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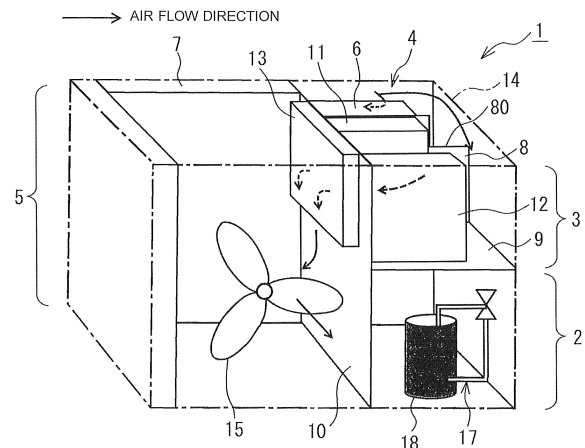
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(54) **OUTDOOR UNIT OF AIR CONDITIONER**

(57) In an outdoor unit for an air-conditioning apparatus, the outdoor unit includes a plurality of accommodating chambers that are respectively adjacent to each other, and the plurality of accommodating chambers are formed by partitioning a casing including an air inlet and an air outlet with partition plates. The plurality of accommodating chambers includes: a machine chamber in which a refrigerant circuit including a compressor is disposed; an electric component chamber in which an electric power board for driving the compressor and a control board for controlling the compressor are disposed; a ventilation chamber, in which a heat sink including a cooling fin is disposed, configured to suck external air through the air inlet of the casing; and a heat exchanger chamber in which a heat exchanger and a fan are disposed. A partition plate configured to partition between the ventilation chamber and the electric component chamber includes a ventilation passage configured to allow communication between the ventilation chamber and the electric component chamber.

FIG. 1



Description

Technical Field

[0001] The present invention relates to an outdoor unit for an air-conditioning apparatus, the outdoor unit having a function of enhancing a cooling capacity of cooling electric components that generate heat.

Background Art

[0002] Regarding an outdoor unit for an air-conditioning apparatus, typically, a configuration is known that the inside of a casing constituting the outline is partitioned by partition plates to include a plurality of chambers such as a machine chamber, an electric component chamber, and a ventilator chamber. In such an electric component chamber, electric components such as an electric power board for driving a compressor disposed in the machine chamber, and a control board for controlling a refrigerant circuit configured with a compressor and other devices are accommodated. The electric components generate heat while the air-conditioning apparatus is being driven. In a case where heat release is not enough and the electric components become too high in temperature, the boards may be damaged by expansion caused by heat, characteristics of the semiconductors may change, or components on the boards may be degraded. Hence, in the outdoor unit for the air-conditioning apparatus, various ventilation passages are designed to reduce the heat generation by the electric components.

[0003] For example, in Patent Literature 1, a ventilator chamber including propeller fans, and a machine chamber including an electric component box are partitioned by a partition plate. The machine chamber includes a compressor chamber including a compressor, and a ventilation passage chamber for allowing communication between the ventilator chamber and the outside. The compressor chamber and the ventilation passage chamber are partitioned by an electric component box having the top face on which a radiation fin is attached. In the electric component box, an electric power board for driving the compressor, for example, and a control board for controlling a refrigerant circuit are accommodated.

Citation List

Patent Literature

[0004] Patent Literature 1: Japanese Unexamined Utility Model Application Publication No. H6-35835

Summary of Invention

Technical Problem

[0005] In the configuration where the radiation fin is attached on the top face of the electric component box,

as is the case with the outdoor unit for the air-conditioning apparatus of Patent Literature 1, only electric components disposed near the top face of the electric component box in contact with the radiation fin can be cooled.

5 The electric components disposed at positions apart from the radiation fin cannot be cooled in a sufficient manner. That is, in the outdoor unit for the air-conditioning apparatus of Patent Literature 1, the entire electric component box cannot be cooled in a sufficient manner. Hence, releasing of heat that is generated from the electric components is not enough, and the electric components become too high in temperature. This may lead to a situation where the boards are damaged by expansion caused by heat, characteristics of the semiconductors change, or components on the boards are degraded.

10 **[0006]** The present invention has been made to address the above-described issue, and has an object to provide an outdoor unit for an air-conditioning apparatus to reduce the temperature of the entire electric component chamber in which an electric power board and a control board are disposed, so that electric components are cooled in a sufficient manner, and a degradation of the electric components is prevented.

