(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 102 143 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
14.12.2022 Bulletin 2022/50

(21) Application number: **22175558.0**

(22) Date of filing: **25.05.2022**

(51) International Patent Classification (IPC):
F24F 1/56 *(2011.01)*

(52) Cooperative Patent Classification (CPC):
F24F 1/56

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **07.06.2021 JP 2021094850**

(71) Applicant: **Panasonic Intellectual Property Management Co., Ltd.**
Osaka-shi, Osaka 540-6207 (JP)

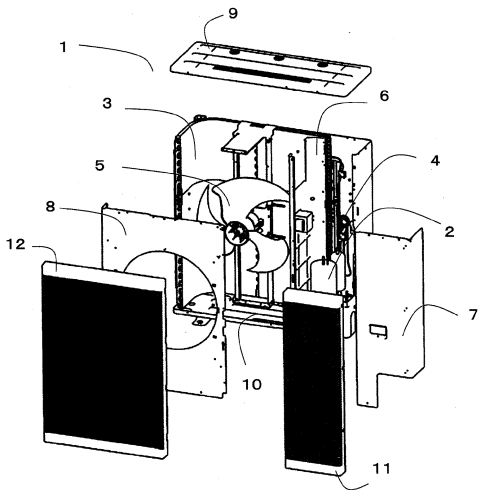
(72) Inventors:
- **MATSUNAMI, Yohei**
  Osaka-shi, Osaka, 540-6207 (JP)
- **KOBAYASHI, Tatsuhiro**
  Osaka-shi, Osaka, 540-6207 (JP)

(74) Representative: **Eisenführ Speiser**
Patentanwälte Rechtsanwälte PartGmbB
Postfach 31 02 60
80102 München (DE)

(54) HEAT PUMP HEAT SOURCE DEVICE

(57) A heat pump heat source device including: a refrigerant circuit 4 composed of at least a compressor 2 and a heat source-side heat exchanger 3; a blower 5 for generating air which exchanges heat with the heat source-side heat exchanger 3; a partition plate 6 for partitioning the compressor 2 and the blower 5 from each other; a first grill 11 for covering the compressor 2 from front; a second grill 12 which is placed in parallel to the first grill 11 and which covers the blower 5 from front; and a main body 1 provided with at least the compressor 2 and the blower 5 therein, wherein a portion where the first grill 11 is fastened to the main body 1 through fastening means is only a portion where the first grill 11 forms a ceiling surface and/or a side surface of the main body 1. According to this, a heat pump heat source device which is excellent in design and maintainability is provided.

[Fig. 1]



EP 4 102 143 A1

Description

[TECHNICAL FIELD]

[0001] The present disclosure relates to a heat pump heat source device.

[BACKGROUND TECHNIQUE]

[0002] Patent document 1 discloses a configuration of a heat pump hot water supply device having a refrigerant circuit and a hot water supply circuit therein, and the refrigerant circuit and the hot water supply circuit are covered with an exterior body.

[0003] There is a refrigerant circuit-side front plate in front of an evaporator of a refrigerant circulation circuit, and there is a hot water supply circuit-side front plate in front of the hot water supply circuit such as a hot water tank. The refrigerant circuit-side front plate and the hot water supply circuit-side front plate are different things, front surfaces of them are secured respectively through a screw, and they form the exterior body.

[PRIOR ART DOCUMENT]

[PATENT DOCUMENT]

[0004] [Patent Document 1] Japanese Patent Application Laid-open No.2005-337597

[SUMMARY OF THE INVENTION]

[PROBLEM TO BE SOLVED BY THE INVENTION]

[0005] The present disclosure provides a heat pump heat source device which is excellent in design and maintainability.

[MEANS FOR SOLVING THE PROBLEM]

[0006] A heat pump heat source device of the present disclosure includes: a refrigerant circuit composed of at least a compressor and a heat source-side heat exchanger; a blower for generating air which exchanges heat with the heat source-side heat exchanger ; a partition plate for partitioning the compressor and the blower from each other; a first grill for covering the compressor from front; a second grill which is placed in parallel to the first grill and which covers the blower from front; and a main body 1 provided with at least the compressor and the blower therein, wherein a portion where the first grill is fastened to the main body through fastening means is only a portion where the first grill forms a ceiling surface and/or a side surface of the main body.

[EFFECT OF THE INVENTION]

[0007] According to the disclosure, it is possible to provide a heat pump heat source device which is excellent in design and maintainability.

[BRIEF DESCRIPTION OF THE DRAWINGS]

[0008]

Fig. 1 is a development view of a heat pump heat source device in an embodiment of the present invention;
Fig. 2 is a perspective view of the heat pump heat source device;
Fig. 3 is another perspective view of the heat pump heat source device;
Fig. 4 is a front view of the heat pump heat source device;
Fig. 5(a) is an enlarged view of a portion A in Fig. 3, and Fig. 5(b) is an enlarged view of a portion B in Fig. 4;
Fig. 6(a) is an enlarged view of a portion C in Fig. 4, and Fig. 6(b) is an enlarged view of a portion D in Fig. 4; and
Fig. 7 is an overall view of the heat pump heat source device.

