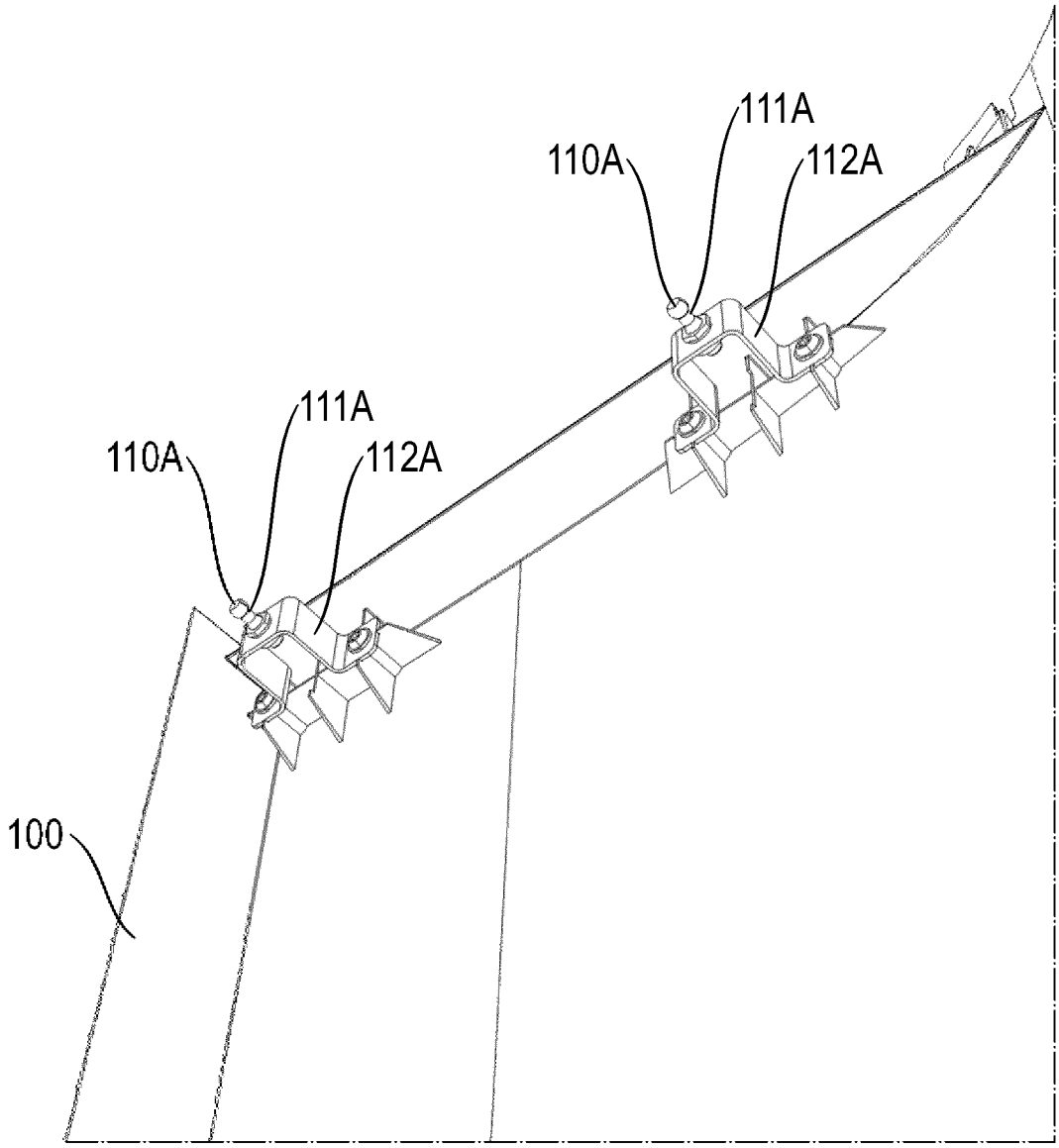
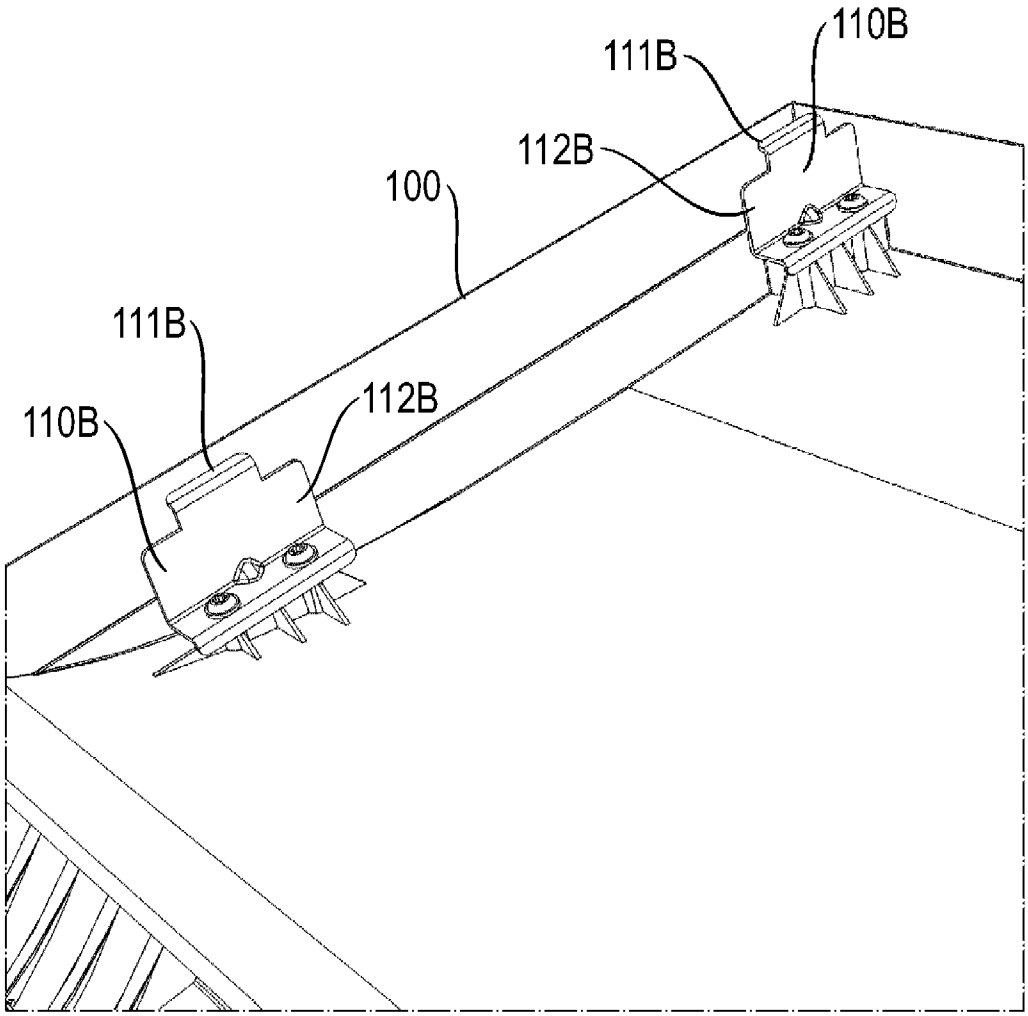
101
110A
110A
100
110B
110B
110A
110A
110B
110B
100
103
104
105

