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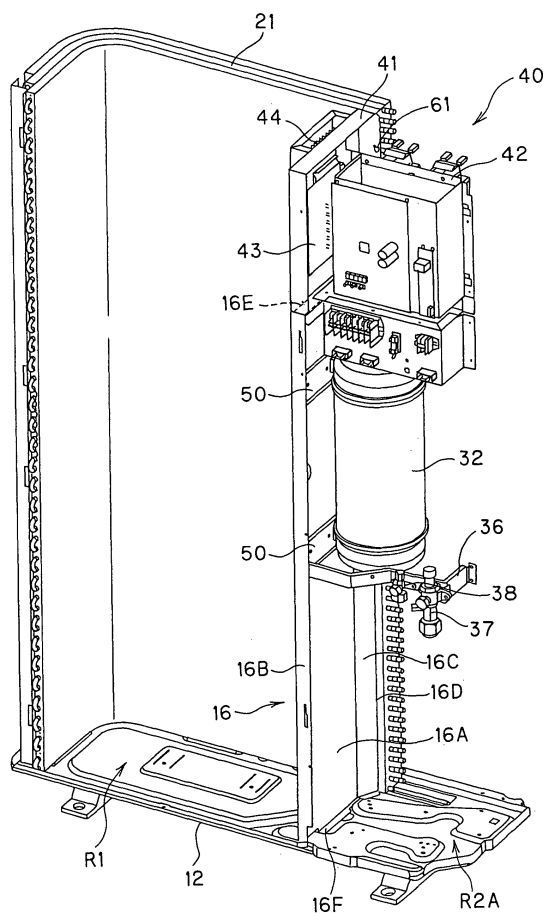
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(54) **Outdoor unit of air conditioner**

(57) In an outdoor unit of an air conditioner including a housing, a partition plate for compartmenting the inside of the housing into a heat exchange chamber and a machine chamber, a heat exchanger and an air blower are mounted in the heat exchange chamber while a compressor, an electrical component box and an accumulator are mounted in the machine chamber, at least one reinforcing plate is provided to the partition plate and the accumulator is fixed to the partition plate through the reinforcing plate. A support plate is provided to support the electrical component unit at the machine chamber side, and one end portion thereof can be temporarily fixed to a tube plate of the heat exchanger while the support plate is mounted on the partition plate. The heat exchanger has fin tube heat exchanging portions laminated in a thickness direction and a step portion for allowing outdoor air to pass therethrough is formed at one end side.

FIG.6



Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to an outdoor unit of an air conditioner.

2. Description of Related Art

[0002] There is generally known an outdoor unit of an air conditioner in which the inside of a housing is compartmented into a heat exchange chamber and a machine chamber by a partition plate, a heat exchanger and an air blower are mounted in the heat exchange chamber, and a compressor, an electric component box and an accumulator are mounted in the machine chamber. Furthermore, there has been recently proposed an outdoor unit in which a compressor and an accumulator are arranged at upper and lower sides (in the up-and-down arrangement) in a machine chamber and the accumulator is secured to a partition plate to thereby miniaturize the machine chamber (see JP-A-09-243115, for example). Furthermore, there has been also proposed an outdoor unit in which an electrical component box is mounted in a substantially horizontal position at the upper portion of a partition plate and the electrical component box is disposed so that one end thereof protrudes into the heat exchange chamber side to cool the electrical component box by air passing through the heat exchange chamber (see JP-A-2001-201110, for example).

[0003] Furthermore, there has been also proposed an outdoor unit of an air conditioner in which a heat exchanger comprising a plurality of fin-tube type heat exchange portions laminated in the thickness direction thereof is equipped in a housing so as to be bent so that a step portion occurs at one end portion side thereof (see JP-A-2002-250544, for example).

[0004] In the construction that the accumulator is secured to the partition plate, the weight of the accumulator is heavy (for example, 8Kg), and thus the partition plate is required to have high strength to the extent that it is not deformed by the weight of the accumulator. Furthermore, vibration occurring when the compressor is operated is transmitted to the accumulator through a pipe, and thus it is considered that the vibration concerned causes vibration of the partition plate. When the partition plate is vibrated, a panel which is continuous with the partition plate and constitutes a housing is also vibrated in connection with the vibration of the partition plate, so that abnormal noise may occur from the outdoor unit. In view of the foregoing situation, an elastic member is disposed between the partition plate and the accumulator, and thus there is a problem that the structure that the accumulator is secured to the partition plate is cumbersome.

[0005] Furthermore, when the electrical component

box is disposed so that one end thereof protrudes into the heat exchange chamber side, the protruding portion of the electrical component box serves as resistance to air flow, and thus the heat exchange efficiency in the heat exchanger may be lowered. Therefore, it is desired that the electrical component box is disposed so that the protrusion amount of the electrical component box is suppressed to the minimum level. On the other hand, when the electrical component box is disposed so that the protrusion amount thereof into the heat exchange chamber side is suppressed, it is difficult to assemble the electrical component box to the housing.

[0006] Furthermore, in the construction of the outdoor unit disclosed in the related art described above, the heat exchanger forms a part of the side surface of the housing, a tube plate is provided to the heat exchanger portion disposed at the outside and the front panel of the housing is fixed to the tube plate. Therefore, outside air does not sufficiently flow through the step portion of the heat exchanger, and the step portion does not contribute to the heat exchange, so that the heat exchange efficiency of the heat exchanger is lowered.

SUMMARY OF THE INVENTION

[0007] The present invention has been implemented in view of the foregoing circumstances, and has an object of the present invention is to provide an outdoor unit of an air conditioner in which vibration of a partition plate can be suppressed with a simple construction and thus occurrence of abnormal noise caused by the vibration can be suppressed.

[0008] Another object of the present invention is to provide an outdoor unit of an air conditioner in which an electrical component box can be easily fixed to a housing with suppressing the protrusion amount of the electrical component box into the heat exchange chamber side.

[0009] Other object of the present invention is to provide an outdoor unit of an air conditioner in which a step portion of a heat exchanger can be made to contribute to heat exchanger to thereby enhance the heat exchange efficiency of the heat exchanger.

[0010] In order to attain the above objects, according to a first aspect of the present invention, an outdoor unit of an air conditioner comprises : a housing in which a heat exchanger having a tube plate at one side thereof, an air blower, a compressor, an electrical component box and an accumulator are mounted; a partition plate for compartmenting the inside of the housing into a heat exchange chamber and a machine chamber, the heat exchanger and the air blower being mounted in the heat exchange chamber and the compressor, the electrical component box and the accumulator being mounted in the machine chamber; and at least one reinforcing plate which is provided to the partition plate and through which the accumulator is secured to the partition plate, wherein one end of the partition plate is fixed to the tube plate of the heat exchanger together with the reinforcing plate.

[0011] In the above outdoor unit, the reinforcing plate is formed integrally with the partition plate, or separately from the partition plate so as to be fitted to the partition plate.

[0012] According to the above outdoor unit, the accumulator is secured to the partition plate through the reinforcing plate, and thus the rigidity of the partition plate is enhanced by the reinforcing plate, so that the vibration of the partition plate can be suppressed. Furthermore, one end of the partition plate is fixed to the tube sheet of the heat exchanger together with the reinforcing plate. Therefore, the vibration of the partition plate is hardly transmitted to the heat exchanger, and thus occurrence of abnormal noise caused by the vibration concerned can be suppressed.

[0013] In the above construction, the accumulator comprises a container body and two or more mounting tabs that are fixed to the container body and arranged at a predetermined pitch, and two or more reinforcing plates are provided to the partition plate and arranged on the partition plate at the same pitch as the reinforcing plates.

[0014] In the above outdoor unit, a hole portion is formed so as to penetrate through the partition plate and each reinforcing plate so that each mounting tab of the accumulator can be hooked to the hole portion.

[0015] In the above outdoor unit, a service valve connected to a refrigerant circuit containing the compressor and the accumulator and a support plate for supporting the service valve are mounted in the machine chamber, and one end of the support plate is fixed to the partition plate through the reinforcing plate.

[0016] In the above outdoor unit, the reinforcing plate is fitted to the partition plate so as to extend in the width direction of the partition plate.

[0017] According to a second aspect of the present invention,

[0018] An outdoor unit of an air conditioner comprises: a housing in which a heat exchanger having a tube plate at one side thereof, an air blower, a compressor, an electrical component box and an accumulator are mounted; a partition plate for compartmenting the inside of the housing into a heat exchange chamber and a machine chamber, the heat exchanger and the air blower being mounted in the heat exchange chamber and the compressor, the electrical component box and the accumulator being mounted in the machine chamber; and a support plate that supports an electrical component unit at the machine chamber side and is configured so that one end portion of the support plate can be temporarily fixed to the tube plate of the heat exchanger under the state that the support plate is mounted on the upper end portion of the partition plate.

[0019] In the outdoor unit described above, the electrical component box has substantially the same width as the partition plate and is disposed so as to extend on the partition plate.

[0020] According to the above outdoor unit, the electrical component unit is mounted at the machine chamber

side of the support plate extending on the partition plate, and thus the protrusion amount of the electrical component box into the heat exchange side can be suppressed. Furthermore, one end portion of the support plate can be temporarily fixed to the tube plate of the heat exchanger under the state that the support plate is mounted at the upper end portion of the partition plate, so that the electrical component box can be simply fixed to the housing.

[0021] In the above outdoor unit, one end portion of the support plate may be provided with a hole portion (61) to which a screw portion (62) provided to the tube plate (35) can be hooked. Furthermore, the hole portion (61) may comprise a small-diameter hole (61A) and a large-diameter hole (61B) continuous with the small-diameter hole, and the small-diameter hole and the large-diameter hole may be located substantially at the same radius from the lower end of the support plate as the center. Furthermore, the support plate may be provided with a tongue portion (41F) extending from the lower end portion of the support plate to the machine chamber side.

[0022] According to a third aspect of the present invention, an outdoor unit of an air conditioner comprises: a housing in which a heat exchanger having a tube plate at one side thereof, an air blower, a compressor, an electrical component box and an accumulator are mounted; and a partition plate for compartmenting the inside of the housing into a heat exchange chamber and a machine chamber, the heat exchanger and the air blower being mounted in the heat exchange chamber, and the compressor, the electrical component box and the accumulator being mounted in the machine chamber, wherein the heat exchanger comprises a plurality of fin tube heat exchanging portions laminated in a thickness direction thereof and is bent so that a step portion is generated at one end portion side thereof, and the step portion is provided with a guide plate for guiding outdoor air to the step portion, one end of the guide plate is fixed to the heat exchanging portion at the innermost side while the other end of the guide plate is fixed to a bottom plate of the housing so that a gap through which outdoor air flows is formed between the other end of the guide plate and the heat exchanging portion at the outermost side.

[0023] According to the above construction, the outdoor air sucked through the gap between the other end of the guide plate and the end portion of the outermost heat exchanging portion is passed through the step portion of the heat exchanger while guided by the guide plate. Therefore, the step portion contributes to the heat exchange, and thus the heat exchange efficiency of the heat exchanger can be enhanced. Furthermore, one end of the guide plate is fixed to the innermost heat exchanging portion, and the other end thereof is fixed to the bottom plate of the housing, so that the heat exchanger and the bottom plate of the housing can be easily joined to each other through the guide plate.

[0024] In the above construction, the front panel of the housing may be secured to the guide plate. An opening portion through which the joint fitting for joining the inner-

most heat exchanging portion and the adjacent heat exchanging portion thereto is passed may be formed in the guide plate. Furthermore, the heat exchanger may be constructed so that the three stages of the heat exchanging portions having substantially the same shape are laminated.

[0025] According to this invention, the accumulator is fixed to the partition plate through the reinforcing plate, and thus the vibration of the partition plate is suppressed because the rigidity of the partition plate is enhanced by the reinforcing plate. Furthermore, one end of the partition plate is fixed to the tube plate of the heat exchanger together with the reinforcing plate, so that the vibration of the partition plate is hardly transmitted to the heat exchanger and the occurrence of abnormal noise due to the vibration concerned can be suppressed.

[0026] Furthermore, according to the present invention, the electrical component unit is mounted in the machine chamber side of the support plate extending to the partition plate, so that the protrusion amount of the electrical component box to the heat exchange chamber side can be suppressed. Still furthermore, the one end portion of the support plate can be temporarily fixed to the tube plate of the heat exchanger under the state that the support plate is mounted on the upper end portion of the partition plate, so that the electrical component box can be easily fixed to the housing.