[MODE FOR CARRYING OUT THE INVENTION]

[0009] An embodiment will be described in detail below with reference to the drawings. Description which is detail more than necessary will be omitted in some cases. For example, detailed description of already well known matters, or redundant description of substantially the same configuration will be omitted in some cases.

[0010] The accompanying drawing and the following description are provided so that a person skilled in the art can sufficiently understand the present disclosure, and it is not intended that they limit the subject matter described in claims.

[1-1. Configuration]

[0011] Fig. 1 is a development view of a heat pump heat source device in an embodiment of the present invention, Fig. 2 is a perspective view of the heat pump heat source device, and Fig. 3 is another perspective view of the heat pump heat source device.

[0012] Fig. 4 is a front view of the heat pump heat source device in the embodiment, Fig. 5(a) is an enlarged view of a portion A in Fig. 3, and Fig. 5(b) is an enlarged view of a portion B in Fig. 4.

[0013] Further, Fig. 6(a) is an enlarged view of a portion C in Fig. 4, Fig. 6(b) is an enlarged view of a portion D in Fig. 4, and Fig. 7 is an overall view of the heat pump heat source device of the embodiment.

[0014] A configuration of the heat pump heat source device of the embodiment will be described below based on Figs. 1 to 7.

[0015] The heat pump heat source device in the em-

bodiment is an outdoor unit including at least a compressor 2 and a heat source-side heat exchanger 3 of a refrigerant circuit 4 which is composed of the compressor 2, a radiator (not shown), a decompressor (not shown) and the heat source-side heat exchanger 3, and a blower 5 for generating air which exchanges heat with heat source-side heat exchanger 3.

[0016] The compressor 2 and the blower 5 are placed horizontally in parallel on a bottom plate 10 in a main body 1 of the outdoor unit. The heat source-side heat exchanger 3 is placed at least in the rear of the blower 5. A top plate 9 is provided above the compressor 2 and the blower 5. The blower 5 is composed of a motor and a propeller fan.

[0017] A partition plate 6 is provided to partition the compressor 2 and the blower 5 from each other, i.e., to partition the compressor 2 and the blower 5 from each other in the horizontal direction. A blast room where the blower 5 is placed and a machine room where the compressor 2 is placed are formed.

[0018] A compressor-side casing 7 covering the compressor 2 from front and a blower-side casing 8 covering the blower 5 from front and having a blast port are placed in parallel in the horizontal direction.

[0019] A lattice-shaped first grill 11 is provided outside the compressor-side casing 7. The first grill 11 is a casing on the side of the compressor 2.

[0020] A lattice-shaped second grill 12 is provided outside the blower-side casing 8. The second grill 12 is a casing on the side of the blower 5. The second grill 12 has ventilating performance.

[0021] The first grill 11 and the second grill 12 are placed in adjacent to each other in parallel in the horizontal direction. The first grill 11 and the second grill 12 form a front surface of the main body 1.

[0022] Figs. 5(a), 5(b), 6(a) and 6(b) respectively show enlarged views of a portion A in Fig. 3, a portion B in Fig. 4, a portion C in Fig. 4 and a portion D in Fig. 4.

[0023] In Figs. 4, 5(a) and 5(b), a plurality of projections 11a which are engaging portions are provided on a side surface of the first grill 11 which is in contact with the second grill 12. A plurality of inserting portions 12a which are engaged portions are provided on a side surface of the second grill 12 which is in contact with the first grill 11.

[0024] In Fig. 6(a), a plurality of L-shaped fixing portions 12b are provided on an outer surface of the compressor-side casing 7 on the inner side of the first grill 11. Thread portions 12c which are threaded are provided in projecting sides of the L-shaped fixing portions 12b.

[0025] In Fig. 6(b), a plurality of penetrating portions 11b are provided only on a portion (side surface) where the first grill 11 forms a side surface of the main body 1.

[0026] Next, attaching and detaching configurations of the first grill 11 will be described based on Figs. 3 to 7.

[0027] The projections 11a which are the engaging portions provided on the side surface of the first grill 11 are inserted into the inserting portions 12a which are engaged portions provided on the side surface of the second grill 12. According to this, by bringing the first grill 11 close to the second grill 12, the first grill 11 is temporarily fixed to the main body 1.

[0028] At that time, positions of the plurality of thread portions 12c provided on the projecting sides of the plurality of L-shaped fixing portions 12b provided on the compressor-side casing 7 and positions of the plurality of penetrating portions 11b provided on the first grill 11 coincide with each other. Therefore, by fixing the thread portions 12c and the penetrating portions 11b to each other by fastening means such as screws, it is possible to easily attach the first grill 11 to the second grill 12.