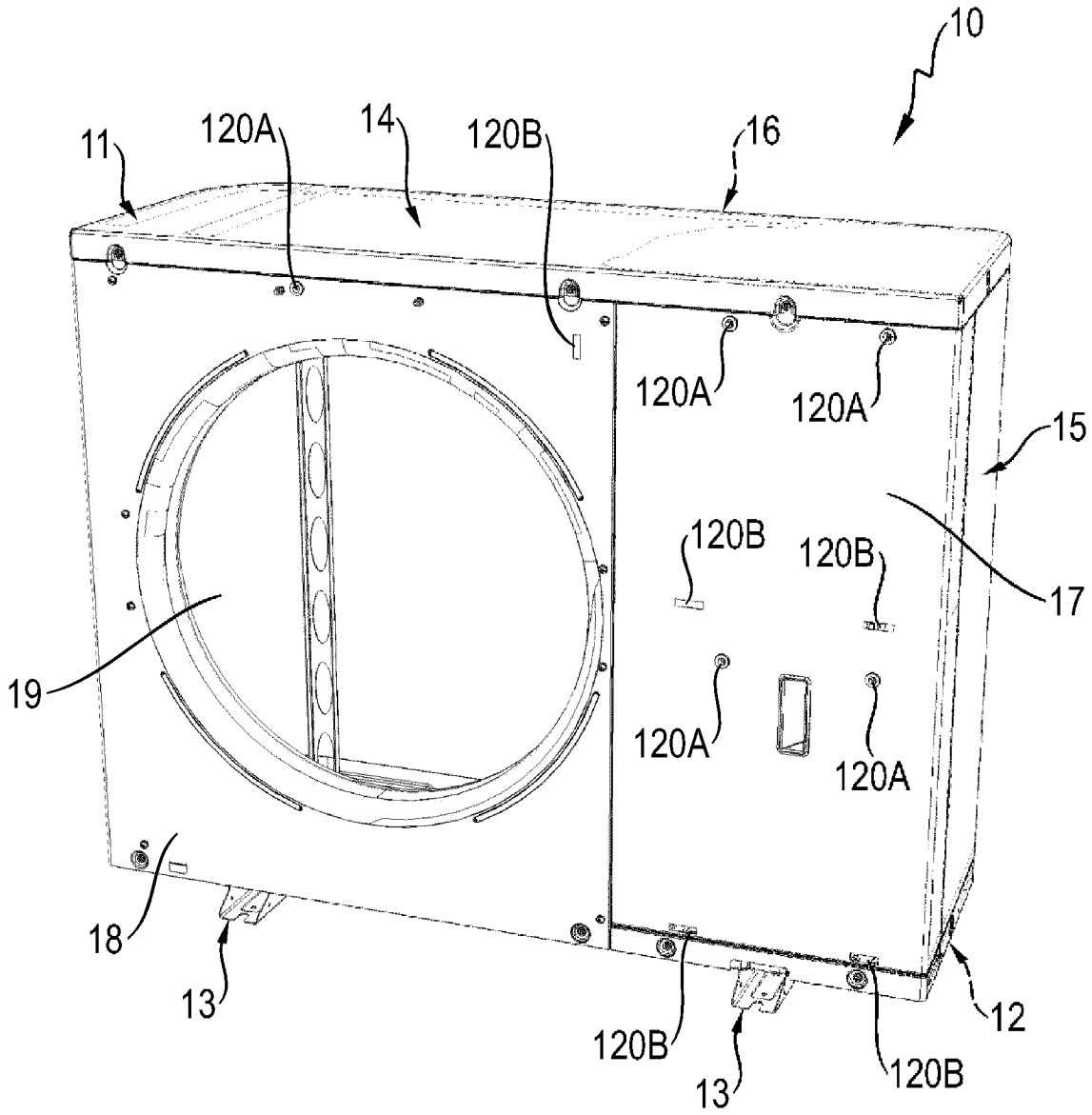
[Fig. 3a]