[0027] Still furthermore, according to the present invention, outdoor air sucked through the gap between the other end of the guide plate and the end portion of the outermost heat exchanging portion is passed through the step portion of the heat exchanger while guided by the guide plate. Therefore, the step portion contributes to the heat exchange, and thus the heat exchange efficiency of the heat exchanger can be enhanced.

BRIEF DESCRIPTION OF THE DRAWINGS

[0028]

Fig. 1 is a front view of the internal construction of an outdoor unit according to an embodiment of the present invention;

Fig. 2 is a top view of the internal construction of the outdoor unit;

Fig. 3 is a perspective view showing a partition plate and an accumulator;

Fig. 4 is a perspective view showing the construction of the partition plate;

Fig. 5 is a top view showing the fixing state of the accumulator to the partition plate;

Fig. 6 is a perspective view showing an electrical component box disposed on the partition plate;

Fig. 7 is a perspective view showing the construction of the electrical component box;

Fig. 8 is a diagram showing a fixing procedure of the electrical component box;

Fig. 9 is a perspective view showing a step portion;

Fig. 10 is a perspective view showing the construction of a guide plate disposed at the step portion; and Fig. 11 is a top view showing flow of outdoor air flowing into the step portion.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0029] Preferred embodiments according to the present invention will be described hereunder with reference to the accompanying drawings.

[0030] An air conditioner according to an embodiment comprises an outdoor unit 10 and an indoor unit (not shown), and refrigerant is circulated in a refrigerant circuit through refrigerant pipes to thereby perform cooling operation and heating operation. The outdoor unit 10 is disposed outdoors, and heat-exchanges the refrigerant with outdoor air so that the refrigerant is condensed to radiate heat to outdoor air under cooling operation and the refrigerant is evaporated to absorb heat from outdoor air under heating operation. The up-and-down direction and the right-and-left direction described below are defined as directions when the outdoor unit 10 is disposed and viewed from the front side.

[0031] Fig. 1 is a front view of the outdoor unit 10 when the outdoor unit 10 is viewed from the front side, and Fig. 2 is a top view of the outdoor unit 10 when the outdoor unit 10 is viewed from the upper side. The outdoor unit 10 has a substantially rectangular parallelepiped box-shaped unit case (housing) 11. The unit case 11 has a bottom plate 12, a top plate 13, a front panel 14 and an outer panel. The inside of the unit case 11 is vertically compartmented by a partition plate 16 erected from the bottom plate 12, and divided into a heat exchange chamber R1 and a machine chamber R2. Fig. 1 shows the state that the front panel 14 is detached from the outdoor unit 10. The front panel 14 is divided into two front panels, a first front panel 14A and a second front panel 14B at both the right and left sides with respect to the partition plate 16 as the boundary thereof. By detaching the respective front panels 14A and 14B, a worker can perform a maintenance work of parts in the heat exchange chamber R1 and the machine chamber R2.

[0032] As shown in Fig. 2, a heat exchanger 21 is mounted at the back side in the heat exchange chamber R1, and air blowers 22A and 22B are mounted at the front side of the heat exchanger 21 so as to be aligned with each other in the vertical direction. The heat exchanger 21 is formed to be bent substantially in an L-shape in top view, and disposed so as to extend from the left side surface (outer surface) of the heat exchange chamber R1 along the back surface of the heat exchange chamber R1. As described above, the heat exchanger 21 forms the left side surface and the back surface of the heat exchange chamber R1 (that is, the unit case 11), and the overall exposed surface between the left side surface and the back surface functions as an air flowing passage (air suction port). In this construction, the sur-

face of the heat exchanger 21 is covered by a fin guard (not shown) formed of resin net or the like to prevent the contact of a human body or the like to the heat exchanger 21.

[0033] The air blowers 22A, 22B are secured to a pair of right and left supporting poles 24L and 24R disposed in the heat exchange chamber R1. The upper end portions of these supporting poles 24L and 24R are hooked to the upper edge portion of the heat exchanger 21, and the lower end portions of the supporting poles 24L and 24R are fixed to the bottom plate 12 by screws.

[0034] The air blower 22A comprises a fan motor 26A fixed to the upper portions of the supporting poles 24L and 24R through a pedestal 25A, and a propeller fan (axial fan) 27A secured to the shaft of the fan motor 26A. The propeller fan 27A is disposed at the front side of the heat exchange chamber R1 in proximity to the heat exchange chamber R1. The front portion of the propeller fan 27A is placed in a round flange-shaped fan cover portion 28A provided to the upper portion of the first front panel 14A of the heat exchange chamber R1, and an opening portion of the fan covering portion 28A functions as an air flowing passage (air blow-out port). The opening portion is covered by the fan guard 29A to prevent the contact of the human body or the like to the propeller fan 27. The air blower 22B is disposed at the lower portion of the supporting poles 24L, 24R, and has substantially the same construction as the air blower 22A. Therefore, the same reference numerals as the elements constituting the air blower 22A are allocated to those of the air blower 22B, and the description thereof is omitted.

[0035] When the propeller fans 27A, 27B are rotated by the fan motors 26A and 26B, outdoor air is sucked into the heat exchange chamber R1 from the surrounding of the outdoor unit 10, more specifically from the back surface side and left surface side of the heat exchanger 21, and passes over substantially the front side of the heat exchanger 21. Thereafter, the outdoor air passes through the fan cover portions 28A and 28B on the front surface of the heat exchange chamber R1, and then discharged to the outside. That is, the outdoor unit 10 is constructed as a front blow-out type for blowing out heat-exchanged air from the front side to the outside.

[0036] As shown in Fig. 1, refrigerant circuit constituent parts such as a compressor 31, an accumulator 32, valve members such as a four-way valve 33, an expansion valve (not shown), etc. which constitute a part of the refrigerant circuit are connected to one another through pipes in the machine chamber R2, and they are disposed in a substantially lower space of the machine chamber R2.

[0037] In this construction, the compressor 31 and the accumulator 32 have compression containers whose capacities are the same level, and they are vertically arranged in juxtaposition with each other in the machine chamber R2. Specifically, the compressor 31 is disposed on the bottom plate 12, and the accumulator 32 is secured to the partition plate above the compressor 31. Accord-

ingly, the setup space of the compressor 31 and the accumulator 32 in the machine chamber R2 can be suppressed to a small level.

[0038] Furthermore, a support plate 36 is disposed at the substantially intermediate position of the front surface side, and a gas-pipe service valve 37 and a liquid-pipe service valve 38 are fixed to the support plate 36. A gas pipe and a liquid pipe (not shown) of a unit pipe extending from the indoor unit are connected to the service valve 37 and the service valve 38 respectively, thereby constituting the refrigerant circuit in which refrigerant is circulated. Furthermore, an electrical component box 40 in which various kinds of electrical components such as a control board for controlling the air conditioner, etc. are disposed is mounted in the upper space of the machine chamber R2. The electrical component box 40 is equipped with a first support plate 41 extending at the upper portion of the partition plate 16, and a second support plate 42 secured to the first support plate 41. An electrical component unit such as a board, etc. is disposed on the first support plate 41 and the second support plate 42.

[0039] Next, the fixing structure of the partition plate 16 and the accumulator 32 will be described.

[0040] Fig. 3 is a perspective view showing the partition plate 16 and the accumulator 32, Fig. 4 is a perspective view showing the construction of the partition plate 16 and Fig. 5 is a top view showing the fixing state of the accumulator 32 to the partition plate 16.

[0041] As shown in Fig. 3, the partition plate 16 comprises a base plate portion 16A disposed between the heat exchange chamber R1 and the machine chamber R2 to partition the heat exchange chamber R1 and the machine chamber R2 from each other, a front surface portion 16B formed by bending the side edge portion of the front surface side of the base plate portion 16A to the machine chamber R2 side, an inclined surface portion 16C formed by obliquely bending the side edge portion of the back surface side of the base portion 16A to the machine chamber R2 side, a back surface portion 16D formed by bending the side edge portion of the inclined surface portion 16C substantially in parallel to the front surface portion 16B, and an upper surface portion 16E formed by bending the upper edge portion of the base plate portion 16A to the machine chamber R2 side, and a lower surface portion 16F formed by bending the lower edge portion of the base plate portion 16A to the machine chamber R2 side substantially in parallel to the upper surface portion 16E, whereby the partition plate 16 is formed in the form of a tray.

[0042] As described above, the rigidity (strength) of the partition plate 16 is enhanced by designing a thin steel plate like a tray. Furthermore, in this construction, in order to further enhance the rigidity of the partition plate 16, at least one reinforcing plate 50 is provided to a part of the partition plate 16. The reinforcing plate 50 is disposed to be fitted (attached) to one surface of the partition plate 16 (the surface at the machine chamber

side), and the accumulator 32 is fixed to the partition plate 16 through the reinforcing plate 50.

[0043] The accumulator 32 comprises a container body 32A formed as a pressure container, and a pair of upper and lower fixing tags 32B which are provided to upper and lower portions of the container body 32A. As shown in Fig. 5, the fixing tag 32B comprises a substantially U-shaped tag and a bolt 32C fixed to the substantially center portion of the tag.

[0044] In this embodiment, as shown in Fig. 3, two reinforcing plates 50 are arranged at two positions of the partition plate 16 which are vertically spaced from each other at the predetermined interval P corresponding to the fixing pitch of the fixing tags 32B of the accumulator 32. In this construction, the reinforcing plates 50 may be merely fitted to a part of the partition plate 16, and thus the manufacturing cost can be reduced to a lower cost as compared with the case where the overall plate thickness of the partition plate is increased. Furthermore, even when the capacity or the like of the accumulator is changed and thus the fixing pitch of the fixing tags is changed, the reinforcing plates 50 may be arranged on the partition plate 16 at the interval corresponding to the fixing pitch of the fixing tags. Therefore, the partition plate (and the reinforcing plates) can be widely adapted to various kinds of products.

[0045] In the above construction, the reinforcing plates 50 may be formed integrally with the partition plate 16 in advance, or they may be formed separately from the partition plate 16 and afterwards attached (fitted) to the partition plate 16 as in the case of this embodiment. However, as described above, from the viewpoint of the change of the capacity of the accumulator, etc., the reinforcing plates 50 are preferably formed separately from the partition plate 16 as in the case of this embodiment.

[0046] The reinforcing plate 50 is formed to be bent substantially in the same shape as the partition plate 16 so as to extend from the front surface portion 16B of the partition plate 16 along the base plate portion 16A, the inclined surface portion 16C and the back surface portion 16D. Specifically, as shown in Fig. 4, the reinforcing plate 50 has a base plate portion 50A, a front surface portion 50B (Fig. 5), an inclined surface portion 50C and a back surface portion 50D which correspond to the base plate portion 16A, the front surface portion 16B, the inclined surface portion 16C and the back surface portion 16D of the partition plate 16 respectively, and the upper and lower edges of the base plate portion 50A, the front surface portion 50B, the inclined surface portion 50C and the back surface portion 50D are bent substantially in L-shape respectively to form ribs 50E.

[0047] The reinforcing plate 50 is brought with the ribs 50E, and thus it is shaped like a tray, so that the rigidity of the reinforcing plate 50 itself is enhanced. The reinforcing plate 50 is formed to have substantially the same shape as the partition plate 16 (in the width direction of the partition plate 16 in this embodiment) and it is fitted (attached) to the partition plate 16 when assembled, so

that the reinforcing plate 50 and the partition plate 16 are unified into one body. Therefore, the rigidity of the partition plate 16 can be enhanced with a simple construction.

[0048] In this construction, the reinforcing plate 50 and the partition plate 16 are joined to each other by spot welding, however, they may be joined to each other by screw cramp or other means.

