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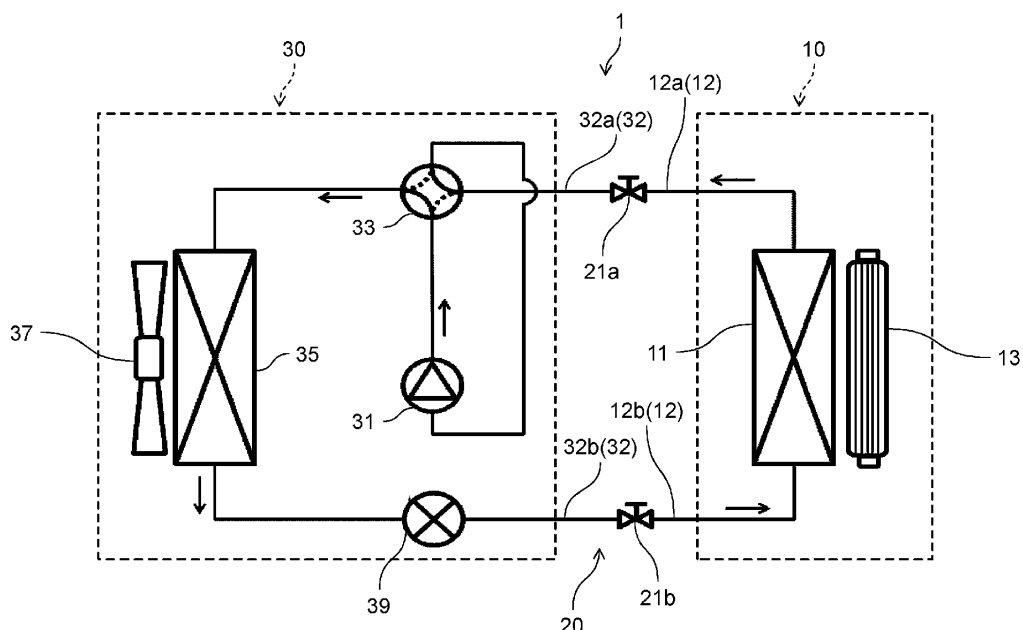
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(54) **AIR CONDITIONER**

(57) An air conditioner according to the present disclosure includes an outdoor unit that includes a compressor, an outdoor heat exchanger, an outdoor fan, and an expansion mechanism, and indoor unit (10) that includes an indoor heat exchanger and an indoor fan, and indoor-outdoor connection pipe (20). Indoor unit (10) and the outdoor unit form a refrigeration cycle circuit by being

connected to each other with indoor-outdoor connection pipe (20). The refrigeration cycle circuit uses a flammable refrigerant. Indoor-outdoor connection pipe (20) includes indoor-side connection pipe (12) extending from indoor unit (10). Indoor-side connection pipe (12) extends to the outside of indoor unit (10).

FIG. 1



Description**BACKGROUND**

1. Technical Field

[0001] The present disclosure relates to an air conditioner.

2. Description of the Related Art

[0002] PTL 1 discloses an air conditioner using a flammable refrigerant. The air conditioner includes a heat exchanger and electric components in a casing, and the electric components are disposed above the heat exchanger.

Citation List

Patent Literature

[0003] PTL 1: Japanese Patent No. 3807004

SUMMARY

[0004] The present disclosure discloses an air conditioner with improved safety when there is a leakage of a flammable refrigerant.

[0005] An air conditioner according to the present disclosure includes: an outdoor unit that includes a compressor, an outdoor heat exchanger, an outdoor fan, and an expansion mechanism; an indoor unit that includes an indoor heat exchanger and an indoor fan; and an indoor-outdoor connection pipe that connects the indoor unit and the outdoor unit. The indoor unit and the outdoor unit form a refrigeration cycle circuit by being connected by the indoor-outdoor connection pipe. The refrigeration cycle circuit uses a flammable refrigerant. The indoor-outdoor connection pipe has an indoor-side connection pipe extending from the indoor unit. The indoor-side connection pipe extends outside of the indoor unit.

[0006] With the air conditioner according to the present disclosure, it is possible to keep the connection between the indoor-side connection pipe and the outdoor-side connection pipe, the connection being a location where it is likely for a leakage of refrigerant to occur, away from the indoor unit and the room. Therefore, it is possible to improve the safety when there is a leakage of a flammable refrigerant.

BRIEF DESCRIPTION OF THE DRAWINGS**[0007]**

Fig. 1 is a schematic diagram illustrating a refrigeration cycle circuit of an air conditioner according to a first exemplary embodiment;

Fig. 2 is a side view of the indoor unit according to

the first exemplary embodiment at the time of factory shipment;

Fig. 3 is a side view of the indoor unit according to the first exemplary embodiment installed on an indoor wall surface;

Fig. 4 is a side view of an indoor unit according to another exemplary embodiment at the time of factory shipment; and

Fig. 5 is a side view of an indoor unit according to still another exemplary embodiment at the time of factory shipment.

DETAILED DESCRIPTIONS

(Knowledge and the like underlying the present disclosure)

[0008] At the time when the inventors have arrived at the present disclosure, in the technical field of air conditioners, there has been a demand for switching the refrigerant to a refrigerant having low global warming potential, e.g., isobutane or propane, from the viewpoint of decelerating the climate change. In the air conditioner industry, because refrigerant such as isobutane or propane is flammable, there have been some disclosures for taking safety measures against the leakage of the refrigerant. In such an environment, the inventors have found that there has been a problem that a leakage of the refrigerant is likely to occur at a point where the indoor-side connection pipe extending from the indoor unit is connected to the pipe extending from the outdoor unit, and come up with the subject matter of the present disclosure, in order to solve this problem.

[0009] Therefore, the present disclosure provides an air conditioner with improved safety when there is a leakage of a flammable refrigerant.

