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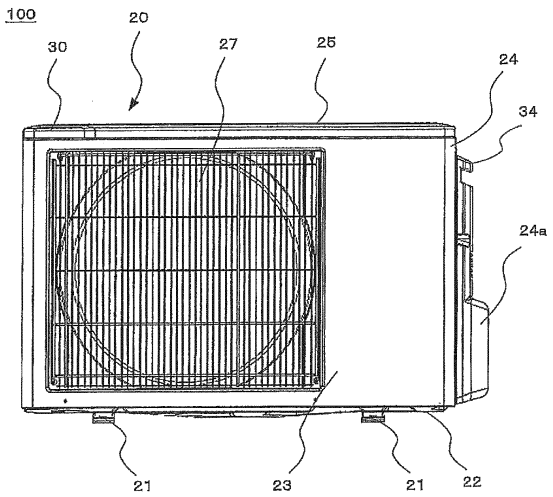
(54) OUTDOOR UNIT OF AIR CONDITIONER

(57) An outdoor unit 100 for an air-conditioning apparatus has a handle provided to a substantially rectangular top panel 25 that covers the upper opening of an outdoor unit body shell 20, the outdoor unit body shell 20 including a machine room 9 and an air-sending device room 5 in its interior. The outdoor unit 100 includes a long-side handle 30 provided in the long-side portion of the top panel 25, and a short-side handle 34 provided in the short-side portion of the top panel 25 or in a side panel. The long-side handle 30 is positioned so that the long-side handle 30 projects outward beyond the long-side portion of the top panel 25, and in top view, the long-side handle 30 does not project outward beyond the distal end position of a leg portion 21 provided on the bottom portion of the outdoor unit body shell 20.

F I G. 1



EP 2 792 956 A1

Description

Technical Field

[0001] The present invention relates to an outdoor unit for an air-conditioning apparatus, in particular, a handle structure of the outdoor unit.

Background Art

[0002] An outdoor unit for an air-conditioning apparatus is provided with a handle to allow a person to carry the outdoor unit during installation or the like. Such a handle is provided on the lateral side of a top panel so as to project outward beyond the lateral side of an outdoor unit body shell (see Patent Literature 1). As discussed in Patent Literature 2, there also exists an outdoor unit for an air-conditioning apparatus which is configured as follows: "a housing includes a housing body, and a top member that closes an opening on the top of the housing body. The top member has a carrying grip portion formed integrally at an end portion on the short side of the top member. The lateral portion of the housing body has a recess that is formed integrally at a position corresponding to the grip portion and recessed toward the inside of the housing body, and a flat portion that is adjacent to this recess. The recess is recessed toward the inside of the housing body in such a way that the top end surface of this recess is integrally continuous to the upper end surface of the flat portion adjacent to the recess. The top end surface of this recess is in contact with or in close proximity to the lower surface of the top member. A space for inserting fingers is provided between this recess and the grip portion to form a grip." Citation List

Patent Literature

[0003]

Patent Literature 1: Japanese Unexamined Patent Application Publication No. 10-227487 (Abstract and Fig. 1)
Patent Literature 2: Japanese Unexamined Patent Application Publication No. 2007-113861 (Abstract and Fig. 7)

Summary of Invention

Technical Problem

[0004] An outdoor unit for an air-conditioning apparatus as described in Patent Literature 1, in which the lateral side of a top panel is provided with a handle that is projected outward beyond the lateral side of the housing shell, has the following problems. That is, the product increases in size by how far the handle projects, with the result that the packaging member increases in size solely because of the presence of this handle. Moreover, the size in the longitudinal direction of the product in its packaged state increases, resulting in decreasing transport efficiency of the product.

[0005] A heat exchanger provided in the interior of an outdoor unit for an air-conditioning apparatus is often formed in an L-shape in order to make the outdoor unit of the product smaller. For this reason, the lateral side of a panel that covers the outside of the heat exchanger is generally exposed while leaving grid-like cross members so as not to obstruct the passage of air through the heat exchanger. Moreover, for the purposes of miniaturization and improved performance of the outdoor unit, it is necessary to minimize the gap between the heat exchanger and the shell panel. Therefore, in a case where a recess is provided on the lateral side of the outdoor unit as in Patent Literature 2, it is not possible to make the depth of the recess very large (deep), which results in a shape that is hard to carry. In a case where the space between the heat exchanger in the interior of the outdoor unit and the shell panel is increased in order to secure this space, there remains a problem that the size of the outdoor unit increases.

[0006] Moreover, in a case where a recess is provided to secure the space for inserting a hand from the lateral side as in Patent Literature 2, providing the recess with an opening for allowing entry of air is difficult for manufacturing reasons, and there is also a problem in that the recess blocks the flow path of air entering the heat exchanger, causing a decrease in the efficiency of the heat exchanger.

