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(54) **OUTDOOR UNIT FOR REFRIGERATION DEVICE**

(57) To provide an outdoor unit of a refrigeration apparatus that is not susceptible to an effect of metal corrosion in an outdoor unit of a refrigeration apparatus using a heat exchanger made of aluminum or aluminum alloy. An outdoor unit (20) of an air-conditioning apparatus (1) according to the present embodiment comprises a heat exchanger (25) made of aluminum or aluminum alloy, a floor frame (8) for mounting the heat exchanger, and a spacer (100) disposed between the heat exchanger and the floor frame. The spacer has an inclined surface (100a) and a horizontal surface (100b). The inclined surface guides condensation from the heat exchanger to the floor frame. The horizontal surface contacts with the heat exchanger and mounts the heat exchanger horizontally.

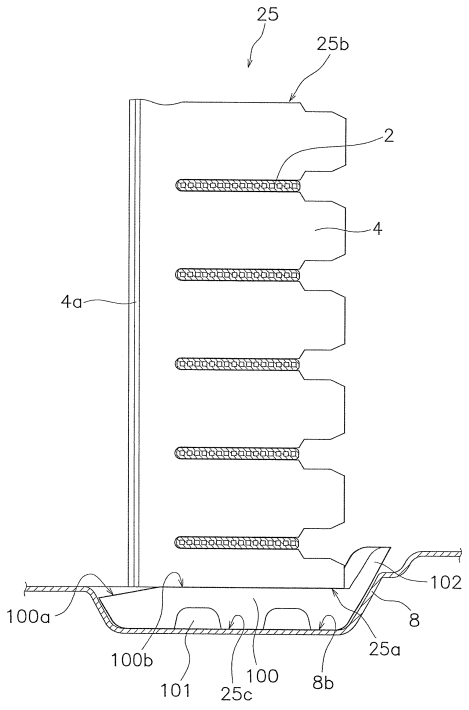

FIG. 9

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Description

TECHNICAL FIELD

[0001] The present invention relates to an outdoor unit of a refrigeration apparatus.

BACKGROUND ART

[0002] There is reported a structure of an outdoor unit of a refrigeration apparatus, for example, as in patent document 1 (Japanese Laid-open Patent Application No. 2010-151387), in which a lower end of a heat exchanger made of aluminum is formed inclined, and a spacer member having an inclined surface facing opposite the lower end of the heat exchanger is disposed to promote drainage using the inclination of the spacer member.

SUMMARY OF THE INVENTION

<Technical Problem>

[0003] However, in the abovementioned configuration, a problem is presented in that the lower end of the heat exchanger had to be formed inclined and manufacturing was difficult.

[0004] An object of the present invention is to provide an outdoor unit of a refrigeration apparatus that is not susceptible to the effect of metal corrosion in an outdoor unit of a refrigeration apparatus using a heat exchanger made of aluminum or aluminum alloy.

<Solution to Problem>

[0005] An outdoor unit of a refrigeration apparatus according to a first aspect of the present invention comprises a heat exchanger made of aluminum or aluminum alloy, a floor frame for mounting the heat exchanger, and a spacer disposed between the heat exchanger and the floor frame. The heat exchanger has a plurality of flat pipes, a header manifold to which each of said flat pipes is connected, and a plurality of fins joined to the flat pipes. The heat exchanger is arranged so that heat exchange occurs between a fluid flowing inside the flat pipes and air flowing outside the flat pipes. The spacer has an inclined surface and a horizontal surface. The inclined surface guides condensation from the heat exchanger to the floor frame. The heat exchanger makes contact with the horizontal surface and is horizontally mounted thereon.

[0006] By virtue of the fact that the surface of the spacer facing opposite the lower end of the heat exchanger is formed inclined from midcourse in a short direction of the heat exchanger, water drops falling from the heat exchanger can be guided to the floor frame and corrosion of the heat exchanger and leakage of refrigerant can be prevented. Furthermore, because the heat exchanger is mounted on the horizontal surface of the spacer, there is no need for the lower end of the heat exchanger to be formed inclined and the heat exchanger is easy to manufacture.

[0007] A ratio of a length L1 in a long direction of the inclined surface and a length L2 in a long direction of the horizontal surface in plan view is not particularly limited provided that water can be guided to the floor frame and the heat exchanger can be mounted horizontally, but the ratio can be set to L1:L2 = about 1:2-5.

[0008] The inclination of the inclined surface is not particularly limited provided that condensation from the heat exchanger can be guided to the floor frame, but the inclination can be set to 7-20° downward from the horizontal direction. The drainage function is insufficient if the angle of inclination is smaller than 7°, and water is difficult to convey, particularly in the case of a water-repellent material, if the inclination is greater than 20°.

[0009] Condensation from the heat exchanger includes condensation water, rainwater, and the like.

[0010] The material of the spacer is preferably rubber from the aspects of being able to mount the heat exchanger stably and having waterproofness and anti-vibration property, and natural rubber, chloroprene rubber, nitrile rubber, butyl rubber, ethylene-propylene rubber, styrene-butadiene rubber, silicone rubber, fluorine rubber, AFLAS, hydrogenated nitrile rubber, urethane rubber, and the like, can be used.

[0011] An outdoor unit of a refrigeration apparatus according to a second aspect of the present invention is the outdoor unit of a refrigeration apparatus according to the first aspect, wherein the fin has a water-guiding part, and the inclined surface is provided on an elongated portion of the water-guiding part.

[0012] Here, because the fin has a water-guiding part, condensation from the heat exchanger can be guided to the spacer. Furthermore, because the inclined surface is provided on an elongated portion of the water-guiding part, water guided from the heat exchanger to the spacer can be guided along the inclined surface to the floor frame, and therefore corrosion of the heat exchanger and leakage of refrigerant can be prevented.

[0013] An outdoor unit of a refrigeration apparatus according to a third aspect of the present invention is the outdoor unit of a refrigeration apparatus according to the first or second aspect, wherein a drainage structure is provided on a lower part of the spacer. Examples of each drainage structure include openings, cutouts, and gutters.

[0014] Here, because water falling onto the spacer from the heat exchanger can be guided to the floor frame from the drainage structure on the lower part of the spacer, corrosion of the heat exchanger and leakage of refrigerant can be prevented.

[0015] An outdoor unit of a refrigeration apparatus according to a fourth aspect of the present invention is the outdoor unit of a refrigeration apparatus according to any of the first to third aspects, wherein the spacer is disposed on a lower end of a bent part of the heat exchanger.

[0016] Here, because a place for the spacer can be

secured while making the outdoor unit compact, corrosion of the heat exchanger and leakage of refrigerant can be prevented.