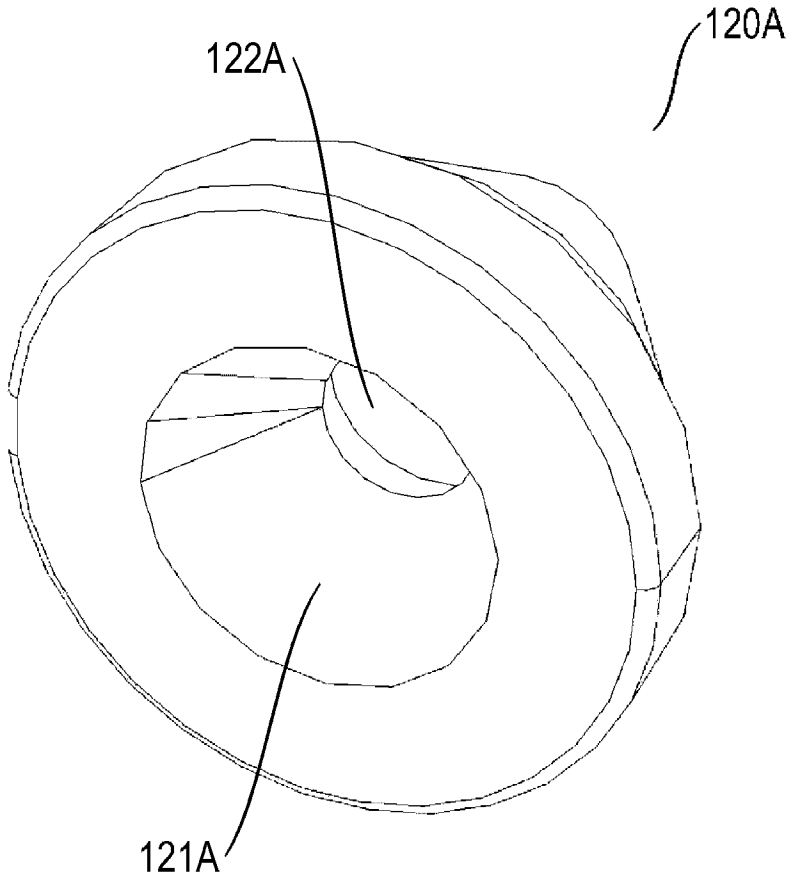
[Fig. 3b]