Solution to Problem

25 **[0007]** In an outdoor unit for an air-conditioning apparatus, in one embodiment of the present invention, the outdoor unit includes a plurality of accommodating chambers that are respectively adjacent to each other, and the plurality of accommodating chambers are formed by partitioning a casing including an air inlet and an air outlet with partition plates. The plurality of accommodating chambers includes: a machine chamber in which a refrigerant circuit including a compressor is disposed; an electric component chamber in which an electric power board for driving the compressor and a control board for controlling the compressor are disposed; a ventilation chamber, in which a heat sink including a cooling fin is disposed, configured to suck external air through the air inlet of the casing; and a heat exchanger chamber in which a heat exchanger and a fan are disposed. A partition plate configured to partition between the ventilation chamber and the electric component chamber includes a ventilation passage configured to allow communication between the ventilation chamber and the electric component chamber.

Advantageous Effects of Invention

50 **[0008]** According to the outdoor unit for the air-conditioning apparatus, in one embodiment of the present invention, the ventilation passage configured to supply the external air that has been taken in from the ventilation chamber to the electric component chamber is arranged at the partition plate configured to partition between the ventilation chamber for taking in the external air through the air inlet and the electric component chamber includ-

ing the electric power board and the control board. Therefore, the wind that has flown into the electric component chamber cools the electric components that are separated from a heat sink and reduces the temperature of the entire electric component chamber, so that a degradation of the electric components is prevented.

Brief Description of Drawings

[0009]

[Fig. 1] Fig. 1 is a perspective diagram illustrating an inner structure of an outdoor unit for an air-conditioning apparatus, from a front face side, in one embodiment of the present invention.

[Fig. 2] Fig. 2 is a perspective diagram illustrating the inner structure of the outdoor unit for the air-conditioning apparatus, from a rear face side, in one embodiment of the present invention.

[Fig. 3] Fig. 3 is a plan view illustrating the inner structure of the outdoor unit for the air-conditioning apparatus, in one embodiment of the present invention.

[Fig. 4] Fig. 4 is a perspective view schematically illustrating a heat sink constituting the outdoor unit for the air-conditioning apparatus, in one embodiment of the present invention.

[Fig. 5] Fig. 5 is a perspective diagram schematically illustrating a duct constituting the outdoor unit for the air-conditioning apparatus, in one embodiment of the present invention.

Description of Embodiments

[0010] Hereinafter, embodiments of the present invention will be described with reference to the accompanying drawings. Note that in each of the drawings, identical or corresponding parts are applied with identical symbols and their descriptions will be omitted or simplified as appropriate. In addition, with regard to each configuration illustrated in each of the drawings, its shape, size, and arrangement can be changed as appropriate within the scope of the present invention.

Embodiments

[0011] Fig. 1 is a perspective diagram illustrating an inner structure of an outdoor unit for an air-conditioning apparatus, from a front face side, in one embodiment of the present invention. Fig. 2 is a perspective diagram illustrating the inner structure of the outdoor unit for the air-conditioning apparatus, from a rear face side, in one embodiment of the present invention. Fig. 3 is a plan view illustrating the inner structure of the outdoor unit for the air-conditioning apparatus, in one embodiment of the present invention. Note that, in Fig. 2, the inside of a machine chamber 2 is omitted.

[0012] As illustrated in Figs. 1 and 2, an outdoor unit 1 for the air-conditioning apparatus in the present em-

bodiment is configured with a casing 14 whose outline having a substantially rectangular parallelepiped shape. The casing 14 is configured by assembling an L-shaped front side face panel, a right side face panel, a bottom face panel, a top face panel, and a rear face panel. In the outdoor unit 1, as illustrated in Figs. 1 to 3, the inside of the casing 14 is partitioned by partition plates 8 to 10, each of which is made of a metal plate, so that the outdoor unit 1 includes a plurality of accommodating chambers adjacent to each other. Such accommodating chambers include four chambers that are the machine chamber 2, an electric component chamber 3, a ventilation chamber 4, and a heat exchanger chamber 5. Note that although not illustrated in detail, an air outlet formed in a circular shape, as an example, is arranged at the front side face panel. The air outlet is covered with a fan guard. Additionally, an air inlet for sucking external air into the ventilation chamber 4 is arranged at the rear face panel. To the air inlet, a louver 16 with inflow openings facing downward is attached. Note that the louver 16 has a configuration in which, as an example, slats each having a window blind shape facing downward are fixed in parallel to each other.

[0013] The machine chamber 2 and the heat exchanger chamber 5 are partitioned by a partition plate 10. The electric component chamber 3 and the ventilation chamber 4 are partitioned by a partition plate 9. In the machine chamber 2, a compressor 18 disposed on the bottom face panel of the casing 14, and a refrigerant circuit 17, in which a four-way valve, an expansion valve, an indoor unit and the like are connected by refrigerant pipes, are accommodated.