[0007] It is an object of the present invention to provide an outdoor unit for an air-conditioning apparatus which has a handle, in which provision of the handle does not increase the size of the outdoor unit and its packaging size, and does not block air entering a heat exchanger.

Solution to Problem

[0008] An outdoor unit for an air-conditioning apparatus according to the present invention is an outdoor unit for an air-conditioning apparatus, in which a top panel is provided with a handle, the top panel having a substantially rectangular shape and covering an upper opening of an outdoor unit body shell, the outdoor unit body shell including a machine room and an air-sending device room in an interior of the outdoor unit body shell, the outdoor unit including a long-side handle and a short-side handle, the long-side handle being provided in a long-side portion of the top panel, the short-side handle being provided in a short-side portion of the top panel or in a side panel. The long-side handle is positioned so that the long-side handle projects outward beyond the long-side portion of the top panel, and in top view, the long-side handle does not project outward beyond a distal end position of a leg portion provided on a bottom portion of the outdoor unit body shell.

Advantageous Effects of Invention

[0009] As mentioned above, the long-side handle is positioned so that the long-side handle projects outward beyond the long-side portion of the top panel, and in top view, the long-side handle does not project outward beyond the distal end portion of the leg portion provided on the bottom portion of the outdoor unit body shell. Therefore, the presence of the long-side handle does not increase the size of the outdoor unit and its packaging size, and does not block the opening through which air enters the heat exchanger. Therefore, it is possible to obtain an outdoor unit for an air-conditioning apparatus which prevents a decrease in the efficiency of the heat exchanger.

Brief Description of Drawings

[0010]

[Fig. 1] Fig. 1 is a front view of an outdoor unit 100 for an air-conditioning apparatus according to Embodiment 1 of the present invention.
[Fig. 2] Fig. 2 is a perspective view of the interior of the outdoor unit 100 illustrated in Fig. 1.
[Fig. 3] Fig. 3 is a perspective view illustrating the shell components of the outdoor unit 100 illustrated in Fig. 1.
[Fig. 4] Fig. 4 is a top view of the outdoor unit 100 illustrated in Fig. 1.
[Fig. 5] Fig. 5 is a cross-sectional view taken along a line Y-Y in Fig. 4.
[Fig. 6] Fig. 6 is a perspective view illustrating the shell components of an outdoor unit 100 for an air-conditioning apparatus according to Embodiment 2 of the present invention.
[Fig. 7] Fig. 7 is a top view of the outdoor unit 100 illustrated in Fig. 6. Description of Embodiments

[0011] Hereinafter, embodiments of an outdoor unit for an air-conditioning apparatus according to the present invention will be described in detail with reference to the drawings.

Embodiment 1

[0012] Fig. 1 is a front view of an outdoor unit 100 for an air-conditioning apparatus according to Embodiment 1 of the present invention.

[0013] As illustrated in Fig. 1, the outdoor unit 100 for an air-conditioning apparatus according to Embodiment 1 includes an outdoor unit body shell 20 formed in a box shape. The outdoor unit body shell 20 includes a base 22 having a leg portion 21, a shell panel 23, a side panel 24, and a top panel 25. A front panel portion 26 of the shell panel 23 has an air outlet 27 for air blown out from an air-sending device.

[0014] Fig. 2 is a perspective view of the interior of the outdoor unit 100 illustrated in Fig. 1. Fig. 2 illustrates an internal structure from which shell components of the outdoor unit body shell 20 other than the base 22 and the side panel 24 are removed.

[0015] The outdoor unit 100 has an air-sending device room 5 and a machine room 9 in the interior of the outdoor unit body shell 20. The rooms 5 and 9 are separated from each other by a separator 10. Various components in the interior of the outdoor unit 100 are held on the base 22 on the bottom having the leg portion 21. The leg portion 21 is used for securing the outdoor unit 100 in place during installation of the outdoor unit 100. As such, the leg portion 21 is arranged so as to project outward beyond the outdoor unit body shell 20 so that a bolt or the like can be set.

[0016] A compressor 6, a refrigerant pipe 7, and an electrical component box 8 are provided in the machine room 9. A refrigerant sent from an indoor unit is compressed in the compressor 6, and passes through the refrigerant pipe 7 before being sent to a heat exchanger 1. The electrical component box 8 supplies electric power to various components, for example.

[0017] The air-sending device room 5 includes the heat exchanger 1 that is bent in an L-shape, an air-sending device 2 (for example, a propeller fan), a motor 3 that drives the air-sending device 2, and a motor support 4 that supports the motor 3. The heat exchanger 1 includes a lateral flat surface portion 1 a, a corner portion 1 b, and a back flat surface portion 1 c. As the air-sending device 2 operates, air passes through the lateral flat surface portion 1 a, the corner portion 1 b, and the back flat surface portion 1 c of the heat exchanger 1 and enters the outdoor unit 100. The air passes through the air-sending device 2, and is further blown out to the outside from the air outlet 27 of the front panel portion 26 located at the front of the outdoor unit 100. As a result, during cooling operation, for example, the refrigerant inside the heat exchanger 1 is cooled by air, and air that has passed through the heat exchanger 1 is heated as the air exchanges heat with the refrigerant.