[0049] As shown in Fig. 3, the partition plate 16 is erected from the bottom plate 12 by fixing the lower surface portion 16F of the partition plate 16 to the bottom plate 12 by screw cramp. Furthermore, the back surface portion 16D (one end) of the partition plate 16 is fixed to the heat exchanger 21 by screw cramp. Specifically, as shown in Fig. 3, the heat exchanger 21 is provided with a tube plate 35 at the right end portion thereof, and the tube plate 35 is provided with a rib 35A formed by bending the side edge portion of the inside of the unit case 11 substantially in L-shape. In this construction, as shown in Fig. 5, the back surface portion 16D of the partition plate 16 is fixed to the rib 35A of the tube plate 35 together with the back surface portion 50D of the reinforcing plate 50 by screw cramp. Still furthermore, in this construction, the front surface portion 16B of the partition plate 16 is fixed to the first front panel 14A together with the front surface portion 50B of the reinforcing plate 50 by screw cramp. Accordingly, the partition plate 16 can be fixed to the tube plate 35 and the first front panel 14A at the reinforced portions thereof which are reinforced by the reinforcing plates 50. Accordingly, the partition plate 16 can be stoutly supported in the unit case 11, and thus the vibration of the partition plate 16 is hardly transmitted to the heat exchanger 21 and each panel of the unit case 11, thereby suppressing occurrence of abnormal noise caused by the vibration.

[0050] Furthermore, the accumulator 32 is fixed to the partition plate 16 through the reinforcing plate 50. Therefore, the rigidity of the partition plate 16 is enhanced by the reinforcing plate 50, and the partition plate 16 can be prevented from being deformed by the weight of the accumulator. In addition, the vibration of the partition plate 16 which is caused by the vibration of the accumulator 32 can be suppressed.

[0051] Still furthermore, a gourd-shaped hole (hole portion) 52 is formed so as to penetrate through the base plate portion 16A of the partition plate 16 and the base plate portion 50A of the reinforcing plate 50 as shown in Fig. 4. The gourd-shaped hole comprises a large-diameter hole 52A and a small-diameter hole 52B which are continuous with each other in the vertical direction. The small-diameter hole 52B is formed to be larger in diameter than the diameter of the bolt 32C of the fixing tag 32B of the accumulator 32 and smaller in diameter than the diameter of a nut 53 which is threadably mounted on the bolt 32c. The large-diameter hole 52A is formed to be larger in diameter than the diameter of the nut 53.

[0052] When the accumulator 32 is secured to the partition plate 16, the bolt 32C with the nut 53 is inserted into the large-diameter hole 52A of the gourd-shaped

hole 52 under the state that the nut 53 is attached to the bolt 32C of the fixing tag 32B of the accumulator 32. Subsequently, when the accumulator 32 is downwardly moved, the bolt 32C is moved to the small-diameter hole 52B, and the nut 53 is hooked to the hole wall of the small-diameter hole 52B. Therefore, the accumulator 32 can be temporarily fixed to the partition plate 16 with a simple work. Thereafter, the nut 53 is fastened so that the accumulator 32 is fixed to the partition plate 16.

[0053] As described above, the gourd-shaped holes 52 to which the fixing tags 32B of the accumulator 32 can be hooked are formed in the partition plate 16 and the reinforcing plate 50. Therefore, the accumulator 32 can be temporarily fixed to the partition plate 16, and thus a worker can easily fix the accumulator 32 to the partition plate 16 by himself/herself.

[0054] Furthermore, as shown in Fig. 5, one end 36A of the support plate 36 for supporting the gas pipe service valve 37 and the liquid pipe service valve 38 is connected to the lower reinforcing plate 50, and the other end 36B of the support plate 36 is connected to the end portion of the front surface side of the outer plate 15.

[0055] When the outdoor unit 10 is installed, a gas pipe and a liquid pipe of a unit pipe (not shown) are connected to the gas pipe service valve 37 and the liquid pipe service valve 38, and also refrigerant may be supplemented through the liquid pipe service valve 38 even after the outdoor unit 10 is installed. Therefore, a pipe or the like is frequently attached/detached to/from the gas pipe service valve 37 or the liquid pipe service valve 38, and thus it is desired that the gas pipe service valve 37 and the liquid pipe service valve 38 are firmly fixed.

[0056] In this construction, one end 36A of the support plate 36 is fixed to the partition plate 16 through the lower reinforcing plate 50, and thus the pipe can be simply attached/detached to/from the gas pipe service valve 37 and the liquid pipe service valve 38.

[0057] According to this embodiment, the inside of the unit case 11 is compartmented into the heat exchange chamber R1 and the machine chamber R2 by the partition plate 16, the heat exchanger 21 and the air blowers 22A, 22B are mounted in the heat exchange chamber R1, and the compressor 31 and the accumulator 32 are mounted in the machine chamber R2. The reinforcing plate 50 is fitted (attached) to the partition plate 16, and the accumulator 32 is fixed to the partition plate 16 through the reinforcing plate 50. Therefore, the rigidity of the partition plate 16 is enhanced by the reinforcing plate 50 with the simple construction, the partition plate 16 can be prevented from being deformed by the weight of the accumulator 32, and also the vibration of the partition plate 16 which is caused by the vibration of the accumulator 32 can be suppressed. Furthermore, the back surface portion 16D of the partition plate 16 is fixed to the tube plate 35 of the heat exchanger 21 together with the reinforcing plate 50, and thus the partition plate 16 can be firmly supported in the unit case 11. Accordingly, the vibration of the partition plate 16 is hardly transmitted to

the heat exchanger 21, and the occurrence of the abnormal noise due to the vibration concerned can be suppressed.

[0058] Furthermore, according to this embodiment, the accumulator 32 is equipped with the container body 32A and the pair of fixing tags 32B fixed to the container body 32A. The reinforcing plates 50 are arranged on the partition plate 16 at the interval corresponding to the pitch of the fixing tags 32B, and thus even when the fixing pitch of the fixing tags of the accumulator is changed, the reinforcing plates 50 may be arranged on the partition plate 16 at the interval corresponding to the changed fixing pitch. Therefore, this embodiment can be widely adapted to various kinds of products, and reduce the manufacturing cost.

[0059] Still furthermore, according to this embodiment, the gourd-shaped hole 52 is formed in each of the partition plate 16 and the reinforcing plate 50 so as to penetrate through the partition plate 16 and the reinforcing plate 50 and so that the fixing tag 32B of the accumulator 32 can be hooked to the gourd-shaped hole 52. Therefore, the accumulator 32 can be temporarily fixed to the partition plate 16, and a worker can easily fix the accumulator to the partition plate 16 all by himself/herself.

[0060] Still furthermore, according to this embodiment, the gas pipe service valve 37 and the liquid pipe service valve 38 connected to the refrigerant circuit connected to the compressor 31 and the accumulator 32 are provided in the machine chamber R2, and one end 36A of the support plate 36 for supporting the gas pipe service valve 37 and the liquid pipe service valve 38 is fixed to the partition plate 16 through the reinforcing plate 50, so that the gas pipe service valve 37 and the liquid pipe service valve 38 can be firmly supported in the unit case 11. Therefore, the work of attaching/detaching a pipe to the gas pipe service valve 37 or the liquid pipe service valve 38 can be easily performed.

[0061] Next, the fixing structure of the electrical component box 40 will be described.

[0062] Fig. 6 is a perspective view showing the fixing state of the electrical component box 40, and Fig. 7 is an enlarged perspective view of Fig. 6.

[0063] As shown in Fig. 7, the electrical component box 40 has a first support plate 41 extending to the upper portion of the partition plate 16, and an inverter board 43 for generating DC power to drive the compressor 31 is disposed at the machine chamber R2 side of the first support plate 41. The inverter board 43 is a board on which electrical parts having relatively high heating values such as an inverter circuit, etc. are mounted, and thus a heat sink 44 for radiating heat occurring in the inverter board 43 is disposed at the opposite side to the inverter board 43, that is, at the heat exchange chamber R1 side of the first support plate 41. The heat sink 44 has a plurality of fins formed of metal plates which are arranged so as to be spaced from one another in the right and left direction.

[0064] A cover body 45 which covers the heat sink 44

is disposed at the heat exchange chamber R1 side of the first support plate 41. The cover body 45 is formed by bending a metal plate, and openings 45A through which cooling air to be heat-exchanged with the fins of the heat sink 44 is passed are formed at the upper and lower portions of the cover body 45.

[0065] The first support plate 41 has substantially the same width as the partition plate 16, and is disposed on the upper portion of the partition plate 16, whereby the first support plate 41 has the function of partitioning the heat exchange chamber R1 and the machine chamber R2 in cooperation with the partition plate 16. In this construction, the height of the first support plate 41 is set so as to be substantially equal to the height of the heat exchanger 21 when it is mounted on the partition plate 16.

[0066] The first support plate 41 comprises a base plate portion 41A on which the inverter board 43 and the heat sink 44 are mounted, a front surface portion 41B formed by bending the side edge portion of the front surface side of the base plate portion 41A to the machine chamber R2 side, a back surface portion (one end portion) 41C formed by bending the side edge portion of the back surface side of the base plate portion 41A substantially in parallel to the front surface portion 41B, an upper surface portion 41D formed by bending the upper edge portion of the base plate portion 16A to the machine chamber R2 side, and a lower surface portion 41E formed by bending the lower edge portion of the base plate portion 41A to the machine chamber R2 side substantially in parallel to the upper surface portion 41D, thereby designing the first support plate 41 in the form of a tray. Furthermore, in this construction, a tongue portion 41F is formed in the first support plate 41 by downwardly bending the edge portion of the lower surface portion 41E of the first support plate 41.

[0067] As shown in Fig. 7, when the first support plate 41 is mounted on the partition plate 16, the tongue portion 41F extends to the machine chamber R2 side of the upper end portion of the partition plate 16. The tongue portion 41F functions as a positioning guide when the first support plate 41 is mounted on the partition plate 16, and also functions as a cover which covers the gap between the first support plate 41 and the partition plate 16. Therefore, even when rain water invades from the heat exchange chamber R1 into the machine chamber R2 through the gap between the partition plate 16 and the first support plate 41, the rain water impinges against the tongue portion 41F and drops to the lower side of the machine chamber R2, so that the rain water is prevented from invading into the electrical component box 40.

[0068] The electrical component box 40 is equipped with a second support plate 42 which is fixed to the first support plate 41 so as to extend in the width direction (in the right and left direction in Fig. 1) of the machine chamber R2. The second support 42 comprises a plate portion 42A extending in the width direction of the machine chamber R2, and a bottom plate portion 42B formed by forwardly bending the lower edge portion of the plate portion

42A, a filter board 46 is disposed at the front side of the plate portion 42A, and reactors 47 are disposed at the back side of the plate portion 42A.

[0069] Furthermore, a cover body 48 which is bent substantially in L-shape in top view so as to cover the filter board 46 is disposed at the front side of the plate portion 42A. The cover body 48 is fixed to the plate portion 42 by screws or the like, and the cover body 48 can be simply detached from the plate portion 42A by taking out the screws. A control board 49 for controlling the operation of each equipment disposed in the outdoor unit 10 is disposed at the front side of the cover body 48. The control board 49 is disposed at the front side of the machine chamber R2, and thus maintenance can be easily carried out on the control board 49 by detaching the second front panel (see Fig. 2).

[0070] A fixing plate 51 formed by bending a metal plate is fixed to the bottom plate portion 42B of the second support plate 42, and terminal tables 52 for supplying power to the outdoor unit 10, performing the communication with the indoor unit, etc. are provided at the front side of the fixing plate 51.

[0071] As described above, the electrical component box 40 has the first support plate 41 and the second support plate 42, and the inverter board 43, the heat sink 44, the filter board 46, the reactors 47, the control board 49, and a power relay, a capacitor, etc. (not shown) are disposed as an electrical unit on the first support plate 41 and the second support plate 42. Therefore, the weight of the electrical component box 40 is relatively large (for example, about 11Kg), and the fixing work of the electrical component box has been hitherto difficult.

[0072] Therefore, in this construction, the back surface portion 41C of the first support plate 41 can be temporarily fixed to the tube plate 35 of the heat exchanger 21 under the state that the first support plate 41 of the electrical component box 40 is mounted on the upper surface portion of the partition plate 16. Specifically, as shown in Fig. 8, a gourd-shaped hole (hole portion) 61 to which the screw 62 fixed to the rib 35A of the tube plate 35 can be hooked is formed in the back surface portion 41C of the first support plate 41.

[0073] This gourd-shaped hole 61 comprises a small-diameter hole 61A and a large-diameter hole 61B continuous with the small-diameter hole 61A. The small-diameter hole 61A is larger in diameter than the screw diameter of the screw 62, and smaller in diameter than the diameter of the head portion of the screw 62. The large-diameter hole 61B is larger in diameter than the diameter of the head portion of the screw 62 so that the head portion of the screw 62 can penetrate through the large-diameter hole 61B.