[0014] The electric component chamber 3 and the heat exchanger chamber 5 are partitioned by the partition plate 10, the electric component chamber 3 and the ventilation chamber 4 are partitioned by a partition plate 8, and the electric component chamber 3 and the machine chamber 2 are partitioned by a partition plate 9. In the electric component chamber 3, an electric power board 11, on which a power module, a semiconductor, a microcomputer, and other elements for an inverter are mounted, and a control board 12 for controlling the rotation speed, for example, of the compressor 18 are accommodated. The control board 12 is configured with, for example, hardware such as a circuit device to enable its functions or software to be executed on an arithmetic device such as a microcomputer or CPU. The electric power board 11 is assembled with a rear face side contacting the partition plate 8, which partitions between the ventilation chamber 4 and the electric component chamber 3. The control board 12 is arranged to be separated by a space S from the electric power board 11. The partition plate 10 has an opening for allowing communication between the electric component chamber 3 and the heat exchanger chamber 5 with the opening formed at a position of the gap of the space S.

[0015] The ventilation chamber 4 are partitioned off from the heat exchanger chamber 5 by the partition plate

10, are partitioned off from the electric component chamber 3 by the partition plate 8, and partitioned off from the machine chamber 2 by a partition plate 9. The external air is allowed to pass into the casing 14 through the air inlet (the louver 16) formed at the casing 14. In the ventilation chamber 4, as illustrated in Figs. 1 to 3, a heat sink 6 for cooling the electric power board 11 accommodated in the electric component chamber 3 is accommodated.

[0016] Fig. 4 is a perspective view schematically illustrating a heat sink included in the outdoor unit for the air-conditioning apparatus, in one embodiment of the present invention. The heat sink 6 is a metal plate made of aluminum, copper, or the like, with an excellent heat dissipation, and includes a base plate in a flat plate shape (not illustrated) and a plurality of standing cooling fins 61, which are spaced apart from each other, on the top face of base plate. The heat sink 6 is secured on the inside of a frame body 60 made of, for example, metal such as aluminum or copper, or resin. The frame body 60 including the heat sink 6 therein is attached to the partition plate 8 for partitioning between the electric component chamber 3 and the ventilation chamber 4. At a position facing the heat sink 6 through the partition plate 8, the electric power board 11 in the electric component chamber 3 is disposed.

[0017] In the frame body 60 of the heat sink 6, a heat sink inlet 6a, serving as an opening for sucking into the heat sink 6 the external air that has flown into the ventilation chamber 4, is formed at a position facing the louver 16. Additionally, in the frame body 60 of the heat sink 6, a heat sink outlet 6b, serving as an opening for discharging the air that has flown into the heat sink 6, is formed on a side face facing the heat exchanger chamber 5. That is, in the heat sink 6, the external air that has been sucked into the ventilation chamber 4 is taken from the louver 16 arranged on the side face of the casing 14 into the heat sink 6 through the heat sink inlet 6a, and is discharged from the heat sink 6 through heat sink outlet 6b. The heat sink 6 is configured such that the heat sink inlet 6a is arranged to face the louver 16. This configuration facilitates the external air that has flown from the louver 16 to be taken into the heat sink 6, and enhances a cooling effect.

[0018] The cooling fins 61 of the heat sink 6, as illustrated in Fig. 4, are horizontally arranged to be spaced apart from each other. This configuration minimizes resistance to the wind that has entered, and enhances the cooling effect, while ensuring the wind amount sufficiently. However, the cooling fins 61 are not limited to the configuration in which the cooling fins 61 are horizontally arranged, and may have another configuration with another arrangement.

[0019] In the partition plate 8, which partitions between the ventilation chamber 4 and the electric component chamber 3, a ventilation passage 80 for allowing communication between the ventilation chamber 4 and the electric component chamber 3 is formed. The ventilation

passage 80 is formed to supply the external air that has been sucked from the ventilation chamber 4 to the electric component chamber 3 through the ventilation passage 80. The ventilation passage 80 is formed as a rectangular cutout at a corner of an upper end of the partition plate 8. The reason why the ventilation passage 80 is formed at the corner of the upper end of the partition plate 8 is to prevent water droplets generated in the casing 14 from entering the electric component chamber 3. The water droplets drip downward because of gravity effects, and are not capable of passing over the ventilation passage 80. Therefore, in the outdoor unit 1, a certain amount of wind is allowed to flow into the electric component chamber 3 from the ventilation chamber 4 through the ventilation passage 80, to cool the electric power board 11 and the control board 12, and to prevent water droplets from entering the electric component chamber 3 in an effective manner. Note that the ventilation passage 80 may be formed near the upper end of the partition plate 8, but is not limited to being formed near the upper end, as illustrated. Additionally, the ventilation passage 80 is desirably formed near the upper end of the partition plate 8, but may be provided in a lower area of the partition plate 8. Furthermore, a plurality of ventilation passages 80 may be configured in parallel with each other. The ventilation passage 80 is not limited to a rectangular cutout, and may be, for example, a circular one. In brief, the ventilation passage 80 can allow communication between the electric component chamber 3 and the ventilation chamber 4 to allow the air in the ventilation chamber 4 to flow into the electric component chamber 3. The position, shape, and size of the ventilation passage 80 may be changed in consideration of a carried-out situation, as appropriate.