[0029] When the first grill 11 is detached from the second grill 12, the fastening means is detached and the first grill 11 is separated from the second grill 12. According to this, the first grill 11 can easily be detached from the second grill 12.

[0030] That is, portions (penetrating portions 11b) where the first grill 11 is fastened by the fastening means are only a portion (side surface) where the first grill 11 forms the side surface of the main body 1.

[0031] The inserting portions 12a which are the engaged portions may be provided on the bottom plate 10, and the penetrating portions 11b may be provided only on the portion where the first grill 11 forms a ceiling surface of the main body 1.

[0032] The penetrating portions 11b may be provided on both the portion where the first grill 11 forms the ceiling surface of the main body and the portion where the first grill 11 forms the side surface of the main body 1.

[1-2. Effect and the like]

[0033] In the embodiment, as described above, the heat pump heat source device includes at least the compressor 2, the refrigerant circuit 4 composed of the heat source-side heat exchanger 3, the blower 5 for generating air which exchanges heat with the heat source-side heat exchanger 3, the partition plate 6 which partitions the compressor 2 and the blower 5 from each other, the first grill 11 which covers the compressor 2 from front, the second grill 12 which is placed in parallel to the first grill 11 and which covers the blower 5 from front, and the main body 1 provided therein with at least the compressor 2 and the blower 5, and the portion where the first grill 11 is fastened to the main body 1 by the fastening means is only the portion where the first grill 11 forms the ceiling surface and/or the side surface of the main body 1.

[0034] According to this, the portion which is fastened by the fastening means is not provided on the front surface of the main body 1. Therefore, it is possible to provide the heat pump heat source device which is excellent in design.

[0035] When maintenance is necessary, the first grill 11 can be detached from the main body 1 only by detaching the fastening means of the first grill 11. Therefore, it is possible to provide the heat pump heat source device which is excellent in maintainability.

[0036] The engaging portions 11a are provided on the side surface of the first grill 11, and the engaged portions 12a are provided on the side surface of the second grill 12.

[0037] According to this, the first grill 11 and the second grill 12 which form a front surface of the main body 1 and which are placed in parallel to each other can be placed in adjacent to each other without a gap. Therefore, it is possible to provide the heat pump heat source device which is excellent in design.

[0038] Further, since fastening means is not used to support the first grill 11 on the second grill 12, it is possible to easily detach the first grill 11 from the main body 1. Therefore, it is possible to provide the heat pump heat source device which is excellent in maintainability.

[0039] When maintenance in the machine room where the compressor 2 and the like are placed is carried out, it is only necessary to detach only the first grill 11, and it is unnecessary to detach the second grill 12. Therefore, it is possible to provide the heat pump heat source device which is excellent in maintainability.

[0040] Further, when maintenance in the machine room where the compressor 2 and the like are placed is carried out while operating or test-operating the heat pump heat source device, the propeller fan of the blower 5 is rotating, but the second grill 12 is attached. Therefore, the propeller fan of the blower 5 is guarded, and it is possible to provide a safe heat pump heat source device.

[0041] The compressor-side casing 7 is provided on the inner side of the first grill 11. The compressor-side casing 7 covers the compressor 2 from front and the outer surface of the compressor-side casing 7 has the fixing portions 12b. The fixing portions 12b and the portion where the first grill 11 forms the ceiling surface and/or the side surface of the main body 1 are fastened to each other through the fastening means.

[0042] According to this, the portion which is fastened by the fastening means is not provided on the front surface of the main body 1. Therefore, it is possible to provide the heat pump heat source device which is excellent in design.

[0043] Further, a front portion of the compressor 2 is of a double-casing structure. Therefore, it is possible to provide a heat pump heat source device which can reduce vibration and noise.

[INDUSTRIAL APPLICABILITY]

[0044] The present disclosure can provide a heat pump heat source device which is excellent in design and maintainability. Therefore, the present invention is useful especially in a heat pump hot water supply device and a heat pump type hydronic heater.

[EXPLANATION OF SYMBOLS]

[0045]

1	main body
2	compressor
3	heat source-side heat exchanger
4	refrigerant circuit
5	blower
6	partition plate
7	compressor-side casing
8	blower-side casing
9	top plate
10	bottom plate
11	first grill
11a	projections (engaging portions)
11b	penetrating portions
12	second grill
12a	inserting portions (engaged portions)
12b	fixing portions
12c	thread portion