[0074] In this construction, the gourd-shaped hole 61 is obliquely formed so that the large-diameter hole 61B is located at a lower position than the small-diameter hole 61A at the machine room R2 side. More specifically, the large-diameter hole 61B and the small-diameter hole 61A of the gourd-shaped hole 61 are located substantially at

the same radius from the corner portion 41E1 at the heat exchange chamber R1 side of the lower surface portion 41E of the first support plate 41. That is, the large-diameter hole 61B and the small-diameter hole 61A of the gourd-shaped hole 61 are located on substantially the same circle having a predetermined radius from the corner portion 41E1 as the center of the circle.

[0075] As described above, the gourd-shaped hole 61 is obliquely formed so that the large-diameter hole 61B is located at a lower right side with respect to the small-diameter hole 61A in front view (Fig. 8, for example). When the electrical component box 40 is secured, the large-diameter hole 61B does not extend to the heat exchange chamber R1 side with respect to the rib 35A of the tube plate 35 as shown in Fig. 4. That is, the large-diameter hole 61B is not nearer to the heat exchange chamber R1 than the rib 35A of the tube plate 35. Accordingly, the large-diameter hole 61B is bunged up by the rib 35A, so that the intercommunication between the heat exchange chamber R1 and the machine chamber R2 through the large-diameter hole 61B is prevented and thus drain water or the like is prevented from invading from the large-diameter hole 61B into the electrical component box 40.

[0076] Next, the fixing procedure of the electrical component box 40 will be described.

[0077] First, the first support plate 41 and the second support plate 42 are combined with each other, and the electrical component unit is disposed on the first support plate 41 and the second support plate 42 to form the electronic component box 40.

[0078] Subsequently, as shown in Fig. 8, the lower surface portion 41E of the first support plate 41 is mounted on the upper surface portion 16E of the partition plate 16, and the first support plate 41 is pushed by using the tongue portion 41F as a guide until the back surface portion 41C of the first support plate 41 abuts against the rib 35A of the tube plate 35 of the heat exchanger 21. In this case, the electrical component box 40 can be pushed to a predetermined position with small force by sliding the electrical component box 40 on the upper surface portion of the partition plate 16 with the tongue portion 41 as the guide.

[0079] Subsequently, as shown in Fig. 7, the upper portion of the electrical component box 40 (for example, the upper surface portion 41D of the first support plate 41) is inclined to the machine chamber R1 side, and the large-diameter hole 61B of the gourd-shaped hole 61 formed in the back surface portion 41C of the first support plate 41 is fitted to the head of the screw 62 which is lightly screwed in the rib 35A of the tube plate 35. The large-diameter and small-diameter holes 61A and 61B of the gourd-shaped hole 61 are formed at substantially the same distance from the corner portion 41E1 at the heat exchange chamber R1 side of the lower surface portion 41E of the first support plate 41 (i.e., on substantially the same circle whose center position corresponds to the corner portion 41E1). Accordingly, when the first

support plate 41 (electrical component box 40) is rotated in the clockwise direction (in R-direction in Fig. 8) around the corner portion 41E1, the screw 62 is moved in the hole 61A, and the head of the screw is hooked to the hole 61A of the small-diameter hole 61A.

[0080] Therefore, the electrical component box 40 can be simply temporarily fixed to the unit case 11, specifically, the partition plate 16 and the tube plate 35 of the heat exchanger 21. Then, the screw 62 is tightened, and also the electrical component box 40 is fixed to the end portion of the front surface side of the outer plate 15 (Fig. 2) through the screw holes 64 formed at the edge portions of the second support plate 42 and the fixing plate 51.

[0081] As described above, the gourd-shaped hole 61 to which the screw 62 provided to the tube plate 35 of the heat exchanger 21 can be hooked under the state that the first support plate 41 is mounted on the upper surface portion of the partition plate 16 is formed in the back surface portion 41C of the first support plate 41 of the electrical component box 40. Therefore, the electrical component box 40 can be temporarily fixed to the tube plate 35 of the partition plate 16 and the tube plate 35 of the heat exchanger 21, so that a worker can solely and easily fix the electrical component box 40 in the unit case 11.

[0082] According to this embodiment, the inside of the unit case 11 is compartmented into the heat exchange chamber R1 and the machine chamber R2 by the partition plate 16, the heat exchanger 21 and the air blowers 22A, 22B are mounted in the heat exchange chamber R1 and the compressor 31, the accumulator 32 and the electrical component box 40 are mounted in the machine chamber R2. The electrical component box 40 has substantially the same width as the partition plate 16 and is mounted on the partition plate 16, and the first support plate 41 for supporting the inverter board 43 is provided at the machine chamber R2 side. Therefore, only the heat sink 44 for cooling the inverter board 43 protrudes into the heat exchange chamber R1 side of the first support plate 41, and the protrusion amount of the electrical component box 40 to the heat exchange chamber R1 side can be suppressed. Therefore, the resistance to air flow which occurs due to the protrusion of the electrical component box 40 into the heat exchange chamber R1 can be suppressed, and the heat exchange efficiency of the heat exchanger 21 can be enhanced.

[0083] Particularly, in the construction that the air blowers 22A, 22B are arranged so as to be juxtaposed with each other in the vertical direction as in the case of this embodiment, the air blowers 22A and 22B can be arranged in the heat exchange chamber R1 so that the flow distribution of air blown from the air blowers 22A, 22B is optimum by suppressing the protrusion amount of the electrical component box 40, so that the heat exchange efficiency of the heat exchanger 21 can be further enhanced.

[0084] Furthermore, the back surface portion 41C of the first support plate 41 can be temporarily fixed to the

rib 35A of the tube plate 35 of the heat exchanger 21 under the state that the first support plate 41 is mounted on the upper surface portion 16E of the partition plate 16. Therefore, the electrical component box 40 can be simply fixed in the unit case 11.

[0085] Still furthermore, according to this embodiment, the back surface portion 41C of the first support plate 41 is provided with the gourd-shaped hole 61 to which the screw 62 secured to the rib 35A of the tube plate 35 can be hooked, and thus the electrical component box 40 can be temporarily fixed to the partition plate 16 and the tube plate 35 of the heat exchanger 21. Therefore, a worker can solely and easily fix the electrical component box 40 in the unit case 11.

[0086] Still furthermore, according to this embodiment, the gourd-shaped hole 61 has the small-diameter hole 61A and the large-diameter hole 61B, and the small-diameter hole 61A and the large-diameter hole 61B are located on substantially the same circle whose center position corresponds to the corner portion 41E1 at the heat exchange chamber R1 side on the lower surface portion 41E of the first support plate 41. Therefore, the screw 62 can be simply hooked to the gourd-shaped hole 61 by rotating the first support plate 41 (the electrical component box 40) in the clockwise direction (in the R direction in Fig. 8) around the corner portion 41E1.

[0087] According to this embodiment, the first support plate 41 has the tongue portion 41F extending from the lower surface portion 41E of the first support plate 41 to the machine chamber R2 side of the upper surface portion 16E of the partition plate 16. Accordingly, when the electrical component box 40 is secured, the electrical component box 40 can be pushed to a predetermined position with small force by sliding the electrical component box 40 on the upper surface portion 16E of the partition plate 16 while the tongue portion 41F is used as a guide.

[0088] Furthermore, the tongue portion 41F functions as a cover which covers the gap between the first support plate 41 and the partition plate 16. Accordingly, even when rain water invades from the heat exchange chamber R1 into the machine chamber R2 through the gap between the partition plate 16 and the first support plate 41, the rain water impinges against the tongue portion 41F and flows to the lower side of the machine chamber R2, so that the rain water can be prevented from invading into the electrical component box 40.

[0089] Next, the structure of the heat exchanger 21 will be described.

[0090] As shown in Fig. 9, the heat exchanger 21 is formed by laminating plural (three in this embodiment) fin tube type heat exchanging portions 151, 152, 153 in the thickness direction. The heat exchanging portion 151 located on the inside (hereinafter referred to as "innermost heat exchanging portion 151") has a refrigerant pipe 151A in which refrigerant flows, and plural heat-radiating fins 151B disposed around the refrigerant pipe 151A. The heat exchanging portions 152 and 153 located at the in-

termediate position and on the outer side (hereinafter referred to as "intermediate heat exchanging portion 152" and "outermost heat exchanging portion 153") are formed to have substantially the same size as the innermost heat exchanging portion 151, and also have substantially the same construction as the innermost heat exchanging portion 151. Therefore, the same reference numerals are applied, and the description thereof is omitted.

[0091] As shown in Fig. 2, the heat exchanging portions 151 to 153 are arranged so that the end portions thereof at the right side in Fig. 8 are aligned with one another, and a first tube plate 35 for joining the heat exchanging portions 151 to 153 is provided to the end portions of the heat exchanging portions 151 to 153. The first tube plate 35 has a rib 35A formed by bending an edge portion of the first tube plate 35 at the inner side of the unit case 11 substantially in L-shape, and the partition plate 16 is fixed to the rib 35A by screws.

[0092] As described above, the heat exchanging portions 151 to 153 are formed to have substantially the same size, the end portions thereof at the right side in Fig. 9 are aligned with one another, and they are bent substantially in L-shape in top view. Therefore, the other end portions of the heat exchanging portions 151 to 153 at the left side in Fig. 9 are not aligned with one another, and a step portion 155 is formed at this end portion side. Specifically, The end portion 152C of the heat exchanging portion 152 located at the intermediate position is located behind the end portion 151C of the innermost heat exchanging portion 151, and the end portion 153C of the outermost heat exchanging portion 153 is located behind the end portion 152C. Therefore, the respective end portions 151C to 153C are not positionally aligned with one another, so that the step portion 155 is formed at one end portion side of the heat exchanger 21.

[0093] As shown in Fig. 10, the step portion 155 is provided with a guide plate 156 for guiding outdoor air to the step portion 155 under operation of the air blowers 22A, 22B. The guide plate 156 is a plate member having substantially the same height as the heat exchanger 21. The guide plate 156 has a front surface portion 156A disposed substantially in parallel to the fins 151B to 153B of the respective heat exchanging portions 151 to 153 at the step portion 155, a side surface portion 156B formed by bending one end of the front surface portion 156A to the step portion 155 side, and a fixing portion 156C formed by bending the other end of the front surface portion 156A, that is, the end portion at the opposite side to the side surface portion 156B to the front panel 14 side. (One end of) the fixing portion is fixed to the innermost heat exchanging portion 151.

[0094] Specifically, a second tube plate 157 for fixing the guide plate 156 to the heat exchanging portion 151 is provided to the end portion 151C of the heat exchanging portion 151. The second tube plate 157 comprises an end plate 157A disposed substantially in parallel to the fin 151B of the heat exchanging portion 151, and a

rib 157B formed by bending the end portion at the left side of the end plate 157A, that is, the end portion at the outermost heat exchanging portion 153 side. The rib 157B has substantially the same width as the fixing portion 156C of the guide plate 156, and the rib 157B and the fixing portion 156C are fitted to each other and screwed, whereby the guide plate 156 is fixed to the innermost heat exchanging portion 151. In this construction, the guide plate 156 can be easily formed by bending one plate member.

[0095] The side surface portion (the other end) 156B is fixed to the bottom plate 112. Specifically, the bottom plate 112 has an erecting portion 112A around the bottom plate 112, and a recess portion 112B is formed so as to face the side surface portion 156B of the guide plate 156. The recess portion 112B is recessed so as to come into contact with the side surface portion 156B, and the recess portion 112B and the side surface portion 156B are fixed to each other by a screw 158, whereby the side surface portion (the other end) 156B of the guide plate 156 is fixed to the bottom plate 112.

[0096] As described above, the fixing portion 156C of the guide plate 156 is fixed to the second tube plate 157 of the innermost heat exchanging portion 151, and the side surface portion 156B of the guide plate 156 is fixed to the recess portion 112B formed in the erecting portion 112A of the bottom plate 112, and thus the heat exchanger 21 and the bottom plate 112 are joined to each other through the guide plate 156. Therefore, a dedicated member for joining the heat exchanger 21 to the bottom plate 112 is unnecessary, so that the number of parts can be reduced and the assembling work can be lightened.

