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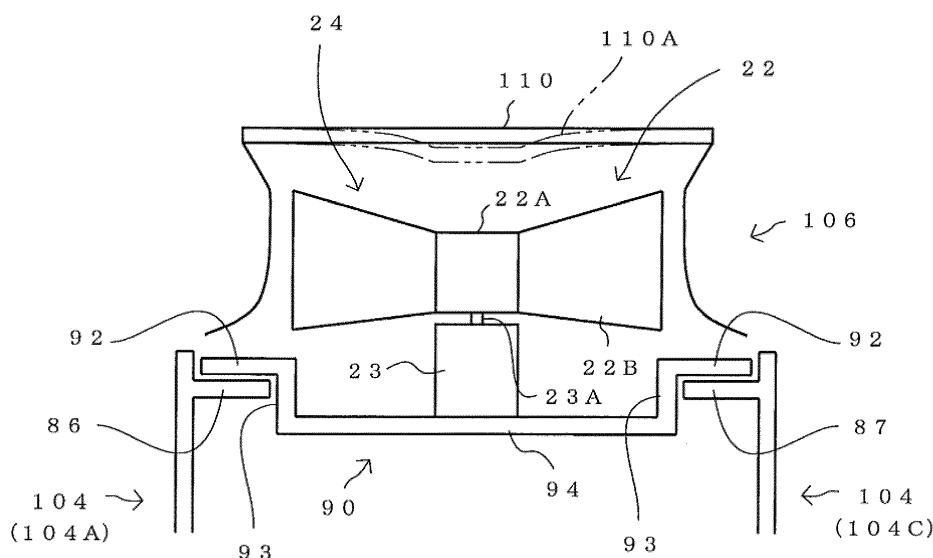
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(54) **OUTDOOR UNIT**

(57) An outdoor unit includes: a body casing in which an intake portion configured to suck air is formed in a lateral side, a blowout portion is formed in a top, the blowout portion being configured to blow out the air sucked through the intake portion, and an air path is formed between the intake portion and the blowout portion; a heat exchanger disposed in the air path; a fan unit disposed

in the air path above the heat exchanger; and a mounting member mounting the fan unit on the body casing, wherein the mounting member includes a fixture portion fixed to the body casing and a fan-unit holding portion holding the fan unit, and the fan-unit holding portion retreats downward from the fixture portion.

FIG. 6



Description**Brief Description of Drawings**Technical Field**[0008]**

[0001] The present invention relates to an outdoor unit configured to suck air from a lateral side and blow out the sucked air upward.

5 Fig. 1 is a diagram showing an example of a configuration of an outdoor unit according to Embodiment 1 of the present invention.

Background Art

Fig. 2 is a diagram showing an example of a configuration of an indoor unit connected to the outdoor unit shown in Fig. 1.

[0002] Conventionally, outdoor units that suck air from a lateral side and blow out the sucked air upward are known (see, for example, Patent Literature 1).

10 Fig. 3 is a diagram of a front face and left side face of the outdoor unit according to Embodiment 1 of the present invention as viewed obliquely.

Citation List

Fig. 3 is a diagram of a front face and left side face of the outdoor unit according to Embodiment 1 of the present invention as viewed obliquely.

Fig. 4 is a diagram of a rear face and right side face of the outdoor unit shown in Fig. 3 as viewed obliquely.

Patent Literature

Fig. 5 is a diagram schematically showing a cross section of a heat exchange chamber of the outdoor unit shown in Figs. 3 and 4.

[0003] Patent Literature 1: Japanese Patent No. 5398283

20 Fig. 6 is a diagram schematically showing a cross section of that part of the outdoor unit shown in Figs. 3 and 4 in which a fan unit is housed.

Summary of Invention

Fig. 7 is a diagram describing how a mounting member shown in Fig. 6 is attached to a body casing.

Technical Problem

25 Fig. 8 is an enlarged view of a fan motor and the mounting member shown in Fig. 7.

[0004] However, with conventional outdoor units such as that described in Patent Literature 1, a fan unit is mounted on a linear mounting member attached to a body casing, upsizing the outdoor unit.

Fig. 9 is a diagram describing a relationship between radial position of a fan and intake rate of the fan.

[0005] The present invention has been made in view of the above problem and has an object to provide a downsized outdoor unit.

30 Fig. 10 is a diagram of Comparative Example 1, which is a comparative example to Fig. 5.

Fig. 11 is a diagram of Comparative Example 2, which is a comparative example to Fig. 6.

Solution to Problem

35 Fig. 12 is a diagram comparing the outdoor unit of Embodiment 1, Comparative Example 1, and Comparative Example 2 with one another in terms of intake/exhaust losses of the outdoor unit.

[0006] An outdoor unit according to one embodiment of the present invention comprises: a body casing including an intake portion that is formed in a lateral side of the body casing and through which air is sucked, a blowout portion formed in a top of the body casing, the blowout portion being configured to blow out the air sucked through the intake portion, and an air path formed between the intake portion and the blowout portion; a heat exchanger disposed in the air path; a fan unit disposed in the air path above the heat exchanger; and a mounting member mounting the fan unit on the body casing, wherein the mounting member includes a fixture portion fixed to the body casing and a fan-unit holding portion holding the fan unit, and the fan-unit holding portion retreats downward from the fixture portion.

Description of Embodiments

40 **[0009]** Embodiments of the present invention will be described below with reference to the drawings. Note that in each drawing, the same or equivalent components are denoted by the same reference numerals, and description thereof will be omitted or simplified as appropriate. Also, shapes, sizes, arrangement, and the like of the components described in each drawing can be changed as appropriate within the scope of the present invention.

Advantageous Effects of InventionEmbodiment 1.

[0007] Since the fan unit is held in the fan-unit holding portion retreating downward from the fixture portion the present invention provides a downsized outdoor unit.

[Refrigeration cycle apparatus]

55 **[0010]** Fig. 1 is a diagram showing an example of a configuration of an outdoor unit according to Embodiment 1 of the present invention and Fig. 2 is a diagram showing

an example of a configuration of an indoor unit connected to the outdoor unit shown in Fig. 1. The outdoor unit 1 shown in Fig. 1 and the indoor unit 200 shown in Fig. 2 are connected with each other via refrigerant pipes, thereby making up a non-illustrated refrigeration cycle apparatus. The non-illustrated refrigeration cycle apparatus is applied, for example, to air-conditioning devices configured to air-condition buildings, commercial facilities, or the like. As the outdoor unit 1 and indoor unit 200 are interconnected via the refrigerant pipes at least a compressor 12, a flow path selector 14, a use side heat exchanger 202, an expansion device 204, and a heat exchanger 18 are interconnected via the refrigerant pipes, forming a refrigerant circuit in which refrigerant circulates.

[Indoor unit]

[0011] The indoor unit 200 shown in Fig. 2 is installed in a room or the like to be air-conditioned and equipped, for example, with the use side heat exchanger 202 and expansion device 204. The use side heat exchanger 202 is designed to exchange heat, for example, between refrigerant and air, and is configured to include, for example, a heat transfer tube through which the refrigerant flows, and plural fins attached to the heat transfer tube. An indoor fan (not illustrated) configured to send air to the use side heat exchanger 202 is installed in a neighborhood of the use side heat exchanger 202. The expansion device 204 is designed to expand refrigerant and is, for example, an LEV (linear electronic expansion valve) whose opening degree can be adjusted, but may be a capillary tube or the like whose opening degree cannot be adjusted.