[0020] The heat exchanger chamber 5 is partitioned by the partition plate 10 from the machine chamber 2, the ventilation chamber 4, and the electric component chamber 3. In the heat exchanger chamber 5, an outdoor heat exchanger 7, an outdoor fan 15, and an outdoor fan motor (not illustrated) are accommodated. Additionally, in the heat exchanger chamber 5, a duct 13, for allowing communication between the heat exchanger chamber 5 and the ventilation chamber 4, and for allowing communication between the heat exchanger chamber 5 and the electric component chamber 3, is provided.

[0021] The outdoor heat exchanger 7, as illustrated in Fig. 3, has for example, a letter L shape in plan view, and is provided along a left side face part in the front side face panel and along the rear face panel. The outdoor fan 15 serves as an air-sending unit configured with, for example, a propeller fan, and generates air circulation for heat exchange in an effective manner. The outdoor fan 15 has a function of sucking the external air into the outdoor unit 1 from the rear face side of the outdoor unit 1, and blowing out the external air that has been sucked into the outdoor unit 1 towards the front face side of the outdoor unit 1. The outdoor fan motor serves as a driving unit configured to drive the outdoor fan 15, and is at-

tached to a support plate provided in the heat exchanger chamber 5 using securing means, for example, a screw.

[0022] Fig. 5 is a perspective diagram schematically illustrating a duct included in the outdoor unit for the air-conditioning apparatus, in one embodiment of the present invention. In Fig. 5, the duct 13 is illustrated when viewed from the rear face side. The duct 13 is provided for smoothly sucking wind from the ventilation chamber 4 and the electric component chamber 3 into the heat exchanger chamber 5. The duct 13, as illustrated in Figs. 1 to 3, is attached to the partition plate 10, and extends over the partition plate 8, which partitions between the ventilation chamber 4 and the electric component chamber 3. As illustrated in Fig. 5, a first duct inlet 13a in communication with the ventilation chamber 4 and a second duct inlet 13b in communication with the electric component chamber 3 are formed on the rear face of the duct 13. Also, the duct 13 includes an opening face facing downward on the heat exchanger chamber 5 side, as a duct outlet 13c for discharging the air that has flown into the duct 13.

[0023] The first duct inlet 13a in communication with the ventilation chamber 4 is in communication with the heat sink outlet 6b of the heat sink 6 accommodated in the ventilation chamber 4. The air that has been discharged from the heat sink outlet 6b flows from the first duct inlet 13a into the duct 13, and flows out of the duct outlet 13c into the heat exchanger chamber 5.

[0024] On the other hand, the second duct inlet 13b in communication with the electric component chamber 3 is arranged at a position of the gap defined between the electric power board 11 and the control board 12. The partition plate 10 has an opening in communication with the second duct inlet 13b with the opening formed in the partition plate 10 at a position of the gap. The air that has flown into the electric component chamber 3, cools the electric component chamber 3, then flows into the duct 13 from the second duct inlet 13b, and flows out of the duct outlet 13c into the heat exchanger chamber 5.

[0025] Here, based on Figs. 1 to 3, the flow of the air through the outdoor unit 1 will be described. In the outdoor unit 1 for the air-conditioning apparatus in the present embodiment, when the outdoor fan 15 accommodated in the heat exchanger chamber 5 rotates, the inside of the heat exchanger chamber 5 becomes negative in pressure. Hence, as illustrated in Fig. 2, the external air flows into the ventilation chamber 4 from the louver 16. The external air that has flown into the ventilation chamber 4 divides into air to flow into the heat sink 6, and air to flow into the electric component chamber 3 through the ventilation passage 80 formed at the partition plate 8, which partitions between the ventilation chamber 4 and the electric component chamber 3.