[0010] Some exemplary embodiments will now be explained in detail with reference to some drawings. However, descriptions more in details than necessary are sometimes omitted. For example, detailed descriptions of already well-known matters and redundant descriptions of substantially the same configurations are sometimes omitted.

[0011] Note that the accompanying drawings and the following descriptions are provided for those skilled in the art to fully understand the present disclosure, and are not intended to limit the subject matter described in the claims in any way.

(First exemplary embodiment)

[1-1. Overall configuration]

[0012] A first exemplary embodiment will now be explained with reference to Figs. 1 to 3. Fig. 1 is a schematic diagram illustrating a refrigeration cycle circuit of air conditioner 1 according to the first exemplary embodiment. In Fig. 1, air conditioner 1 includes indoor unit 10 and

outdoor unit 30. Air conditioner 1 circulates a flammable refrigerant such as isobutane or propane in the refrigeration cycle circuit illustrated in Fig. 1, and performs air conditioning such as heating or cooling inside a space in which indoor unit 10 is installed. Note that devices that are not used in the descriptions, such as an accumulator, are not illustrated in Fig. 1, but air conditioner 1 may include such other devices not illustrated.

[0013] Indoor unit 10 is installed inside of a room such as a building or a moving body such as a ship, and performs air conditioning inside the room. Indoor unit 10 includes indoor heat exchanger 11 and indoor fan 13. Indoor heat exchanger 11 is, for example, a finned tube heat exchanger, and inside of which is provided with a flow channel through which the refrigerant is passed.

[0014] Indoor fan 13 is, for example, a cross flow fan that uses a motor, not illustrated, to rotate an impeller to blow out the air. Indoor fan 13 suctions the indoor air into indoor unit 10 and circulates the air through indoor heat exchanger 11, to exchange the heat between the refrigerant inside of indoor heat exchanger 11 and the suctioned air. The air having the heat exchanged with the refrigerant is returned to the outside of indoor unit 10, and conditions the air inside of the room.

[0015] Outdoor unit 30 includes compressor 31, four-way valve 33, outdoor heat exchanger 35, outdoor fan 37, and expansion mechanism 39. Compressor 31 is, for example, a sealed compressor that suctions, compresses, and discharges gaseous refrigerant toward four-way valve 33. Four-way valve 33 is capable of switching a flow path of the refrigerant flowing into compressor 31 and a flow path of the refrigerant discharged from compressor 31.

[0016] By switching the refrigerant flow path, four-way valve 33 switches the operation of indoor unit 10 between a cooling operation and a heating operation. For example, when four-way valve 33 causes the refrigerant to flow in the direction of the arrow illustrated in Fig. 1, indoor unit 10 performs the cooling operation. Outdoor heat exchanger 35 is, for example, a finned tube heat exchanger, and inside of which is provided with a flow channel through which the refrigerant is passed. The flow channel in outdoor heat exchanger 35 is connected to four-way valve 33 and expansion mechanism 39. Outdoor fan 37 is, for example, an axial blower, and exchanges heat between the air outside of outdoor unit 30 and the refrigerant inside of outdoor heat exchanger 35. Expansion mechanism 39 is, for example, a capillary tube or an expansion valve, and decompresses the refrigerant flowing there-through.

[0017] Indoor unit 10 and outdoor unit 30 form a refrigeration cycle circuit by being connected to each other by indoor-outdoor connection pipe 20. Indoor-outdoor connection pipe 20 includes indoor-side gas pipe 12a, indoor-side liquid pipe 12b, outdoor-side gas pipe 32a, and outdoor-side liquid pipe 32b.

[0018] In indoor unit 10, indoor heat exchanger 11 is connected to indoor-side gas pipe 12a and indoor-side

liquid pipe 12b. Each of indoor-side gas pipe 12a and indoor-side liquid pipe 12b is a refrigerant pipe through which the refrigerant is passed. Indoor-side gas pipe 12a and indoor-side liquid pipe 12b are collectively referred to as indoor-side connection pipe 12. Indoor-side connection pipe 12 is directly connected to indoor heat exchanger 11 by brazing, for example.

[0019] In outdoor unit 30, four-way valve 33 is connected to indoor-side gas pipe 12a via outdoor-side gas pipe 32a. Expansion mechanism 39 is connected to indoor-side liquid pipe 12b via outdoor-side liquid pipe 32b. Each of outdoor-side gas pipe 32a and outdoor-side liquid pipe 32b are refrigerant pipes through which the refrigerant is passed. Outdoor-side gas pipe 32a and outdoor-side liquid pipe 32b are collectively referred to as outdoor-side connection pipe 32. Outdoor-side connection pipe 32 may be directly connected to four-way valve 33 and expansion mechanism 39, or may be connected via a refrigerant pipe, not illustrated, provided internal of the outdoor unit. In other words, outdoor-side connection pipe 32 may be connected to outdoor unit 30 at the time of factory shipment of outdoor unit 30, or may be connected to outdoor unit 30 by a worker after outdoor unit 30 is installed.

[0020] Indoor-side connection pipe 12 and outdoor-side connection pipe 32 are connected to each other by gas pipe connection portion 21a and liquid pipe connection portion 21b. Gas pipe connection portion 21a and liquid pipe connection portion 21b are, for example, two-way valves or three-way valves. With these, indoor unit 10 and outdoor unit 30 are connected to each other, and the refrigerant is enabled to flow.

[1-2. Configuration of indoor unit]

[1-2-1. Configuration of indoor unit at time of factory shipment]

[0021] Fig. 2 is a side view of indoor unit 10, illustrating indoor unit 10 at the time of factory shipment as viewed from the rear side. Note that UP, LH, and FR in Figs. 2 and subsequent drawings correspond to an upper side, a left side, and a front side of indoor unit 10 described herein, respectively, and are used as a reference in referring to directions, such as upward and downward, leftward and rightward, frontward and rearward, and horizontal and vertical directions, in the description herein. In addition, UP, LH, and FR illustrated in each of the drawings and directions such as upward and downward, leftward and rightward, frontward and rearward, and horizontal and vertical directions described herein are defined with reference to installed indoor unit 10. For the convenience of description, indoor-side gas pipe 12a and indoor-side liquid pipe 12b are collectively illustrated as one pipe in Fig. 2 and subsequent drawings, but actually, two pipes extend along the same direction.