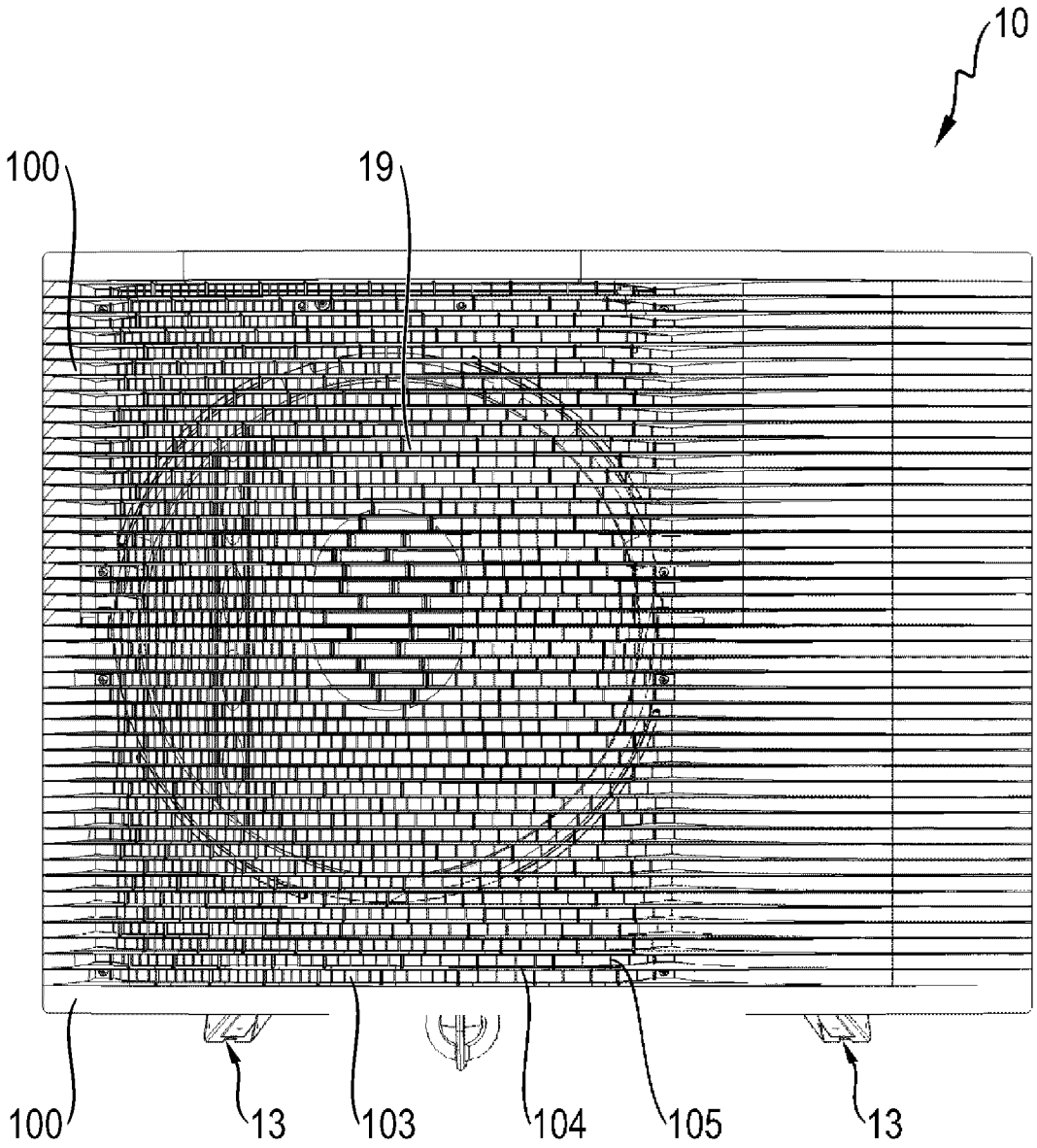
[Fig. 4]