[0026] The air that flows into the heat sink 6 flows from the heat sink inlet 6a into a frame body 60. After passing through the plurality of cooling fins 61, the air flows out of the heat sink outlet 6b. The air flows into the heat sink 6, and therefore cools the electric power board 11 ac-

commodated in the electric component chamber 3. The air that has flown out of the heat sink outlet 6b flows from the first duct inlet 13a in communication with the heat sink outlet 6b into the duct 13. Then, the air changes its direction to flow downward in a vertical direction, and flows out of the duct outlet 13c into the heat exchanger chamber 5. After the air that has flown into the heat exchanger chamber 5 is subject to heat exchange with refrigerant through the outdoor heat exchanger 7, the air blows out of the outlet of the front side face panel by an outdoor fan 15.

[0027] On the other hand, the air that has flown into the electric component chamber 3 through the ventilation passage 80 formed at the partition plate 8 passes through the gap between the control board 12 and the electric power board 11, and flows into the duct 13 from the second duct inlet 13b in communication with the heat exchanger chamber 5. Then, the air changes its direction to flow downward in the vertical direction, and flows out of the duct outlet 13c into the heat exchanger chamber 5. Then, the air that has flown into the heat exchanger chamber 5 is subject to heat exchange with refrigerant through the outdoor heat exchanger 7. After the heat exchange is carried out between the refrigerant and the air, the air is blown out of the outlet of the front side face panel by the outdoor fan 15.

[0028] In the outdoor unit 1 for the air-conditioning apparatus in the present embodiment, the ventilation passage 80 for allowing communication between the ventilation chamber 4 and the electric component chamber 3 is formed at the partition plate 8, which partitions between the ventilation chamber 4 and the electric component chamber 3. Hence, the external air that has sucked by the ventilation chamber 4 is supplied through the ventilation passage 80 to the electric component chamber 3. Thus, in the outdoor unit 1, the air that has flown into the electric component chamber 3 is enabled to sufficiently cool the electrical components, such as the control board 12, separated from the heat sink 6 and having a high necessity to be cooled, so that the temperature of the entire electric component chamber 3 is reduced, and a degradation of the electrical components is prevented.

[0029] Additionally, in the outdoor unit 1, the heat sink 6 is disposed through the partition plate 8 to be adjacent to the electric power board 11 disposed in the electric component chamber 3. The control board 12 is spaced apart from the electric power board 11 by the space S. Thus, in the outdoor unit 1, the rear face side of the electric power board 11 is directly cooled by heat sink 6, and the front face side of the electric power board 11 facing the control board 12 is cooled by the air that has flown into the gap between the electric power board 11 and the control board 12. This configuration enhances the cooling effect of cooling the electric power board 11, which generates heat the most.

[0030] Further, in the outdoor unit 1, the ventilation chamber 4 and the electric component chamber 3 are partitioned from the machine chamber 2 by the partition

plate 9. The external air that has flown into the ventilation chamber 4 is not allowed to enter the machine chamber 2 having a low necessity to be cooled, but a large amount of wind is allowed to enter the electric component chamber 3 having a high necessity to be cooled. Thus, the cooling effect is enhanced. Moreover, in the outdoor unit 1, any sound that is generated in the machine chamber 2 is insulated by the partition plates 9 and 10, and is less likely to be transmitted to the outside from the louver 16. Hence, a noise prevention effect also works.

[0031] Additionally, in the outdoor unit 1, the partition plate 8 partitions between the electric component chamber 3 and the ventilation chamber 4, and therefore it becomes difficult for water droplets such as rain that has flown from the louver 16 hardly enter the electric component chamber 3. This configuration prevents corrosion of the electric components disposed in the electric component chamber 3, and maintains the quality.

[0032] Further, in the outdoor unit 1, the ventilation passage 80 is arranged near the upper part of the partition plate 8. Hence, even in a case where water droplets are generated in the inside of the outdoor unit 1, the water droplets that drip downward because of gravity effects do not pass over the ventilation passage 80. Thus, in the outdoor unit 1, air is allowed to flow into the electric component chamber 3 from the ventilation chamber 4 to cool the electric power board 11 and the control board 12. In addition, liquid is prevented from entering the electric component chamber 3 in an effective manner.

[0033] Further, in the outdoor unit 1, the duct 13 for allowing communication between the heat exchanger chamber 5 and the ventilation chamber 4, and for allowing communication between the heat exchanger chamber 5 and the electric component chamber 3 is provided with the opening face facing downward, on the heat exchanger chamber 5 side. Hence, for example, even at the time of a rainstorm, the rain that has entered from the outlet of the heat exchanger chamber 5 is prevented from entering the electric component chamber 3 through the duct 13. Thus, in the outdoor unit 1, the electric components that are accommodated in the electric component chamber 3 are prevented from corroding, and the quality is maintained. Also, in the outdoor unit 1, in a case where an outdoor fan 15 is arranged below the duct 13, an effect of readily sucking wind due to the negative pressure of the outdoor fan 15 into the inside works.