[Outdoor unit]

[0012] The outdoor unit 1 shown in Fig. 1 is installed outdoors outside the room and functions as a heat source apparatus configured to discharge or supply heat produced by air-conditioning. The outdoor unit 1 includes a compressor 12, a first flow path selector 14A, a second flow path selector 14B, a first decompressor 16A, a second decompressor 16B, a first heat exchanger 18A, a second heat exchanger 18B, and an accumulator 26. Note that in the following description, for ease of understanding of the present embodiment, the first flow path selector 14A and second flow path selector 14B may be referred to simply as a flow path selector 14, the first decompressor 16A and second decompressor 16B may be referred to simply as a decompressor 16, and the first heat exchanger 18A and second heat exchanger 18B may be referred to simply as a heat exchanger 18.

[0013] The compressor 12 is designed to suck and compress refrigerant, and then discharge the refrigerant in a high-temperature, high-pressure state. The compressor 12 is, for example, a capacity-controllable inverter compressor, but may be a constant velocity type. The

flow path selector 14 is designed to switch between heating flow path and cooling flow path according to operation mode, which is switched between cooling operation and heating operation, and is made up, for example, of a four-way valve. The flow path selector 14 may be configured by combining plural two-way valves or the like.

[0014] The decompressor 16 is designed to decompress the refrigerant caused to flow into the heat exchanger 18 and is, for example, a motor-operated valve whose opening degree can be adjusted, but may be a capillary tube or the like whose opening degree cannot be adjusted. The heat exchanger 18 is designed to exchange heat between refrigerant and air, and is configured to include, for example, a heat transfer tube through which the refrigerant flows, and plural fins attached to the heat transfer tube. The heat transfer tube has, for example, a circular or flat shape. The fins are disposed in a direction parallel to a direction in which air flows. The accumulator 26 is designed to accumulate the refrigerant and is connected to a suction side of the compressor 12. Of the refrigerant accumulated in the accumulator 26, the compressor 12 sucks gas refrigerant.

[0015] Next, an operation example of the outdoor unit 1 and the indoor unit 200 will be described.

[Cooling operation]

[0016] First, an operation example of the outdoor unit 1 and the indoor unit 200 during cooling operation will be described. When cooling operation is performed, each of the first flow path selector 14A and second flow path selector 14B shown in Fig. 1 is interconnecting flow paths as indicated by dashed lines. That is, the first flow path selector 14A and second flow path selector 14B are connecting a discharge side of the compressor 12 to the first heat exchanger 18A and second heat exchanger 18B while connecting the suction side of the compressor 12 to the use side heat exchanger 202 of the indoor unit 200 shown in Fig. 2 via the accumulator 26. The refrigerant compressed by the compressor 12 shown in Fig. 1 flows through the first heat exchanger 18A and second heat exchanger 18B via the first flow path selector 14A and second flow path selector 14B. The refrigerant condensed by flowing through the first heat exchanger 18A and second heat exchanger 18B flows out of the outdoor unit 1 and flows into the indoor unit 200 shown in Fig. 2. The refrigerant flowing into the indoor unit 200 is expanded in the expansion device 204 and flows through the use side heat exchanger 202. The refrigerant evaporated while flowing through the use side heat exchanger 202 flows out of the indoor unit 200 and flows into the outdoor unit 1 shown in Fig. 1. The refrigerant flowing into the outdoor unit 1 is accumulated in the accumulator 26 via the first flow path selector 14A. The refrigerant accumulated in the accumulator 26 is sucked into the compressor 12 and compressed again.

[Heating operation]

[0017] Next, an operation example of the outdoor unit 1 and the indoor unit 200 during heating operation will be described. When heating operation is performed, each of the first flow path selector 14A and second flow path selector 14B shown in Fig. 1 is interconnecting flow paths as indicated by solid lines. That is, the first flow path selector 14A and second flow path selector 14B are connecting the discharge side of the compressor 12 to the use side heat exchanger 202 of the indoor unit 200 shown in Fig. 2 while connecting the suction side of the compressor 12 shown in Fig. 1 to the first heat exchanger 18A and second heat exchanger 18B via the accumulator 26. The refrigerant compressed by the compressor 12 flows out of the outdoor unit 1 via the first flow path selector 14A and flows into the indoor unit 200 shown in Fig. 2. The refrigerant flowing into the indoor unit 200 flows to the use side heat exchanger 202, condensed, and expanded in the expansion device 204. The refrigerant expanded in the expansion device 204 flows out of the indoor unit 200 and flows into the outdoor unit 1 shown in Fig. 1. The refrigerant flowing into the outdoor unit 1 is decompressed in the first decompressor 16A and second decompressor 16B and flows through the first heat exchanger 18A and second heat exchanger 18B. The refrigerant evaporated while flowing through the first heat exchanger 18A and second heat exchanger 18B is accumulated in the accumulator 26 via the first flow path selector 14A and second flow path selector 14B. The refrigerant accumulated in the accumulator 26 is sucked into the compressor 12 and compressed again.

[Structure of outdoor unit]

[0018] Fig. 3 is a diagram of a front face and left side face of the outdoor unit according to Embodiment 1 of the present invention as viewed obliquely, Fig. 4 is a diagram of a rear face and right side face of the outdoor unit shown in Fig. 3 as viewed obliquely, Fig. 5 is a diagram schematically showing a cross section of a heat exchange chamber of the outdoor unit shown in Figs. 3 and 4, Fig. 6 is a diagram schematically showing a cross section of that part of the outdoor unit shown in Figs. 3 and 4 in which a fan unit is housed, Fig. 7 is a diagram describing how a mounting member shown in Fig. 6 is attached to a body casing, and Fig. 8 is an enlarged view of a fan motor and the mounting member shown in Fig. 7. A specific structure of the outdoor unit 1 according to the present embodiment will be described with reference to Figs. 3 to 8.

[0019] As shown in Figs. 3 and 4, the outdoor unit 1 according to the present embodiment includes a body casing 101, which houses a compressor 12, a flow path selector 14, a decompressor 16, a heat exchanger 18, an accumulator 26, and other components inside. The body casing 101 has, for example, a cuboid shape, in which intake portions 104 configured to suck air are

formed in lateral sides and a blowout portion 109 is formed in a top to blow out air. That is, the outdoor unit 1 according to the present embodiment sucks air from the lateral sides and blows out the sucked air through the top.

[0020] A lower part of the body casing 101 is covered with an open/close panel 102A, a left lower panel 102B, a rear lower panel 102C, and a right lower panel 102D, forming a machine chamber 103 in which, for example, the compressor 12 is housed. The open/close panel 102A, left lower panel 102B, rear lower panel 102C, and right lower panel 102D are substantially flat-plate members, making up an outer shell of a lower part of the outdoor unit 1. The open/close panel 102A is disposed in a lower part of the front face of the outdoor unit 1, the left lower panel 102B is disposed in a lower part of the left side face of the outdoor unit 1, the rear lower panel 102C is disposed in a lower part of the rear face of the outdoor unit 1, and the right lower panel 102D is disposed in a lower part of the right side face of the outdoor unit 1. The open/close panel 102A shown in Fig. 3 is attached openably/closably to the body casing 101. By opening the open/close panel 102A, it is possible to perform maintenance and the like of the compressor 12, electrical component box (not illustrated), and the like disposed inside the body casing 101. Note that in the outdoor unit 1 in the example of the present embodiment, all or part of the open/close panel 102A, left lower panel 102B, rear lower panel 102C, and right lower panel 102D may be omitted.

[0021] As shown in Figs. 3 to 5, a heat exchange chamber 105 housing the heat exchanger 18 is formed on top of the machine chamber 103 of the body casing 101. In the example of the present embodiment, the intake portions 104 configured to suck air are provided all around the body casing 101. That is, the body casing 101 includes a front intake portion 104A configured to suck air through a front face, a left intake portion 104B configured to suck air through a left side face, a rear intake portion 104C configured to suck air through a rear face, and a right intake portion 104D configured to suck air through a right face. For example, a panel in which plural air inlets configured to pass air is formed on each of the front intake portion 104A, left intake portion 104B, rear intake portion 104C, and right intake portion 104D. Note that the outdoor unit 1 according to the present embodiment may be a frame-type outdoor unit in which panels are omitted.