Claims

1. A heat pump heat source device comprising:

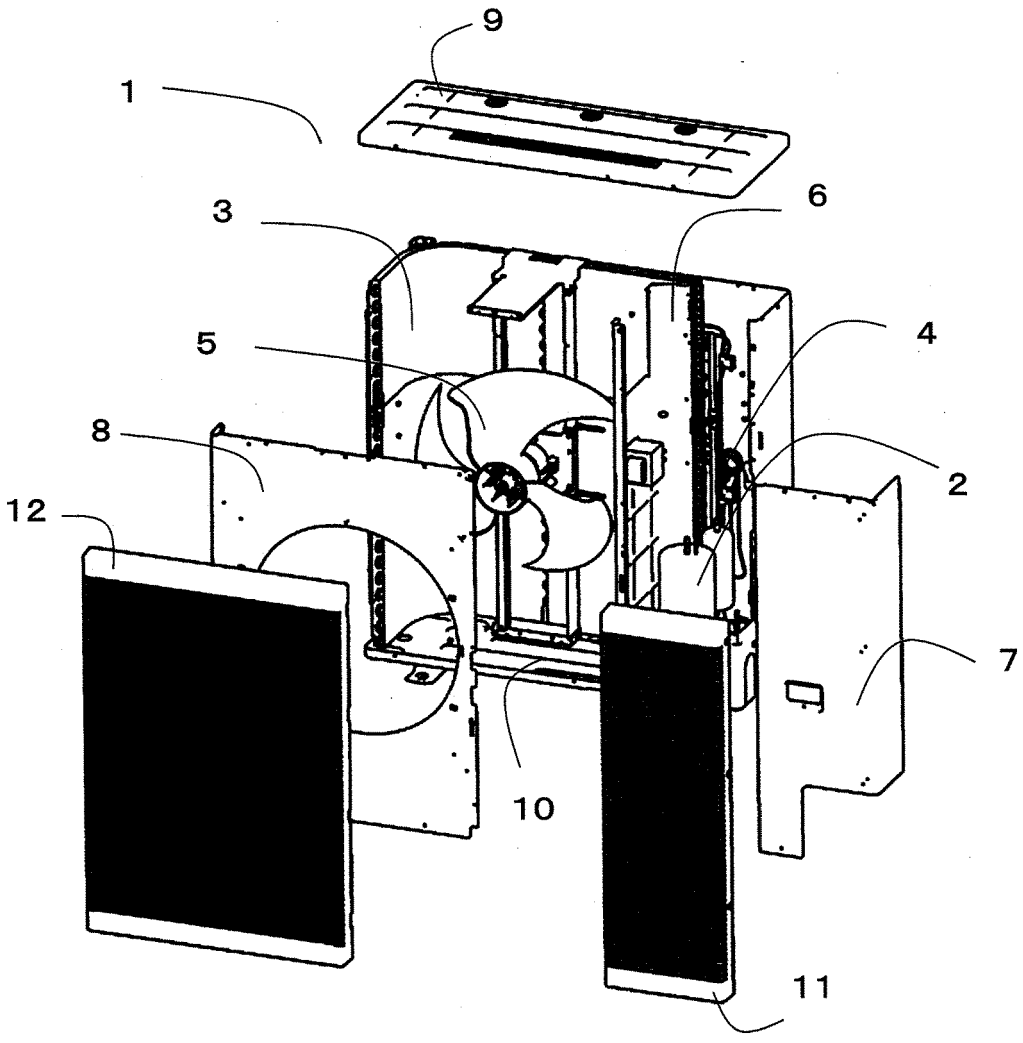
a refrigerant circuit (4) composed of at least a compressor (2) and a heat source-side heat exchanger (3);
a blower (5) for generating air which exchanges heat with the heat source-side heat exchanger (3);
a partition plate (6) for partitioning the compressor (2) and the blower (5) from each other;
a first grill (11) for covering the compressor (2) from front;
a second grill (12) which is placed in parallel to the first grill (11) and which covers the blower (5) from front; and
a main body (1) provided with at least the compressor (2) and the blower (5) therein, wherein
a portion where the first grill (11) is fastened to the main body (1) through fastening means is only a portion where the first grill (11) forms a ceiling surface and/or a side surface of the main body (1).

2. The heat pump heat source device according to claim 1, wherein
an engaging portion (11a) is provided on a side surface of the first grill (11), and an engaged portion (12a) is provided on a side surface of the second grill (12) .