[0097] Here, the guide plate 156 is fixed to the bottom plate 112 so that a gap 160 having a gap W is formed between the side surface portion 156B of the guide plate 156 and the end portion 153C of the heat exchange portion 153 disposed outside. The width W of the gap 160 is set to such a level that outdoor air can flow through the gap into the step portion 155.

[0098] Accordingly, by operating the air blowers 22A, 22B, outdoor sucked through the gap 160 passes through the step portion 155 of the heat exchanger while guided to the guide plate 156 as indicated by an arrow X in Fig. 11. Therefore, sufficient outdoor air flows through the step portion 155, and thus the step portion 155 contributes to heat exchange, so that the heat exchange efficiency of the heat exchanger 21 can be enhanced.

[0099] Particularly, when the three or more heat exchanging portions 51 to 53 are laminated to form the heat exchanger 21 as in the case of this embodiment, the area (hatched area) of the heat exchanging portions which contribute to the heat exchange is more enhanced by the guide plate 156 as indicated by slant lines in Fig. 11, so that the obtained effect is greater.

[0100] Furthermore, as shown in Fig. 10, plural (four in this embodiment in Fig. 1) cutouts (opening portions) 161 are formed at a predetermined pitch in the front sur-

face portion 156A and the fixing portion 156C of the guide plate 156. The cutout 161 is used when the innermost heat exchanging portion 151 and the heat exchanging portion 152 located at the intermediate position (adjacent to the heat exchanging portion 151) are joined to each other. In this construction, the refrigerant pipe 151A of the innermost heat exchanging portion 151 and the refrigerant pipe 152A of the intermediate heat exchanging portion 152 are bound by a binding band (joint fitting) 162, whereby the heat exchanging portions 151, 152 can be easily joined to each other.

[0101] When the cutout 161 is formed in large size, the work of binding the refrigerant pipes 151A, 152A by the binding band 162 can be easily performed. However, outdoor air is easily passed through the cutout 161 into the inner space of the heat exchanger 21, so that the size of the cutout 161 is desired to be small to the extent that the binding work using the binding band is not disturbed.

[0102] In this construction, as not shown, the refrigerant pipe 152A of the intermediate heat exchanging portion 152 and the refrigerant pipe 153A of the outermost heat exchanging portion 153 are bound by the binding band inside the guide plate 156, thereby joining the heat exchanging portions 152 and 153.

[0103] As shown in Fig. 9, the first front panel 14A is fixed to the side surface portion 156B of the guide plate 156. The first front panel 14A has a side portion 14A1 formed by bending the end portion of the heat exchanger 21 at the step portion 155 side to the back surface side, and this side portion 14A1 extends to the outside of the side surface portion 156B of the guide plate 156 and is screwed to the side surface portion 156B.

[0104] As not shown, the side portion 114A1 is provided with the recess portion which is recessed so as to abut against the side surface portion 156B, and the recess portion and the side surface portion 156B are screwed to each other to thereby fix the first front panel 14A. According to this construction, the tube plate for fixing the first front panel 14a to the end portion 153C of the outermost heat exchanging portion 153 is unnecessary, so that the number of parts is reduced and the assembling work can be lightened.

[0105] In this construction, as shown in Fig. 11, the side portion 114A1 of the first front panel 114A is secured so as to be substantially superposed on the side surface portion 156B of the guide plate 156. According to this construction, the gap 160 is prevented from being narrowed by the side portion 114A1 of the first front panel 114A, and also the side surface portion 156B of the guide plate 156 is prevented from being exposed to the outside by the side portion 114A1, so that the appearance beauty of the outdoor unit 10 of the air conditioner can be enhanced.

[0106] According to this embodiment, the heat exchanger 21 is formed by the fin tube heat exchanging portions 151 to 153 which are laminated in the thickness direction thereof and bent so that the step portion 155 occurs at one end portion side, and mounted in the unit

case 11. The step portion 155 is provided with the guide plate 156 for guiding outdoor air, and the fixing portion 156C of the guide plate 156 is fixed to the innermost heat exchanger 151. In addition, the side surface portion 156B of the guide plate 156 is fixed to the bottom plate 112 of the unit case 11 so that the gap 160 through which outdoor air flows is provided between the side surface portion 156B and the end portion 153C of the outermost heat exchanging portion 153. Therefore, the outdoor air sucked through the gap 160 is passed through the step portion 155 of the heat exchanger 21 while guided by the guide plate 156. Therefore, sufficient outdoor air flows through the step portion 155, whereby the step portion 155 contributes to the heat exchange and thus the heat exchange efficiency of the heat exchanger 21 can be enhanced.

[0107] The heat exchanger 21 and the bottom plate 12 are joined to each other through the guide plate 156, and a dedicated member for joining the heat exchanger 21 to the bottom plate 12 is unnecessary, so that the number of parts can be reduced and the assembling work can be lightened.

[0108] Furthermore, according to this embodiment, the first front surface panel 14A is fixed to the guide plate 156, and thus the tube plate for fixing the first front panel 14A to the end portion 153C of the outermost heat exchanging portion 153 is unnecessary, so that the number of parts can be reduced and the assembly work can be lightened.

[0109] Still furthermore, the cutout 161 is formed in the guide plate 156 so that the binding band for joining the innermost heat exchanging portion 151 and the intermediate heat exchanging portion 152 can be passed. Therefore, the refrigerant pipe 151A of the innermost heat exchanging portion 151 and the refrigerant pipe 152A of the intermediate refrigerant pipe 152 are bound with the binding band 162, whereby the heat exchanging portions 151, 152 can be easily joined to each other.

[0110] Still furthermore, according to this embodiment, the heat exchanger 21 is formed by laminating the heat exchanging portions 151 to 153 having substantially the same shape at three stages. Therefore, the area which contributes to the heat exchange can be more enlarged by the guide plate 156 as compared with the lamination of the two heat exchanging portions, so that the heat exchange efficiency can be further enhanced.

[0111] The present invention is not limited to the above embodiments, and various modifications may be made to the above embodiments.

[0112] For example, in the above embodiments, the two upper and lower reinforcing plates 50 are arranged on the partition plate 16. However, one or three or more reinforcing plates may be arranged. In connection with this modification, one or three or more fitting tags may be arranged on the accumulator.

[0113] Furthermore, in the above embodiments, the support plate 36 for supporting the gas pipe service valve 37 and the liquid pipe service pipe 38 are fixed to the

partition plate 16 through the lower reinforcing plate 50. However, The support plate 36 maybe fixed to the partition plate 16 through the upper reinforcing plate 50.

[0114] In the above embodiments, the heat exchanger 21 comprises the three laminated heat exchanging portions 151, 152 and 153. However, the heat exchanger may be formed by laminating plural heat exchanging portions of two layers, four layers or five or more layers. In this construction, as the number of the laminated heat exchanging portions increase as described above, the heat exchange efficiency can be more enhanced, and thus a greater effect can be obtained. Furthermore, in the above embodiments, the binding band 62 is used as the joining fitting. However, the present invention is not limited to this, and the heat exchange portions may be joined by a wire, a string or a belt.

[0115] Furthermore, in the above embodiments, the two air blowers 22A and 22B are mounted in the vertical direction. However, only one air blower may be provided.

Claims

1. An outdoor unit of an air conditioner comprising:

a housing in which a heat exchanger having a tube plate at one side thereof, an air blower, a compressor, an electrical component box and an accumulator are mounted;

a partition plate for compartmenting the inside of the housing into a heat exchange chamber and a machine chamber, the heat exchanger and the air blower being mounted in the heat exchange chamber and the compressor, the electrical component box and the accumulator being mounted in the machine chamber; and at least one reinforcing plate which is provided to the partition plate and through which the accumulator is secured to the partition plate, wherein one end of the partition plate is fixed to the tube plate of the heat exchanger together with the reinforcing plate.

2. The outdoor unit of the air conditioner according to claim 1, wherein the reinforcing plate is formed integrally with the partition plate or separately from the partition plate so as to be fitted to the partition plate.

3. The outdoor unit of the air conditioner according to claim 1, wherein the accumulator comprises a container body and two or more mounting tabs that are fixed to the container body and arranged at a predetermined pitch, and two or more reinforcing plates are provided to the partition plate and arranged on the partition plate at the same pitch as the reinforcing plates.

4. The outdoor unit of the air conditioner according to

claim 1, wherein a hole portion is formed so as to penetrate through the partition plate and each reinforcing plate so that each mounting tab of the accumulator can be hooked to the hole portion.

5. The outdoor unit of the air conditioner according to claim 1, wherein a service valve connected to a refrigerant circuit containing the compressor and the accumulator and a support plate for supporting the service valve are mounted in the machine chamber, and one end of the support plate is fixed to the partition plate through the reinforcing plate. 10
6. The outdoor unit of the air conditioner according to claim 1, wherein the reinforcing plate is fitted to the partition plate so as to extend in the width direction of the partition plate. 15
7. An outdoor unit of an air conditioner comprising: 20
 - a housing in which a heat exchanger having a tube plate at one side thereof, an air blower, a compressor, an electrical component box and an accumulator are mounted; and
 - a partition plate for compartmenting the inside of the housing into a heat exchange chamber and a machine chamber, the heat exchanger and the air blower being mounted in the heat exchange chamber and the compressor, the electrical component box and the accumulator being mounted in the machine chamber; and
 - a support plate that supports an electrical component unit at the machine chamber side and is configured so that one end portion of the support plate can be temporarily fixed to the tube plate of the heat exchanger under the state that the support plate is mounted on the upper end portion of the partition plate. 25
8. The outdoor unit of the air conditioner according to claim 7, wherein the electrical component box has substantially the same width as the partition plate and is disposed so as to extend to the partition plate. 30
9. The outdoor unit of the air conditioner according to claim 7, wherein one end portion of the support plate is provided with a hole portion to which a screw portion provided to the tube plate can be hooked. 35
10. The outdoor unit of the air conditioner according to claim 9, wherein the hole portion comprises a small-diameter hole and a large-diameter hole continuous with the small-diameter hole, and the small-diameter hole and the large-diameter hole are located substantially at the same radius from the lower end of the support plate as the center. 40
11. The outdoor unit of the air conditioner according to 45

claim 7, wherein the support plate is provided with a tongue portion extending from the lower end portion of the support plate to the machine chamber side.

- 5 12. An outdoor unit of an air conditioner comprising:
 - a housing in which a heat exchanger having a tube plate at one side thereof, an air blower, a compressor, an electrical component box and an accumulator are mounted; and
 - a partition plate for compartmenting the inside of the housing into a heat exchange chamber and a machine chamber, the heat exchanger and the air blower being mounted in the heat exchange chamber, and the compressor, the electrical component box and the accumulator being mounted in the machine chamber, wherein the heat exchanger comprises a plurality of fin tube heat exchanging portions laminated in a thickness direction thereof and is bent so that a step portion is generated at one end portion side thereof, and the step portion is provided with a guide plate for guiding outdoor air to the step portion, one end of the guide plate is fixed to the heat exchanging portion at the innermost side while the other end of the guide plate is fixed to a bottom plate of the housing so that a gap through which outdoor air flows is formed between the other end of the guide plate and the heat exchanging portion at the outermost side. 50
13. The outdoor unit of the air conditioner according to claim 12, wherein a front panel of the housing is secured to the guide plate. 55
14. The outdoor unit of the air conditioner according to claim 12, wherein an opening portion through which a joint fitting for joining the innermost heat exchanging portion and the adjacent heat exchanging portion thereto is inserted is formed in the guide plate.
15. The outdoor unit of the air conditioner according to claim 12, wherein the heat exchanger is constructed so that the heat exchanging portions having substantially the same shape are laminated at three stages.