[0018] Fig. 3 is a perspective view illustrating the shell components of the outdoor unit 100 illustrated in Fig. 1.

[0019] As described above, the outdoor unit 100 includes the outdoor unit body shell 20 that has the base 22, the shell panel 23, the side panel 24, and the top panel 25. Among these components, the shell panel 23 is formed so as to cover the front, the left side, and the corner portion between the left side and the back, of the outdoor unit 100 in front view. The side panel 24 is formed so as to cover the right side, and the right end portion of the back, of the outdoor unit 100 in front view. The top panel 25 serves as a lid member that covers the upper opening of the outdoor unit body shell 20. The shell components may not necessarily be configured as described above. For example, the shell panel 23 and the side panel 24 may be integrated together.

[0020] A number of openings 28 are formed in the left side portion of the shell panel 23 to allow entry of air into the lateral flat surface portion 1 a of the heat exchanger

1. In addition, a bell-mouth 27a that defines the air outlet 27, and an opening 27b for attaching a protective guard are formed in the portion of the front panel portion 26 of the shell panel 23 corresponding to the air-sending device room 5.

[0021] Now, a handle provided in the top panel 25 will be further described with reference to Fig. 4 and Fig. 5.

[0022] Fig. 4 is a top view of the outdoor unit 100 illustrated in Fig. 1. Fig. 5 is a cross-sectional view taken along a line Y-Y in Fig. 4.

[0023] As illustrated in Fig. 4, the top panel 25 is a lid member that has a substantially rectangular shape, and covers the upper surface of the outdoor unit 100. A long-side handle 30 is provided at an end portion of the long-side portion (the long-side portion on the air-sending device room 5 side) of the top panel 25 so as to project outward (toward the front) beyond the long-side portion. Further, the long-side handle 30 is positioned so that in top view, the long-side handle 30 does not project outward beyond a distal end position 21 a of the leg portion 21. That is, while the long-side handle 30 is positioned so that the long-side handle 30 projects outward beyond the long-side portion of the top panel 25, in top view, the long-side handle 30 does not project outward beyond an imaginary line 21 b running parallel to the front panel portion 26 at the distal end position 21 a of the leg portion 21.

[0024] Although the long-side handle 30 is provided in the front long-side portion of the top panel 25 in Fig. 4, the long-side handle 30 may be provided in the back long-side portion in the same positional relationship as mentioned above. The long-side handle 30 is preferably formed integrally with the top panel 25 by sheet metal working or the like.

[0025] The upper surface of the top panel 25 has an indication 31 that is provided near the long-side handle 30 to clearly indicate the position of the handle 30. The indication 31 may be formed by any method such as imprinting or baking of ink, as long as the indication 31 does not easily disappear. The indication 31 allows a person carrying the outdoor unit 100 to easily find the location of the long-side handle 30.

[0026] As illustrated in Fig. 5, the long-side handle 30 has a recess 32 at the back side. The size of the recess 32 is such that the finger of a carrying person can be inserted thereof. A lower end portion 30a of the long-side handle 30 is bent in a U-shape. This configuration ensures that when a carrying person puts a hand into the recess 32 of the long-side handle 30, the hand does not directly touch the end of the sheet metal, which ensures easy portability and prevents injury.

[0027] The long-side handle 30 is preferably arranged at an end portion of the long-side portion of the top panel 25 on the air-sending device room 5 side. For this reason, a short-side handle 34 is arranged in the right side portion on the machine room 9 side. As illustrated in Fig. 4 and Fig. 1, the side panel 24 on the right-hand side has a projection 24a that accommodates a valve and the like. The projection 24a is generally larger than the short-side handle 34. Therefore, as the short-side handle 34, a handle configured in the same manner as in related art may be used. As illustrated in Fig. 1, the short-side handle 34 may be arranged near the upper end of the side panel 24. In a case where the same configuration as that of the long-side handle 30 is adopted for the short-side handle 34, the short-side handle 34 may be arranged in the short-side portion of the top panel 25. In that case as well, the short-side handle 34 is positioned so that the short-side handle 34 projects outward beyond the short-side portion of the top panel 25, and in top view, the short-side handle 34 does not project outward beyond a maximum projecting position 24b of the projection 24a.