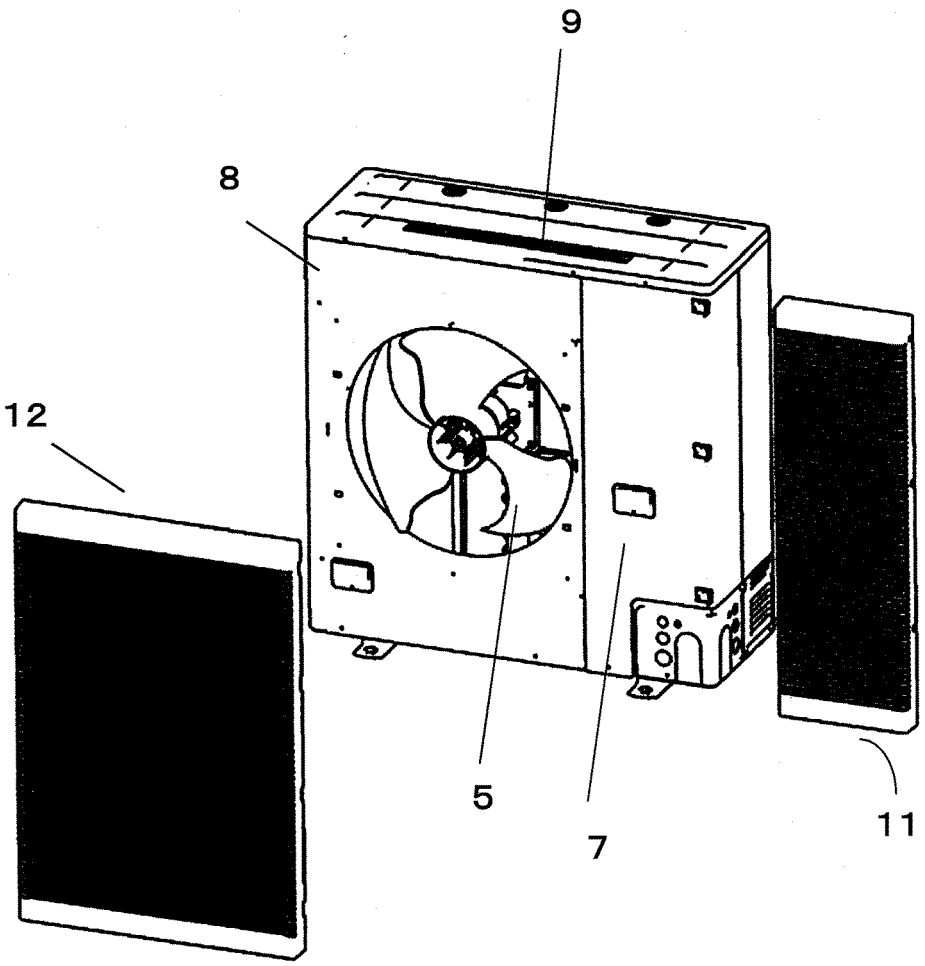
3. The heat pump heat source device according to claim 1 or 2, wherein
a compressor-side casing (7) which covers the compressor (2) from front is provided on an inner side of the first grill (11), an outer surface of the compressor-side casing (7) includes a fixing portion (12b), the fixing portion (12b) and the portion which forms the

ceiling surface and/or the side surface of the main body (1) of the first grill (11) are fastened to each other through the fastening means.

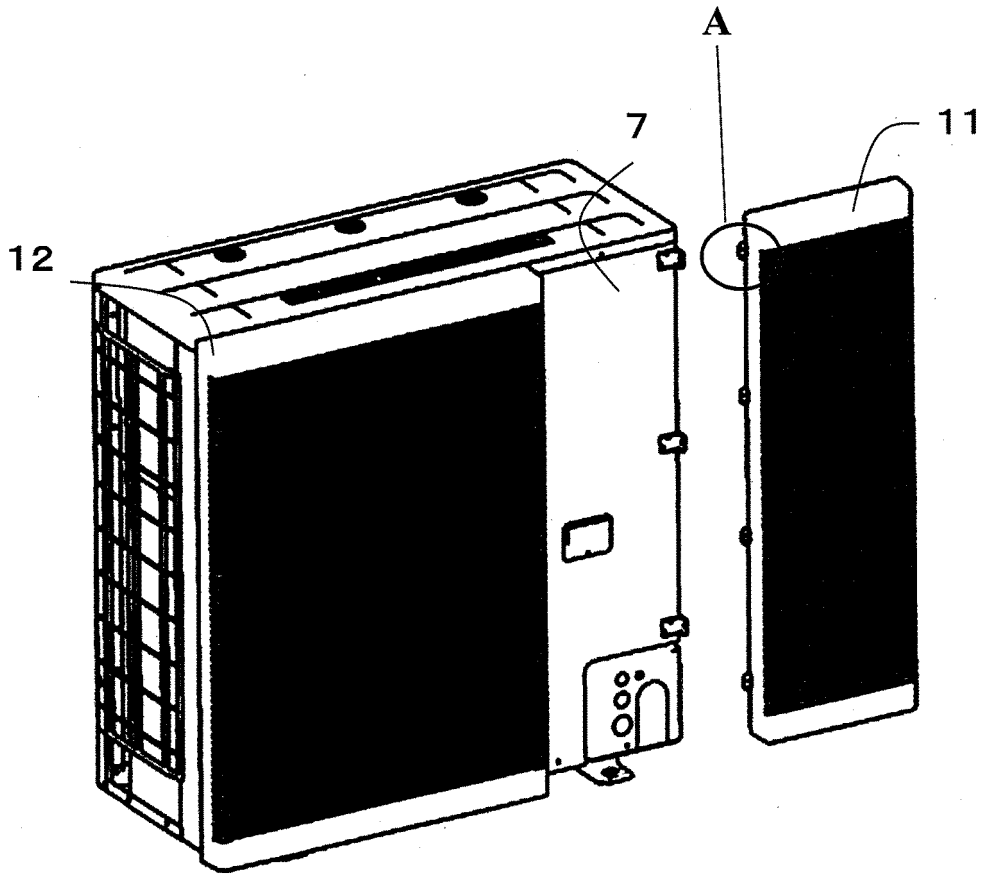
[Fig. 1]