[0017] An outdoor unit of a refrigeration apparatus according to a fifth aspect of the present invention is the outdoor unit of a refrigeration apparatus according to any of the first to fourth aspects, wherein an extended part extending diagonally upward from the horizontal surface is provided on the spacer.

[0018] Here, because condensation from the heat exchanger can be guided to the drainage structure more effectively by the extended part, corrosion of the heat exchanger and leakage of refrigerant can be prevented.

<Advantageous Effects of Invention>

[0019] In the outdoor unit of a refrigeration apparatus according to the first aspect of the present invention, water drops falling from the heat exchanger can be guided to the floor frame, and corrosion of the heat exchanger and leakage of refrigerant can be prevented. Furthermore, there is no need for the lower end of the heat exchanger to be formed inclined, and the heat exchanger can be manufactured easily.

[0020] In the outdoor unit of a refrigeration apparatus according to the second aspect of the present invention, because condensation from the heat exchanger can be guided to the spacer and furthermore can be guided from the inclined surface to the floor frame, corrosion of the heat exchanger and leakage of refrigerant can be prevented.

[0021] In the outdoor unit of a refrigeration apparatus according to the third aspect of the present invention, water falling onto the spacer from the heat exchanger can be guided effectively to the floor frame, and corrosion of the heat exchanger and leakage of refrigerant can be prevented.

[0022] In the outdoor unit of a refrigeration apparatus according to the fourth aspect of the present invention, a place for the spacer can be secured while making the outdoor unit compact, and corrosion of the heat exchanger and leakage of refrigerant can be prevented.

[0023] In the outdoor unit of a refrigeration apparatus according to the fifth aspect of the present invention, condensation from the heat exchanger can be guided to the drainage structure more effectively, and corrosion of the heat exchanger and leakage of refrigerant can be prevented.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024]

FIG. 1 is a general perspective view of an outdoor unit of a refrigeration apparatus according to one embodiment of the present invention.

FIG. 2 is a general perspective view of an outdoor unit of a refrigeration apparatus according to one embodiment of the present invention in a condition having removed a ceiling plate, left side plate, right front plate, and right rear plate.

FIG. 3 is a general perspective view of an outdoor heat exchanger.

FIG. 4 is a partially enlarged view cut in a vertical direction of flat pipes and fins of an outdoor heat exchanger. Some reference numerals are omitted with respect to identical members.

FIG. 5 is a plan view of a floor frame of an outdoor unit of a refrigeration apparatus according to one embodiment of the present invention.

FIG. 6 is a front view of a spacer according to one embodiment of the present invention.

FIG. 7 is a plan view of a spacer according to one embodiment of the present invention.

FIG. 8 is a sectional view along VIII-VIII in FIG. 7.

FIG. 9 is a sectional view along IX-IX in FIG. 5.

DESCRIPTION OF EMBODIMENTS

[0025] An embodiment of the present invention is described below while referring to the drawings.

[0026] The outdoor unit of a refrigeration apparatus of the present embodiment is used as an outdoor unit of an air-conditioning apparatus.

(1) General configuration of the outdoor unit

[0027] The outdoor unit of an air-conditioning apparatus according to one embodiment of the present invention is illustrated in FIG. 1. FIG. 1 is a perspective view illustrating the outdoor unit 20 of an air-conditioning apparatus. The outdoor unit 20 is placed outside a space to be air-conditioned (indoors) where air conditioning is to be performed, and an interior of a roughly rectangular box-form casing 50 is divided into a ventilation compartment and a machine compartment by a partitioning plate (not illustrated) extending vertically. The outdoor unit 20 is connected via refrigerant-communicating piping (not illustrated) to an indoor unit (not illustrated) disposed inside the space to be air conditioned.

[0028] The outdoor unit 20 mainly comprises a roughly box-form casing 50, an outdoor fan (not illustrated), refrigerant circuit-configuring parts (not illustrated) including a heat exchanger, compressor, valves, pipes, and the like, to configure a refrigerant circuit, and an electrical unit (not illustrated) for performing operation and control.

[0029] A blow-out port positioned at the center and to the left of a front face 51 is formed on the casing 50, and air sent out by the outdoor fan is blown out forward from the blow-out port.

[0030] The casing 50 has a ceiling plate 57, a right rear plate 56, and a right front plate 55, and additionally has a left side plate 54 and a floor frame 8. "60" indicates a fan grill attached on the outside of the casing 50.

[0031] FIG. 2 is a general perspective view of an outdoor unit of a refrigeration apparatus according to one

embodiment of the present invention in a condition having removed a ceiling plate, left side plate, right front plate, and right rear plate. A heat exchanger 25 is mounted on the floor frame 8, and an outdoor fan 35 is disposed in front thereof. The floor frame 8 has a portion 8a standing upright in a vertical direction (see FIG. 5) on an edge portion. Facing the partitioning plate 58, the left side is the ventilation compartment and the right side is the machine compartment.

[0032] FIG. 3 is a general perspective view of an outdoor heat exchanger 25. As illustrated in FIG. 3, the outdoor heat exchanger 25 has a flat pipe 2, fins 4, and header manifolds 61 and 62. The fins 4 are omitted in the illustration in FIG. 3. Some of the reference numerals of the flat pipes 2 also are omitted. The fin 4 has a bent part 25b. A spacer to be described is disposed beneath the outdoor heat exchanger 25 in a manner connected to a lower end 25a of the bent part 25b.

[0033] The outdoor heat exchanger 25 allows refrigerant flowing inside to be condensed or evaporated by heat exchange with outside air. The outdoor heat exchanger 25 is made entirely of aluminum or aluminum alloy. The outdoor heat exchanger 25 is disposed inside the casing 50, with a space being opened between the outdoor heat exchanger and the casing 50 or with a resin member, or the like, being placed between the casing 50 and the outdoor heat exchanger 25, so as not to be in direct contact with the casing 50 (see FIG. 1).

[0034] The outdoor heat exchange 25, as illustrated in FIG. 2, extends along the back face of the casing 50 toward the left from near an end part of the partitioning plate 58, changes in direction at near a left rear corner part of the casing 50, and extends toward the front along the left side plate 54 (see FIG. 1).

[0035] Header manifolds 61 and 62 are connected to both ends of flat pipes 2 disposed in a plurality of stages in the vertical direction. The header manifolds 61 and 62 have a function of supporting the flat pipes 2, a function of guiding refrigerant to internal channels (not illustrated) of the flat pipes 2, and a function of collecting refrigerant discharged from the internal channels.