[0028] The long-side handle 30 and the short-side handle 34 are preferably arranged at substantially diagonal positions. That is, by arranging the handles 30 and 34 at substantially diagonal positions so that the center of gravity of the outdoor unit 100 is situated at substantially the middle of a line connecting both hands when lifting the outdoor unit 100 with the handles 30 and 34, good weight balance is achieved to ensure easy portability.

[0029] As described above, according to Embodiment 1, the long-side handle 30 is positioned so that the long-side handle 30 projects outward beyond the long-side portion of the top panel 25, and in top view, the long-side handle 30 does not project outward beyond the distal end position 21 a of the leg portion 21 provided on the bottom portion of the outdoor unit body shell 20. Therefore, there is no increase in packaging size caused solely by the presence of the long-side handle 30.

[0030] In addition, the opening 28 is provided in the left side portion of the shell panel 23 to allow entry of air into the heat exchanger 1. While air flows in the outdoor unit 1 through the above-mentioned path for heat exchange, there is no decrease in the efficiency of the heat exchanger 1 due to the presence of the long-side handle 30, because the long-side handle 30 is arranged in a location that does not affect this flow of air.

Embodiment 2

[0031] Fig. 6 is a perspective view illustrating the shell components of an outdoor unit 100 for an air-conditioning apparatus according to Embodiment 2 of the present invention. Fig. 7 is a top view of the outdoor unit 100 illustrated in Fig. 6.

[0032] Unless otherwise specified, components of the outdoor unit 100 for an air-conditioning apparatus according to Embodiment 2 which are the same as or equivalent to those of Embodiment 1 will be denoted by the same reference signs.

[0033] For Embodiment 2, the outdoor unit body shell 20 having only the shell panel 23, the side panel 24, and the top panel 25 is illustrated in Fig. 6. The base 22 having the leg portion 21 is not illustrated.

[0034] As for a long-side handle 33 provided in the long-side portion of the top panel 25, although the amount

of its projection is the same as that in Embodiment 1, its length in the longitudinal direction is equal to or larger than an inside diameter D of the air outlet 27. That is, as illustrated in Fig. 7, the long-side handle 33 is provided at the front side of the top panel 25 in this case, and its characteristic feature resides in that the long-side handle 33 projects outward beyond the long-side portion of the top panel 25, and the length in the longitudinal direction of the long-side handle 33 is equal to or larger than the inside diameter D of the air outlet 27. At the back side of the long-side handle 33, a recess and a lower end portion that is bent in a U-shape as illustrated in Fig. 5 are provided.

[0035] For example, suppose a case where snow accumulates on top of the outdoor unit 100 in wintertime, and the outside air temperature hovers at around 0 degrees C. In this case, when the outdoor unit has not run for a while, sometimes, the snow accumulating on top of the outdoor unit melts, and the resulting water flows along the front panel portion 26 and reaches into the air outlet 27. When the outside air temperature drops at nighttime or the like while the water is flowing in, this flow of water freezes, creating icicles inside the air outlet 27. At other times, water accumulating in a lower portion of the air outlet 27 may freeze, creating reverse icicles.

[0036] In Embodiment 2, the length in the longitudinal direction of the long-side handle 33 is set equal to or larger than the inside diameter of the air outlet 27. Therefore, the long-side handle 33 serves as a canopy and prevents inpouring of water from the top of the outdoor unit 100 to the air outlet 27, thereby effectively preventing icicles from forming at the air outlet 27.

[0037] Preventing formation of icicles in this way also makes it possible to avoid noise caused by interference with the air-sending device 2 at the start of operation or breakage of the air-sending device caused by contact with icicles.

[0038] Moreover, the larger the length of the long-side handle 33 in the longitudinal direction is than the inside diameter of the air outlet 27, the more it is possible to prevent inflow from the lateral direction in cases such as when wind blows from the outside, and hence the greater the effect that can be achieved in this regard. Reference Signs List

[0039] 1 heat exchanger, 1 a lateral flat surface portion, 1 b corner portion, 1 c back flat surface portion, 2 air-sending device, 3 motor, 4 motor support, 5 air-sending device room, 6 compressor, 7 refrigerant pipe, 8 electrical component box, 9 machine room, 10 separator, 20 outdoor unit body shell, 21 leg portion, 21 a distal end position of leg portion, 21 b imaginary line, 22 base, 23 shell panel, 24 side panel, 24a projection, 24b maximum projecting position, 25 top panel, 26 front panel portion, 27 air outlet, 28 openings, 30 long-side handle, 30a lower end portion, 31 indication, 32 recess, 33 long-side handle, 34 short-side handle, 100 outdoor unit

Claims

1. An outdoor unit for an air-conditioning apparatus, in which a top panel is provided with a handle, the top panel having a substantially rectangular shape and covering an upper opening of an outdoor unit body shell, the outdoor unit body shell including a machine room and an air-sending device room in an interior of the outdoor unit body shell, the outdoor unit comprising:

   a long-side handle and a short-side handle, the long-side handle being provided in a long-side portion of the top panel, the short-side handle being provided in a short-side portion of the top panel or in a side panel,
   wherein the long-side handle is positioned so that the long-side handle projects outward beyond the long-side portion of the top panel, and in top view, the long-side handle does not project outward beyond a distal end position of a leg portion provided on a bottom portion of the outdoor unit body shell.