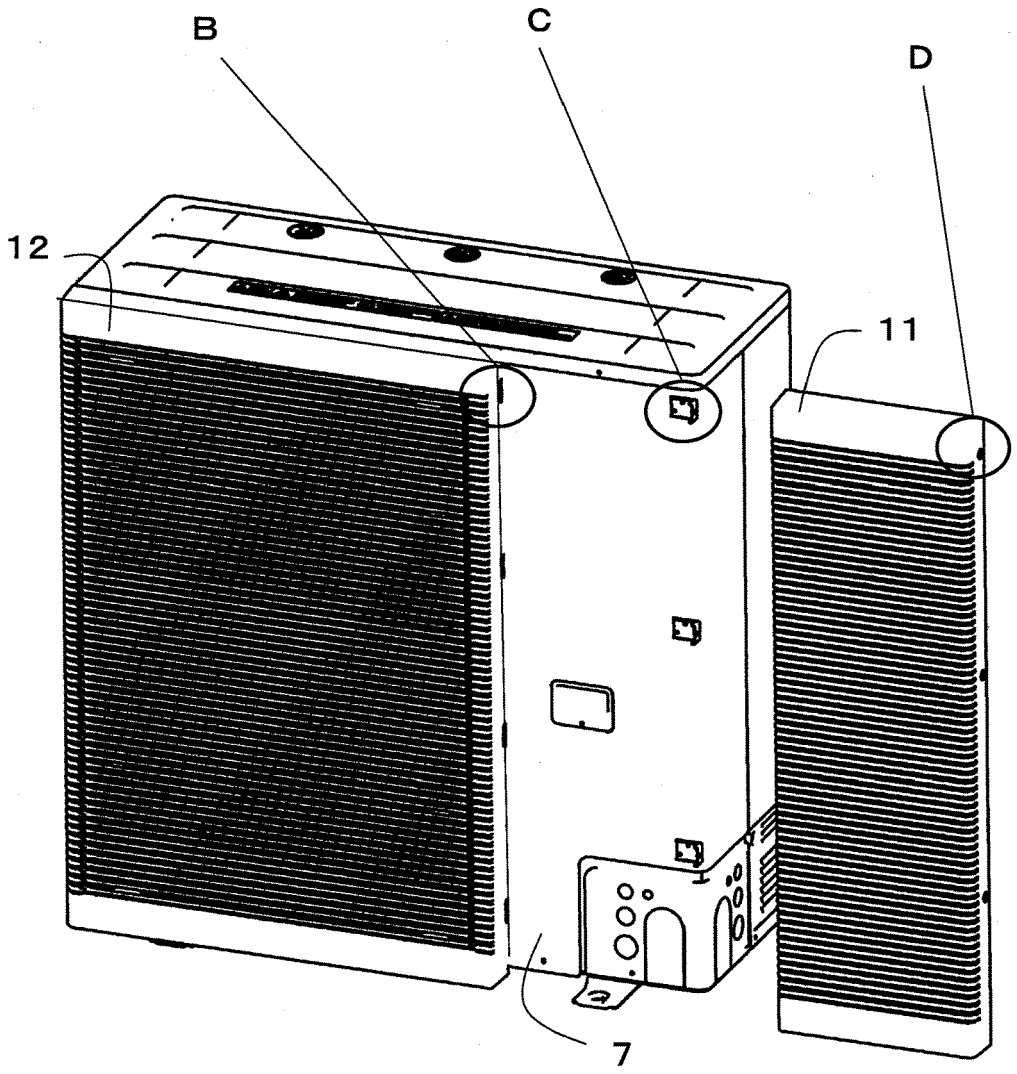
[Fig. 2]