[0036] FIG. 4 is a partially enlarged view cut in the vertical direction of flat pipes 2 and fins 4. The flat pipe 2 has a vertical planar part serving as a heat-conducting surface, and a plurality of internal channels 2a in which the refrigerant flows. The flat pipes 2 are disposed in a plurality of stages with spacing between in a state in which the planar parts are oriented vertically. The fin 4 is connected to the flat pipe 2. A plurality of cutouts 4b extending horizontally in a long and slender form are formed on the fins 4 so that the fins 4 are interleaved with the plurality of stages of flat pipes 2 arrayed between the header manifolds 61 and 62. The shape of the cutout parts 4b of the fins 4, as illustrated in FIG. 4, is nearly consistent with the external shape in section of the flat pipe 2. The fin 4 is provided with waffles or louvers, and has one water-guiding part 4a connected in the vertical direction at a most downstream side of the fin. Condensation is guided along the water-guiding part 4a to the lower part of the heat exchanger.

[0037] The floor frame 8, as illustrated in FIG. 5, mainly has a roughly rectangular shape in plan view, and has a drain part (drain pan) 8b. The heat exchanger not illustrated is mounted on the drain pan, and a first drainage opening 10 and a plurality of other openings 11 are provided on the drain pan. Water accumulating inside the floor frame 8 is drained basically from these openings 10 and 11. The first drainage opening 10 is disposed in the lowest position in the vertical direction, and condensation water is drained therefrom.

[0038] A spacer 100 is disposed in a portion of the drain pan indicated by "25c," and the bent part 25b of the heat exchanger is mounted thereon. "26" indicates a boss for fixing the spacer 100 in position. The spacer 100 is disposed in a manner so that a long direction of the spacer 100 coincides with a short direction of the heat exchanger 25. By the fact that the spacer 100 is disposed on the lower end 25a (FIG. 3) of the bent part of the heat exchanger 25, the drainage mechanism of the heat exchanger 25 can be provided compactly.

(2) Spacer

[0039] FIGS. 6 to 8 illustrate a front view, a plan view, and a sectional view of a spacer 100. On the spacer 100, an inclined surface 100a for guiding condensation from the heat exchanger 25 to the floor frame 8 and a horizontal surface 100b for contacting with the heat exchanger 25 and mounting the heat exchanger 25 horizontally are provided on a surface facing opposite the lower end of the heat exchanger 25. The inclination of the inclined surface 100a is 10° downward from the horizontal direction.

[0040] The inclined surface 100a is provided so as to incline from midcourse in a short direction of the heat exchanger 25. Water drops falling from the heat exchanger 25 can thereby be led to the floor frame 8. As illustrated in FIG.5, an opening 11 is provided on the floor frame 8 near a position 25c where the spacer 100 is disposed, and drainage is therefore achieved smoothly.

[0041] A ratio of a length L 1 in a long direction of the inclined surface 100a and a length L2 in a long direction of the horizontal surface 100b in plan view is L1:L2 = about 1:3. By providing the inclined surface 100a and the horizontal surface 100b with such ratio, drainage of condensation from the heat exchanger 25 is promoted, and at the same time, there is no need for the lower end of the heat exchanger 25 to be inclined and the heat exchanger 25 can be easily mounted horizontally.

[0042] A drainage opening 101 is provided on a lower part of the spacer 100. The portion where the drainage opening 101 is provided is thinner than a thickness of the spacer 100, and water is therefore easily guided to the drainage opening 101.

[0043] The spacer 100 is furthermore provided with an extended part 102 extending diagonally upward from the

horizontal surface 100b. The heat exchanger 25 can be anchored by the extended part 102, an anti-vibration property is improved, and drainage is further promoted. The heat exchanger also can be prevented from contacting the upright portion of the floor frame when the heat exchanger is shifted by vibration.

[0044] A depression 103 is provided on a surface of the spacer 100 on an opposite side to the surface facing opposite the heat exchanger. A boss 26 (FIG. 5) provided on the floor frame 8 is inserted into the depression 103, and the position of the spacer 100 relative to the floor frame 8 is determined.

[0045] FIG. 9 illustrates a condition in which the outdoor heat exchanger 25 is mounted on the floor frame 8 via the spacer 100. FIG. 9 is a sectional view along IX-IX in FIG. 5. The spacer 100 is disposed in the position 25c where the spacer is disposed on the floor frame 8. The heat exchanger 25 is mounted on the spacer 100, with the horizontal surface 100b provided on the side of the spacer 100 opposite the surface facing opposite the floor frame 8 contacting with the lower end 25a of the bent part 25b of the heat exchanger 25 having the flat pipes 2 and the fins 4. The side face of the heat exchanger 25 is disposed so as to be prevented from directly contacting with the floor frame 8 by the extended part 102. The anti-vibration property of the heat exchanger can thereby be increased and water is effectively guided to the opening 11 of the floor frame 8.

[0046] Condensation from the heat exchanger 25 is guided along the water-guiding part 4a of the fin 4 to the spacer 100, and is guided by the inclined surface 100a to the floor frame 8. Because the drainage opening 101 on the spacer 100 is provided on a portion on a lower end of the fin 4, a portion of the condensation dripping on the horizontal surface 100b of the spacer 100 is guided to the floor frame 8 by the drainage opening 101.

(3) Features of the outdoor unit

[0047]

(3-1) The outdoor unit 20 of the air-conditioning apparatus 1 according to the present embodiment comprises a heat exchanger 25 made of aluminum or aluminum alloy, a floor frame 8 for mounting the heat exchanger 25, and a spacer 100 disposed between the heat exchanger 25 and the floor frame 8. The spacer 100 has an inclined surface 100a and a horizontal surface 100b. The inclined surface 100a guides condensation from the heat exchanger 25 to the floor frame 8. The horizontal surface 100b contacts with the heat exchanger 25 and mounts the heat exchanger 25 horizontally.

Here, by virtue of the fact that the surface of the spacer facing opposite the lower end of the heat exchanger is formed inclined from midcourse in a short direction of the heat exchanger, water drops falling from the heat exchanger can be guided to the floor frame and corrosion of the heat exchanger and leakage of refrigerant can be prevented. Furthermore, because the heat exchanger is mounted on the horizontal surface of the spacer, there is no need for the lower end of the heat exchanger to be formed inclined and the heat exchanger is easy to manufacture.

(3-2) In the outdoor unit 20 of the air-conditioning apparatus 1 of the present embodiment, the fin 4 has a water-guiding part 4a, and the inclined surface 100a is provided on an elongated portion of the water-guiding part 4a.