[0022] Indoor unit 10 includes housing 14 that is a box having a substantially cuboid shape. In indoor unit 10,

indoor heat exchanger 11 and indoor fan 13 illustrated in Fig. 1 are housed inside housing 14. Indoor unit 10 includes electric component 16 for controlling indoor fan 13 and the like inside housing 14. Housing 14 has an air outlet, not illustrated, on a front surface, not illustrated, facing the front side. Indoor unit 10 blows the air having exchanged heat with indoor heat exchanger 11 into the room through the air outlet.

[0023] Indoor unit 10 has rear surface 10a. Rear surface 10a is a surface facing the rear side, and is a part of indoor unit 10 and housing 14. Rear surface 10a is a surface to be mounted on an installation surface, such as a wall inside the room, with mount plate 18, to be described later, interposed therebetween, when indoor unit 10 is installed in the room. Rear surface 10a has groove 14b recessed forwards and extending in the left-right direction. A plurality of pipe openings 14a are provided on a bottom end of groove 14b. Each of pipe openings 14a is an opening closed by a lid. When the lid is removed, the space inside groove 14b becomes connected to the outside of indoor unit 10. Indoor-side connection pipe 12 is routed through groove 14b and pipe opening 14a having the lid removed, to the outside of indoor unit 10.

[0024] Rear surface 10a has a substantially rectangular shape in a rearward side view, and has length W1 as a horizontal size and length W2 as a vertical size. In the first exemplary embodiment, length W1 is larger than length W2. Therefore, horizontal length W1 of rear surface 10a is the longitudinal length of rear surface 10a. Length W2 of rear surface 10a in the vertical direction is the length of rear surface 10a in the short side direction.

[0025] Mount plate 18 is mounted on rear surface 10a of indoor unit 10 at the time of factory shipment, that is, for transportation. Mount plate 18 has a large number of fastening holes 18a and claws 18b. Fastening holes 18a are holes penetrating through mount plate 18. When indoor unit 10 is installed, mount plate 18 is fastened to a wall surface or the like of the room, with screws or the like, not illustrated, through fastening holes 18a. Each of claws 18b has a shape protruding forwards, and hooks onto the top and bottom edges of housing 14 and hold indoor unit 10. When indoor unit 10 is shipped from the factory, mount plate 18 is fastened onto rear surface 10a of indoor unit 10, with claws 18b being hooked onto the top and bottom edges of housing 14.

[0026] As illustrated in Fig. 2, at the time of factory shipment of indoor unit 10, indoor-side connection pipe 12 is bent and fitted on the inner side of rear surface 10a along an outer periphery of rear surface 10a. As indicated by a broken line in Fig. 2, indoor-side connection pipe 12 is pulled outside of housing 14 from the left part of rear surface 10a, and passed and pulled out between rear surface 10a and mount plate 18. Indoor-side connection pipe 12 is fastened to mount surface 18c of mount plate 18 with belts 19. Mount surface 18c is a surface facing the wall surface or the like that is an installation surface when indoor unit 10 is installed inside the room, and is a

surface on the opposite side of the surface facing indoor unit 10. Each belt 19 is attached, through fastening holes 18a, to mount plate 18. Indoor-side connection pipe 12 is fastened to mount plate 18 by binding indoor-side connection pipe 12 to mount plate 18 with belts 19.

[0027] A portion of indoor-side connection pipe 12 pulled out from rear surface 10a to the outside of housing 14, the portion being indicated by a broken line in Fig. 2, is collectively referred to as pulled-out portion 12c. The tip of indoor-side connection pipe 12 is collectively referred to as tip portion 12d. The length of indoor-side connection pipe 12 is defined as a length between pulled-out portion 12c and tip portion 12d. The length of indoor-side connection pipe 12 is equal to or longer than twice length W1. That is, the length of indoor-side connection pipe is equal to or longer than twice the longitudinal length of rear surface 10a.

[1-2-2. Configuration of indoor unit at time of installation]

[0028] Fig. 3 is a side view of indoor unit 10, illustrating indoor unit 10 installed on a wall surface inside of a room. As described above, indoor unit 10 is installed on an installation surface such as a wall surface inside of a room, with mount plate 18 interposed therebetween. As a result, rear surface 10a is disposed substantially in parallel with the wall surface or the like.

[0029] As illustrated in Fig. 3, when indoor unit 10 is installed, indoor-side connection pipe 12 is passed through the space between groove 14b and mount plate 18, and is pulled out of indoor unit 10 through pipe opening 14a. In the present exemplary embodiment, indoor-side connection pipe 12 pulled outside of indoor unit 10 is then pulled outside of the room through hole H provided on the wall surface of the room, and is connected to outdoor-side connection pipe 32 outside the room. In this manner, indoor-outdoor connection pipe 20 is formed.

[0030] Different pipe opening 14a may be used to pass indoor-side connection pipe 12, depending on a positional relationship between hole H formed in the wall surface and the position where indoor unit 10 is installed. For example, unlike the configuration illustrated in Fig. 2, when hole H is positioned on the left side of indoor unit 10, indoor-side connection pipe 12 is pulled out of indoor unit 10 through pipe opening 14a on the left side. As described above, because the length of indoor-side connection pipe 12 is equal to or longer than twice the longitudinal width of rear surface 10a, indoor-side connection pipe 12 can be pulled out of indoor unit 10, by passing indoor-outdoor connection pipe 20 through any one of pipe openings 14a. Therefore, when indoor unit 10 is installed, the position where indoor-side connection pipe 12 and outdoor-side connection pipe 32 are connected is located outside of the indoor unit 10.