FIG.1

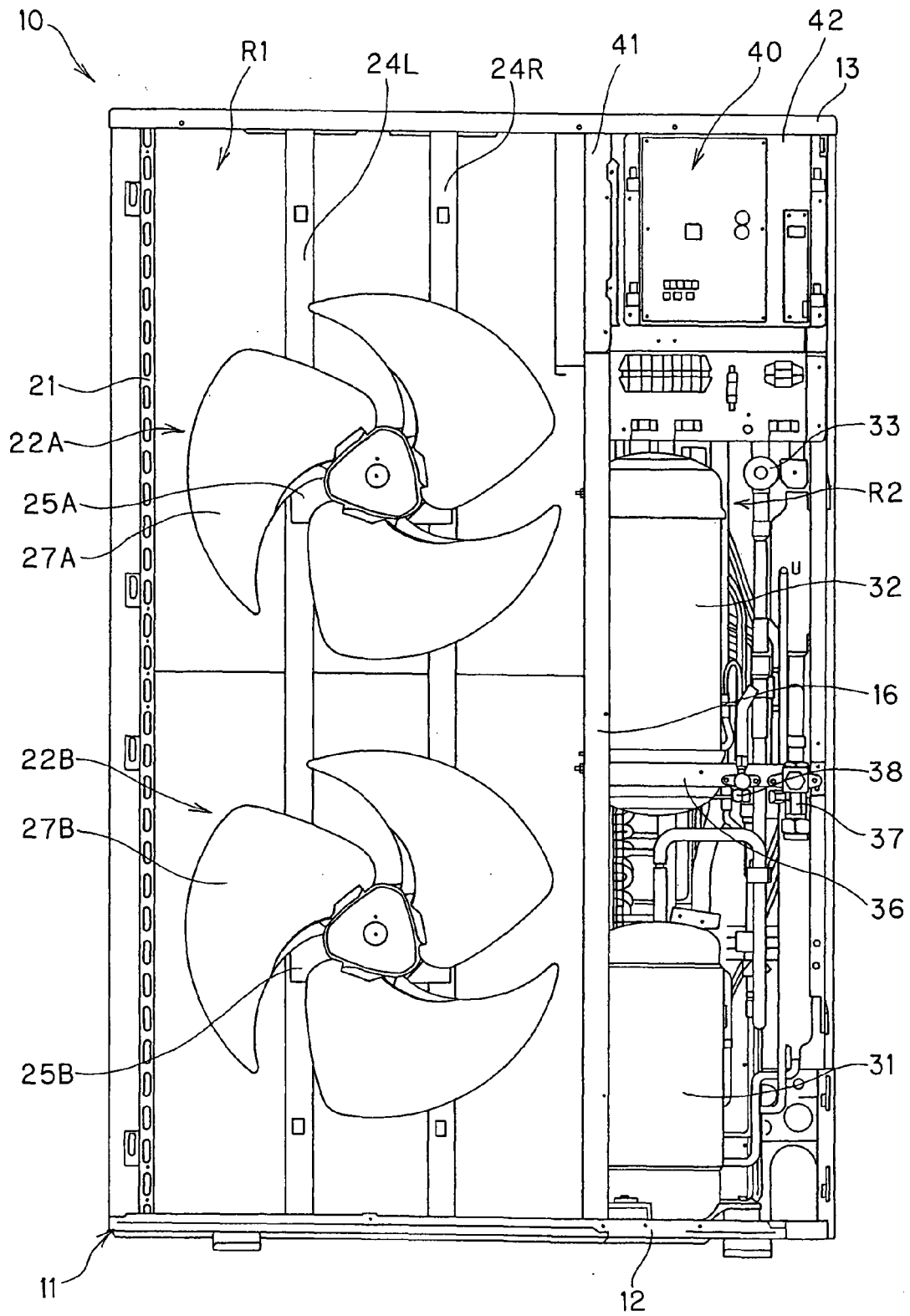


FIG.2

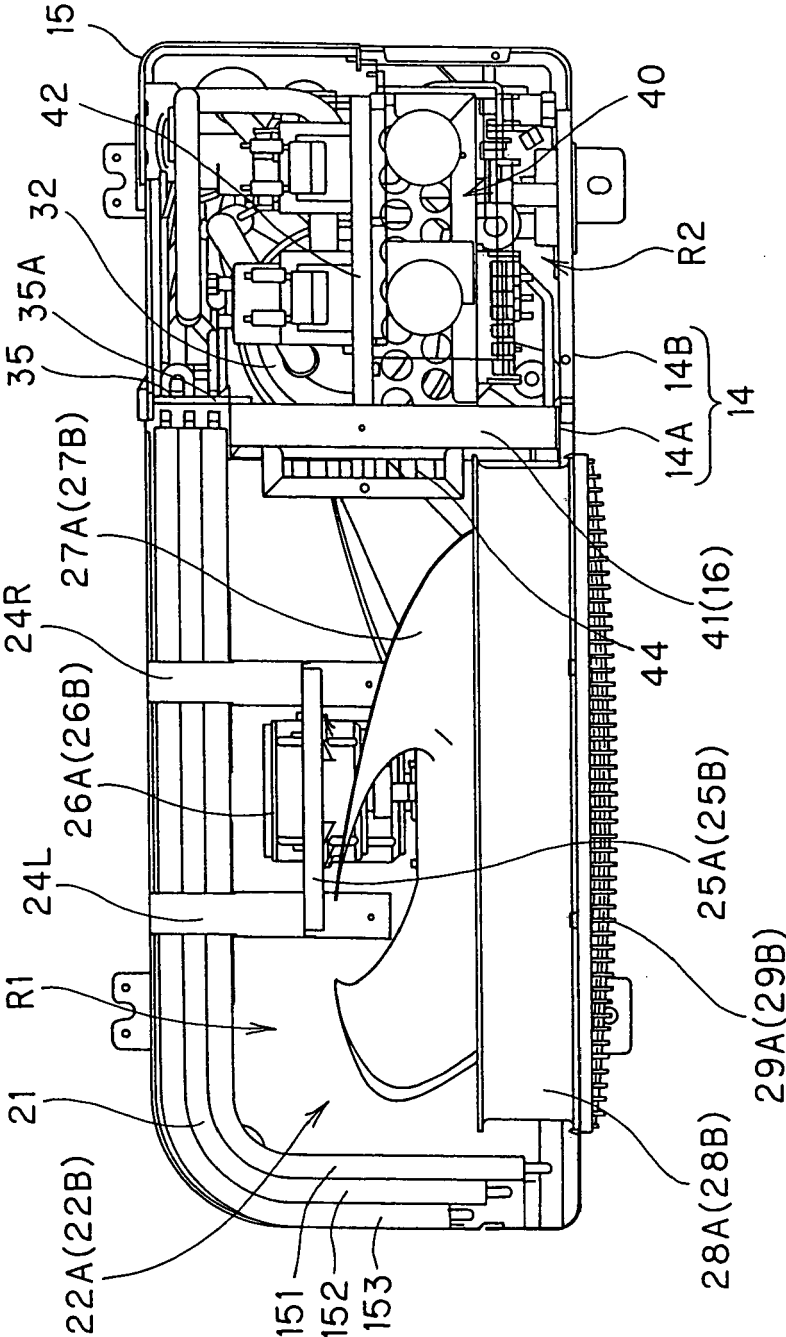


FIG.3

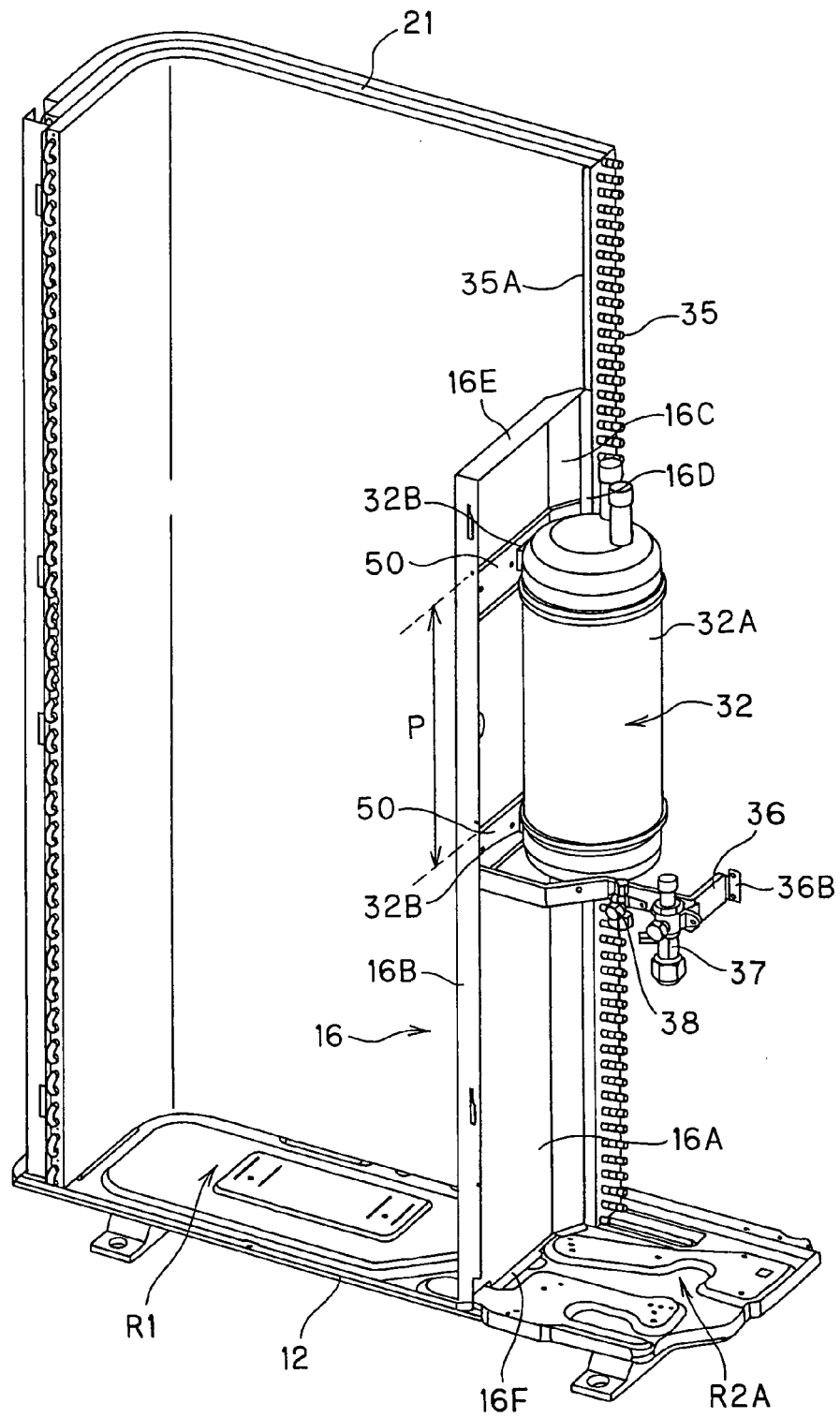


FIG.4

