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(54) **COMPRESSOR COVER FOR AIR TREATMENT DEVICE**

(57) The present invention relates to a compressor cover (10) used in an air treatment unit, the compressor cover (10) includes a side panel (17, 18, 19) and a head cover (15, 16), an upper edge of the side panel (17, 18, 19) and side edges of the head cover (15, 16) are interconnected, and the head cover (15, 16) is configured by an inclined plate that is inclined with respect to a horizontal plane. When the compressor cover (10) pertaining to the invention is used in an air treatment unit, water puddling on the head cover (15, 16) of the compressor cover (10) is effectively avoided, and water can be prevented from getting inside the compressor cover (10).

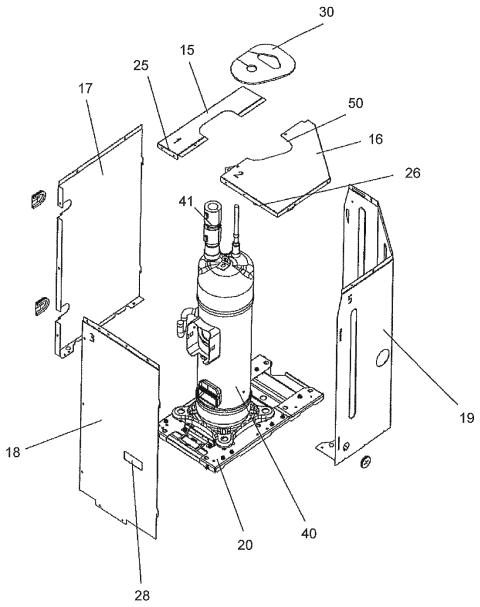

FIG. 1

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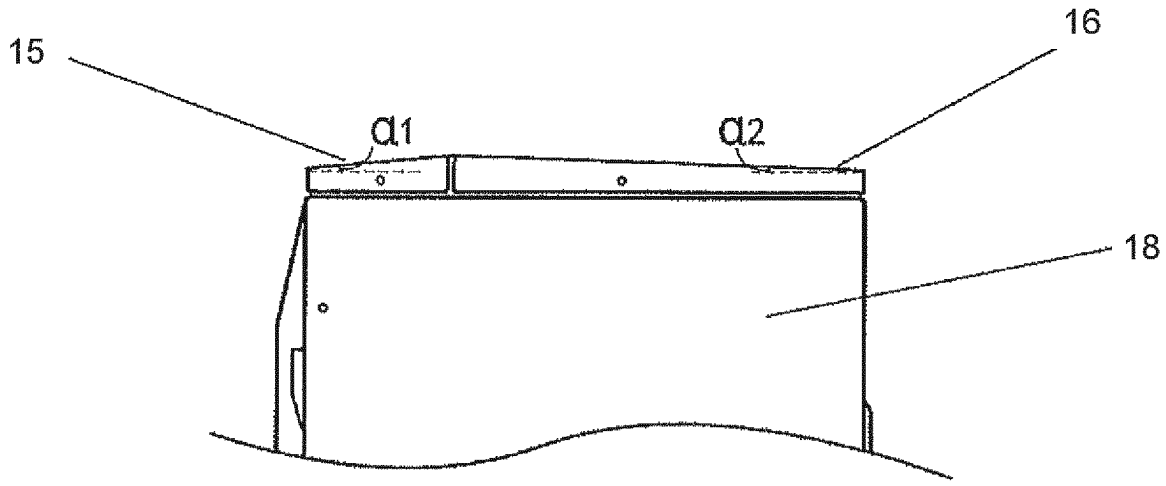

FIG. 4

Description

TECHNICAL FIELD

[0001] The present invention relates to the field of air treatment units and particularly relates to a compressor cover used in an air treatment unit.

BACKGROUND ART

[0002] In conventional air treatment units, it has been common to add, inside a casing of the air treatment unit, a compressor cover that encloses a compressor main body to soundproof, reduce the noise of, keep warm, and thermally insulate a compressor in the air treatment unit.

[0003] As shown in FIG. 8, Chinese Invention Patent Application Laid-open Publication CN 104,748,252 A discloses a compressor soundproofing unit 1. The unit 1 includes a vacuum soundproofing cover 2 that is provided on, so as to cover, the outside of a compressor 4 and an anchoring plate 3 that is provided on a bottom portion of the vacuum soundproofing cover 2. The operating noise of the compressor 4 is effectively reduced by the soundproofing action of the vacuum soundproofing cover 2, whereby the noise of the entire unit is reduced and the comfort of use of the unit is improved.

[0004] As shown in FIG. 9, Chinese Utility Model Publication CN 204,511,892 U discloses a compressor noise reducing unit 5 that has a side wall 6 and a head cover 7. The side wall 6 includes a soundproofing layer and a noise-absorbing layer, and the head cover 7 also includes a soundproofing layer and a noise-absorbing layer. The side wall 6 surrounds, in a shape following, the outer shape of an internal compressor, and the head cover 7 covers, with a stepped structure and conforming to, a top portion of the side wall 6. This kind of structure improves the comfort of use of the compressor and also simplifies assembly because of the embedded-type internal mating structure between the side wall and the head cover.

[0005] However, as regards air treatment units installed outdoors, further protective measures are needed for the compressor to soundproof the compressor and prevent the compressor from being adversely affected by rainwater. To that end, further improvements are needed for compressor covers used in air treatment units.

SUMMARY OF INVENTION

<Solution to Problem>

[0006] To eliminate the defects in the prior art, the present invention relates to a compressor cover used in an air treatment unit, the compressor cover includes a side panel and a head cover, an upper edge of the side panel and side edges of the head cover are interconnected, and the head cover is configured by an inclined plate that is inclined with respect to a horizontal plane. It is preferred that a pipe passing hole be provided in the head cover and that a stopper piece for sealing be provided in, and conforming to, the pipe passing hole.