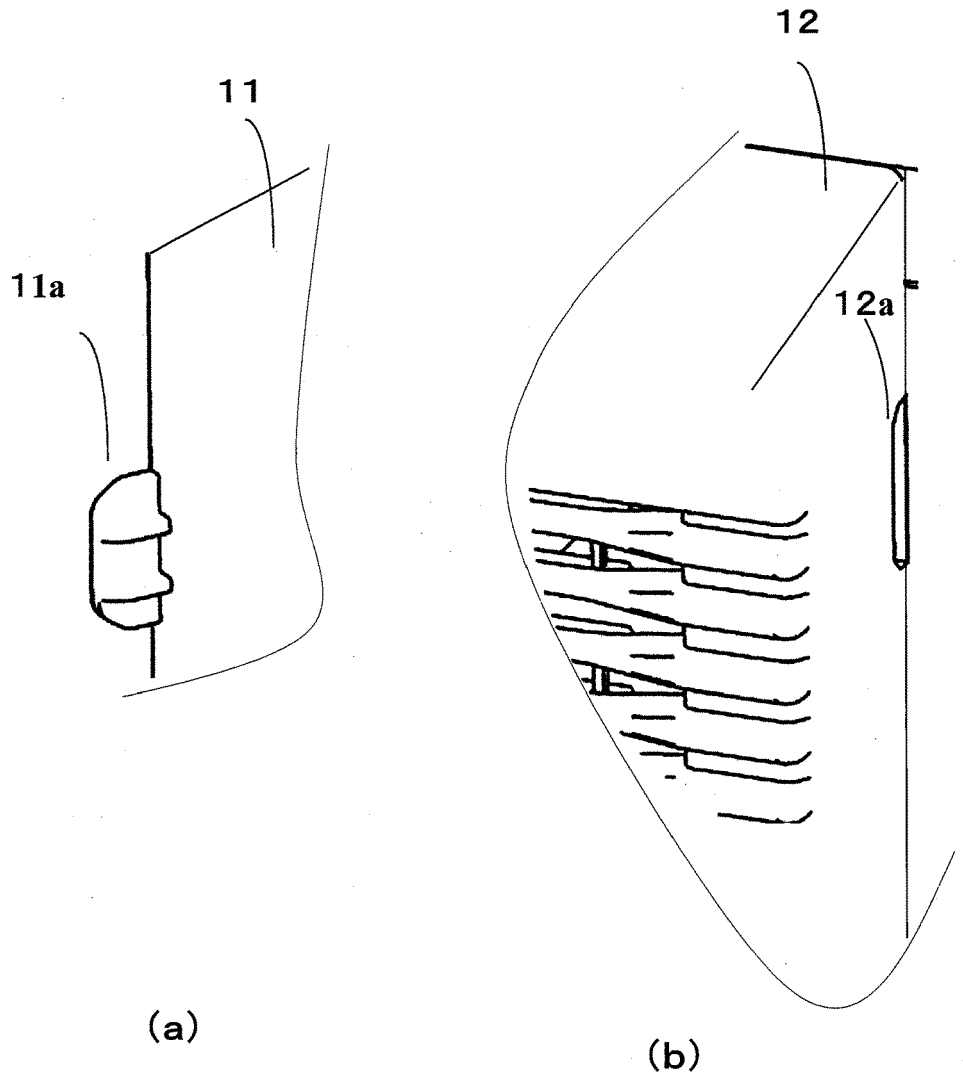
[Fig. 3]



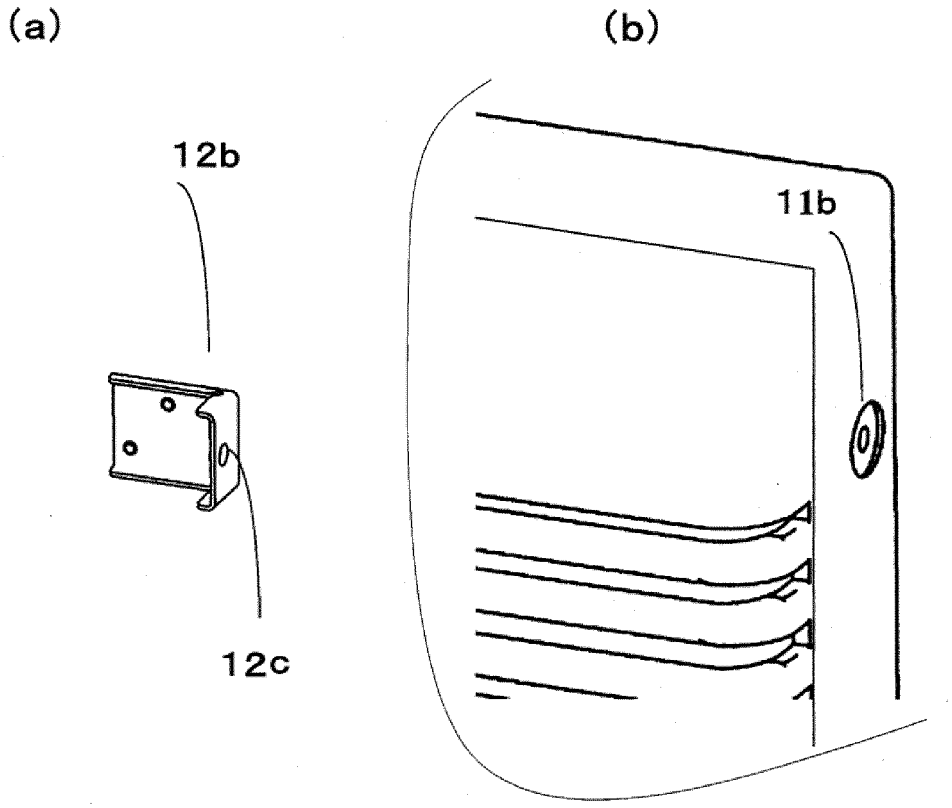
[Fig. 4]