2. The outdoor unit for an air-conditioning apparatus of claim 1, wherein in a case where the long-side handle is provided at a front side of the top panel, a length in a longitudinal direction of the long-side handle is equal to or larger than an inside diameter of an air outlet of a front panel.

3. The outdoor unit for an air-conditioning apparatus of claim 1 or 2, wherein the top panel is provided with an indication indicative of a position of the long-side handle.

4. The outdoor unit for an air-conditioning apparatus of any one of claims 1 to 3, wherein in a case where the short-side handle is provided in the short-side portion of the top panel, the short-side handle is positioned so that the short-side handle projects outward beyond the short-side portion of the top panel, and in top view, the short-side handle does not project outward beyond a maximum projecting position of a projection provided in the side panel of the outdoor unit body shell.

5. The outdoor unit for an air-conditioning apparatus of any one of claims 1 to 3, further comprising
   a recess into which a hand is inserted, the recess being located at a back side of the long-side handle.

FIG. 1

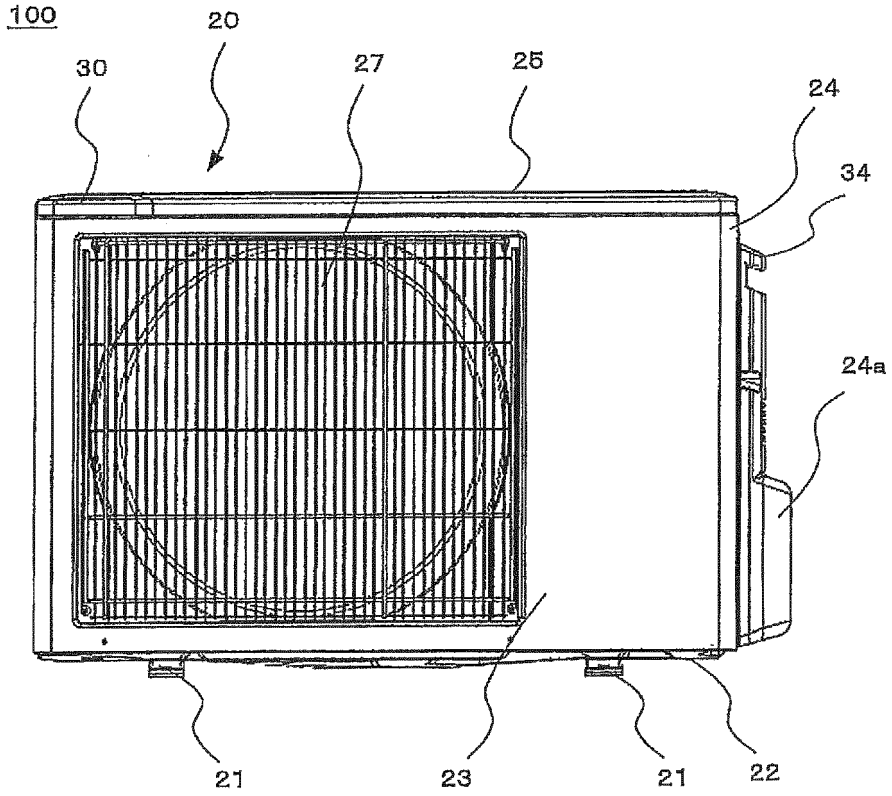


FIG. 2

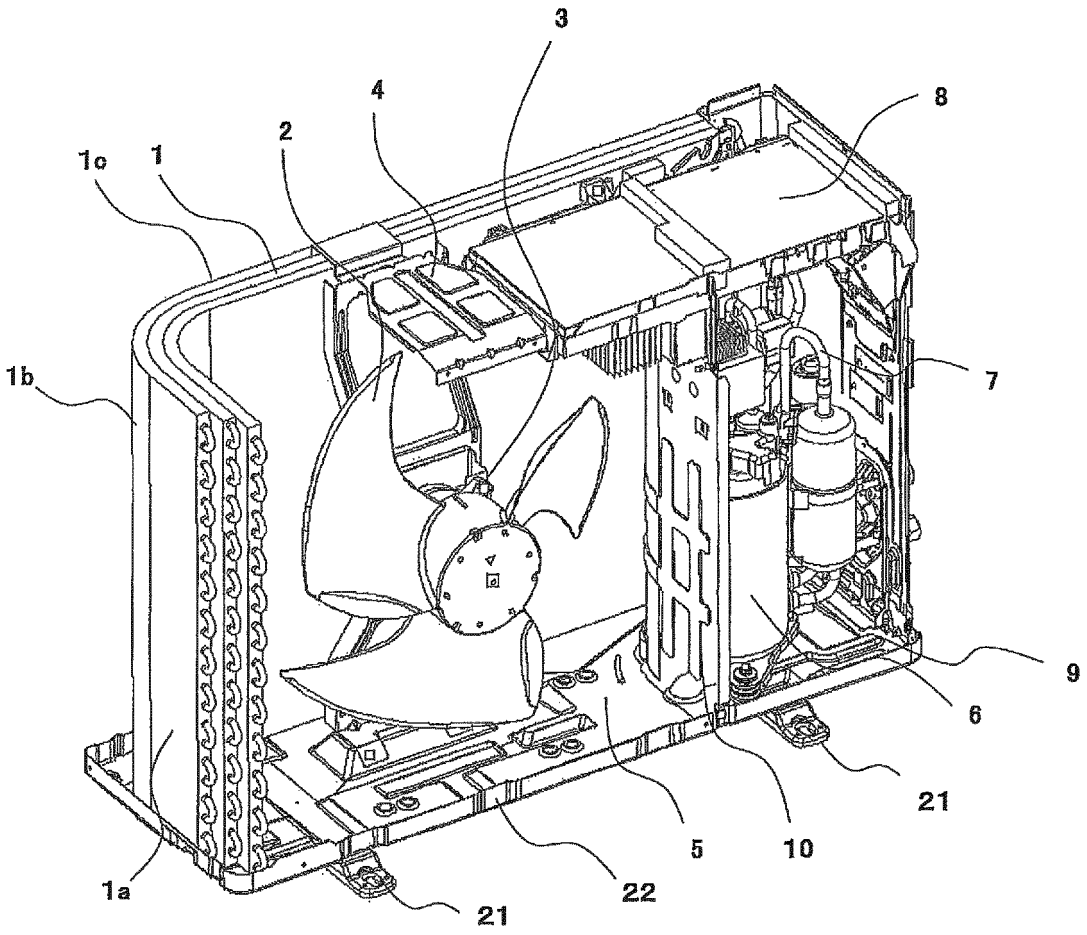


FIG. 3

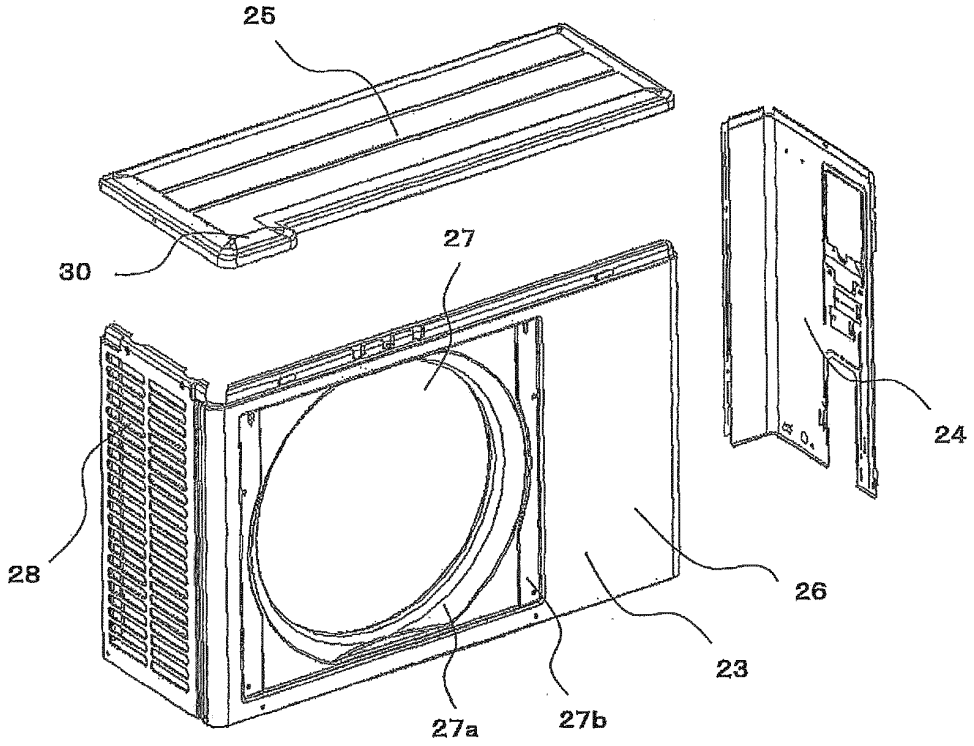

25
30
27
24
28
26
23
27a
27b

FIG. 4

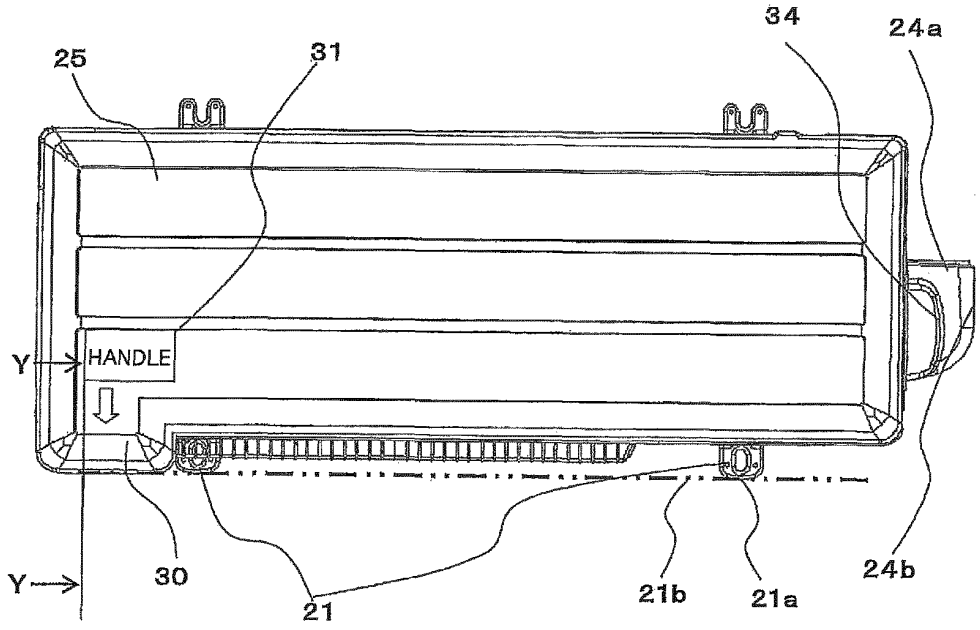

34
24a
25
31
Y
HANDLE
Y
30
21
21b
21a
24b

FIG. 5

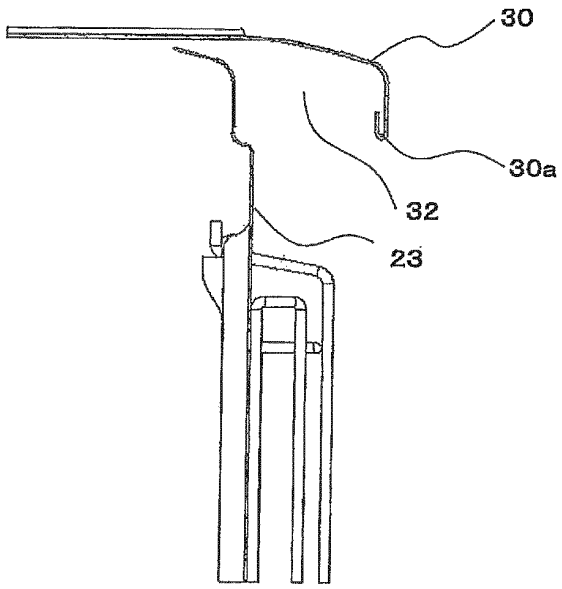


FIG. 6

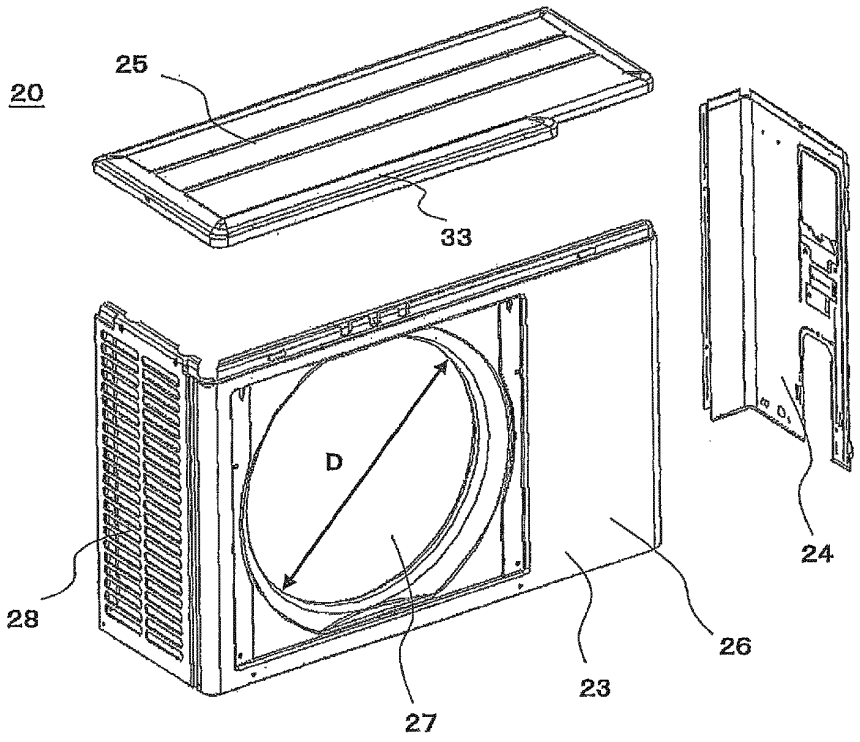
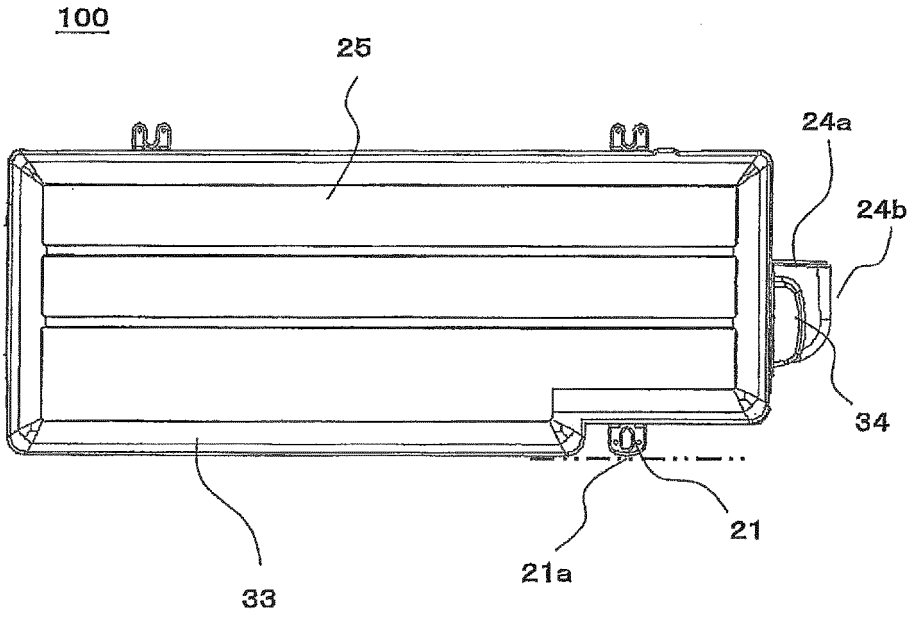


FIG. 7



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2012/004269

A. CLASSIFICATION OF SUBJECT MATTER
F24F1/56(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)
F24F1/56

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 1996-2012