[0034] Further, in the outdoor unit 1, the heat sink 6 is arranged in the frame body 60 having an opening (the heat sink inlet 6a) at a position facing the inlet formed in the casing 14. Hence, the external air that has been sucked from the louver 16 is readily supplied into the inside through the opening, and the cooling effect is enhanced.

[0035] Further, in the outdoor unit 1, the cooling fins 61 of the heat sink 6 are arranged horizontally. This configuration minimizes resistance to the wind that has entered the frame body 60, secures a sufficient amount of wind, and enhances the cooling effect.

[0036] Further, in the outdoor unit 1, the louver 16 including inflow openings facing downward is provided at the inlet of the casing 14. This configuration makes it difficult for rain to enter the ventilation chamber 4 even at the time of a storm, and also prevents the rain from entering the electric component chamber 3. Accordingly, in the outdoor unit 1, the electric parts are prevented from corroding caused by entering of the rain, and the quality is maintained.

[0037] Heretofore, the present invention has been described based on the embodiments, but the present invention is not limited to the configurations in the above-described embodiments. For example, in each of the accommodating chambers, other than the members described above, different members may be accommodated. Additionally, the duct 13 may be provided individually for the ventilation chamber 4 and the electric component chamber 3. In brief, it is to be noted that various changes, applications, use ranges that are made as needed by so-called those skilled in the art are also included in subject matters (technical scope) of the present invention.

Reference Signs List

[0038]

1 outdoor unit, 2 machine chamber, 3 electric component chamber,
4 ventilation chamber, 5 heat exchanger chamber, 6 heat sink, 6a heat sink inlet, 6b heat sink outlet, 7 outdoor heat exchanger, 8, 9, 10 partition plate, 11 electric power board, 12 control board, 13 duct, 13a first duct inlet, 13b second duct inlet, 13c duct outlet, 14 casing, 15 outdoor fan, 16 louver, 17 refrigerant circuit, 18 compressor, 60 frame body, 61 cooling fin, 80 ventilation passage

Claims

1. An outdoor unit for an air-conditioning apparatus, comprising
a plurality of accommodating chambers that are respectively adjacent to each other, the plurality of accommodating chambers formed by partitioning a casing including an air inlet and an air outlet with a partition plate,
wherein the plurality of accommodating chambers includes
a machine chamber in which a refrigerant circuit including a compressor is disposed,
an electric component chamber in which an electric power board configured to drive the compressor and a control board configured to control the compressor are disposed,
a ventilation chamber, in which a heat sink including cooling fins is disposed, configured to suck external air through the air inlet of the casing, and

a heat exchanger chamber in which a heat exchanger and a fan are disposed, and wherein the partition plate configured to partition between the ventilation chamber and the electric component chamber includes a ventilation passage configured to allow communication between the ventilation chamber and the electric component chamber.

2. The outdoor unit for the air-conditioning apparatus of claim 1, wherein the heat sink is arranged to be adjacent to the electric power board disposed in the electric component chamber through the partition plate and wherein the control board is arranged to be spaced apart from the electric power board.
3. The outdoor unit for the air-conditioning apparatus of claims 1 or 2, wherein the ventilation passage is provided in a proximity of an upper end of the partition plate configured to partition between the ventilation chamber and the electric component chamber.
4. The outdoor unit for the air-conditioning apparatus of any one of claim 1 to claim 3, wherein the heat exchanger chamber includes a duct with an opening face facing downward on a heat exchanger chamber side, the duct being configured to allow communication between the heat exchanger chamber and the ventilation chamber, and to allow communication between the heat exchanger chamber and the electric component chamber.
5. The outdoor unit for the air-conditioning apparatus of any one of claim 1 to claim 4, wherein the heat sink is disposed in a frame body having an opening arranged at a position facing the air inlet of the casing.
6. The outdoor unit for the air-conditioning apparatus of any one of claim 1 to claim 5, wherein the cooling fins of the heat sink are arranged in a horizontal direction.
7. The outdoor unit for the air-conditioning apparatus of any one of claim 1 to claim 6, wherein a louver with an inflow opening facing downward is provided at the air inlet of the casing.