[0031] Furthermore, because the length of indoor-side connection pipe 12 is about twice the longitudinal length of rear surface 10a, in many cases, indoor-side connection pipe 12 can be pulled out to the outdoor side from

the hole H as illustrated in Fig. 3. In this case, indoor-side connection pipe 12 and outdoor-side connection pipe 32 are connected to each other on the outdoor side of hole H.

[1-3. Operation and action]

[0032] An operation of air conditioner 1 configured as described above when refrigerant leakage occurs at a position where indoor-side connection pipe 12 and outdoor-side connection pipe 32 are connected will now be explained.

[0033] As described above, the length of indoor-side connection pipe 12 is equal to or longer than twice the longitudinal width of rear surface 10a, and is pulled out of indoor unit 10 through pipe opening 14a. Therefore, the connection between indoor-side connection pipe 12 and outdoor-side connection pipe 32, the connection being where the refrigerant leakage occurs, is located outside of indoor unit 10. Therefore, even when the refrigerant leaks at the position of the connection between indoor-side connection pipe 12 and outdoor-side connection pipe 32, the leaked refrigerant does not accumulate inside indoor unit 10. As a result, it is less likely for the refrigerant to catch the fire ignited by the motor of indoor fan 13, electric components 16, or the like, as an ignition source, advantageously.

[0034] Furthermore, as described above, because the length of indoor-side connection pipe 12 is equal to or longer than twice the longitudinal length of rear surface 10a, in many cases, indoor-side connection pipe 12 can be pulled out to the outdoor side of hole H. Therefore, the connection between indoor-side connection pipe 12 and outdoor-side connection pipe 32 where the refrigerant leakage occurs is positioned outside the room. As a result, leaked refrigerant is prevented from accumulating indoors, so that it is less likely for the refrigerant to catch fire, advantageously.

[1-4. Effects and the like]

[0035] As described above, in the present exemplary embodiment, air conditioner 1 includes outdoor unit 30 that includes compressor 31, outdoor heat exchanger 35, outdoor fan 37, and expansion mechanism 39, and indoor unit 10 that includes indoor heat exchanger 11 and indoor fan 13. Indoor unit 10 and outdoor unit 30 form a refrigeration cycle circuit by being connected by indoor-outdoor connection pipe 20. The refrigeration cycle circuit uses a flammable refrigerant. Indoor-outdoor connection pipe 20 includes indoor-side connection pipe 12 extending from indoor unit 10. Indoor-side connection pipe 12 extends to the outside of indoor unit 10.

[0036] With this configuration, when the refrigerant leaks from the outdoor-side end of indoor-side connection pipe 12, it is less likely for the leaked refrigerant to accumulate inside of indoor unit 10, advantageously. Therefore, it is less likely for the refrigerant to catch the

fire ignited by an ignition source inside indoor unit 10 or in the indoor space, advantageously, so that the safety of air conditioner 1 is improved.

[0037] In air conditioner 1, the length of indoor-side connection pipe 12 is equal to or longer than twice longitudinal length W1 of rear surface 10a of indoor unit 10.

[0038] With this configuration, in many cases, indoor-side connection pipe 12 can be routed to the outdoor. Therefore, the refrigerant leaked from the outdoor-side end of indoor-side connection pipe 12 does not accumulate indoors. Therefore, it is less likely for the refrigerant to catch fire, advantageously. Even when indoor-side connection pipe 12 cannot be routed outdoors, indoor-side connection pipe 12 has an enough length to prevent the leaked refrigerant from coming near indoor fan 13 or the like, advantageously. Therefore, it is less likely for leaked refrigerant to catch fire, advantageously. Therefore, the safety of air conditioner 1 is improved.

[0039] During the transportation of indoor unit 10, indoor-side connection pipe 12 is placed on the inner side of rear surface 10a along the outer periphery of rear surface 10a.

[0040] With this configuration, even with indoor-side connection pipe 12 that is longer than longitudinal length W1 of rear surface 10a, indoor unit 10 can be transported compactly. Therefore, it is possible to achieve both improvement in safety of air conditioner 1 and improvement in transportability of air conditioner 1.

[0041] Indoor unit 10 includes mount plate 18 that is mounted removably on indoor unit 10, and mount plate 18 holds indoor-side connection pipe 12 on mounting surface 18c that is on the opposite side of a surface facing indoor unit 10 during transportation of the indoor unit.

[0042] With this configuration, indoor-side connection pipe 12 can be held compactly without providing a new member, and indoor unit 10 can be transported compactly. Therefore, it is possible to achieve both improvement in safety of air conditioner 1 and improvement in transportability of air conditioner 1.

(Other exemplary embodiments)

[0043] The first exemplary embodiment has been described above as an example of the technology disclosed in the present application. However, the technology in the present disclosure is not limited thereto, and may be applied to exemplary embodiments with some changes, replacements, additions, omissions, or the like applied thereto. Therefore, other exemplary embodiments will be explained below.

[0044] In the first exemplary embodiment, as illustrated in Fig. 2, indoor-side connection pipe 12 is explained to be bent and housed on the inner side of rear surface 10a along the outer periphery of rear surface 10a, at the time of factory shipment of indoor unit 10. However, this is merely an example. For example, as illustrated in Fig. 4, during the transportation of indoor unit 10, indoor-side connection pipe 12 may be laid spirally in circles having

a diameter equal to length W2 of rear surface 10a in the short side direction. In this configuration, too, indoor-side connection pipe 12 is fastened with belts 19, on mount plate 18. In this configuration, indoor-side connection pipe 12 is disposed on the inner side of rear surface 10a along the outer periphery of rear surface 10a of indoor unit 10. The diameter mentioned herein includes a substantial diameter.