Here, condensation from the heat exchanger is guided along the water-guiding part to the spacer. Condensation is also guided from the inclined surface of the elongated portion of the water-guiding part, and corrosion of the heat exchanger and leakage of refrigerant are prevented.

(3-3) In the outdoor unit 20 of the air-conditioning apparatus 1 according to the present embodiment, a drainage opening 101 is provided on a lower part of the spacer 100.

Here, because water falling onto the spacer 100 from the heat exchanger 25 is guided to the floor frame 8 from the drainage opening 101 on the lower part of the spacer 100, corrosion of the heat exchanger 25 and leakage of refrigerant are prevented.

(3-4) In the outdoor unit 20 of the air-conditioning apparatus 1 according to the present embodiment, the spacer is disposed on a lower end of a bent part of the heat exchanger.

Here, because a place for the spacer can be secured while making the outdoor unit compact, corrosion of the heat exchanger and leakage of refrigerant are prevented.

(3-5) In the outdoor unit 20 of the air-conditioning apparatus 1 according to the present embodiment, an extended part extending diagonally upward from the horizontal surface is provided on the spacer.

Here, because condensation from the heat exchanger can be guided to the drainage structure more effectively by the extended part, corrosion of the heat exchanger and leakage of refrigerant are prevented.

(4) Modified example

[0048] A modified example of the present embodiment is presented below. A plurality of modified examples may be appropriately combined.

(4-1) Modified example A

[0049] Although the outdoor unit 20 illustrated in the above embodiment is used in an air-conditioning apparatus 1, the outdoor unit is not limited to this and may be used in another refrigeration apparatus.

INDUSTRIAL APPLICABILITY

[0050] According to the present invention as above, susceptibility to an effect of metal corrosion can be suppressed, and this is useful for an outdoor unit of a refrigeration apparatus.

REFERENCE SIGNS LIST

[0051]

2	Flat pipe
4	Fin
4a	Water-guiding part
61, 62	Header manifold
8	Floor frame
8b	Drain part (drain pan)
10	First drainage opening
11	Opening
20	Outdoor unit
25	Outdoor heat exchanger (heat exchanger)
25b	Bent part
35	Outdoor fan
50	Casing
51	Front plate
54	Left side plate
55	Right front plate
56	Right rear plate
57	Ceiling plate
58	Partitioning plate
60	Fan grill
100	Spacer
100a	Inclined surface
100b	Horizontal surface
101	Drainage opening
102	Extended part

CITATION LIST

PATENT LITERATURE

[0052] Patent document 1: Japanese Laid-open Patent Application No. 2010-151387

Claims

1. An outdoor unit of a refrigeration apparatus, comprising:

a heat exchanger (25) made of aluminum or aluminum alloy, the heat exchanger having a plurality of flat pipes (2), a header manifold (6) to which each of said flat pipes is connected, and a plurality of fins (4) joined to said flat pipes, heat exchange occurring between a fluid flowing inside said flat pipes and air flowing outside said flat pipes;

a floor frame (8) for mounting said heat exchanger; and

a spacer (100) disposed between said heat exchanger and said floor frame,

said spacer has an inclined surface (100a) for guiding condensation from said heat exchanger to said floor frame, and a horizontal surface (100b) with which said heat exchanger makes contact and on which said heat exchanger is horizontally mounted.

2. The outdoor unit according to claim 1, wherein:

said fin has a water-guiding part (4a), and said inclined surface is provided on an elongated portion of said water-guiding part.

3. The outdoor unit according to claim 1 or 2, wherein:

a drainage structure (101) is provided on a lower part of said spacer.

4. The outdoor unit according to any of claims 1 to 3, wherein:

said spacer is disposed on a lower end (25a) of a bent part (25b) of said heat exchanger.

5. The outdoor unit according to any of claims 1 to 4, wherein:

an extended part (102) extending diagonally upward from said horizontal surface is provided on said spacer.