[0007] In one aspect of the invention, the head cover is configured by two inclined plates.

[0008] In another aspect of the invention, a joint line of the two inclined plates extends through the pipe passing hole, and the stopper piece is simultaneously joined to the two inclined plates.

[0009] In another aspect of the invention, a noise-controlling layer and/or a waterproofing layer is adhered to a side of the side panel and/or the head cover that face the inside of the compressor cover.

[0010] In another aspect of the invention, nonwoven fabric is adhered to a side of the side panel and/or the head cover that face the inside of the compressor cover.

[0011] In another aspect of the invention, the compressor cover further includes a bottom plate that supports a compressor, wherein the bottom plate, the side panel, and the head cover form an enclosed space that houses the compressor.

[0012] In another aspect of the invention, a water discharge hole is provided in the bottom plate.

[0013] In still another aspect of the invention, the stopper piece is manufactured using at least one of rubber, resin, and silica gel.

[0014] In still another aspect of the invention, a handle is provided in the side panel.

[0015] In still another aspect of the invention, the side panel has five side surface portions that are perpendicular to a horizontal plane, and three side surface portions of the five side surface portions are connected to each other to form an integrated folded plate.

[0016] In still another aspect of the invention, a pipe passing hole is provided in the side panel, and a stopper piece for sealing is provided in, and conforming to, the pipe passing hole. The stopper piece can likewise be manufactured using at least one of rubber, resin, and silica gel.

<Advantageous Effects of Invention>

[0017] When the compressor cover according to the invention is used in an air treatment unit, water puddling on the head cover of the compressor cover is effectively avoided, water can be prevented from getting inside the compressor cover, and the combined structure of the side panel and the head cover is convenient to detach.

BRIEF DESCRIPTION OF DRAWINGS

[0018]

FIG. 1 is an exploded three-dimensional view of a compressor cover in a preferred embodiment of the invention.

FIG. 2 is a three-dimensional view of the compressor

cover in the preferred embodiment of the invention in an attached state.

FIG. 3 is a three-dimensional view of a bottom plate of the compressor cover.

FIG. 4 is a partial side view of a top portion of the compressor cover in the preferred embodiment of the invention.

FIG. 5 is an exploded three-dimensional view of a compressor cover in another embodiment of the invention.

FIG. 6 is a three-dimensional view of the compressor cover shown in FIG. 5 in an attached state.

FIG. 7 is a side view of the compressor cover shown in FIG. 5.

FIG. 8 is a schematic view of a compressor cover in prior art.

FIG. 9 is a schematic view of a compressor cover in other prior art.

DESCRIPTION OF EMBODIMENTS

[0019] The invention will be further described below by associating drawings with specific embodiments. In the following description, more details are described to sufficiently understand the invention. However, the invention can also be implemented by many other aspects different from those in the description, and it will be apparent that a person skilled in the art can make similar enlargements and deductions in accordance with actual application circumstances without departing from the content of the invention. Consequently, the scope of protection of the invention should not be limited by the content of the specific embodiments.

[0020] FIG. 1 shows an exploded three-dimensional view of a compressor cover 10 in a preferred embodiment of the invention. The compressor cover 10 is applicable to an air treatment unit (not shown in the drawings). The air treatment unit usually has a casing. The compressor cover 10 is provided inside the casing of the air treatment unit. The compressor cover 10 encloses the inside space thereof. A compressor 40 of the air treatment unit is placed in the inside space of the compressor cover 10. The space between the compressor cover 10 and the casing of the air treatment unit is used to house other parts of the air treatment unit, such as a heat exchanger, a fan, and an electrical control box, for example.

[0021] In relation to an air treatment unit installed outdoors, the compressor cover 10 is ideally configured to prevent rainwater from getting in.

[0022] As shown in FIG. 1, the compressor cover 10 of the invention includes side panels 17, 18, 19 and head covers 15, 16. The side panels 17, 18, 19 can be provided upright on a bottom portion of the casing of the air treatment unit. Alternatively, an independent compressor cover bottom plate 20 that supports the compressor 40 may also be provided to stand the side panels 17, 18, 19 upright. As shown in FIG. 2, when the upper edges of the side panels 17, 18, 19 and the side edges of the head covers 15, 16 are interconnected, the entire compressor cover 10 forms a housing space for the compressor 40. The size of the housing space is determined in accordance with the volume of the compressor 40 to be contained therein.

[0023] In particular, the head covers 15, 16 of the compressor cover 10 in this embodiment are particularly configured to have a distributive structure that guides water from the head covers 15, 16 to the side edges of the head covers 15, 16. That is, the head covers 15, 16 are configured by inclined plates that are disposed so as to be inclined with respect to a horizontal plane. The inclined plates are formed with the distributive structure, so that when water reaches the head covers 15, 16 of the compressor cover 10, the water can be guided to the side edges of the head covers 15, 16. For this reason, the formation of water puddles on the head covers 15, 16 can be avoided, and a situation where puddled water gets inside the compressor cover 10 can be effectively avoided. Furthermore, to realize a more effective seal, downwardly bent portions 25, 26 are provided on the head covers 15, 16. When the head covers 15, 16 are attached to the side panels 17, 18, 19, the downwardly bent portions 25, 26 of the head covers 15, 16 cover the upper edges of the side panels 17, 18, 19 from the outside.

[0024] Hereinafter, the structure of the head cover part of the compressor cover 10 will be described in detail with reference to FIG. 1 and FIG. 2.