10
11
120A
14
120B
16
120A
120A
15
120B
120B
17
19
120A
120A
18
13
120B
13
120B
12

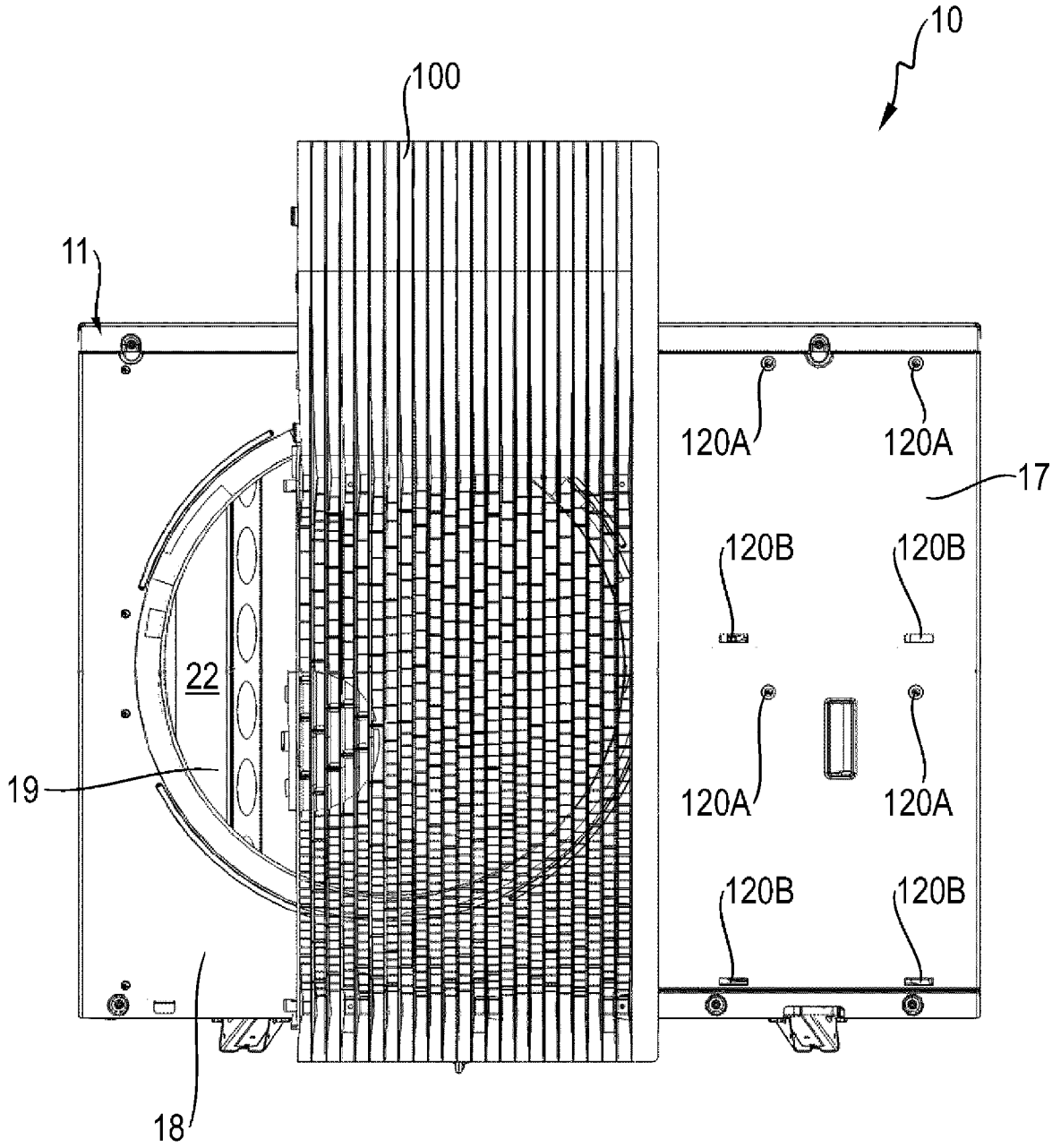
[Fig. 5]