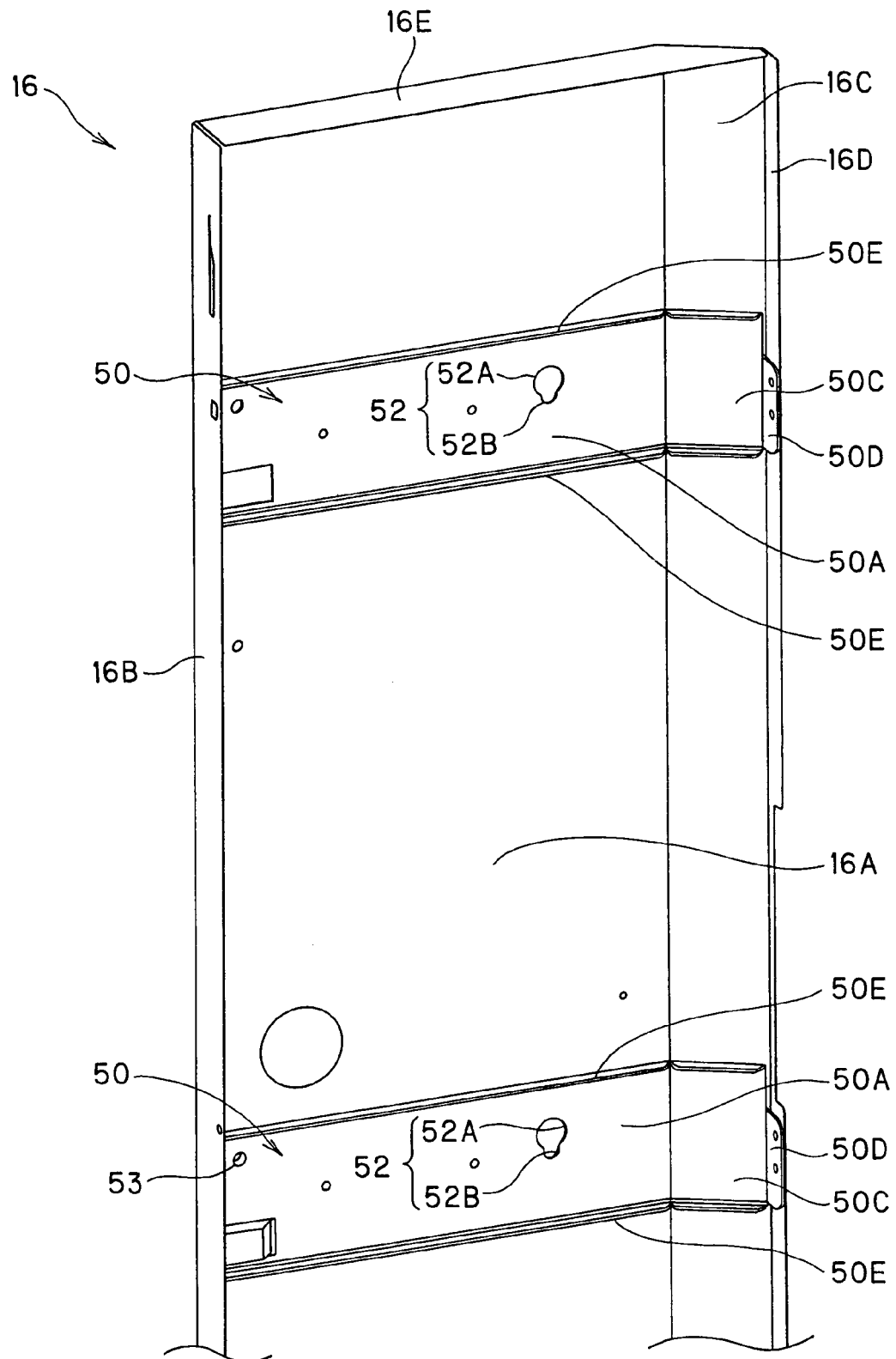


FIG.5

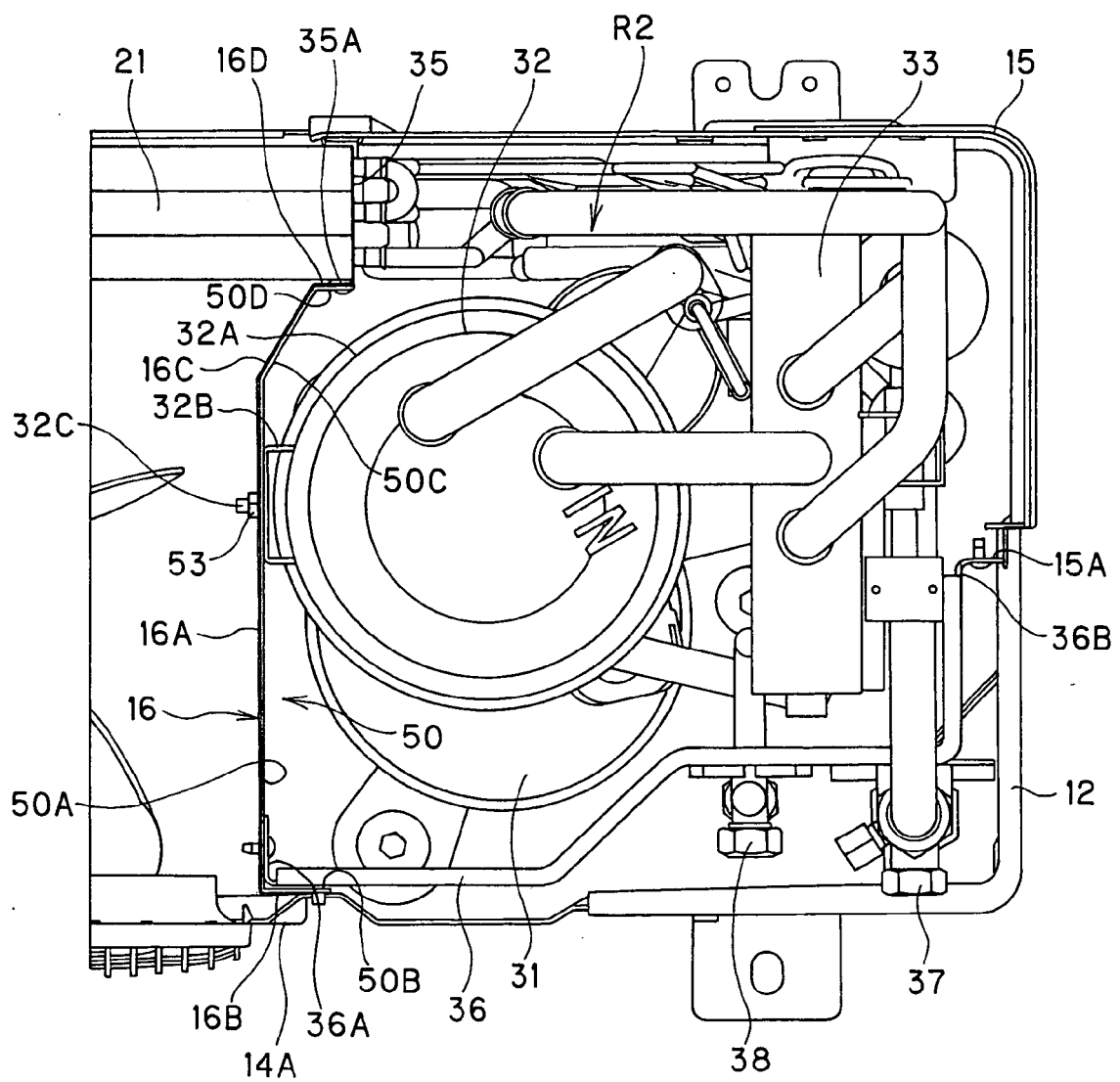


FIG. 6

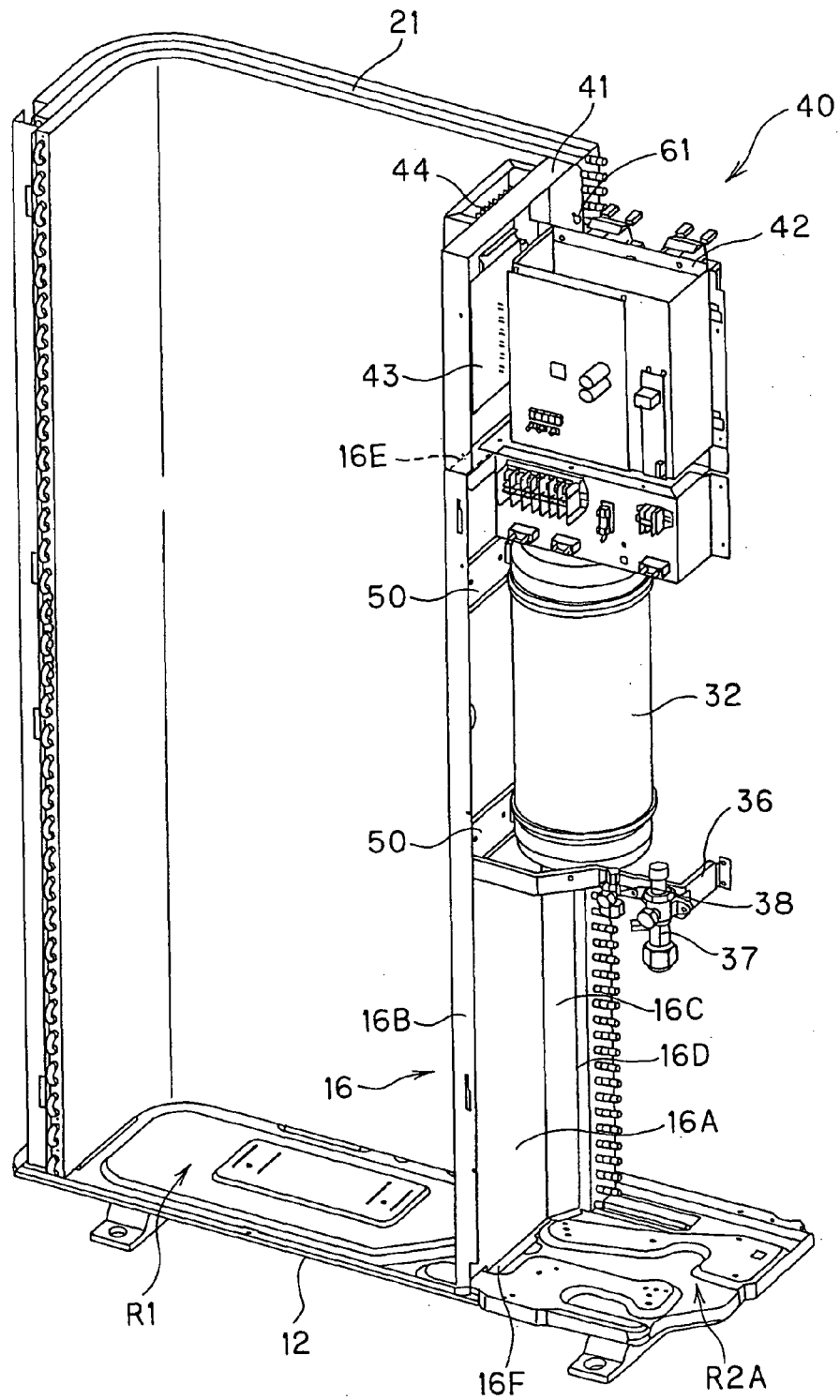


FIG.7

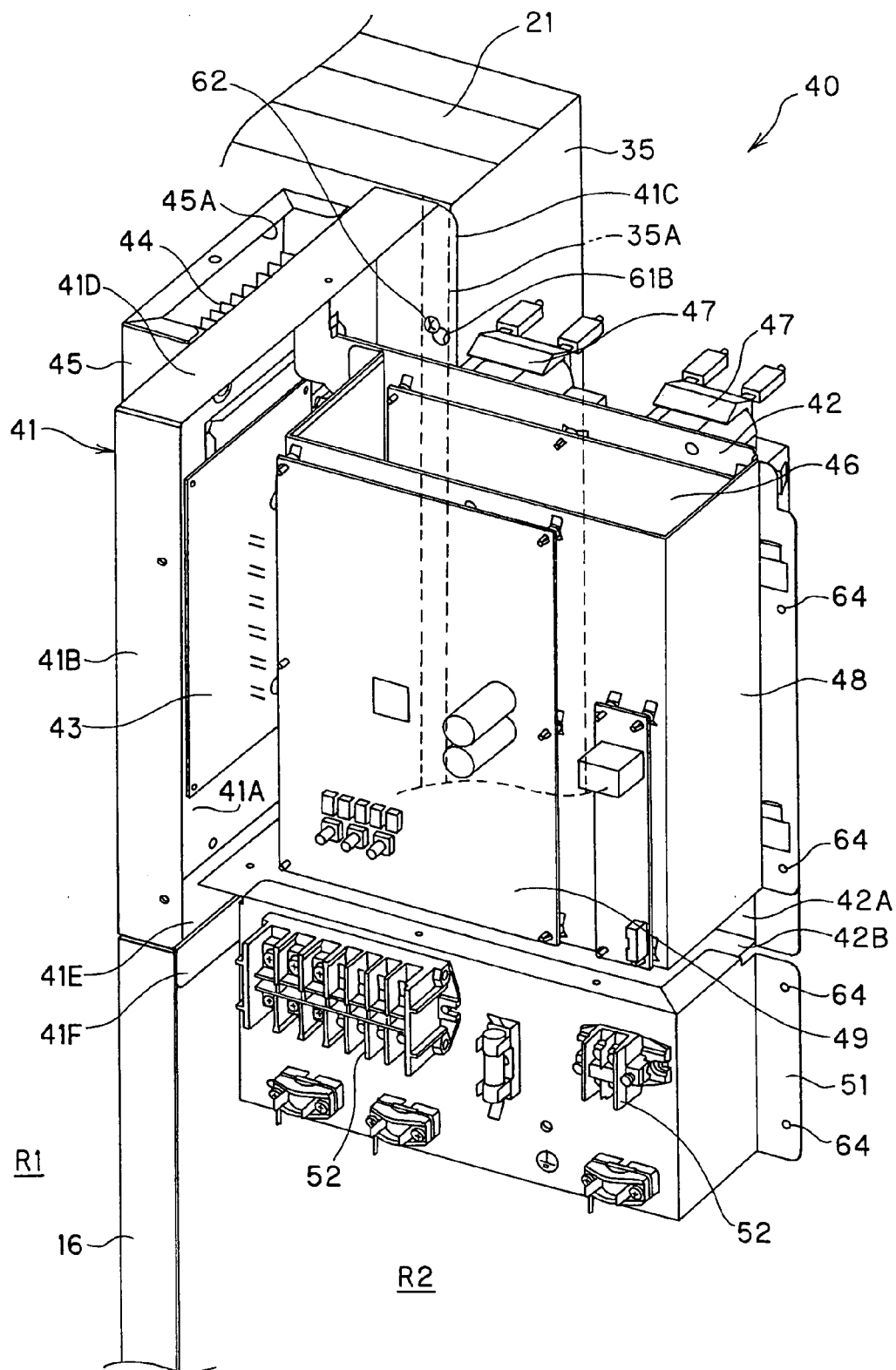