[0022] As shown in Figs. 3 and 4, an upper part of the heat exchange chamber 105 of the body casing 101 forms a bell-mouth unit 106. The bell-mouth unit 106 has a cylindrical shape, with the blowout portion 109 formed in a top to blow out air. As shown in Fig. 6, a fan 22 is housed inside the bell-mouth unit 106. A fan guard portion 110 configured to cover a top of the fan 22 is mounted on the bell-mouth unit 106. An outer periphery of the fan guard portion 110 is fixed to the bell-mouth unit 106.

[0023] As the fan 22 operates, air is sucked through the front intake portion 104A, left intake portion 104B, rear intake portion 104C, and right intake portion 104D

shown in Figs. 3 to 5. The sucked air is heat-exchanged by passing through the heat exchanger 18, and is then discharged through the blowout portion 109 shown in Figs. 3 and 4.

[0024] As shown in Fig. 5, the heat exchanger 18 of the example of the present embodiment includes four heat exchange units configured to exchange heat with the air sucked through the intake portions 104 formed in four side faces. That is, the air taken in through the front intake portion 104A is heat-exchanged by passing through that part of a first heat exchanger 18A that faces the front intake portion 104A. The air taken in through the left intake portion 104B is heat-exchanged by passing through that part of a second heat exchanger 18B that faces the left intake portion 104B. The air taken in through the rear intake portion 104C is heat-exchanged by passing through that part of the second heat exchanger 18B that faces the rear intake portion 104C. The air taken in through the right intake portion 104D is heat-exchanged by passing through that part of the first heat exchanger 18A that faces the right intake portion 104D. Then, the air heat-exchanged by passing through the heat exchanger 18 is blown out through the blowout portion 109 shown in Figs. 3 and 4. In the example of the present embodiment, aerodynamic performance has been improved since air is sucked uniformly from all around the outdoor unit 1 including the front face, both side faces, and rear face of the outdoor unit 1. With the outdoor unit 1 in the example of the present embodiment, since the aerodynamic performance has been improved, electric power used to drive the fan is reduced, and noise produced when the fan is driven is reduced as well.

[Installation of the fan unit]

[0025] As shown in Fig. 6, the fan unit 24 includes the fan 22 and a fan motor 23. The fan unit 24 is mounted on the body casing 101 using a mounting member 90. As shown in Figs. 6 and 7, the mounting member 90 includes fixture portions 92 fixed to the body casing 101 and a fan-unit holding portion 94 holding the fan motor 23 of the fan unit 24. The fixture portions 92 are formed on opposite sides of the fan-unit holding portion 94 and fixed to the body casing 101. That is, the fixture portions 92 are fixed to a front-side frame 86 in upper front part of the body casing 101 and to a rear-side frame 87 in upper rear part of the body casing 101. Note that the fixture portions 92 may be fixed to a frame on a left side face of the body casing 101 and a frame on a right side face of the body casing 101. As shown in Figs. 7 and 8, the fixture portions 92 and fan-unit holding portion 94 are connected together by connecting portions 93 and the fan-unit holding portion 94 retreats downward from the fixture portions 92. That is, the mounting member 90 is shaped such that the fan-unit holding portion 94 projects downward from the fixture portions 92. For example, the mounting member 90 is formed by bending or another process, and the fixture portions 92, the connecting por-

tions 93, and the fan-unit holding portion 94 are formed integrally. The fan motor 23 is fixed to the fan-unit holding portion 94 retreating downward from the fixture portions 92.

[0026] The fan motor 23 includes a drive shaft 23A protruding upward. As shown in Fig. 6, the fan 22 is mounted on the drive shaft 23A of the fan motor 23. The fan 22 includes a boss 22A in a center and blades 22B formed around the boss 22A. An upper part of the boss 22A retreats below tops of the blades 22B, reducing the risk of contact between the fan guard portion 110 and the fan 22. This is because an outer periphery of the fan guard portion 110 is fixed to the bell-mouth unit 106. Therefore, as indicated by an imaginary line 110A, when a force is applied to the fan guard portion 110, a central portion of the fan guard portion 110 is most prone to flexure. In the example of the present embodiment, since the boss 22A in the center of the fan 22 retreats downward from the blades 22B, the risk of contact between the fan guard portion 110 and the fan 22 is curbed.

[0027] Fig. 9 is a diagram describing a relationship between radial position of the fan and intake rate of the fan. As shown in Fig. 9, on a suction side of the fan 22, a suction rate decreases on that side of the blades 22B that is closer to the boss 22A and increases on that side of the blades 22B that is farther from the boss 22A. Therefore, on an outer side of the blades 22B, by providing a large distance between the blades 22B and the mounting member 90, it is possible to reduce intake loss of the fan 22. As shown in Fig. 6, in the example of the present embodiment, a connection position between the fixture portion 92 and the connecting portion 93 is located outward of an intermediate position of a straight line joining a connecting portion between the boss 22A and each blade 22B to an end portion of the blade 22B. That is, the mounting member 90 is shaped to start bending down from the fixture portion 92 at a position outward of an intermediate position of the blade 22B. For example, the connecting portion 93 is shaped to bend down vertically from the fixture portion 92, but may be shaped to bend down obliquely from the fixture portion 92. In the example of the present embodiment, on an outer side of the blade 22B, a distance between a lower part of the blade 22B and the mounting member 90 is equal to a length between the lower part of the blade 22B and the fan-unit holding portion 94, making it possible to reduce intake loss of the fan 22. Note that whereas the intake loss of the fan 22 can be reduced by placing the connecting position between the fixture portion 92 and the connecting portion 93 outward of the intermediate position of the straight line joining the connecting portion between the boss 22A and each blade 22B to the end portion of the blade 22B, more preferably the intake loss of the fan 22 can be reduced by placing the connecting position between the fixture portion 92 and the connecting portion 93 outward of the end portion of the blade 22B.

[Comparison with comparative examples]

[0028] Fig. 10 is a diagram of Comparative Example 1, which is a comparative example to Fig. 5, Fig. 11 is a diagram of Comparative Example 2, which is a comparative example to Fig. 6, and Fig. 12 is a diagram comparing the outdoor unit of Embodiment 1, Comparative Example 1, and Comparative Example 2 with one another in terms of intake/exhaust losses of the outdoor unit. Note that in Fig. 12, A represents intake loss of the fan itself, B represents intake loss of the fan caused by a mounting member, C represents intake loss caused by placement of a heat exchanger, and D represents exhaust loss caused during exhaust.

[0029] As shown in Fig. 10, in Comparative Example 1, a heat exchanger 180 placed in a heat exchange chamber 150 has a double-bend shape. Comparative Example 1 is configured such that the air sucked through three side faces—namely, a side face 140A, a side face 140B, and a side face 140C—will pass through the heat exchanger 180. In Comparative Example 1, air is not sucked uniformly in a circumferential direction of the heat exchange chamber 150, resulting in poor intake balance and thereby increasing the intake loss C due to the placement of the heat exchanger as shown in Fig. 12. Compared to Comparative Example 1, since the outdoor unit 1 according to the present embodiment is configured such that air will be sucked uniformly from all around the outdoor unit 1 including the front face, both side faces, and rear face as shown in Fig. 5, the intake loss C due to the placement of the heat exchanger is improved.

[0030] As shown in Fig. 11, in Comparative Example 2, a fan unit 240 including a fan 220 and a fan motor 230 is mounted on a body casing via a linear mounting member 190. In Comparative Example 2, a boss 220A in a central portion of the fan 220 is located above blades 220B and closest to a fan guard portion 111. The fan guard portion 111 is most prone to flexure in a central portion as indicated by an imaginary line 111A. Therefore, in Comparative Example 2, there is increased risk of contact between the fan guard portion 111 and the boss 220A. Compared to Comparative Example 2, in the outdoor unit 1 according to the present embodiment, since the boss 22A retreats downward from the blades 22B as shown in Fig. 6, the risk of contact between the fan guard portion 110 and the fan 22 is reduced.