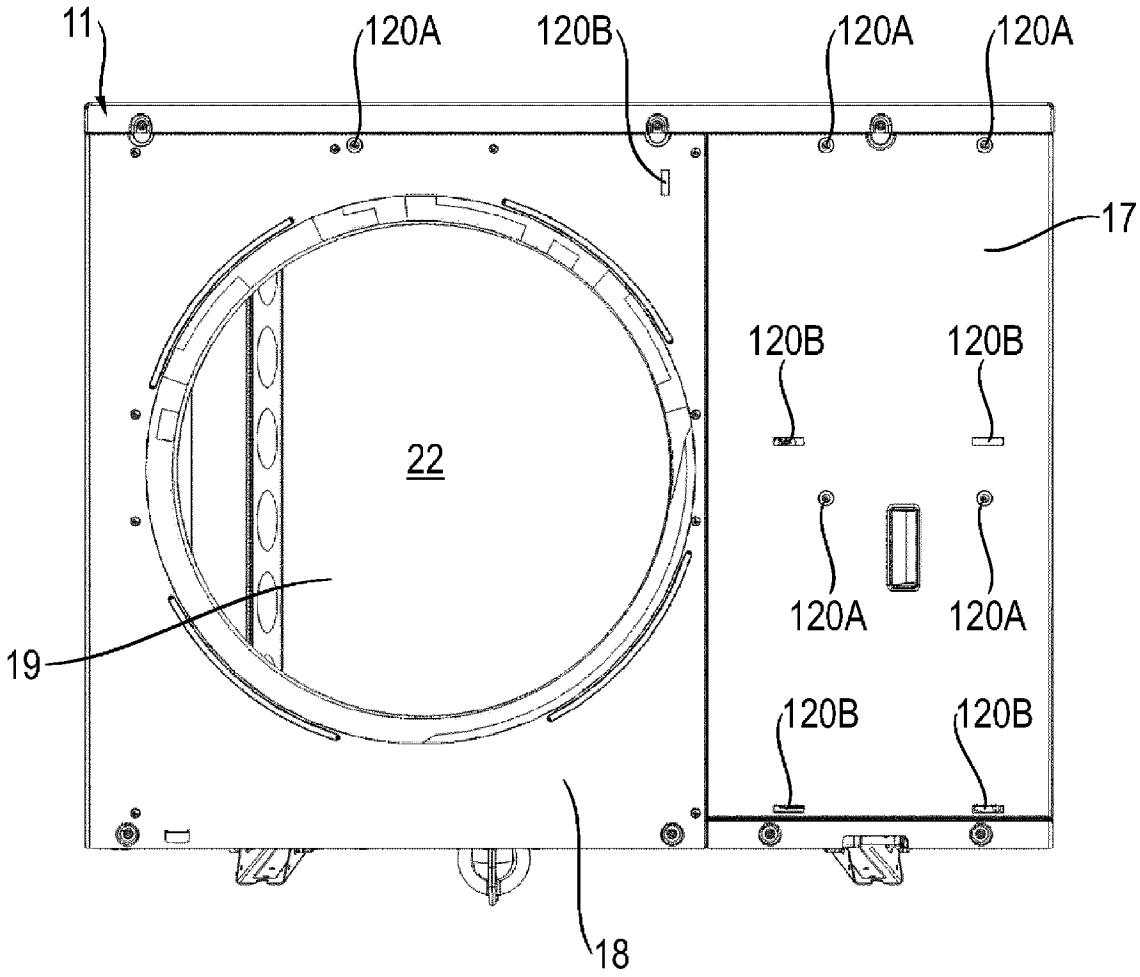
[Fig. 6a]



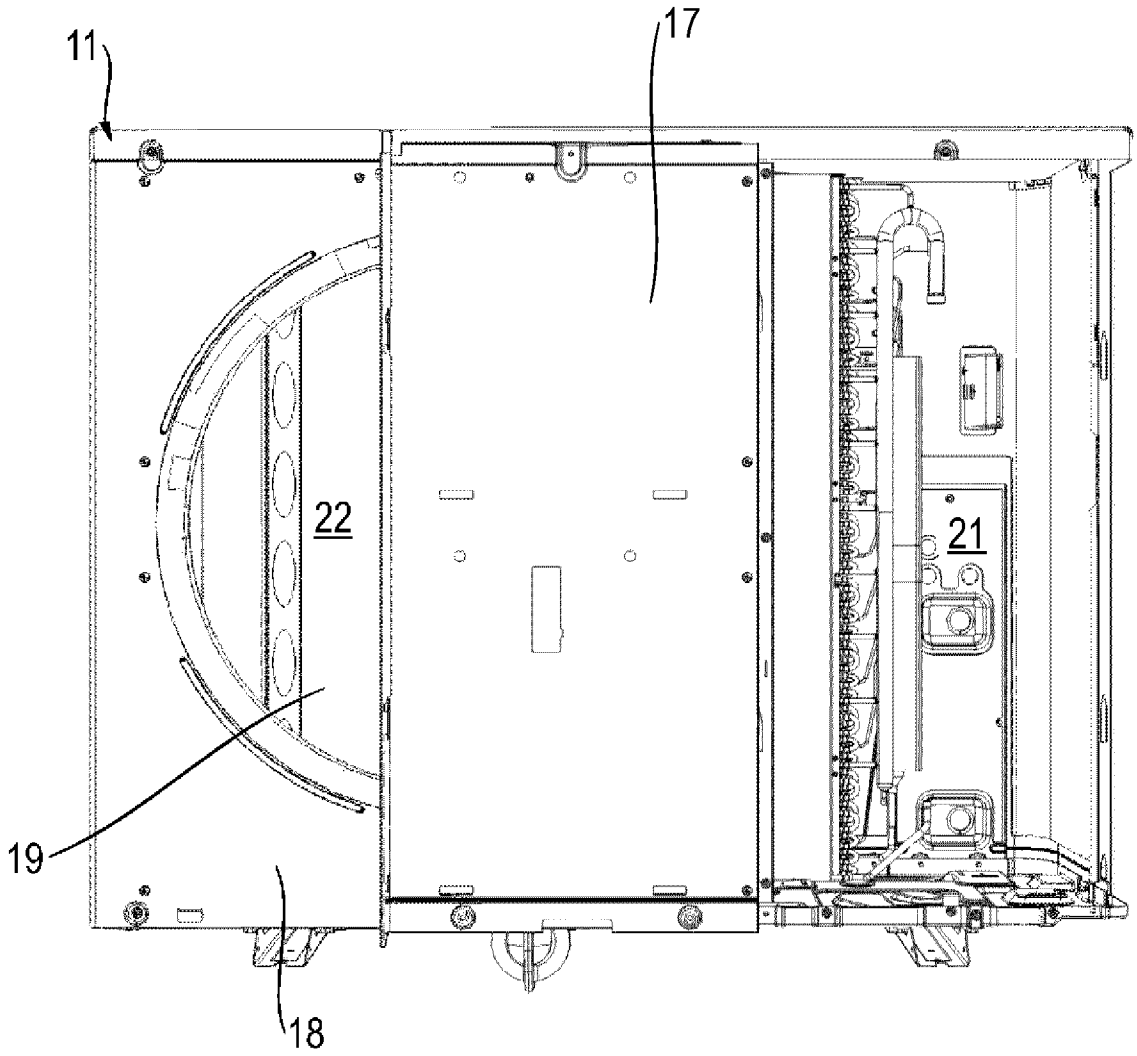
[Fig. 6b]