Kokai Jitsuyo Shinan Koho 1971-2012 Toroku Jitsuyo Shinan Koho 1994-2012

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 A	JP 2007-232276 A (Matsushita Electric Industrial Co., Ltd.), 13 September 2007 (13.09.2007), paragraphs [0017] to [0019]; fig. 1 to 4 (Family: none)	1,3-5 2
Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 158333/1988(Laid-open No. 077525/1990) (Matsushita Refrigeration Co.), 14 June 1990 (14.06.1990), page 1, line 16 to page 2, line 4; fig. 3 (Family: none)	1,3-5

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

* Special categories of cited documents:
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Date of the actual completion of the international search	Date of mailing of the international search report
07 September, 2012 (07.09.12)	25 September, 2012 (25.09.12)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2012/004269

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 07-301434 A (Matsushita Seiko Co., Ltd.), 14 November 1995 (14.11.1995), paragraphs [0015] to [0016]; fig. 1 (Family: none)	1,3-5
Y	JP 2010-210097 A (Mitsubishi Electric Corp.), 24 September 2010 (24.09.2010), paragraphs [0010] to [0013]; fig. 1 to 3 (Family: none)	1,3-5
Y	JP 06-159734 A (Hitachi, Ltd.), 07 June 1994 (07.06.1994), paragraph [0008]; fig. 1 (Family: none)	3,5
Y	JP 07-110142 A (Sharp Corp.), 25 April 1995 (25.04.1995), paragraphs [0014] to [0016]; fig. 1 (Family: none)	3,5
Y	JP 10-227487 A (Matsushita Electric Industrial Co., Ltd.), 25 August 1998 (25.08.1998), fig. 1, 9 & US 6044657 A & WO 1998/036224 A1 & CN 1217779 A	5
Y	JP 2002-081696 A (Mitsubishi Electric Corp.), 22 March 2002 (22.03.2002), fig. 1, 2 (Family: none)	5

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REFERENCES CITED IN THE DESCRIPTION

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- JP 10227487 A **[0003]**
- JP 2007113861 A **[0003]**