[0031] Also, as shown in Fig. 11, in Comparative Example 2, since the boss 220A of the fan 220 is located above the blades 220B, to obtain aerodynamic characteristics, lower parts of the blades 220B protrude greatly downward, coming close to the mounting member 190. In Comparative Example 2, since the lower parts of the blades 220B and the mounting member 190 are located close to each other, preventing air intake of the fan 220, the intake loss B of the fan caused by the mounting member is increased as shown in Fig. 12. Compared to Comparative Example 2, in the outdoor unit 1 according to the present embodiment, as shown in Fig. 6, the boss

22A retreats downward from an upper part of the blades 22B and the blades 22B partially protrude above the boss 22A. Unlike Comparative Example 2, the outdoor unit 1 according to the present embodiment does not need to make the lower parts of the blades 22B protrude greatly downward to obtain aerodynamic characteristics. Therefore, the outdoor unit 1 according to the present embodiment allows a greater distance between the lower parts of the blades 22B and the mounting member 90, reducing the intake loss B of the fan caused by the mounting member as shown in Fig. 12.

[0032] Note that an outdoor unit in which air is not sucked uniformly from all around the heat exchange chamber 150 as with Comparative Example 1 shown in Fig. 10 incurs great intake loss C due to the placement of the heat exchanger and the intake loss B of the fan caused by the mounting member is diminished in a relative sense, as shown in Fig. 12. Therefore, with an outdoor unit such as Comparative Example 1, an effect obtained by improving the intake loss B of the fan caused by the mounting member is insignificant. However, with the outdoor unit in which air is sucked uniformly from all around the outdoor unit including the front face, both side faces, and rear face as shown in Fig. 5, since the intake loss B of the fan caused by the mounting member has an increased impact as shown in Fig. 12, an effect of reducing the intake loss B of the fan caused by the mounting member is remarkable.

[0033] As described above, in the outdoor unit 1 according to the present embodiment, the fan unit 24 is mounted on the body casing 101 via the mounting member 90. The mounting member 90 includes the fixture portion 92 fixed to the body casing and the fan-unit holding portion 94 holding the fan unit 24, where the fan-unit holding portion 94 retreats from the fixture portion 92. In the present embodiment, since the fan unit 24 is held in the fan-unit holding portion 94 depressed downward from the fixture portion 92, the outdoor unit 1 is downsized in a height direction. Also, since the fan unit 24 is held in the fan-unit holding portion 94 retreating downward from the fixture portion 92, a center of gravity of the outdoor unit 1 can be lowered.

[0034] Also, in the outdoor unit 1 according to the present embodiment, the boss 22A in the center of the fan 22 retreats downward from the tops of the blades 22B. Since the outer periphery of the fan guard portion 110 covering the top of the fan 22 is fixed to the bell-mouth unit 106 of the body casing 101, the fan guard portion 110 is prone to flexure in the central portion. In the outdoor unit 1 according to the present embodiment, since the boss 22A in the center of the fan 22 retreats, the risk of contact between the fan 22 and the fan guard portion 110 is curbed, improving safety.

[0035] Also, in the outdoor unit 1 according to the present embodiment, the boss 22A of the fan 22 retreats downward from the tops of the blades 22B, and the blades 22B partially protrude above the boss 22A. Therefore, in the present embodiment, the lower parts of the

blades 22B can be placed at a higher level, allowing a greater distance between the lower parts of the blade 22B and the mounting member 90. Thus, the present embodiment reduces the intake loss of the fan 22 caused by the mounting member 90 and thereby reduces noise as well.

[0036] The present invention is not limited to the above embodiment, and various changes can be made without departing from the scope of the present invention. That is, the configurations of the above embodiment may be improved as appropriate and at least part of the configurations may be substituted with another configuration. Furthermore, components whose arrangement is not limited specifically are not limited to the arrangement disclosed in the embodiment and may be placed at positions where the functions of the components can be achieved.

Reference Signs List

[0037]

1 outdoor unit
12 compressor
14 flow path selector
14A first flow path selector
14B second flow path selector
16 decompressor
16A first decompressor
16B second decompressor
18 heat exchanger
18A first heat exchanger
18B second heat exchanger
22 fan
22A boss
22B blade
23 fan motor
24 fan unit
26 accumulator
86 front-side frame
87 rear-side frame
90 mounting member
92 fixture portion
93 connecting portion
94 fan-unit holding portion
101 body casing
102A open/close panel
102B left lower panel
102C rear lower panel
102D right lower panel
103 machine chamber
104 intake portion
104A front intake portion
104B left intake portion
104C rear intake portion
104D right intake portion
105 heat exchange chamber
106 bell-mouth unit
109 air outlet

110 fan guard portion
110 imaginary line
111 fan guard portion
111A imaginary line
5 140A side face
140B side face
140C side face
150 heat exchange chamber
180 heat exchanger
10 190 mounting member
200 indoor unit
202 use side heat exchanger
204 expansion device
220 fan
15 220A boss
220B blade
230 fan motor
240 fan unit

20

Claims

1. An outdoor unit comprising:

25 a body casing including
an intake portion that is formed in a lateral side of the body casing and through which air is sucked,
a blowout portion formed in a top of the body casing, the blowout portion being configured to blow out the air sucked through the intake portion, and
30 an air path formed between the intake portion and the blowout portion;
35 a heat exchanger disposed in the air path;
a fan unit disposed in the air path above the heat exchanger; and
a mounting member mounting the fan unit on the body casing,
40 wherein the mounting member includes a fixture portion fixed to the body casing and a fan-unit holding portion holding the fan unit, and the fan-unit holding portion retreats downward from the fixture portion.

45

2. The outdoor unit of claim 1, wherein the fan unit includes a fan motor provided with a drive shaft protruding upward and a fan mounted on the drive shaft,
50 the fan includes a boss in a center and blades formed around the boss, and an upper part of the boss retreats downward from tops of the blades.

55 3. The outdoor unit of claim 2, further comprising a fan guard portion configured to cover a top of the fan, wherein an outer periphery of the fan guard portion is fixed

to the body casing.

4. The outdoor unit of claim 2 or 3, wherein the mounting member is shaped to be bent down from the fixture portion at a position outward of an intermediate position of a straight line joining a connecting portion between the boss and each of the blades to an end portion of the blade. 5
5. The outdoor unit of any one of claims 1 to 4, wherein the body casing is shaped to include four side faces on lateral sides, and the mounting member is fixed to the body casing on both sides of the side faces facing each other. 10 15
6. The outdoor unit of claim 5, wherein the intake portion is formed in each of the four side faces, and the heat exchanger includes four heat exchange units each facing each of the intake portions and configured to exchange heat with the air sucked through each of the intake portions. 20 25 30 35 40 45 50 55