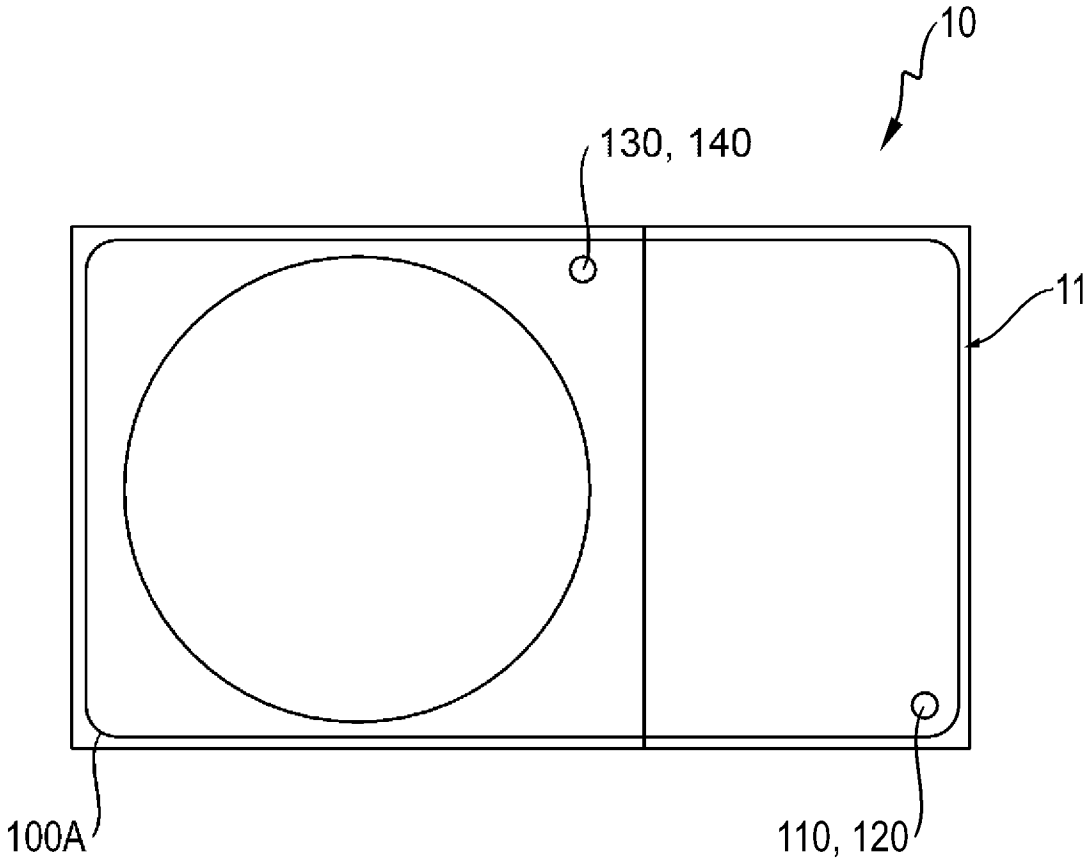
[Fig. 7a]