[0045] With this configuration, as compared with the exemplary arrangement of indoor-side connection pipe 12 illustrated in Fig. 2, indoor-side connection pipe 12 the length of which is longer can be disposed on the inner side of rear surface 10a along the outer periphery of rear surface 10a. Therefore, it is possible to achieve both improvement in safety of air conditioner 1 and improvement in transportability of air conditioner 1.

[0046] As illustrated in Fig. 5, during the transportation of indoor unit 10, indoor-side connection pipe 12 may be laid spirally in ellipses having short axis S in the vertical direction that is the short side direction of rear surface 10a and long axis L in the horizontal direction that is the longitudinal direction. In this configuration, too, indoor-side connection pipe 12 is fastened with belts 19, on mount plate 18. In this configuration, indoor-side connection pipe 12 is disposed on the inner side of rear surface 10a along the outer periphery of rear surface 10a of indoor unit 10.

[0047] With this configuration, as compared with the exemplary arrangement of indoor-side connection pipe 12 illustrated in Fig. 2, indoor-side connection pipe 12 the length of which is longer can be disposed on the inner side of rear surface 10a along the outer periphery of rear surface 10a. Therefore, it is possible to achieve both improvement in safety of air conditioner 1 and improvement in transportability of air conditioner 1.

[0048] In the above exemplary embodiment, the long-axis side of rear surface 10a is laid horizontally, and the short-axis side is laid vertically, but this is an example. For example, the long-axis side of rear surface 10a may be laid vertically. Indoor unit 10 is not limited to the installation on a wall surface inside the room, and may also be installed on a ceiling, for example.

[0049] The present disclosure can be applied to air conditioners. Specifically, the present invention can be applied to home-use and business-use air conditioners that use a flammable refrigerant.

nects the indoor unit and the outdoor unit, wherein the indoor unit and the outdoor unit form a refrigeration cycle circuit by being connected to each other via the indoor-outdoor connection pipe, the refrigeration cycle circuit uses a flammable refrigerant, the indoor-outdoor connection pipe includes an indoor-side connection pipe extending from the indoor unit, and the indoor-side connection pipe extends to an outside of the indoor unit.

2. The air conditioner according to Claim 1, wherein a length of the indoor-side connection pipe is equal to or longer than twice a longitudinal length of a rear surface of the indoor unit.
3. The air conditioner according to Claim 2, wherein the indoor-side connection pipe is disposed on an inner side of the rear surface, along an outer periphery of the rear surface during a transportation of the indoor unit.
4. The air conditioner according to Claim 3, wherein the indoor-side connection pipe is disposed spirally in circles having a diameter equal to a short-side length of the rear surface, during a transportation of the indoor unit.
5. The air conditioner according to Claim 3, wherein the indoor-side connection pipe is disposed spirally in ellipses a short axis of which extending along a short-hand side of the rear surface, and a long axis of which extends along a longitudinal side, during a transportation of the indoor unit.
6. The air conditioner according to any one of Claims 1 to 5, further comprising a mount plate that is removable from the indoor unit, wherein the mount plate holds the indoor-side connection pipe on a surface on an opposite side of a surface facing the indoor unit, during a transportation of the indoor unit.

Claims

1. An air conditioner comprising:

an outdoor unit that includes a compressor, an outdoor heat exchanger, an outdoor fan, and an expansion mechanism;
 an indoor unit that includes an indoor heat exchanger and an indoor fan; and
 an indoor-outdoor connection pipe that con-