FIG. 1

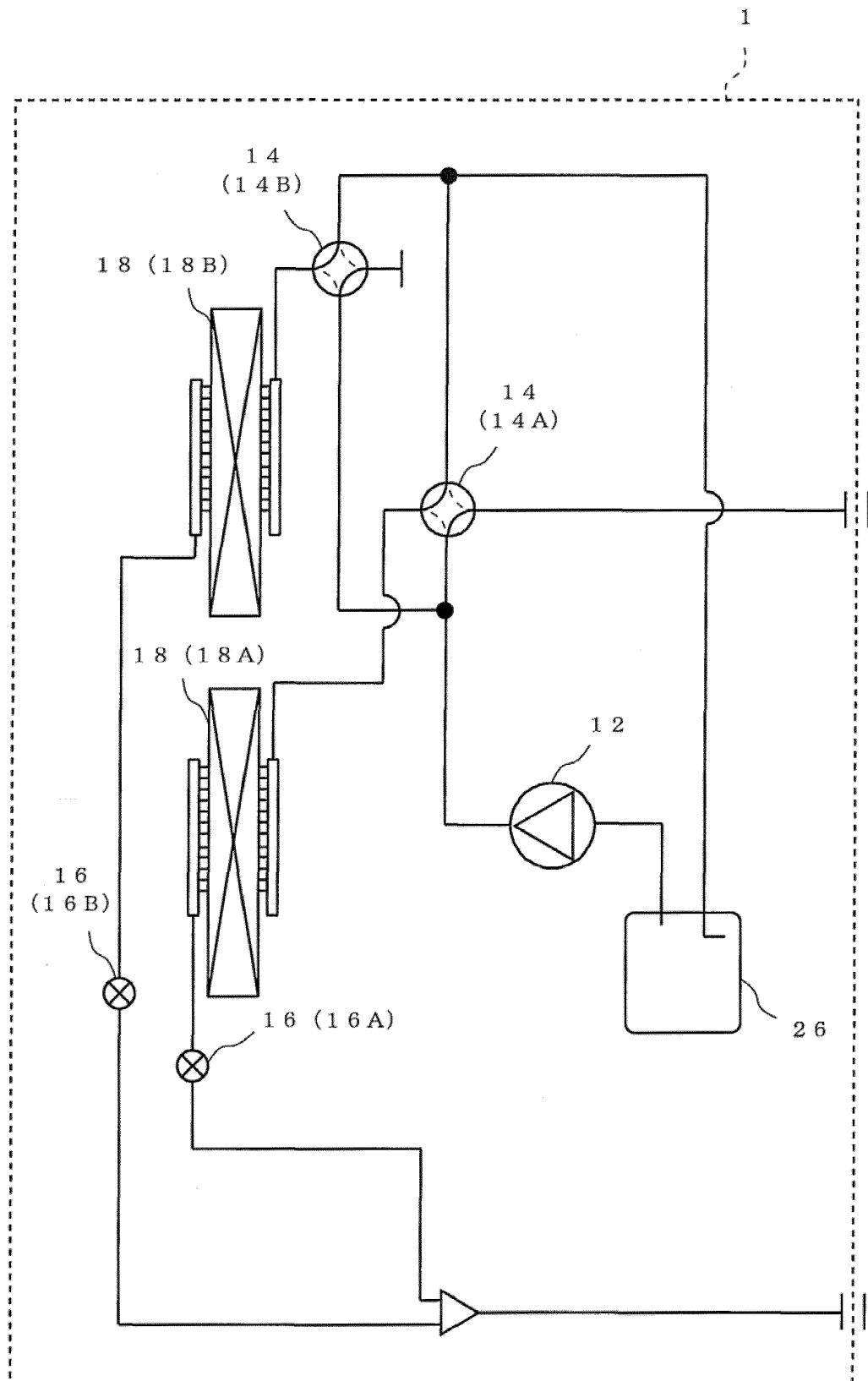


FIG. 2

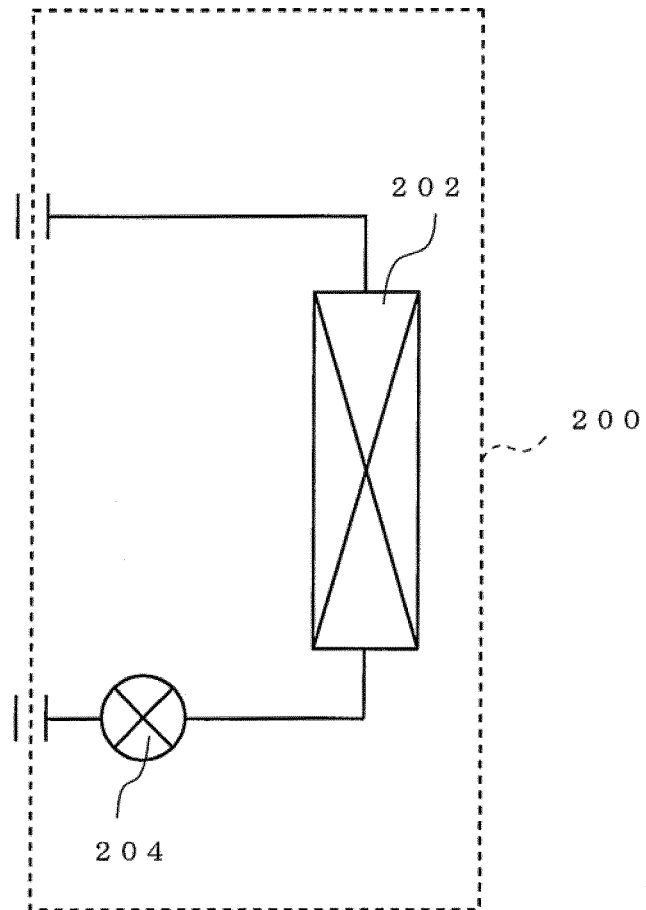


FIG. 3

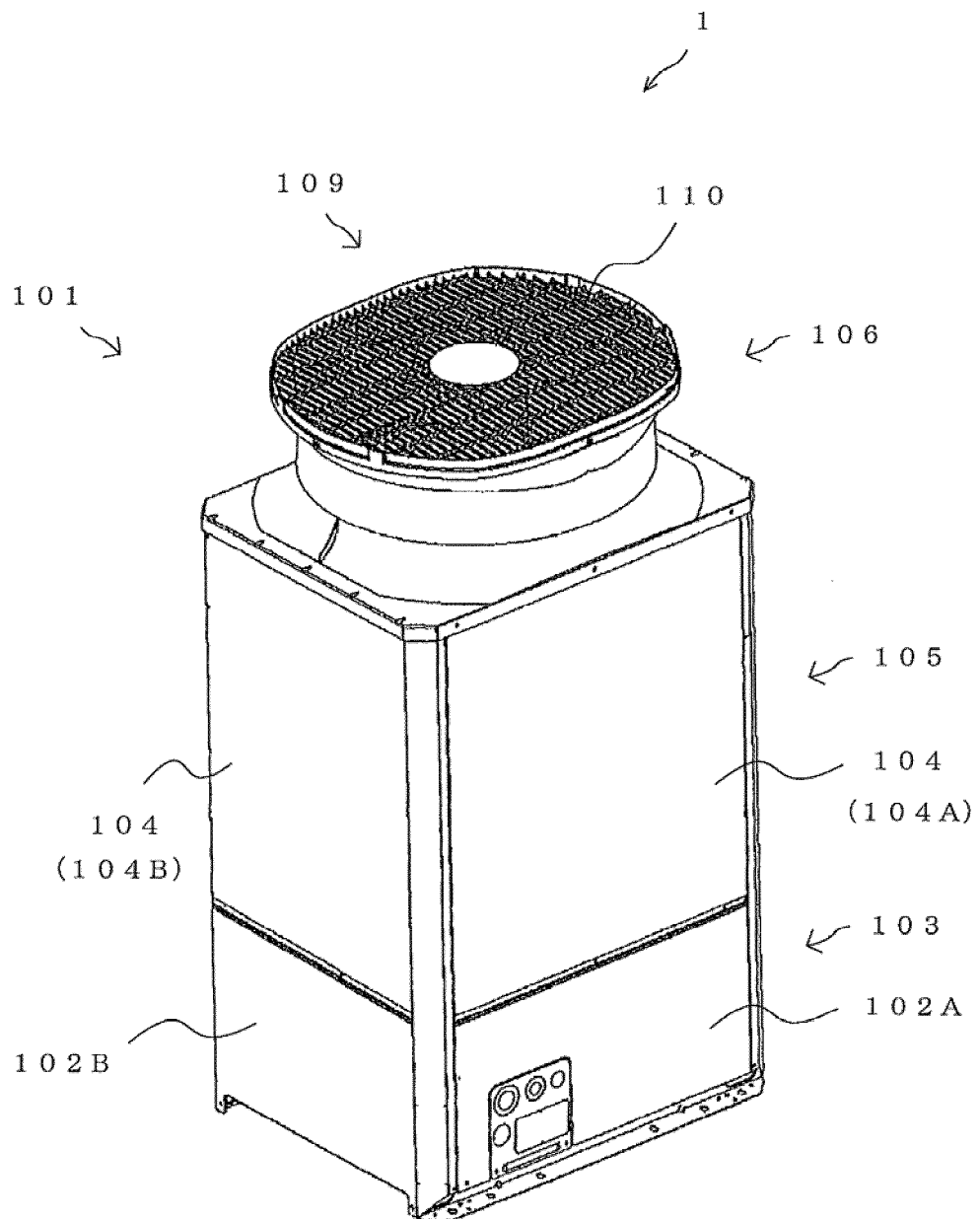


FIG. 4

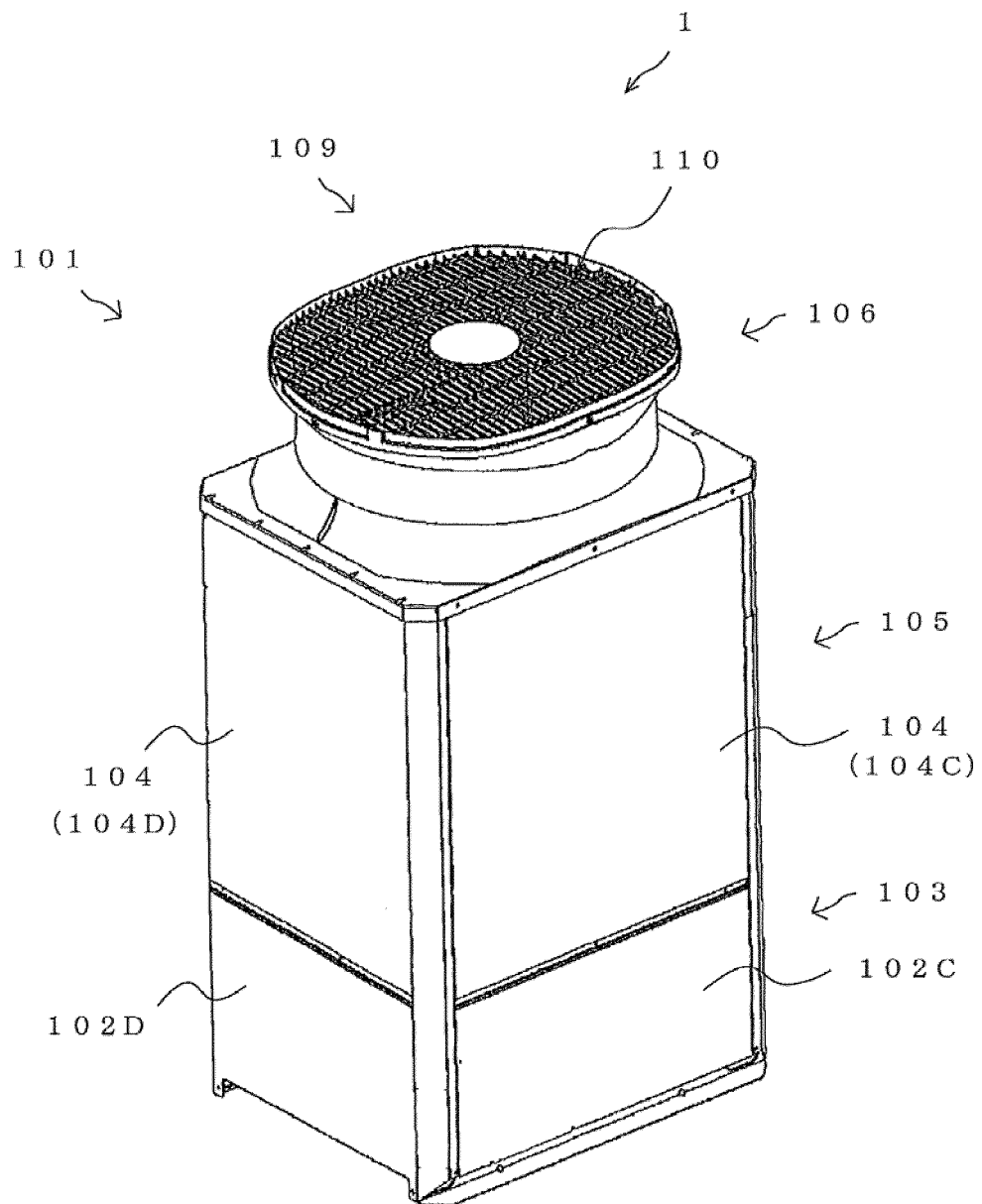


FIG. 5

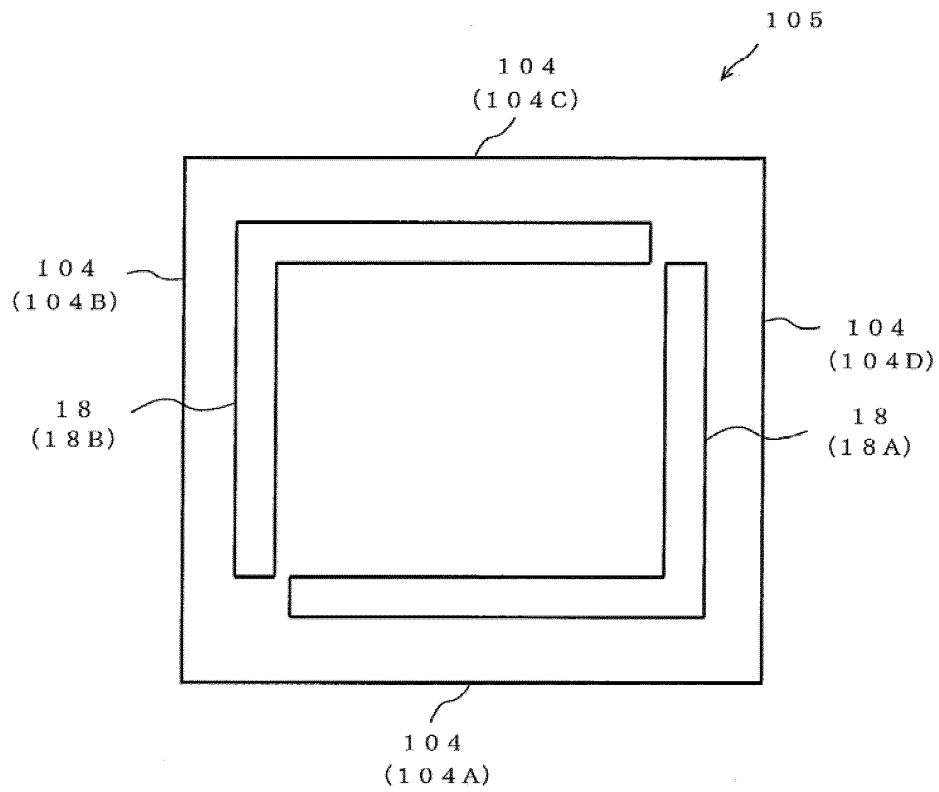


FIG. 6

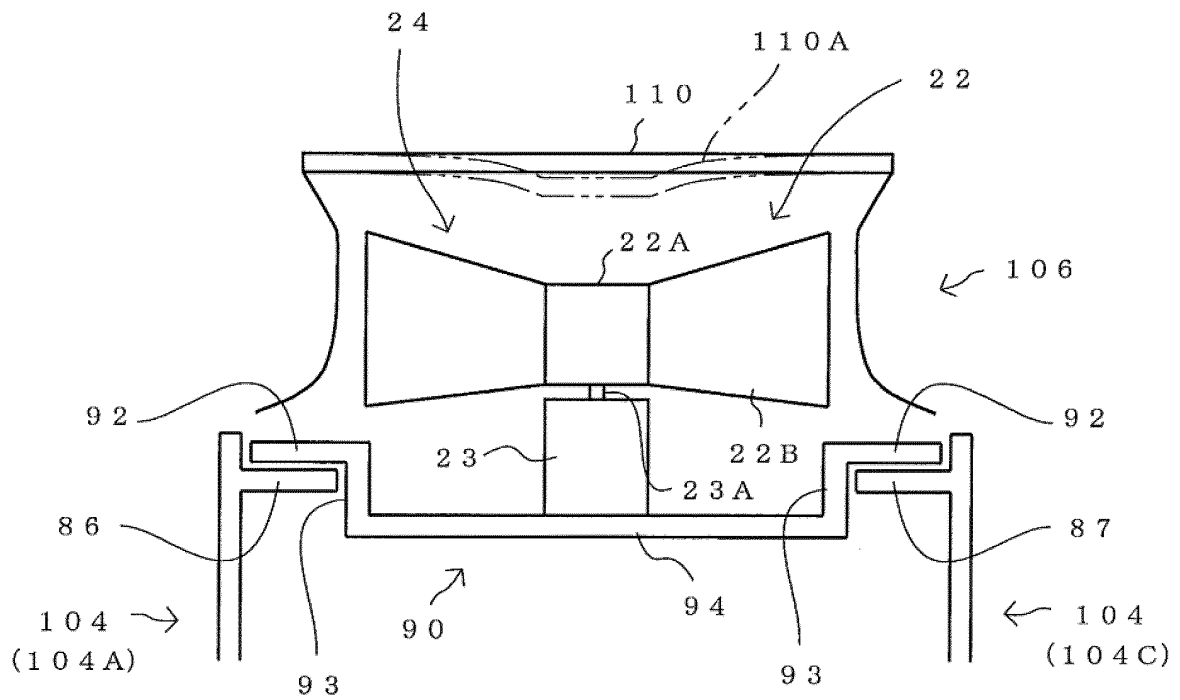


FIG. 7

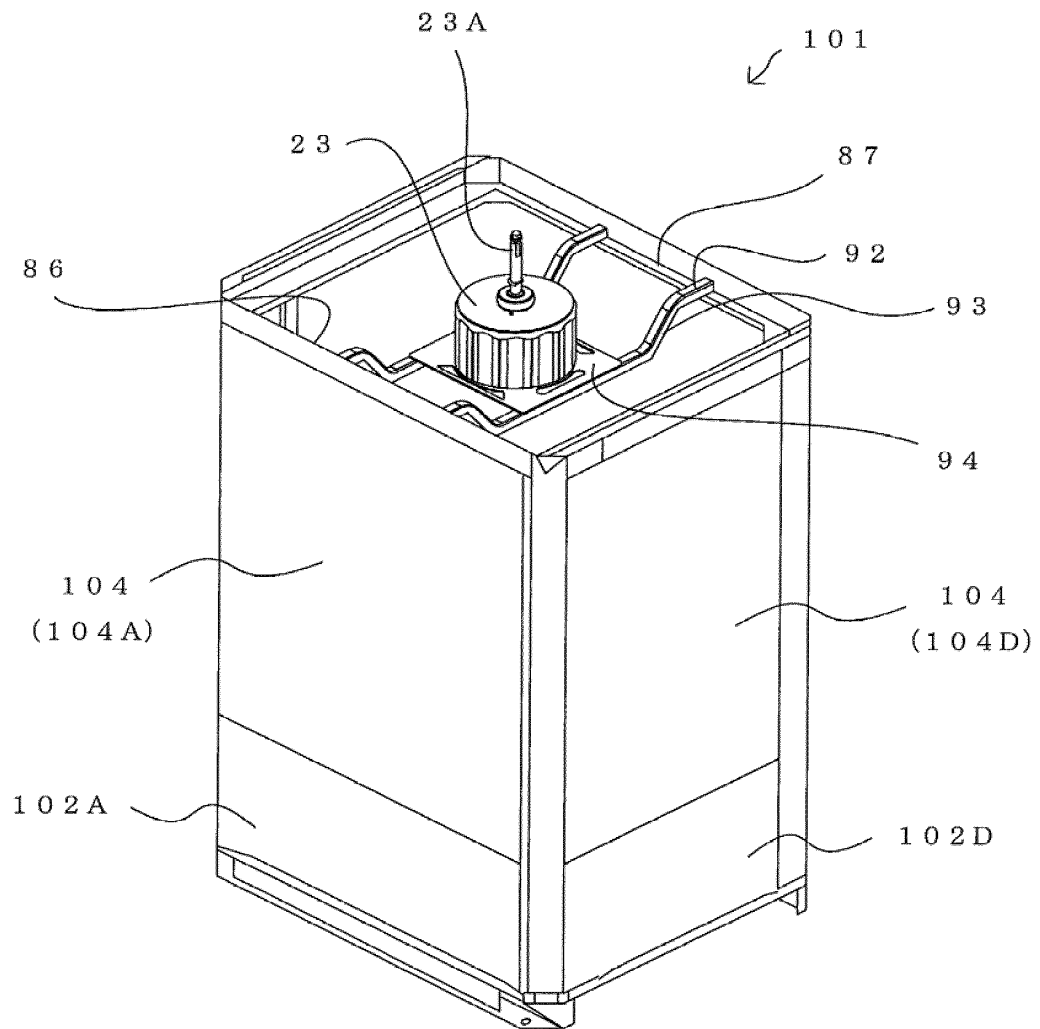


FIG. 8

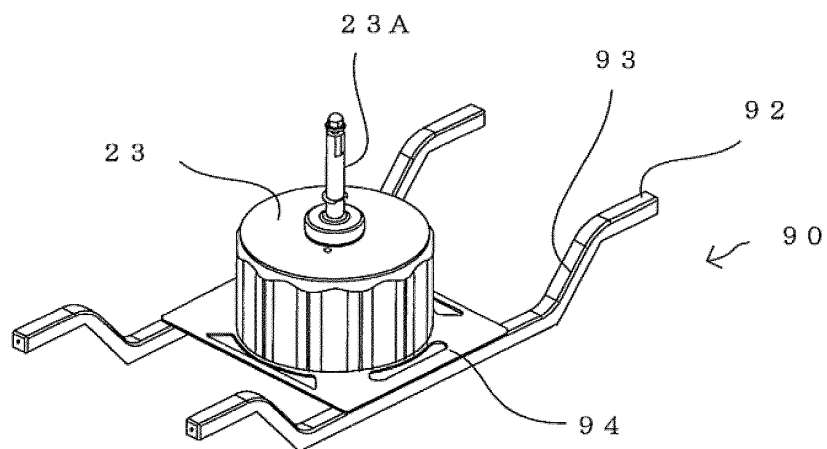


FIG. 9

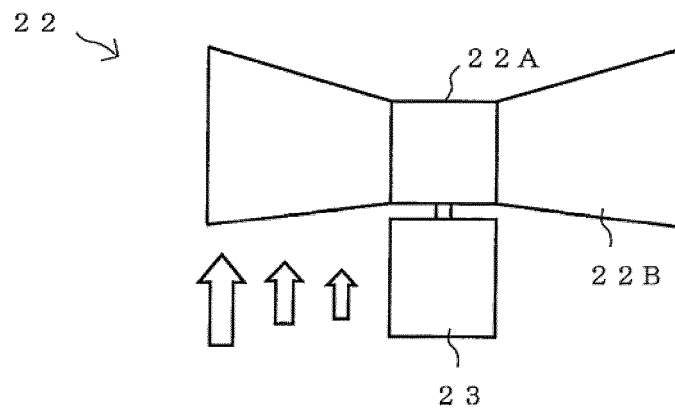


FIG. 10

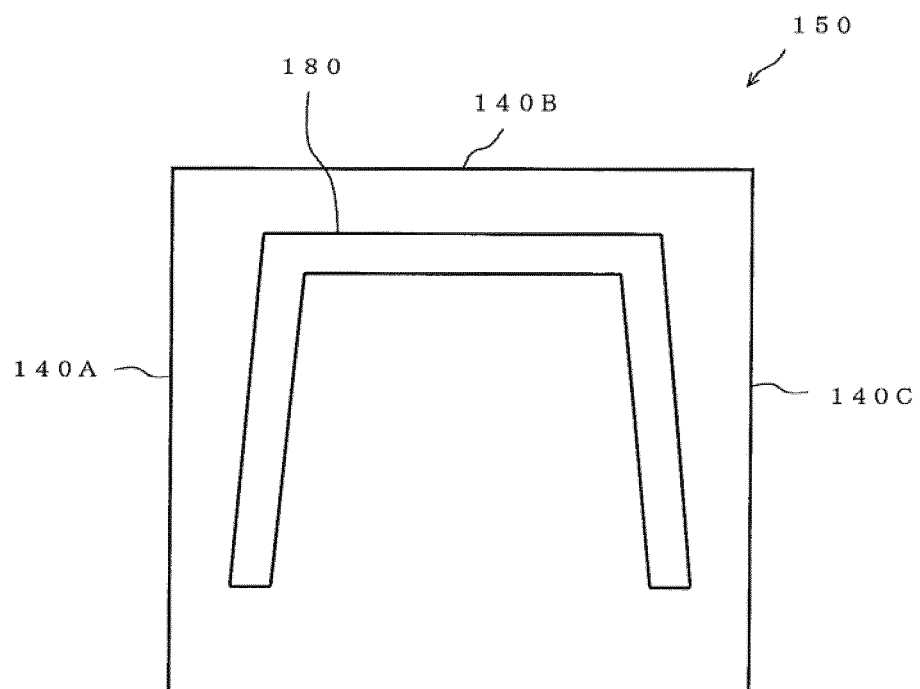


FIG. 11

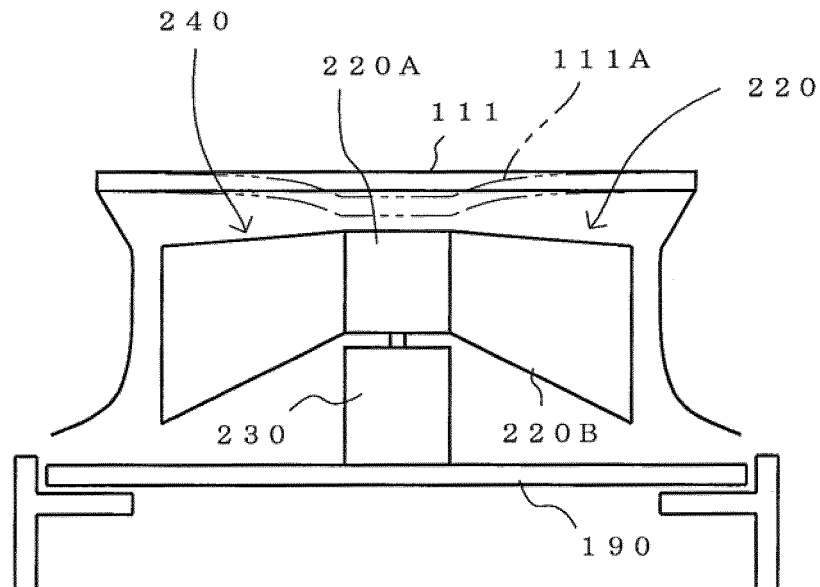
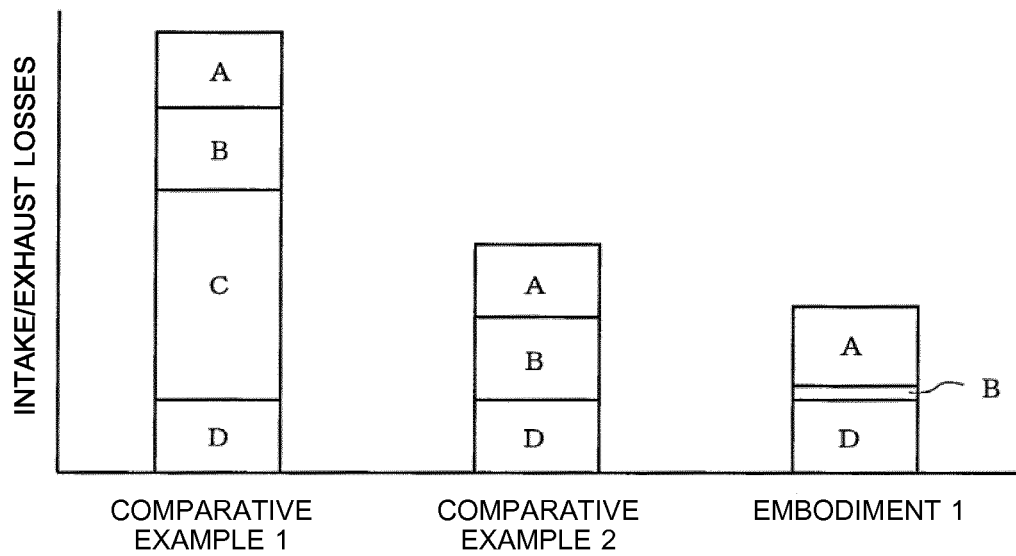


FIG. 12