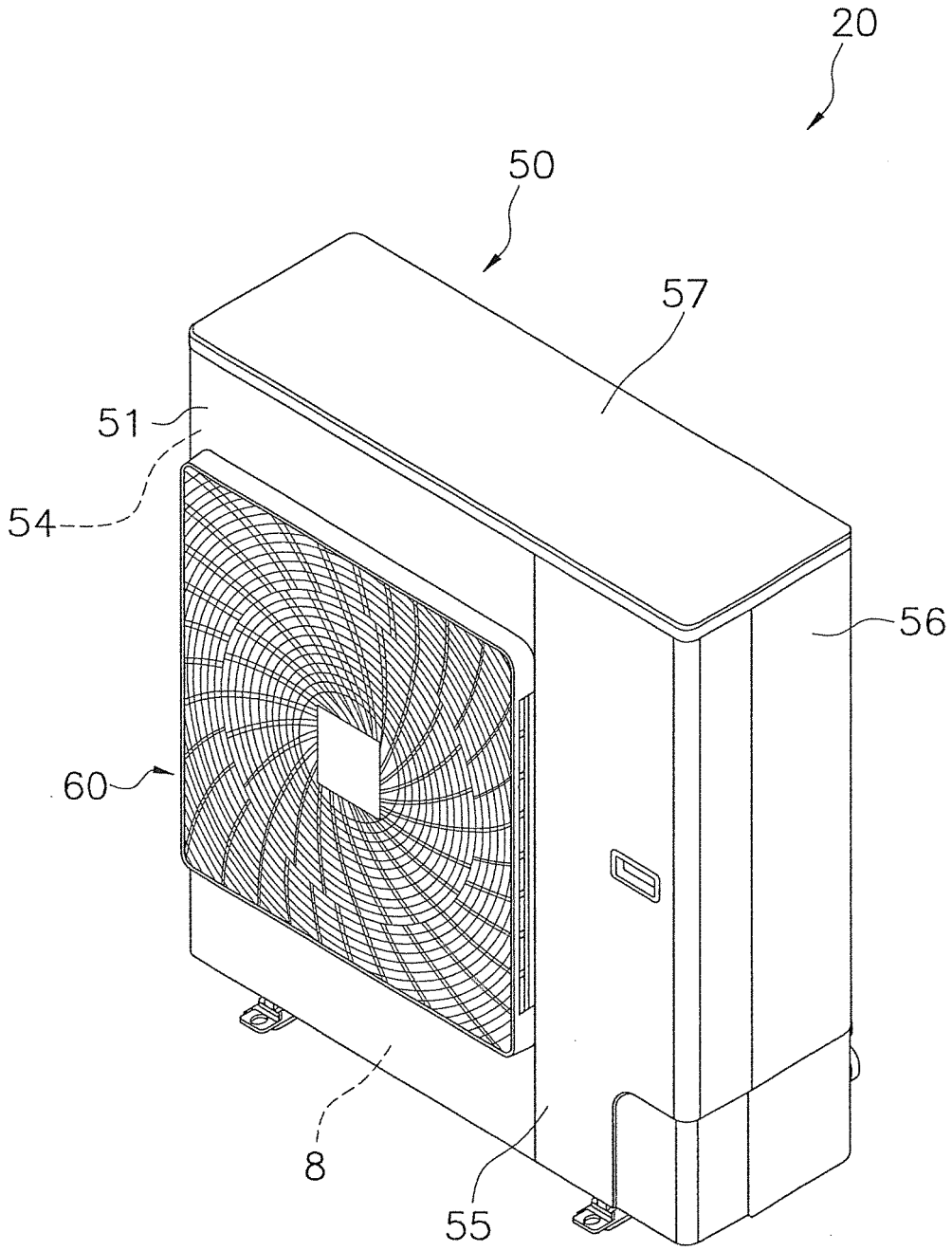


FIG. 1

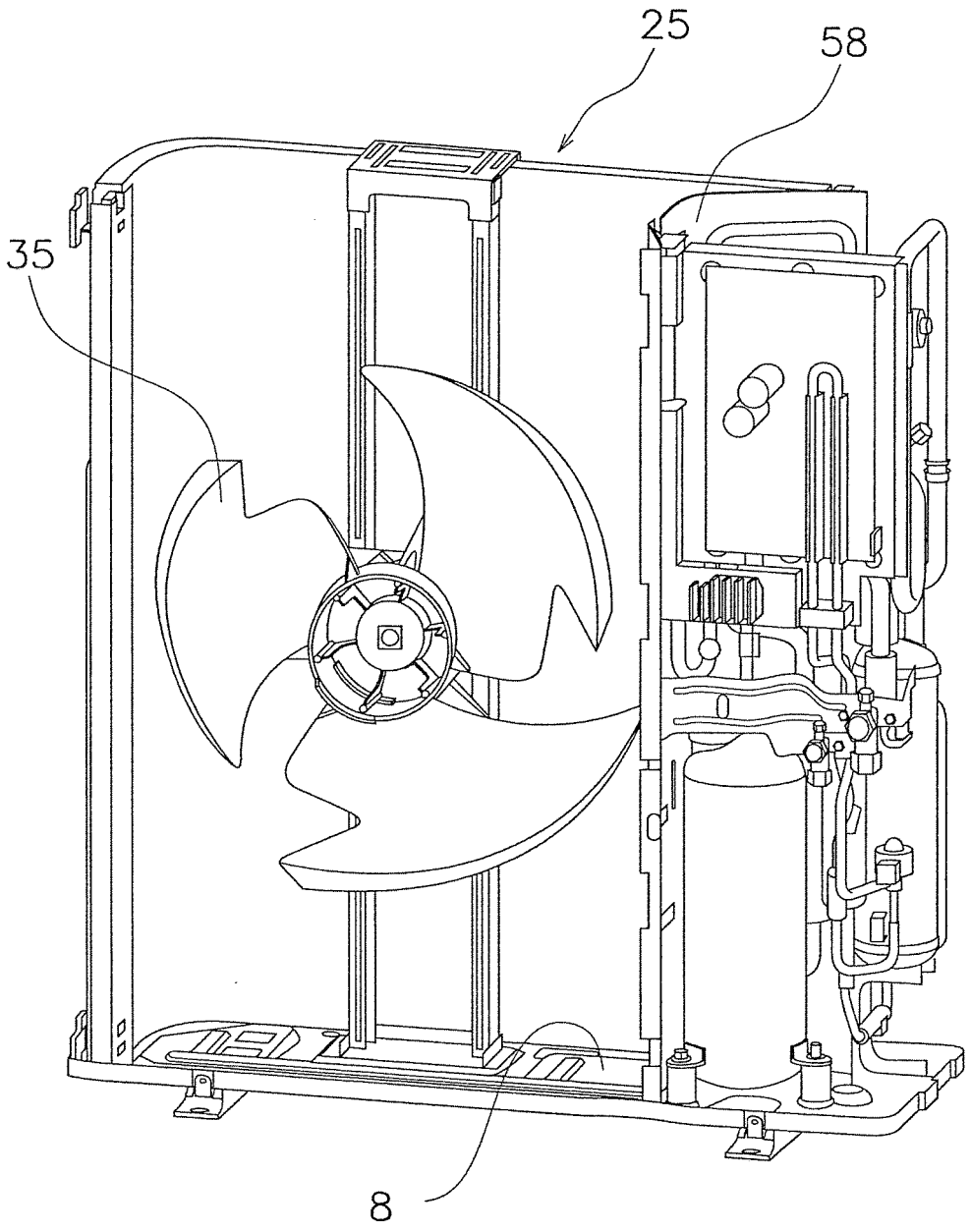


FIG. 2