11
120A
120B
120A
120A
17
120B
120B
22
120A
120A
19
120B
120B
18

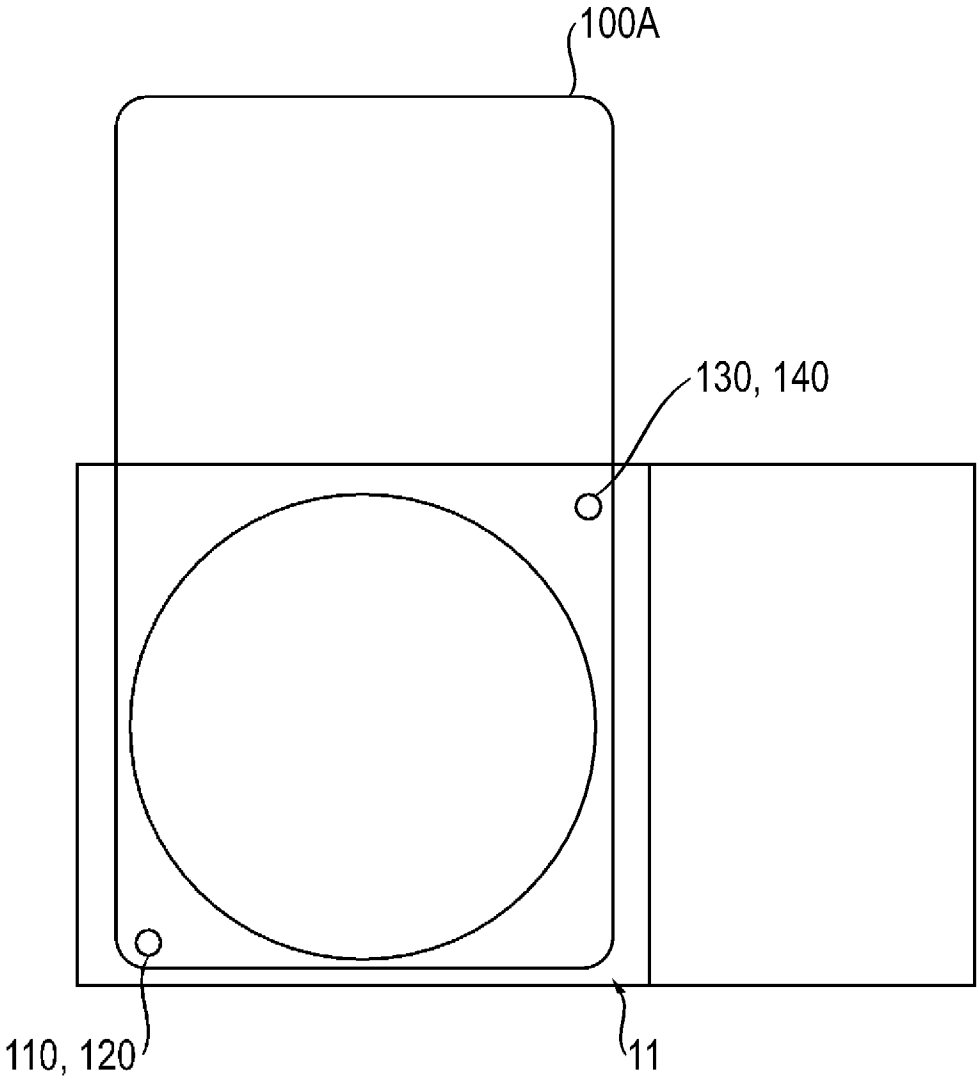
[Fig. 7b]



[Fig. 8a]



[Fig. 8b]



INTERNATIONAL SEARCH REPORT

International application No
PCT/JP2020/036734

A. CLASSIFICATION OF SUBJECT MATTER
INV. F24F1/56
ADD.

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)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP H08 178363 A (DAIKIN IND LTD) 12 July 1996 (1996-07-12) paragraphs [0004] - [0009]; figures 1,3	1-15
A	US 2019/219279 A1 (YONEHARA KENTARO [JP] ET AL) 18 July 2019 (2019-07-18) abstract; figures 1,2,4	1-15
A	JP 2000 039186 A (MITSUBISHI HEAVY IND LTD) 8 February 2000 (2000-02-08) abstract; figure 3	1-15
A	JP 2005 114246 A (HOSHIZAKI ELECTRIC CO LTD) 28 April 2005 (2005-04-28) abstract; figure 3	1-15

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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"&" 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 December 2020	12/01/2021

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Degen, Marcello

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
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