[0025] According to the preferred embodiment of the invention, the head covers 15, 16 are configured by two inclined plates-a first inclined plate 15 and a second inclined plate 16-that are inclined with respect to a horizontal plane. The first inclined plate 15 and the second inclined plate 16 are disposed in postures in which their angles of inclination $\alpha 1$ and $\alpha 2$ with respect to the horizontal plane are angles between 3 to 10 degrees, and these two inclined plates 15, 16 are inclined in different directions with respect to the horizontal plane. It will be understood from FIG. 4 that the joint line of the first inclined plate 15 and the second inclined plate 16 forms the highest point of the head cover. A pipe passing hole 50 is provided in the head covers 15, 16 to allow them to conform to a pipe member 41 of the compressor 40. The pipe passing hole 50 is provided in the position of a joint line 27 of the two inclined plates 15, 16. In other words, the joint line 27 of the two inclined plates 15, 16 extends through the pipe passing hole 50. A stopper piece 30 for sealing the space between the pipe member 41 of the compressor 40 and the pipe passing hole 50 is provided in the pipe passing hole 50. The stopper piece 30 is manufactured using a flexible sealing material such as at least one of rubber, resin, and silica gel, for example. As shown in FIG. 2, the stopper piece 30 is joined to the first inclined plate 15 and the second inclined plate 16. A sealing groove may also be formed in the stopper piece 30. A reliable seal is formed as a result of the edge of the pipe passing hole 50, which is formed by putting to-

gether the inclined plates 15, 16, mating with the sealing groove of the stopper piece 30. It is preferred that when the stopper piece 30 adapts to the pipe passing hole 50 in the inclined plates 15, 16, the top surface of the stopper piece 30 be a little higher than the side edges of the inclined plates 15, 16. By ensuring this, water on the top surface of the stopper piece 30 easily flows to the side edges, so water puddling in the position of the stopper piece 30 is avoided, and even if the air treatment unit is directly left in an open-air environment, the potential for water to get inside the compressor cover 10 is greatly reduced.

[0026] The structures of the side panels 17, 18, 19 of the compressor cover 10 in the preferred embodiment are clearly viewed from FIG. 1. The side panels 17, 18, 19 in this embodiment are disposed substantially perpendicular to a horizontal plane. The side panels 17, 18, 19 are configured by five side surface portions, so that the compressor cover 10 has a five-sided shape when viewed from an overhead direction. To make attachment easier, the five side surface portions are configured by the three side panels 17, 18, 19, and three side surface portions of these are connected to each other to form an integrated folded plate 19. The side surface portion in the middle of the folded plate 19 is connected at obtuse angles to the side surface portions on both ends of the folded plate 19, and the two independent side panels 17, 18 are each connected at right angles as one to the side surface portions of the folded plate 19 with which they are continuous. The compressor 40 has a substantially cylindrical casing, and the arrangement of the side panels 17, 18, 19 of the compressor cover 10 contributes to maximizing space utilization inside the air treatment unit and makes it convenient to attach and detach the compressor cover 10. Ribs may also be provided on the folded plate 19 to improve the strength of the folded plate 19.

[0027] Furthermore, a handle 28 is provided in a side panel to make it easier to detach the compressor cover 10 and inspect and perform maintenance on the compressor 40 inside. Preferably, the handle 28 is provided in the side panel 18 of the two independent side panels 17, 18 to make it easier to first remove the side panel 18 when detaching the compressor cover 10. To maintain the waterproofing effect of the compressor cover 10, the handle 28 is attached to the side panel 18 using a sealing structure that water does not penetrate.

[0028] It is preferred that the compressor 40 be supported by the independent bottom plate 20. FIG. 3 is a three-dimensional view of the bottom plate 20 of the compressor cover. The bottom plate 20 of the compressor cover forms a single space with the bottom plate 20, the side panels 17, 18, 19, and the head covers 15, 16. A compressor anchoring portion 22 for anchoring and connecting the compressor 40 is provided in the bottom plate 20. Furthermore, water discharge holes 23 are also provided in the bottom plate 20. It is preferred that the plural water discharge holes 23 be disposed on different sides around the compressor 40, so as to remove water inside the compressor cover 10 out from the compressor cover 10.

[0029] In a case where the compressor 40 is directly attached to the bottom portion of the casing of the air treatment unit, that part of the bottom portion of the casing doubles as a bottom plate that supports the compressor 40. Additionally, water discharge holes are also provided in that part of the bottom portion of the casing.

[0030] Furthermore, a noise-controlling layer and/or a waterproofing layer may also be adhered to the sides of the side panels 17, 18, 19 and/or the head covers 15, 16 of the compressor cover 10 that face the inside of the compressor cover 10. Furthermore, nonwoven fabric may also be adhered to the sides of the side panels 17, 18, 19 and/or the head covers 15, 16 that face the inside of the compressor cover 10. It is preferred that the noise-controlling layer and the waterproofing layer be adhered to the entire inside surfaces of the side panels 17, 18, 19 and the head covers 15, 16. In a case where the stopper piece 30 has a sealing groove, the noise-controlling layer and/or the waterproofing layer adhered to the inclined plates 15, 16 may also be configured to mate with the sealing groove of the stopper piece 30 together with the head covers 15, 16.

[0031] FIG. 5, FIG. 6, and FIG. 7 show a compressor cover 100 in another embodiment of the invention, the compressor cover 100 includes side panels 117, 118, 119 and a head cover 115, and these are put together to form an inside space. A compressor 140 is contained in this inside space. In this embodiment, the head cover 115 can be formed by an integrated structure resulting from a single plate. It will be understood from FIG. 7 that the head cover 115 is configured by an inclined plate that is inclined with respect to a horizontal plane and has no holes. It is preferred that the angle of inclination of the head cover 115 with respect to the horizontal plane be set between 3 to 10 degrees. With this kind of head cover 115, water flows along the direction of inclination from the head cover, and water puddling on top of the head cover can be avoided.