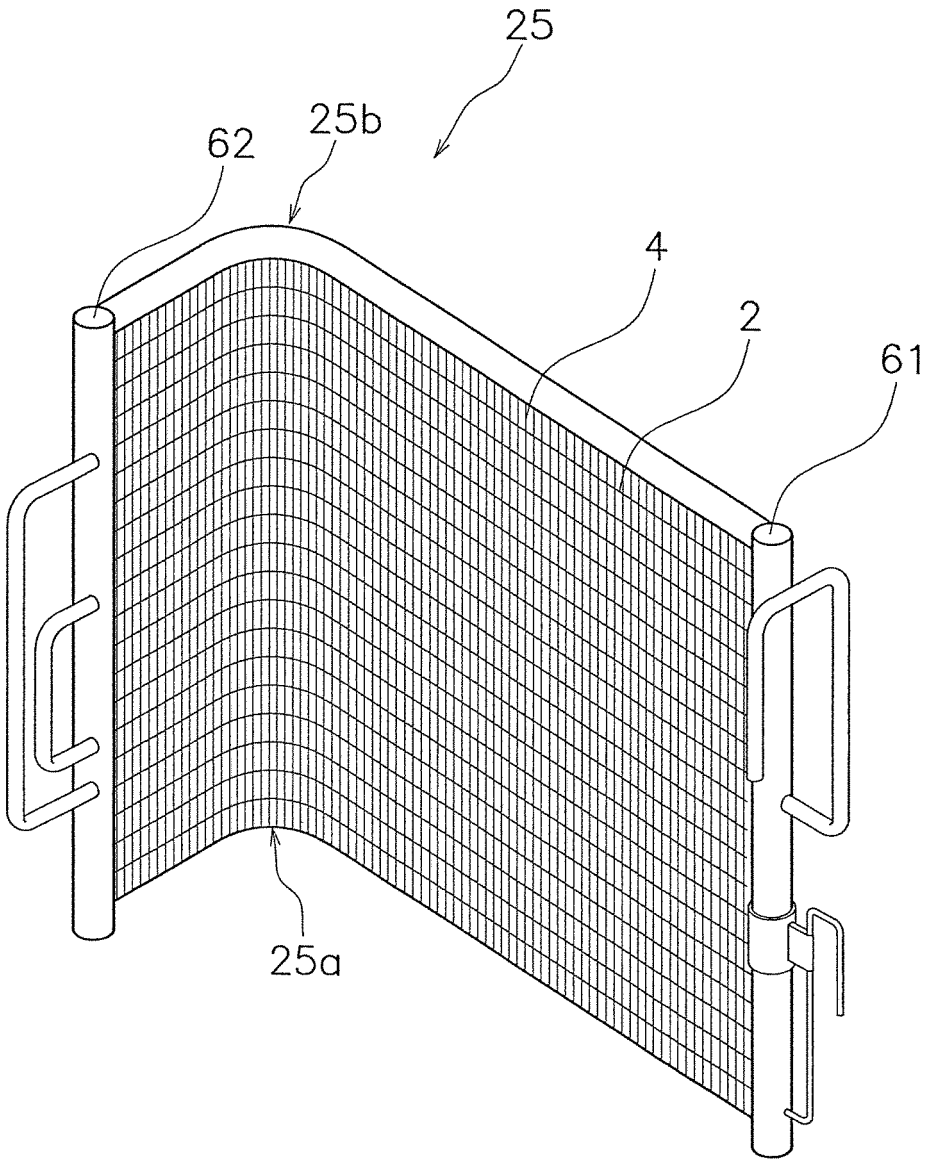


FIG. 3

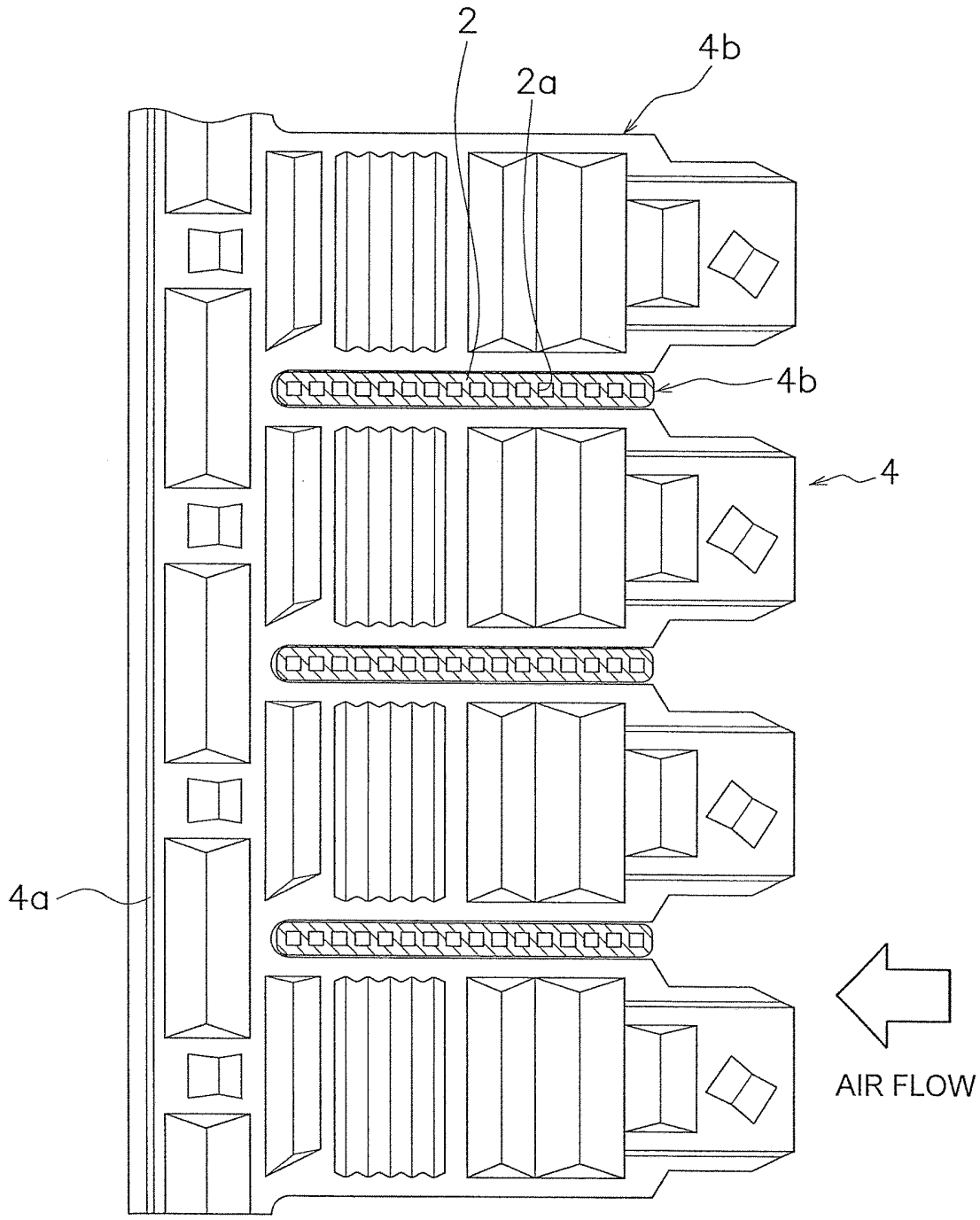


FIG. 4

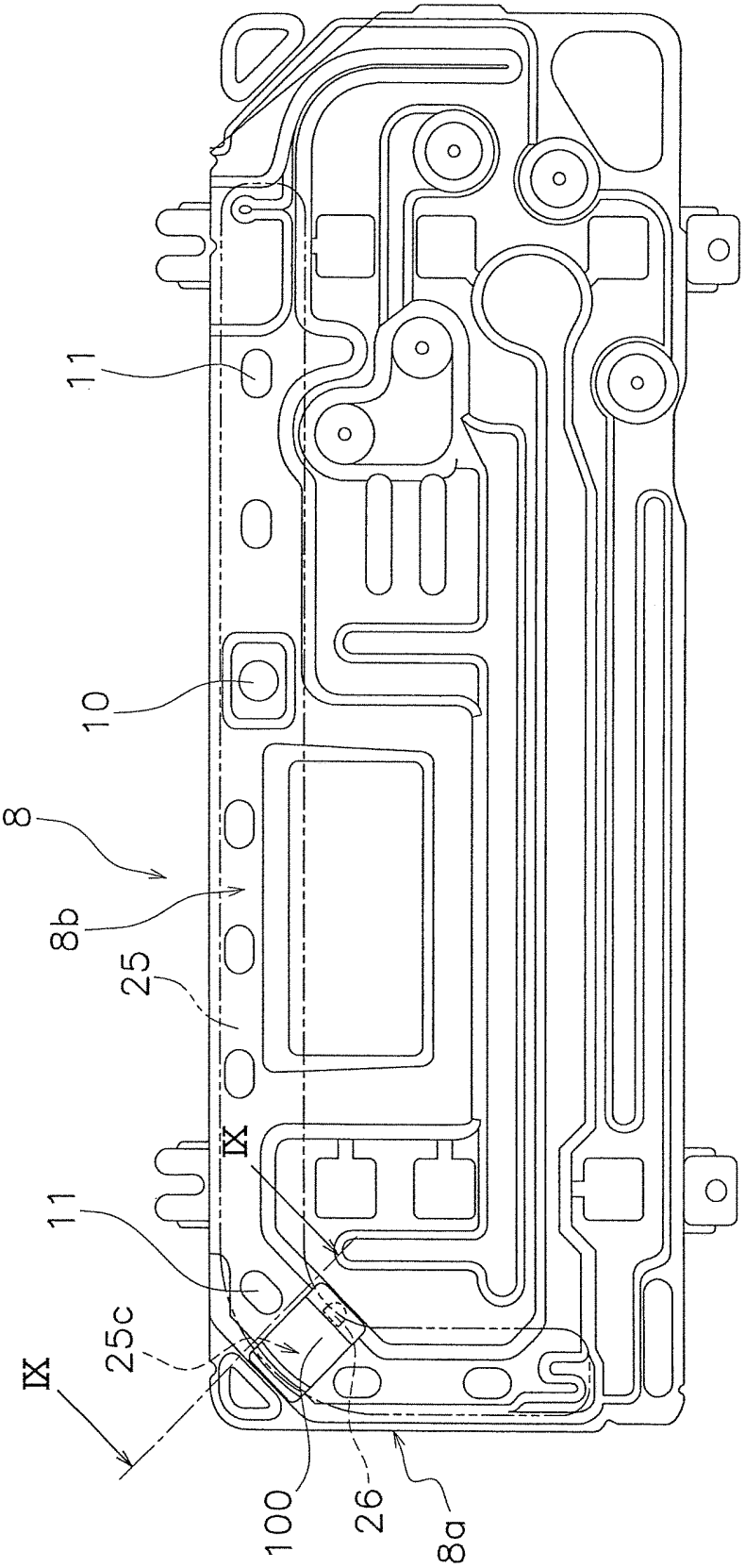