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2015/083553

A. CLASSIFICATION OF SUBJECT MATTER

F24F1/38 (2011.01) 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)

F24F1/38

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2016

Kokai Jitsuyo Shinan Koho 1971-2016 Toroku Jitsuyo Shinan Koho 1994-2016

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2001-304624 A (Sanyo Electric Co., Ltd.),	1
Y	31 October 2001 (31.10.2001), paragraphs [0011] to [0015]; fig. 1 to 3 (Family: none)	2-6
Y	JP 2011-185236 A (Mitsubishi Electric Corp.), 22 September 2011 (22.09.2011), paragraphs [0013], [0021]; fig. 2, 5 (Family: none)	2-6
Y	JP 2015-34503 A (Mitsubishi Electric Corp.), 19 February 2015 (19.02.2015), paragraphs [0039] to [0050]; fig. 9 to 11 & US 2015/0044058 A1 paragraphs [0109] to [0135]; fig. 9 to 11 & EP 2835538 A2	2-6

☒ 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
05 February 2016 (05.02.16)Date of mailing of the international search report
16 February 2016 (16.02.16)Name and mailing address of the ISA/
Japan Patent Office
3-4-3, Kasumigaseki, Chiyoda-ku,
Tokyo 100-8915, Japan

Authorized officer

Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2015/083553

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2012-242028 A (Daikin Industries, Ltd.), 10 December 2012 (10.12.2012), paragraph [0036]; fig. 5 & WO 2012/160784 A1	5-6
Y	JP 2002-243209 A (Mitsubishi Electric Corp.), 28 August 2002 (28.08.2002), paragraphs [0044] to [0051]; fig. 6, 7 (Family: none)	6
A	JP 2001-349580 A (Sanyo Electric Co., Ltd., Sanyo Electric Air Conditioning Co., Ltd.), 21 December 2001 (21.12.2001), paragraphs [0011] to [0025]; fig. 1 to 3 (Family: none)	1-6
A	JP 2012-72937 A (Sanyo Electric Co., Ltd.), 12 April 2012 (12.04.2012), paragraphs [0011] to [0034]; fig. 1, 2 (Family: none)	1-6

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 5398283 B [0003]