[0032] In the present embodiment, pipe passing holes 150 are provided in the side panel 117. It is preferred that the pipe passing holes 150 be provided in positions in the upper edge of the side panel 117 adjacent to the head cover 115. Stopper pieces 130 for sealing spaces between pipe members 141 of the compressor 140 and the pipe passing holes 150 are attached to the pipe passing holes 150. The stopper pieces 130 can be manufactured using a flexible sealing material. As shown in FIG. 7, the pipe passing holes 150 are provided in the side panel 117 that is on a side with an inclined edge of the head cover 115.

[0033] The side panels 117, 118, 119 in this embodiment are disposed substantially perpendicular to a horizontal plane. The side panels 117, 118, 119 are configured by five side surface portions, so that the compressor cover has a five-sided shape when viewed from an overhead direction. To make attachment easier, the five side

surface portions are configured by the three side panels 117, 118, 119, and three side surface portions of these are connected to each other to form an integrated folded plate 119. The side surface portion in the middle of the folded plate 119 is connected at obtuse angles to the side surface portions on both ends of the folded plate 119, and the two independent side panels 117, 118 are each connected at right angles as one to the side surface portions of the folded plate 119 with which they are continuous. The compressor 140 has a substantially cylindrical casing, and the arrangement of the side panels 117, 118, 119 of the compressor cover 100 contributes to maximizing space utilization inside the air treatment unit and makes it convenient to attach and detach the compressor cover 100. In the present embodiment, the pipe passing holes 150 are provided in the independent side panel 117 that forms a side surface portion on its own.

[0034] When the compressor cover pertaining to the invention is used in an air treatment unit, water puddling on the head cover of the compressor cover is effectively avoided, and water is prevented from getting inside the compressor cover. Furthermore, the installment and combined structure of the side panels and the head cover are convenient to detach.

[0035] Furthermore, by covering the main bodies of the compressors 40, 140 with a soundproofing material, a certain waterproofing effect is fulfilled.

[0036] Preferred embodiments of the invention have been disclosed as described above, but neither is intended to limit the invention. All persons skilled in the art can make possible modifications and revisions without departing from the spirit and scope of the invention. Consequently, all revisions and equivalent changes and modifications made with respect to the above-described embodiments on the basis of the technical substance of the invention belong to the scope of protection defined by the claims of the invention.

Claims

1. A compressor cover that is used in an air treatment unit, includes a side panel and a head cover, and in which an upper edge of the side panel and side edges of the head cover are interconnected,
   wherein the head cover is configured by an inclined plate that is inclined with respect to a horizontal plane.

2. The compressor cover according to claim 1, wherein a pipe passing hole is provided in the head cover, and a stopper piece for sealing is provided in, and conforming to, the pipe passing hole.

3. The compressor cover according to claim 2, wherein the head cover is configured by two inclined plates.

4. The compressor cover according to claim 3, wherein a joint line of the two inclined plates extends through the pipe passing hole, and
   the stopper piece is simultaneously joined to the two inclined plates.

5. The compressor cover according to any one of claims 1 to 4, wherein a noise-controlling layer and/or a waterproofing layer is adhered to a side of the side panel and/or the head cover that face the inside of the compressor cover.

6. The compressor cover according to any one of claims 1 to 5, wherein nonwoven fabric is adhered to a side of the side panel and/or the head cover that face the inside of the compressor cover.

7. The compressor cover according to any one of claims 1 to 6, further including a bottom plate that supports a compressor,
   wherein the bottom plate, the side panel, and the head cover form an enclosed space that houses the compressor.

8. The compressor cover according to claim 7, wherein a water discharge hole is provided in the bottom plate.

9. The compressor cover according to claim 1, wherein a pipe passing hole is provided in the side panel, and a stopper piece for sealing is provided in, and conforming to, the pipe passing hole.

10. The compressor cover according to claim 2 or 9, wherein the stopper piece is manufactured using at least one of rubber, resin, and silica gel.

11. The compressor cover according to any one of claims 1 to 10, wherein a handle is provided in the side panel.

12. The compressor cover according to any one of claims 1 to 11, wherein
    the side panel has five side surface portions that are perpendicular to a horizontal plane, and
    three side surface portions of the five side surface portions are connected to each other to form an integrated plate.