FIG. 5

FIG. 6

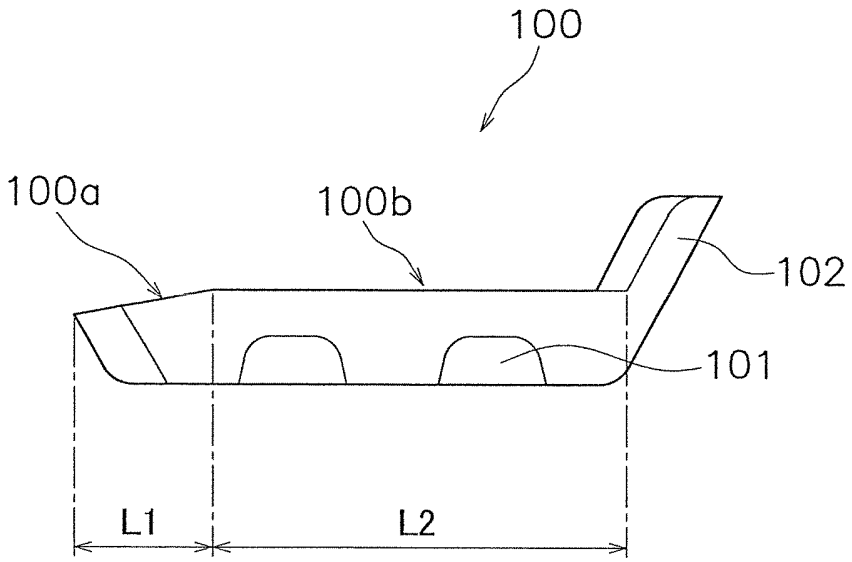
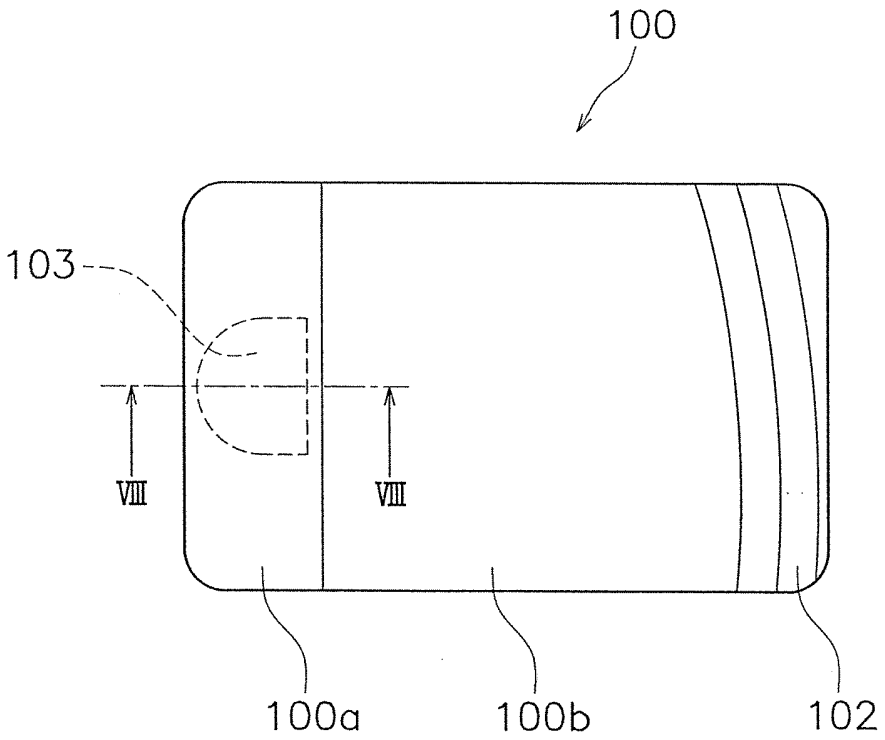