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FIG. 1

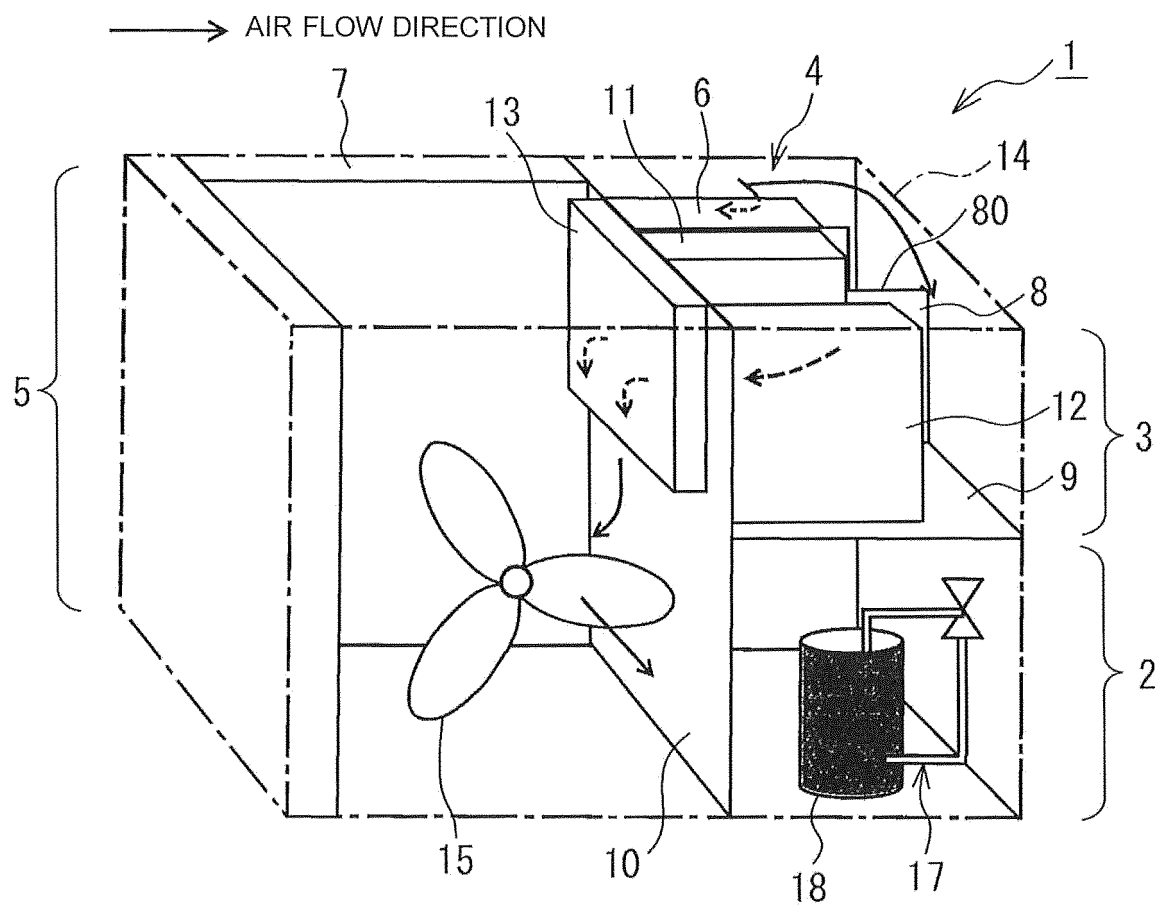


FIG. 4

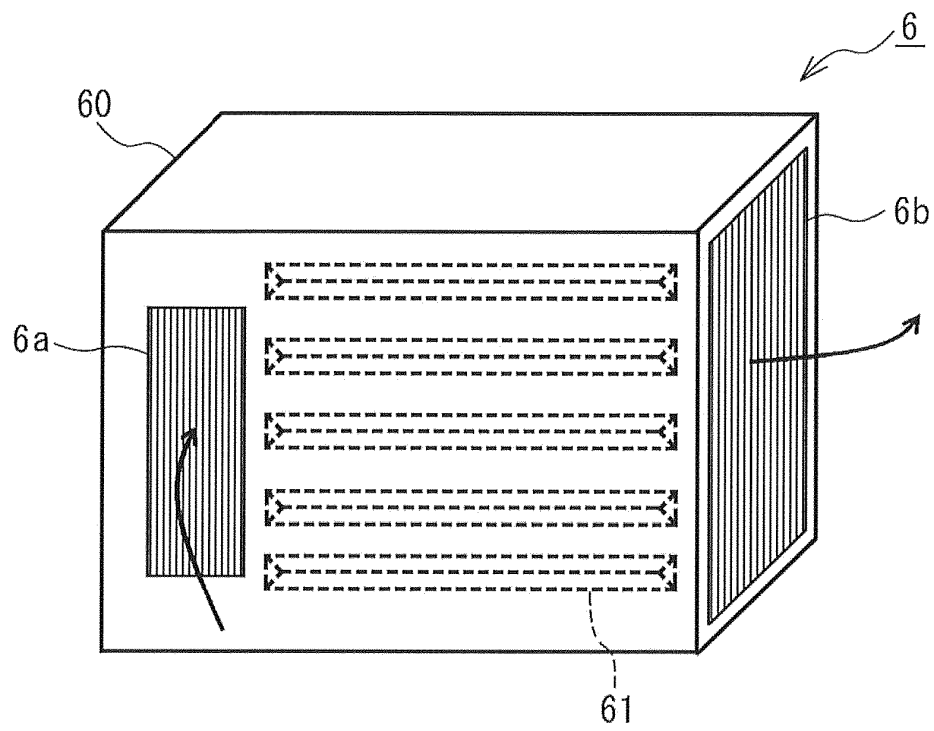
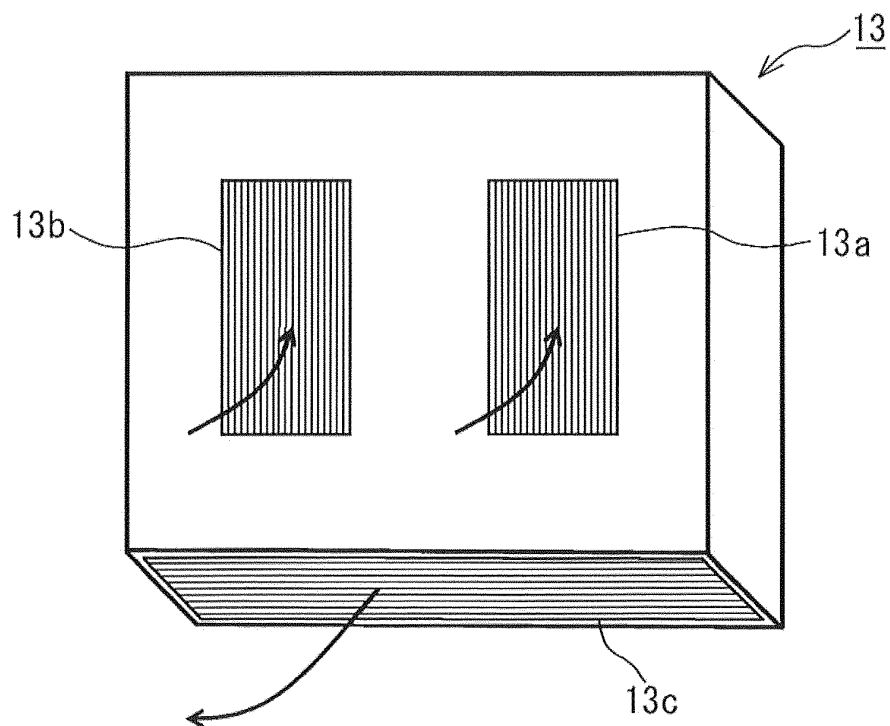


FIG. 5



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2016/078354

A. CLASSIFICATION OF SUBJECT MATTER

F24F1/24 (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)

F24F1/24

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	WO 2005/31219 A1 (Toshiba Carrier Corp.),	1-3
Y	07 April 2005 (07.04.2005),	6-7
A	paragraphs [0001] to [0033]; fig. 1	4-5
	& JP 4520412 B & JP 2010-169393 A	
	& EP 1684022 A1	
	paragraphs [0001] to [0033]; fig. 1	
	& KR 10-2006-0085636 A & CN 1860337 A	
Y	JP 2013-204935 A (Mitsubishi Electric Corp.),	6-7
	07 October 2013 (07.10.2013),	
	paragraph [0029]; fig. 6	
	& US 2013/0255298 A1	
	paragraph [0038]; fig. 6	
	& EP 2645017 A2 & CN 203177534 U	
	& KR 10-2013-0110049 A & CN 103363719 A	

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

* Special categories of cited documents:

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search
28 October 2016 (28.10.16)Date of mailing of the international search report
08 November 2016 (08.11.16)Name and mailing address of the ISA/
Japan Patent Office
3-4-3, Kasumigaseki, Chiyoda-ku,
Tokyo 100-8915, Japan

Authorized officer

Telephone No.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2016/078354

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 2006-125696 A (Sanyo Electric Co., Ltd.), 18 May 2006 (18.05.2006), paragraph [0025]; fig. 3, 6 (Family: none)	7
A	JP 2012-237533 A (Mitsubishi Electric Corp.), 06 December 2012 (06.12.2012), entire text; all drawings (Family: none)	1-7

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP H635835 B [0004]