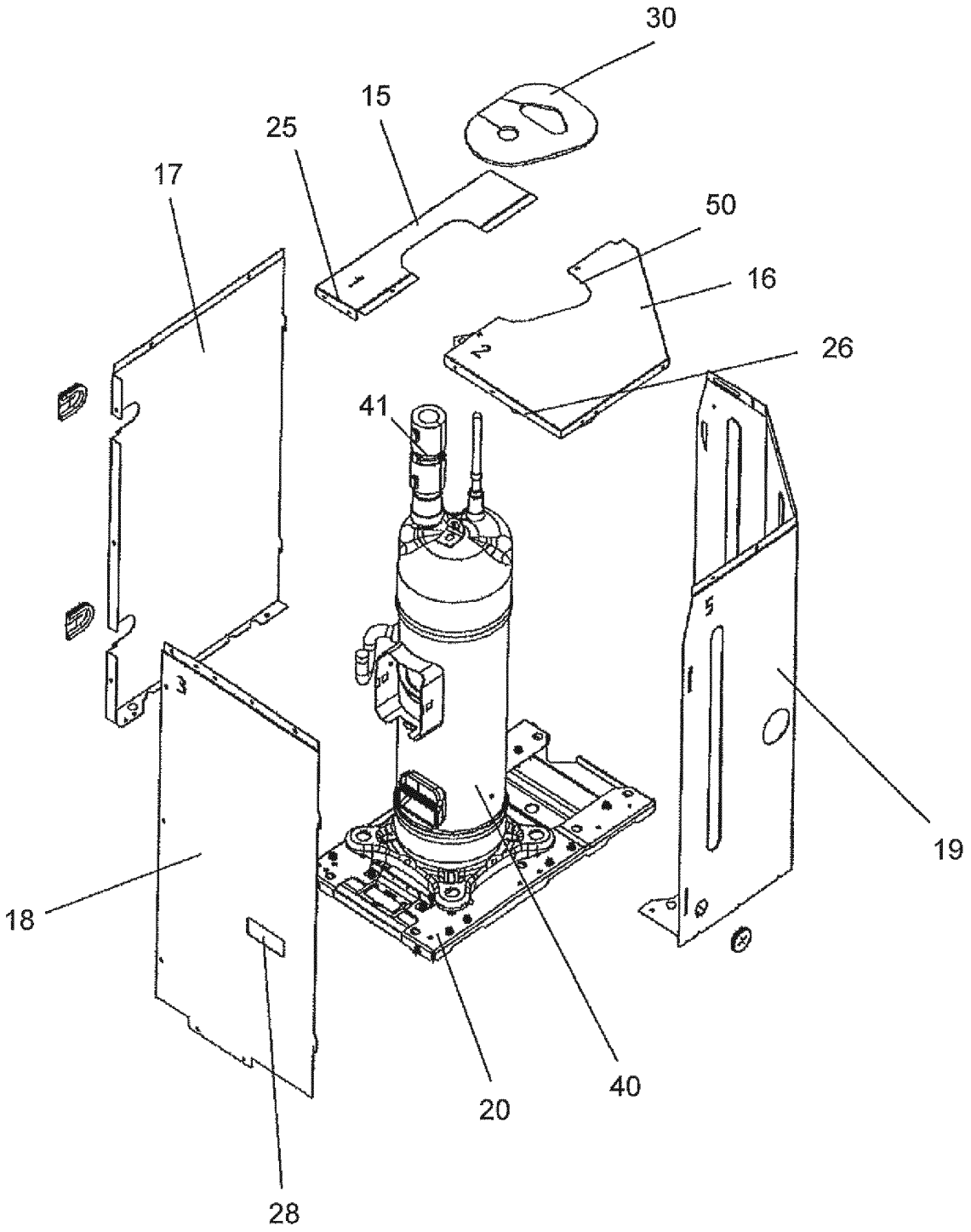

FIG. 1

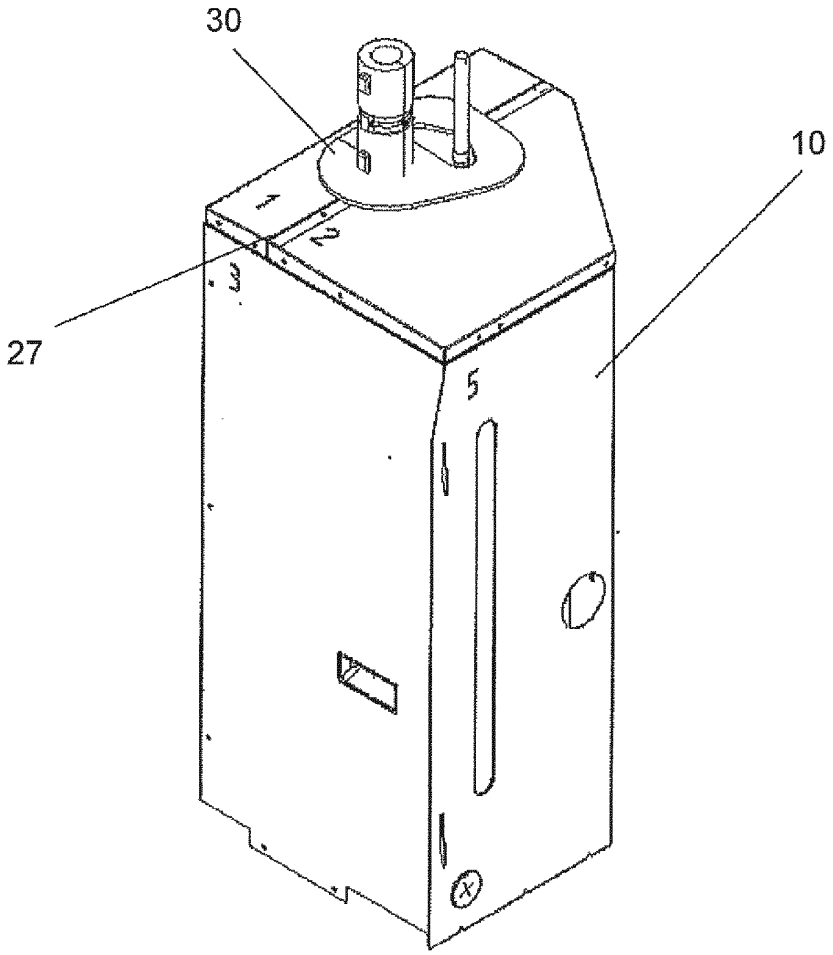

FIG. 2

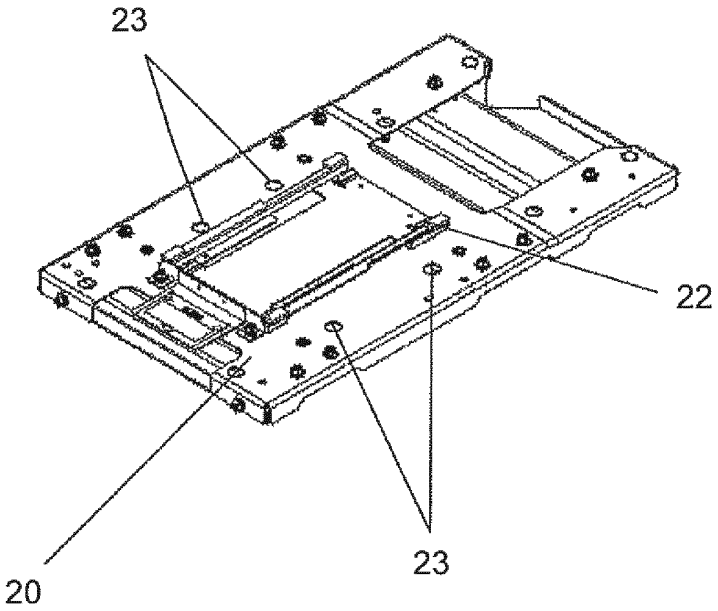

FIG. 3

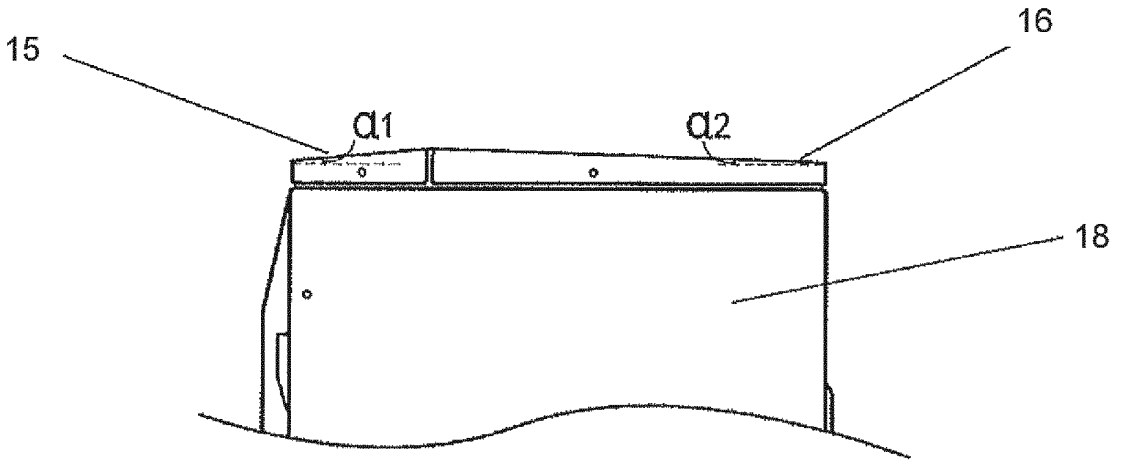

FIG. 4

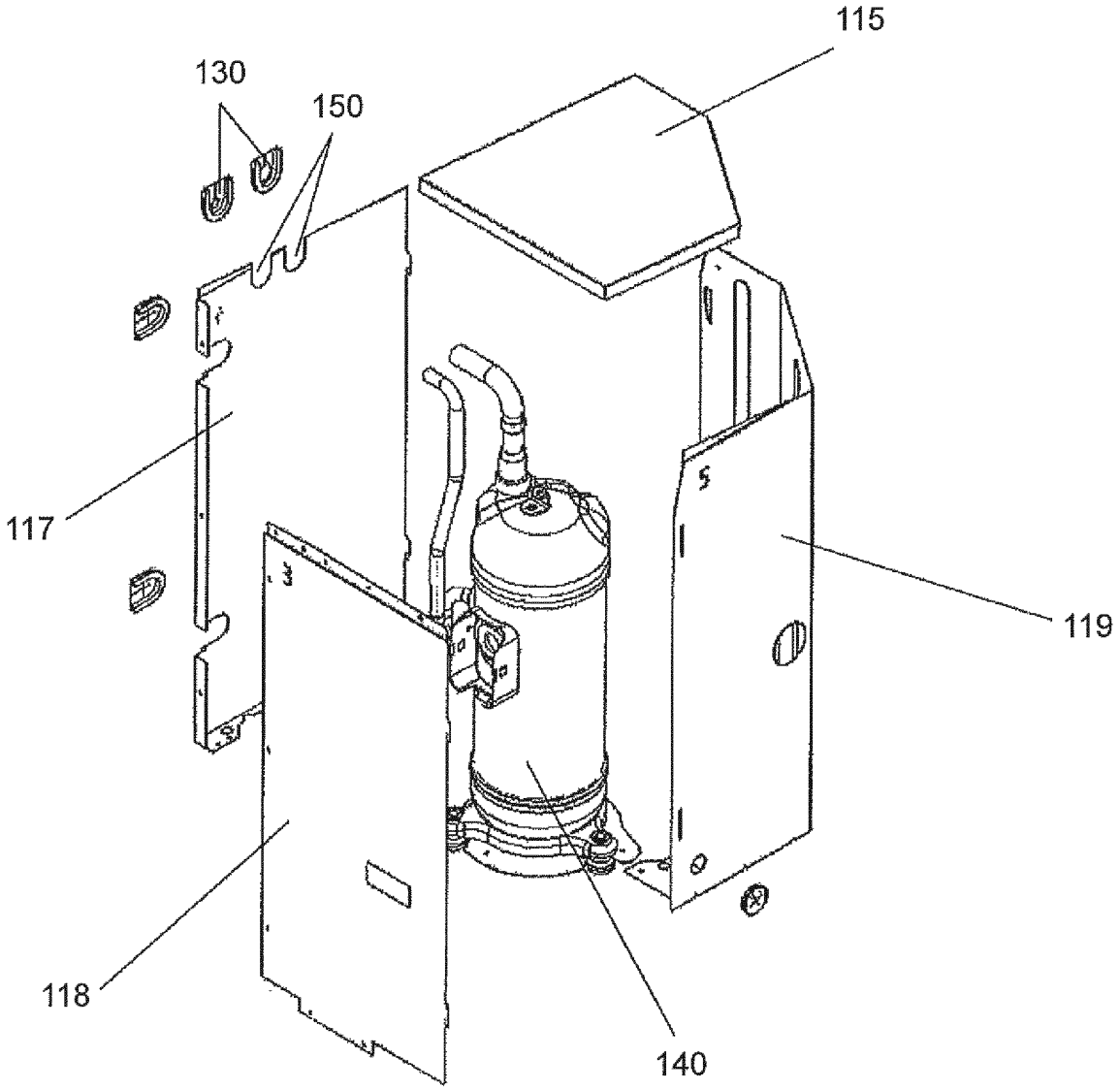

FIG. 5

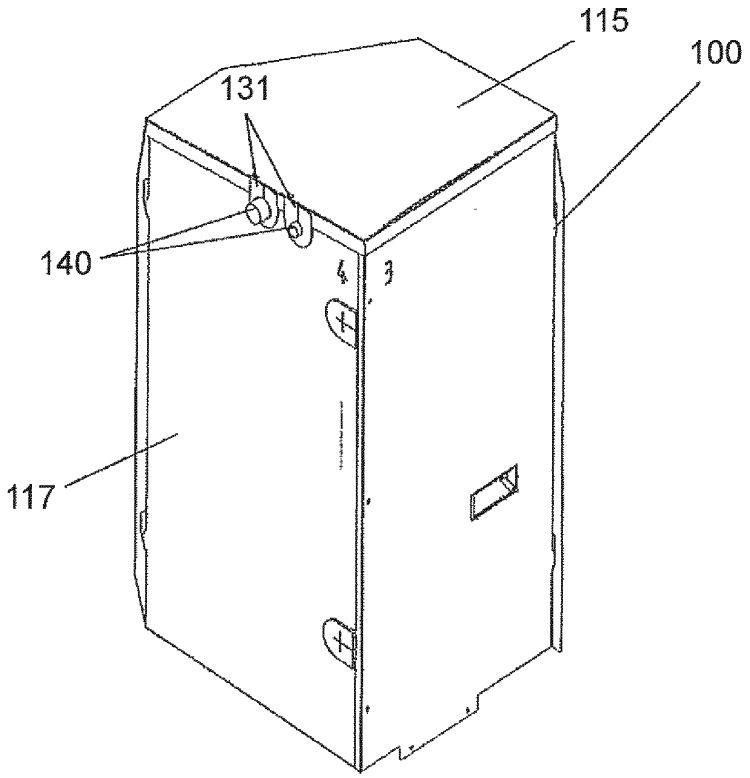

FIG. 6

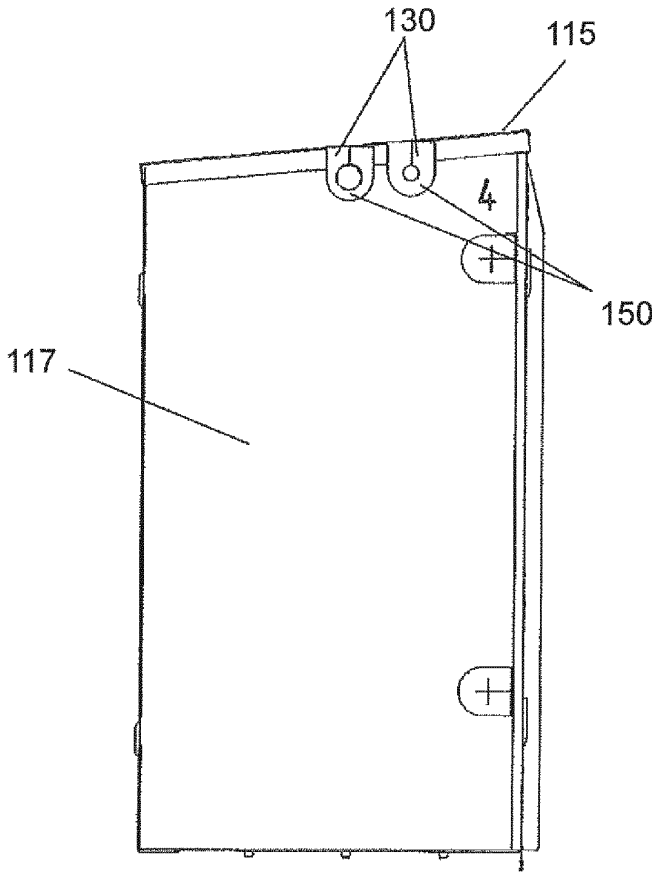

FIG. 7

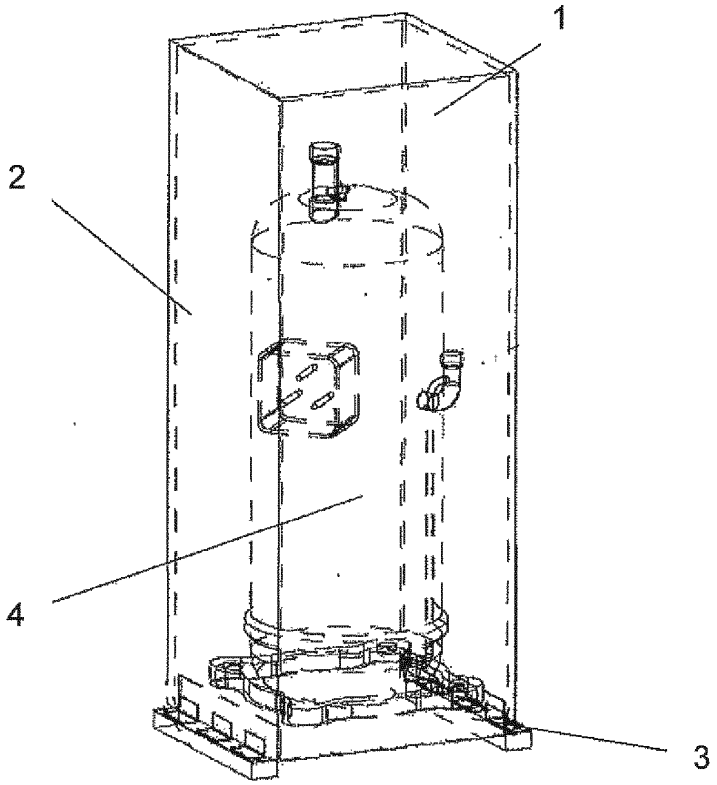

FIG. 8

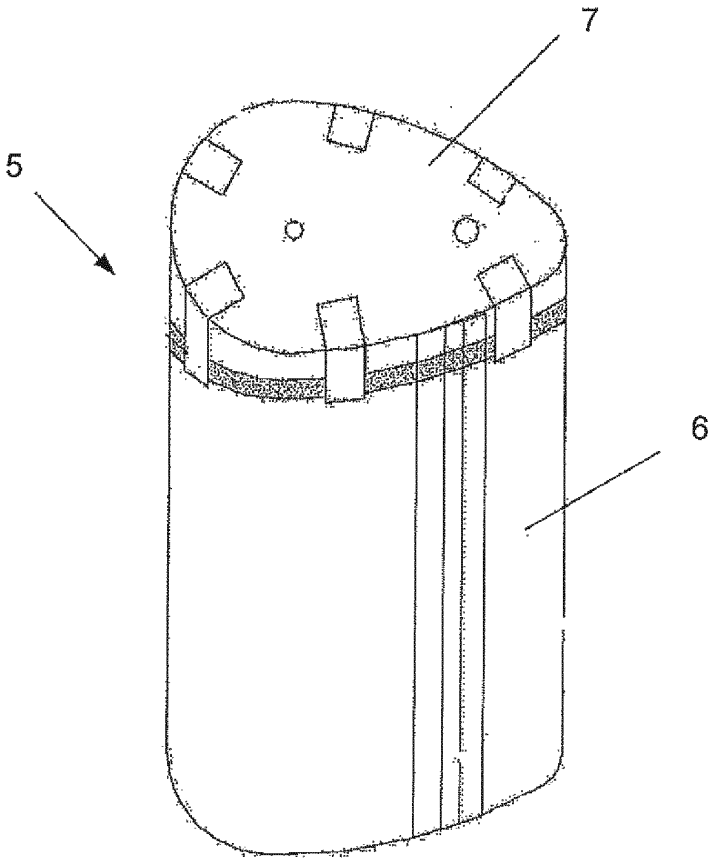

FIG. 9

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2017/025460

A. CLASSIFICATION OF SUBJECT MATTER
F24F1/12(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)
F24F1/12