FIG. 7



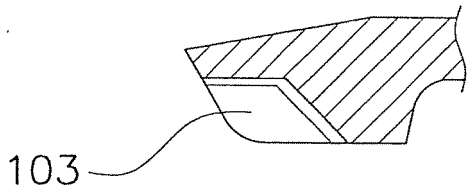


FIG. 8

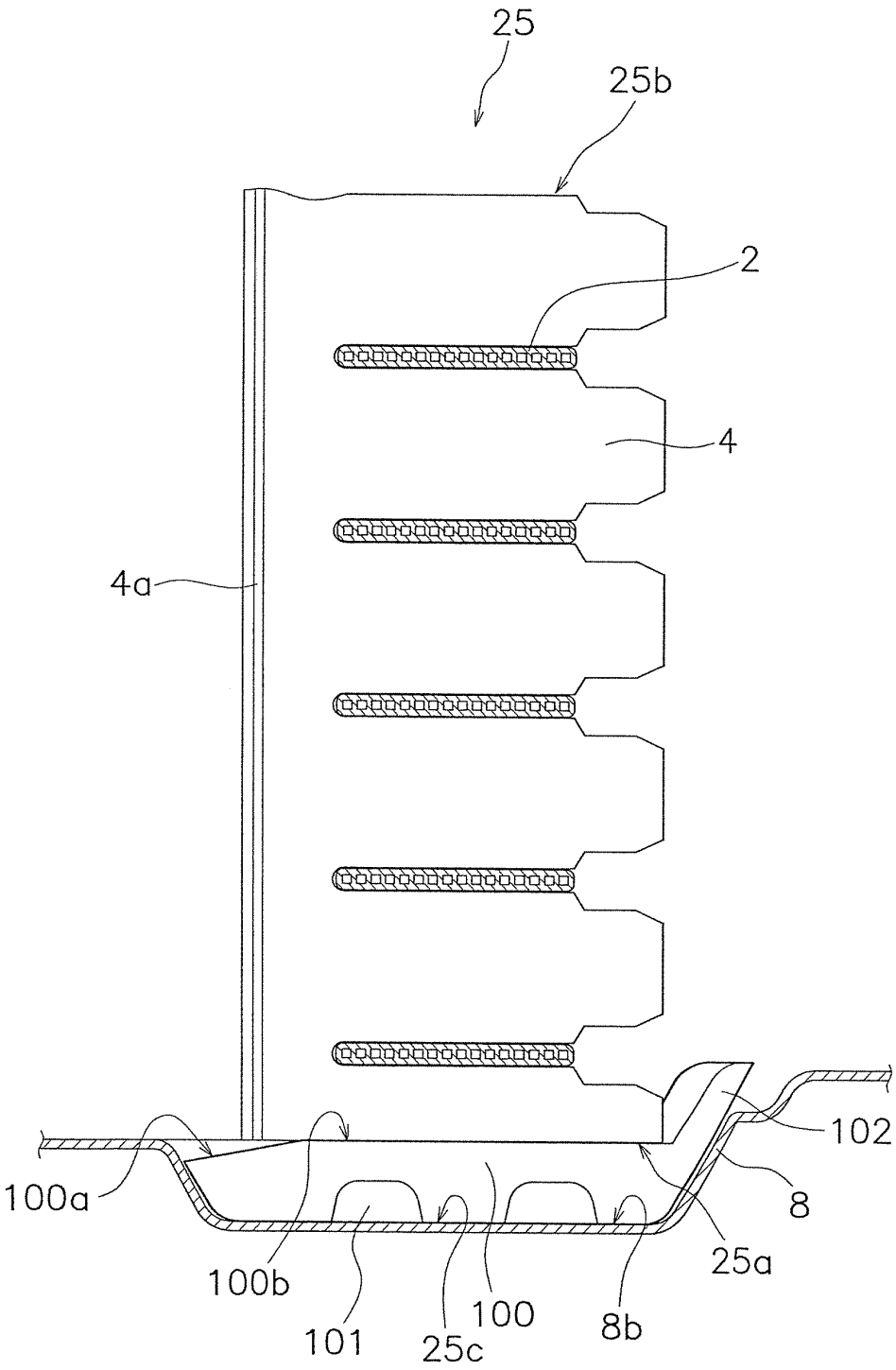


FIG. 9

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2012/083564

A. CLASSIFICATION OF SUBJECT MATTER
F24F1/36(2011.01)i, *F24F1/16*(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)
F24F1/36, F24F1/16

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 1996-2013
Kokai Jitsuyo Shinan Koho 1971-2013 Toroku Jitsuyo Shinan Koho 1994-2013

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.
Y	JP 2011-145029 A (Sharp Corp.), 28 July 2011 (28.07.2011), paragraphs [0023] to [0051]; fig. 1 to 7 (Family: none)	1-5
Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 168487/1981(Laid-open No. 071666/1983) (Sanyo Electric Co., Ltd.), 14 May 1983 (14.05.1983), page 1, line 12 to page 5, line 6; fig. 1 to 2 (Family: none)	1-5

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

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
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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
13 March, 2013 (13.03.13)	26 March, 2013 (26.03.13)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2012/083564

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 047776/1979(Laid-open No. 146970/1980) (Mitsubishi Electric Corp.), 22 October 1980 (22.10.1980), fig. 1 (Family: none)	1-5
Y	JP 2010-038486 A (Daikin Industries, Ltd.), 18 February 2010 (18.02.2010), fig. 4 (Family: none)	1-5
Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 092119/1989(Laid-open No. 031229/1991) (Daikin Industries, Ltd.), 27 March 1991 (27.03.1991), page 7, line 18 to page 10, line 14; fig. 1 to 8 (Family: none)	2-5
Y	JP 2007-285643 A (Asahi Kasei Homes Corp.), 01 November 2007 (01.11.2007), claims; paragraph [0049]; fig. 2, 3 (Family: none)	2-5
Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 106196/1983(Laid-open No. 014426/1985) (Kabushiki Kaisha General), 31 January 1985 (31.01.1985), page 1, line 9 to page 3, line 9; fig. 1, 2 (Family: none)	3-5
Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 035035/1991(Laid-open No. 129035/1992) (Hoshizaki Electric Co., Ltd.), 25 November 1992 (25.11.1992), paragraph [0004]; fig. 3 (Family: none)	4-5
Y	JP 2008-202889 A (Yanmar Co., Ltd.), 04 September 2008 (04.09.2008), paragraphs [0028] to [0030]; fig. 8, 9 (Family: none)	5

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2010151387 A **[0002] [0052]**