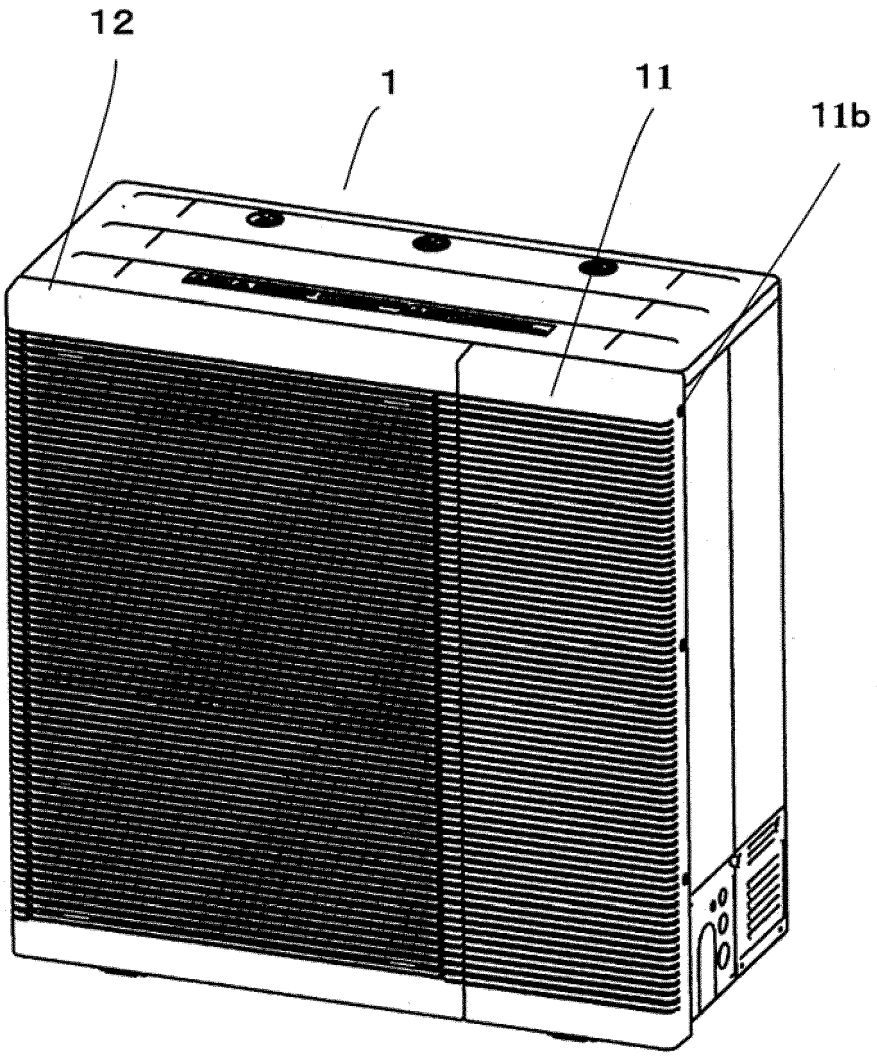
[Figs. 5]



[Figs. 6]



[Fig. 7]



1 Main body
11 First grill
11b Penetrating portion
12 Second grill

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 22 17 5558

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 2 840 326 A1 (MITSUBISHI HEAVY IND LTD [JP]) 25 February 2015 (2015-02-25) * paragraphs [0024] - [0039]; figure 2 *	1-3	INV. F24F1/56
X	EP 2 481 994 A1 (FUJITSU GENERAL LTD [JP]) 1 August 2012 (2012-08-01) * paragraphs [0018] - [0021]; figures 1,2 *	1	
X	JP 2007 247984 A (MATSUSHITA ELECTRIC IND CO LTD) 27 September 2007 (2007-09-27) * the whole document *	1	
X	WO 2018/193520 A1 (MITSUBISHI ELECTRIC CORP [JP]) 25 October 2018 (2018-10-25) * paragraphs [0015] - [0017]; figure 1 *	1	

TECHNICAL FIELDS SEARCHED (IPC)

F24F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	17 October 2022	Lienhard, Dominique

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 22 17 5558

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

17-10-2022

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2840326 A1	25-02-2015	EP 2840326 A1	25-02-2015
		JP 5968271 B2	10-08-2016
		JP 2015017740 A	29-01-2015
EP 2481994 A1	01-08-2012	AU 2012200510 A1	16-08-2012
		CN 102620356 A	01-08-2012
		EP 2481994 A1	01-08-2012
		JP 5849396 B2	27-01-2016
		JP 2012159224 A	23-08-2012
		US 2012192585 A1	02-08-2012
JP 2007247984 A	27-09-2007	NONE	
WO 2018193520 A1	25-10-2018	JP 6732110 B2	29-07-2020
		JP WO2018193520 A1	21-11-2019
		WO 2018193520 A1	25-10-2018

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- JP 2005337597 A **[0004]**