FIG. 1

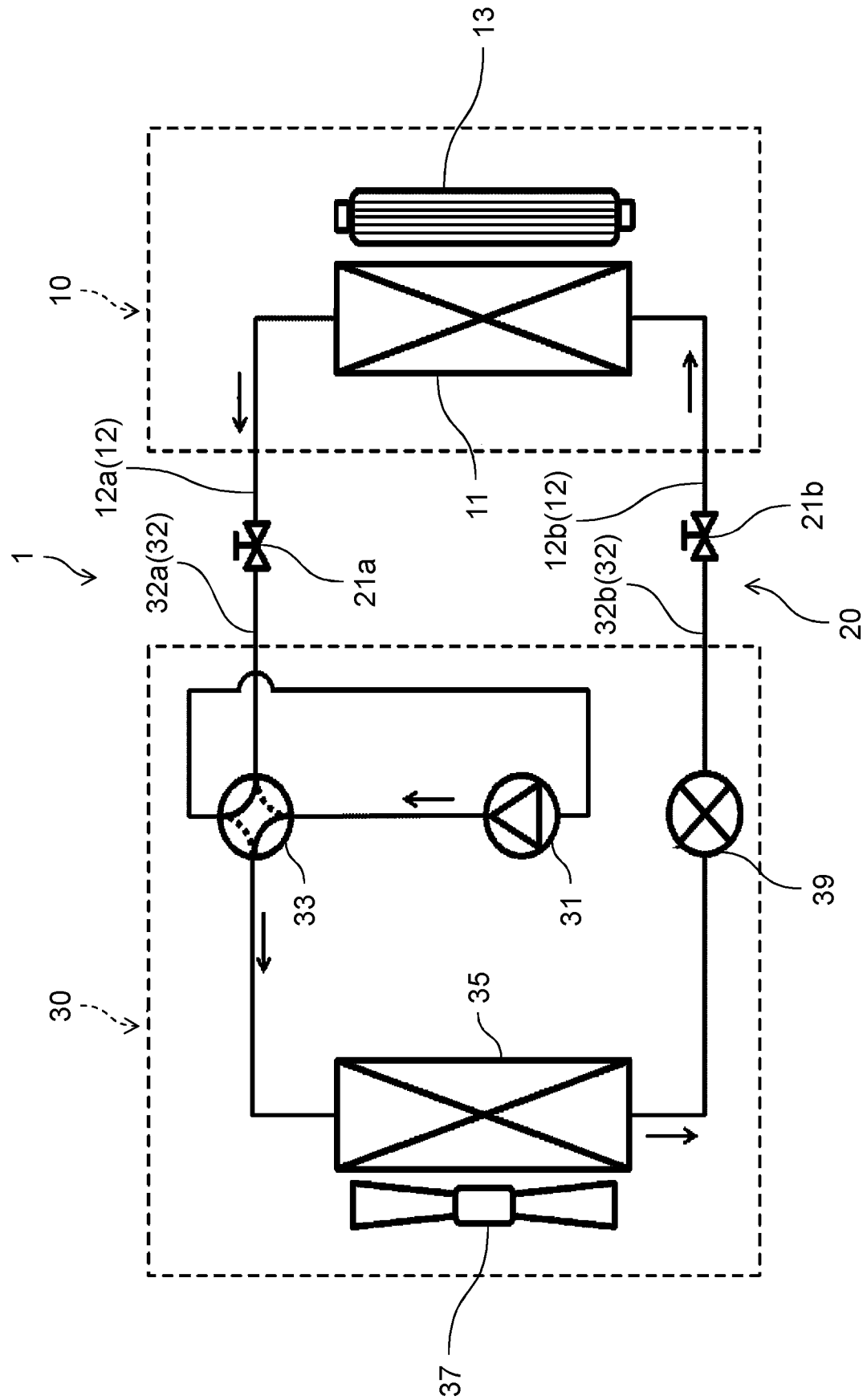


FIG. 2

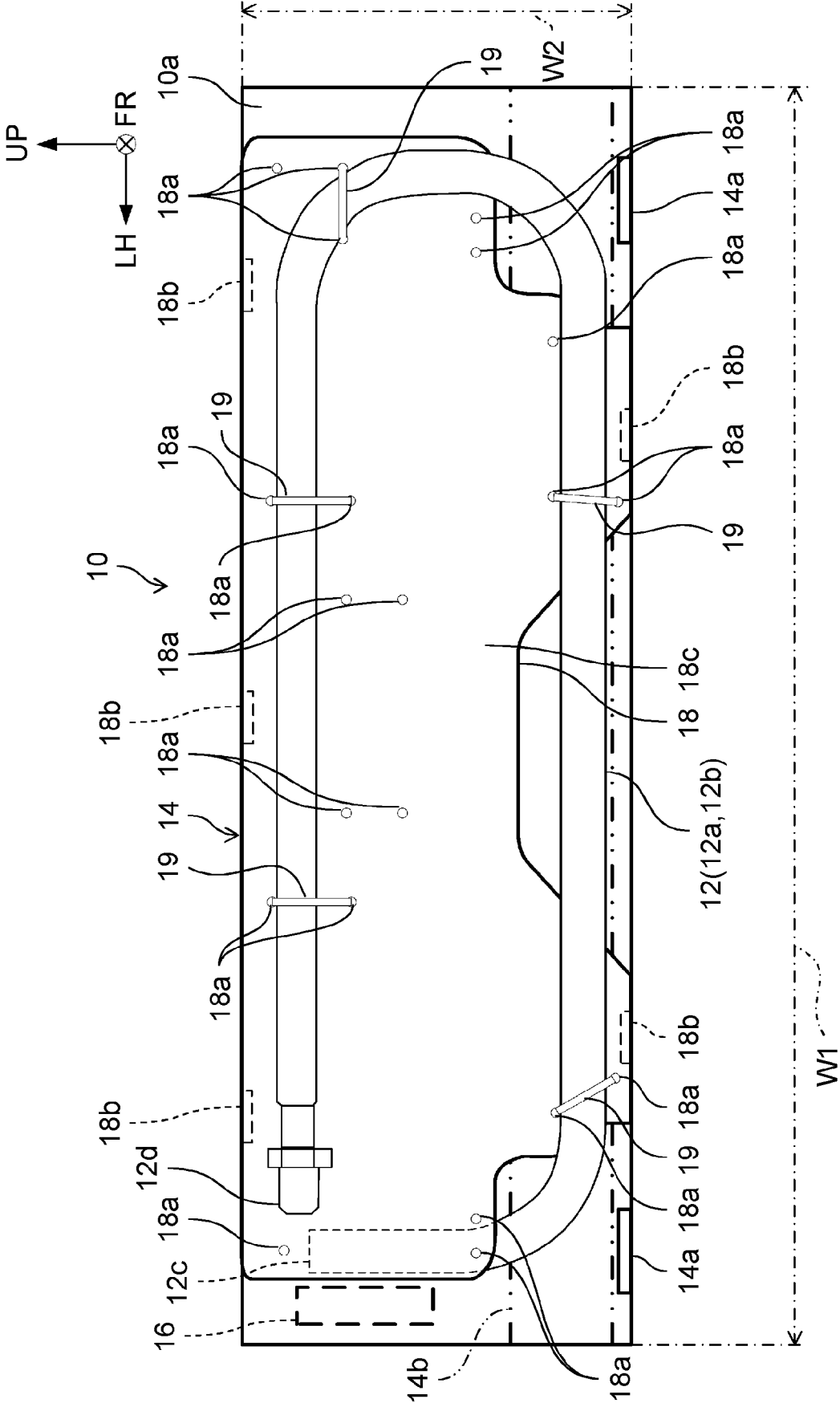


FIG. 3

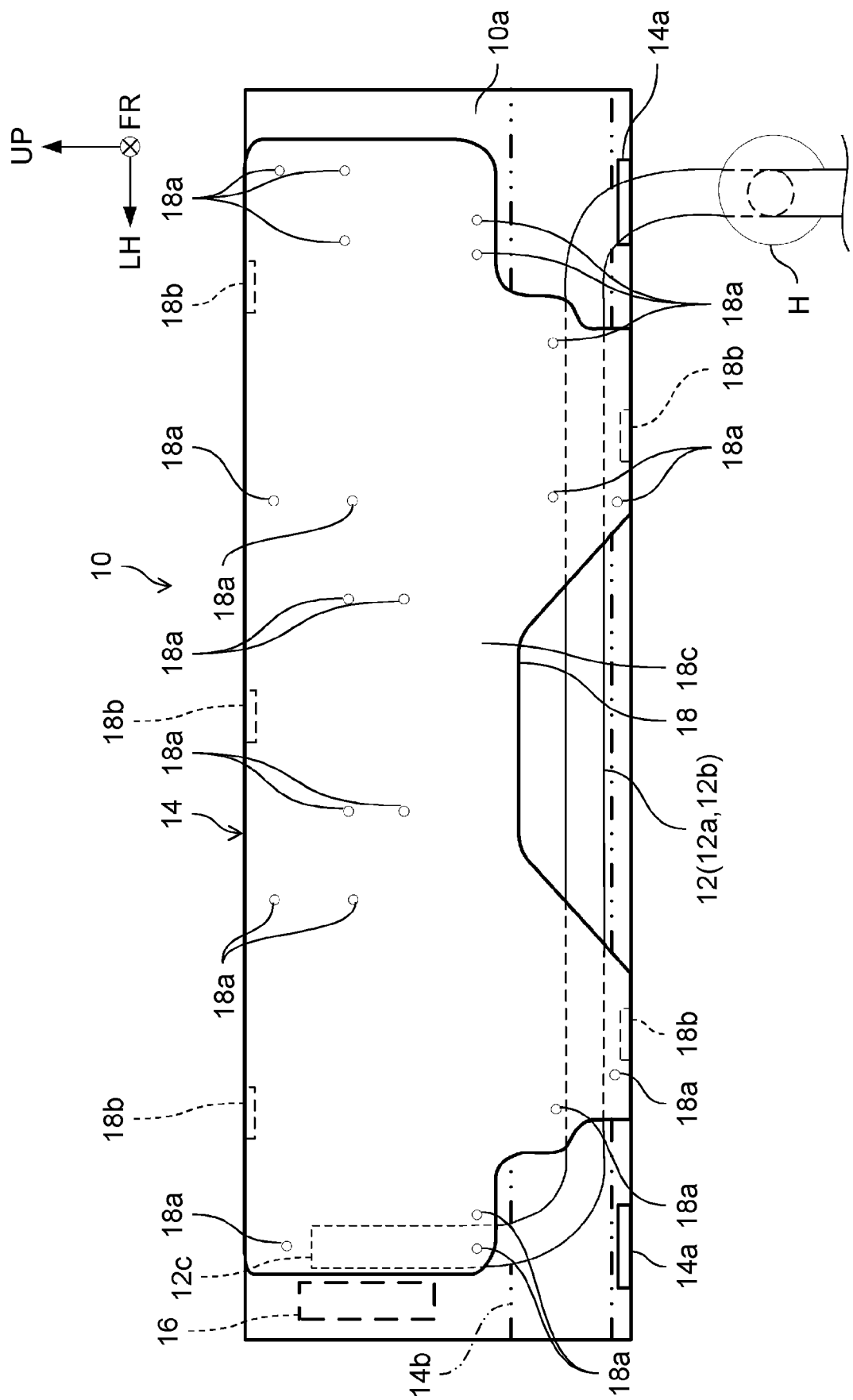


FIG. 4

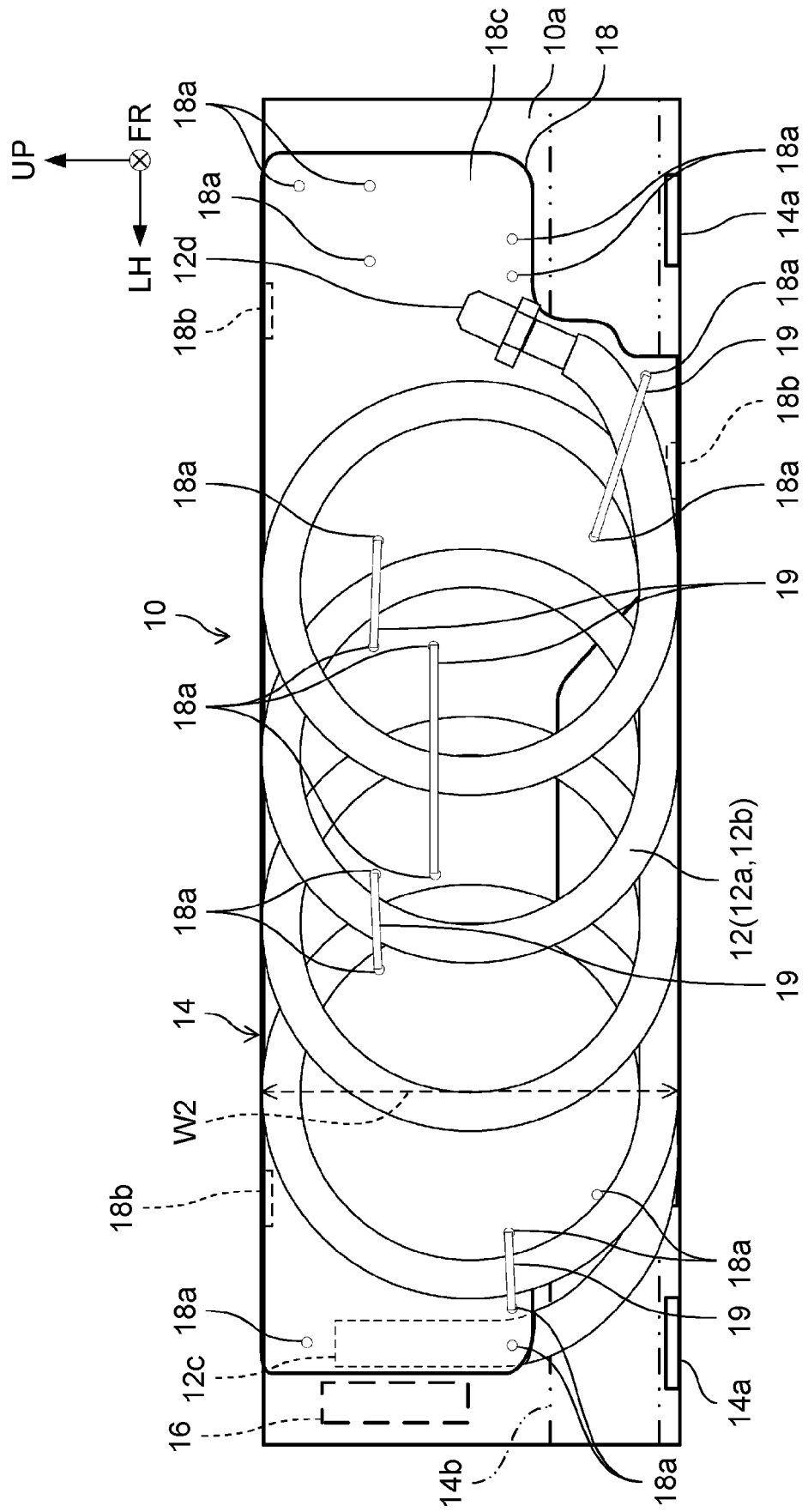
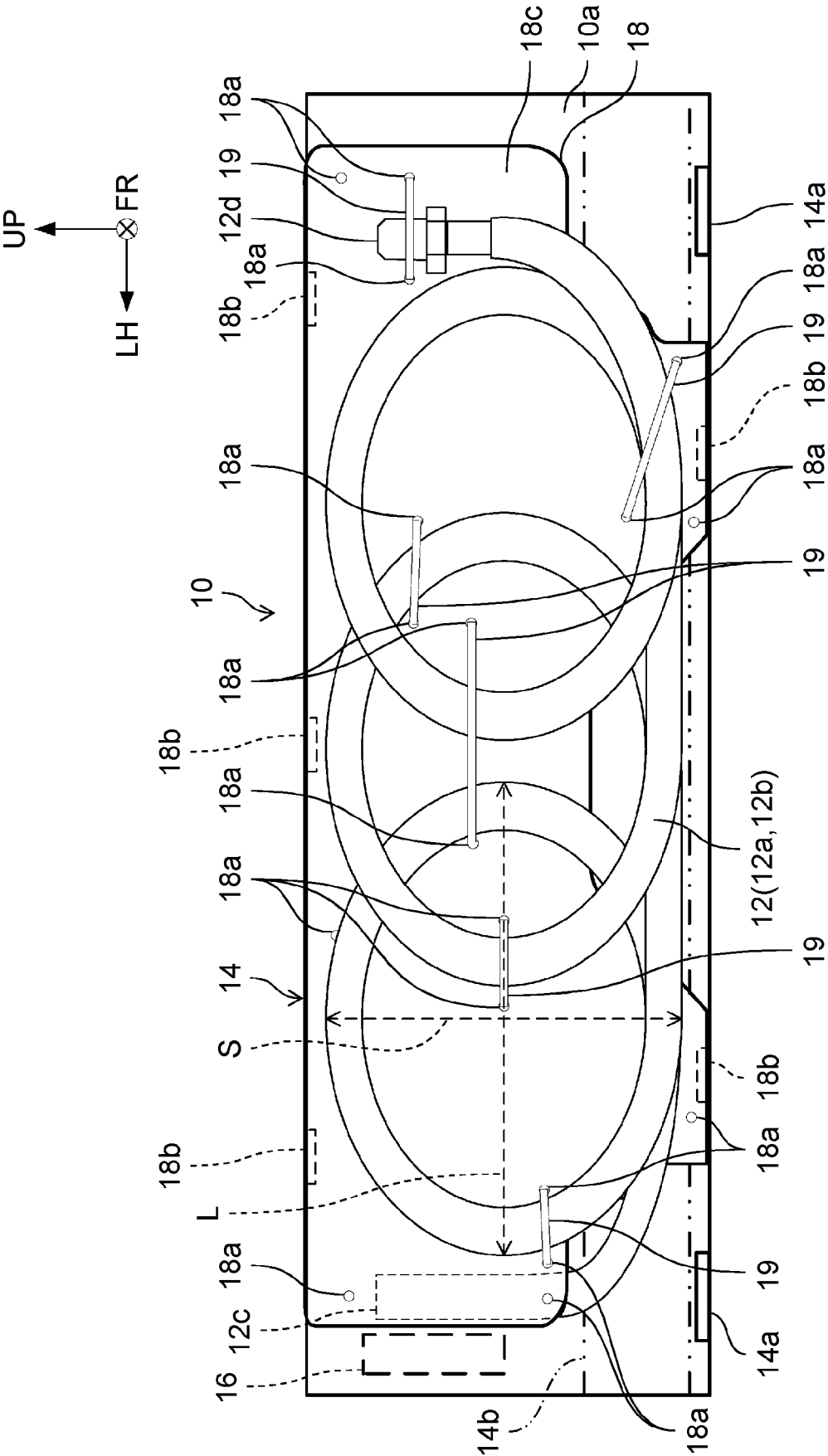


FIG. 5





EUROPEAN SEARCH REPORT

Application Number

EP 23 17 3296

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EPO FORM 1503 03.82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	JP 2013 064525 A (PANASONIC CORP) 11 April 2013 (2013-04-11) * figures 1-7 *	1-6	
A	JP 2017 172885 A (FUJITSU GENERAL LTD) 28 September 2017 (2017-09-28) * figures 1-3 *	1-6	
			TECHNICAL FIELDS SEARCHED (IPC)
			F24F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 22 September 2023	Examiner Ismail, Youssef
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ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 23 17 3296

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22-09-2023

10	Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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