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 1996-2017
Kokai Jitsuyo Shinan Koho 1971-2017 Toroku Jitsuyo Shinan Koho 1994-2017

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 Y A	JP 10-159726 A (Matsushita Electric Industrial Co., Ltd.), 16 June 1998 (16.06.1998), paragraphs [0001], [0012] to [0013]; fig. 1 to 2 (Family: none)	1-3,7,9-10, 12 2-3,5-6,8-11 4
X Y A	JP 2005-36698 A (Mitsubishi Heavy Industries, Ltd.), 10 February 2005 (10.02.2005), paragraphs [0001], [0008] to [0013], [0015]; fig. 1 to 3 (Family: none)	1,5-7,12 2-3,5-6,8-11 4

☒ 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
07 September 2017 (07.09.17)	19 September 2017 (19.09.17)
Name and mailing address of the ISA/ Japan Patent Office 3-4-3,Kasumigaseki,Chiyoda-ku, Tokyo 100-8915,Japan	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2017/025460

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 7-96736 A (Matsushita Electric Industrial Co., Ltd.), 11 April 1995 (11.04.1995), paragraph [0016]; fig. 1 (Family: none)	8
Y	JP 2012-63114 A (Mitsubishi Heavy Industries, Ltd.), 29 March 2012 (29.03.2012), paragraph [0020]; fig. 2 (Family: none)	11
Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 178211/1984(Laid-open No. 92773/1986) (Diesel Kiki Co., Ltd.), 16 June 1986 (16.06.1986), examples; fig. 2 (Family: none)	11
A	JP 2015-224824 A (Mitsubishi Heavy Industries, Ltd.), 14 December 2015 (14.12.2015), paragraphs [0029] to [0033], [0039] to [0041]; fig. 3 to 6 & EP 2949934 A2 fig. 3 to 6 & ES 2605843 T	1-12
A	JP 2014-173769 A (Mitsubishi Heavy Industries, Ltd.), 22 September 2014 (22.09.2014), paragraphs [0022] to [0032]; fig. 1 to 3 (Family: none)	1-12
A	JP 2000-130801 A (Matsushita Electric Industrial Co., Ltd.), 12 May 2000 (12.05.2000), paragraph [0014]; fig. 1 to 3 (Family: none)	1-12

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- CN 104748252 A **[0003]**
- CN 204511892 U **[0004]**