FIG.8

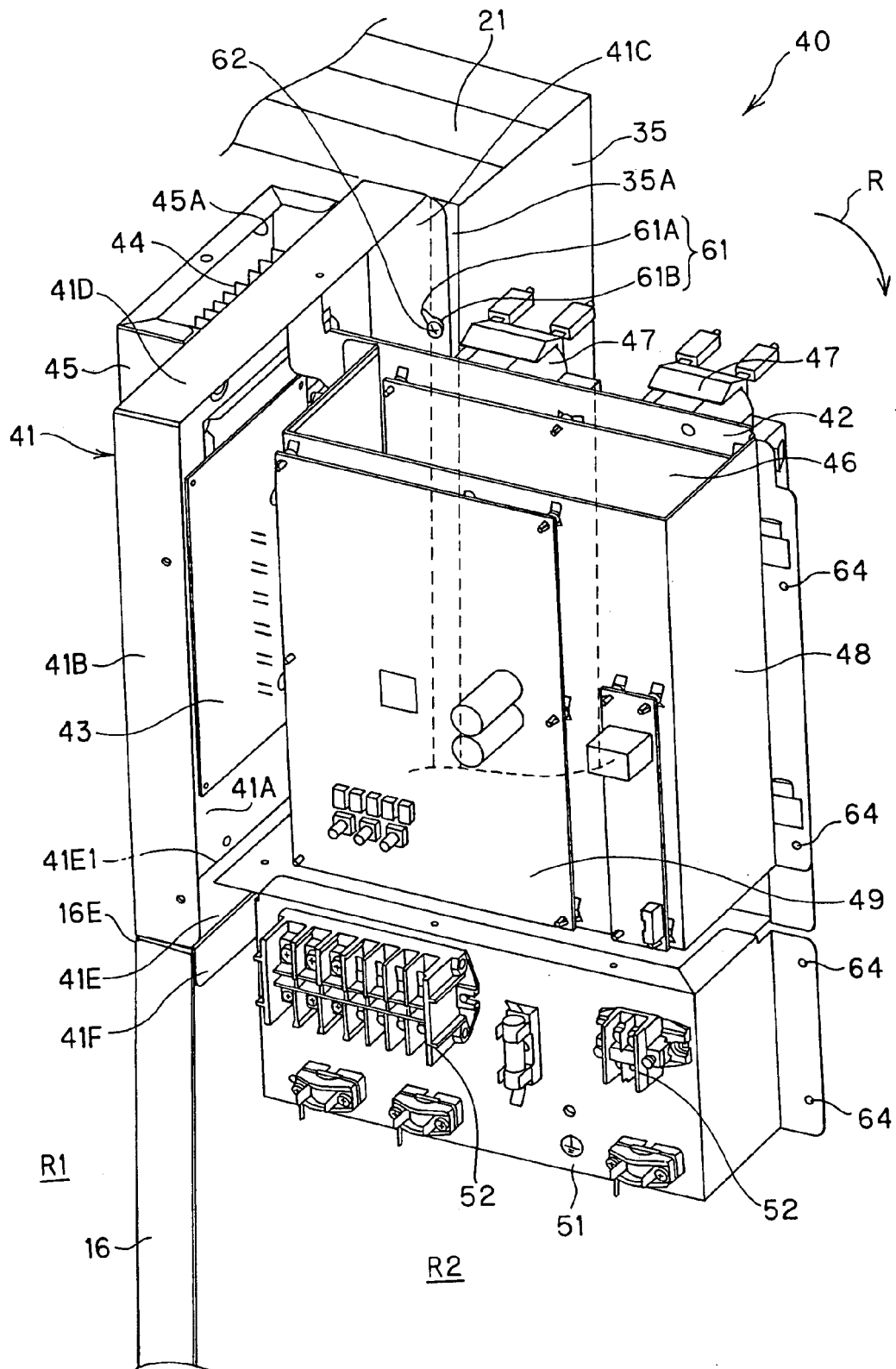


FIG. 9

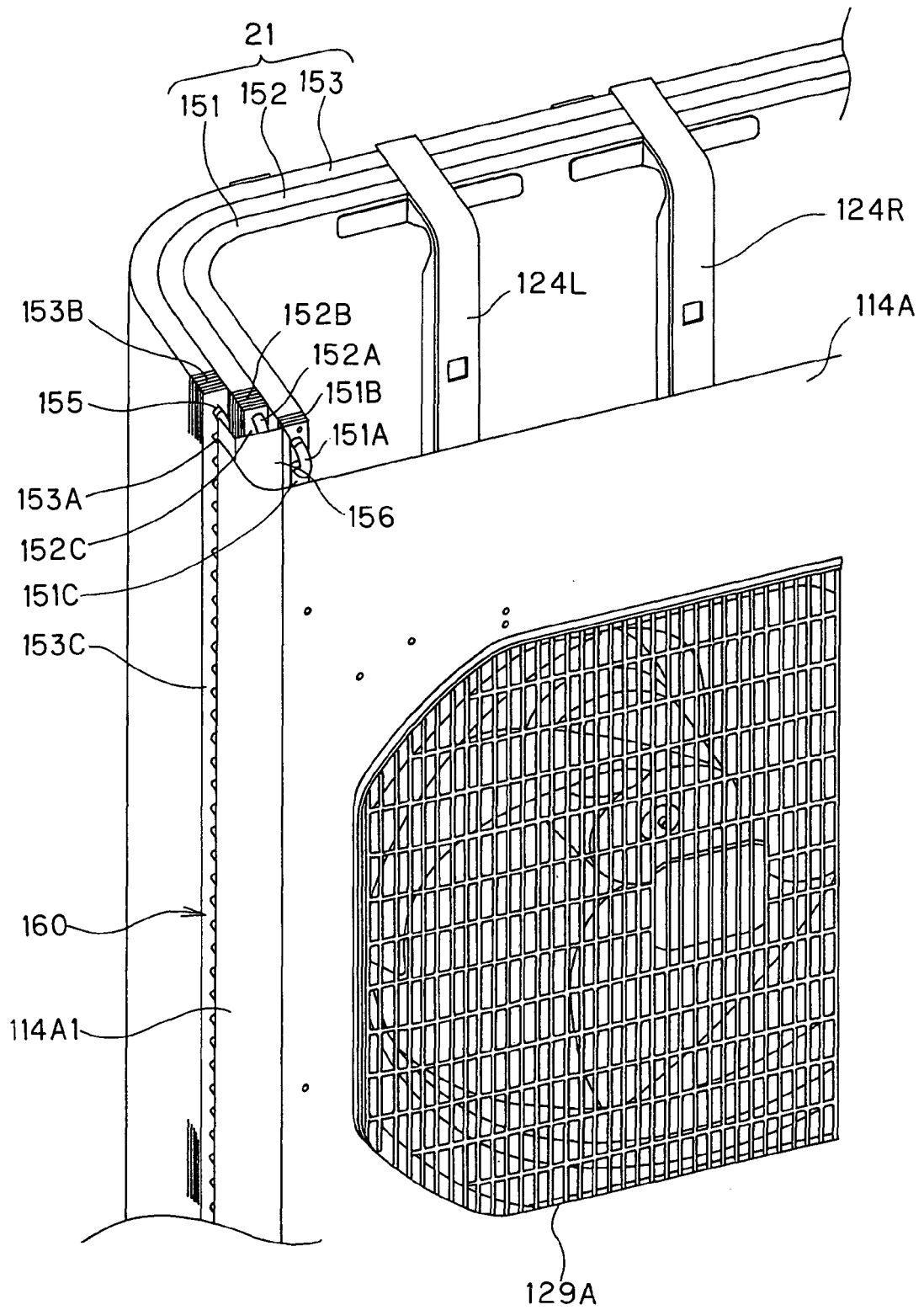


FIG. 10

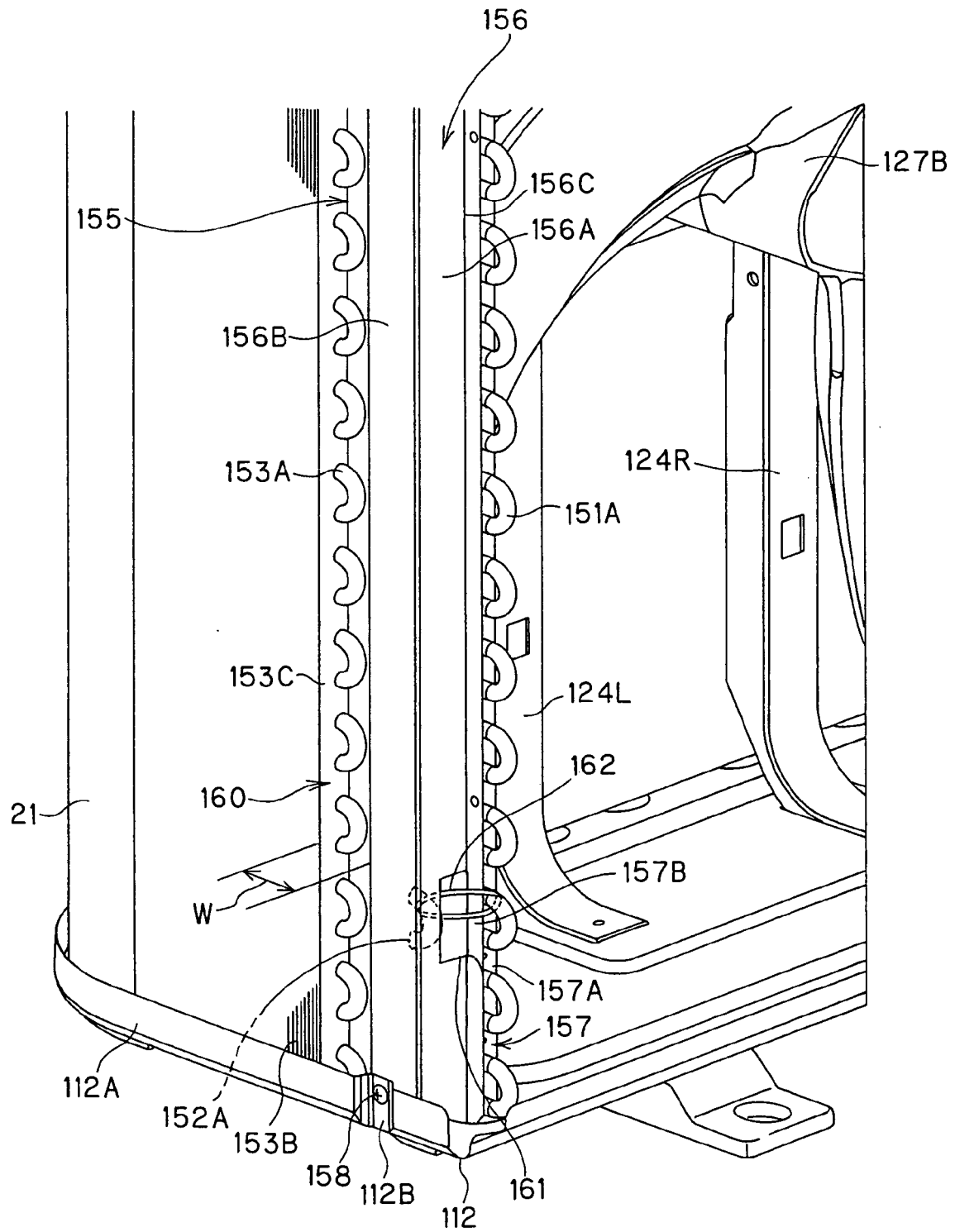
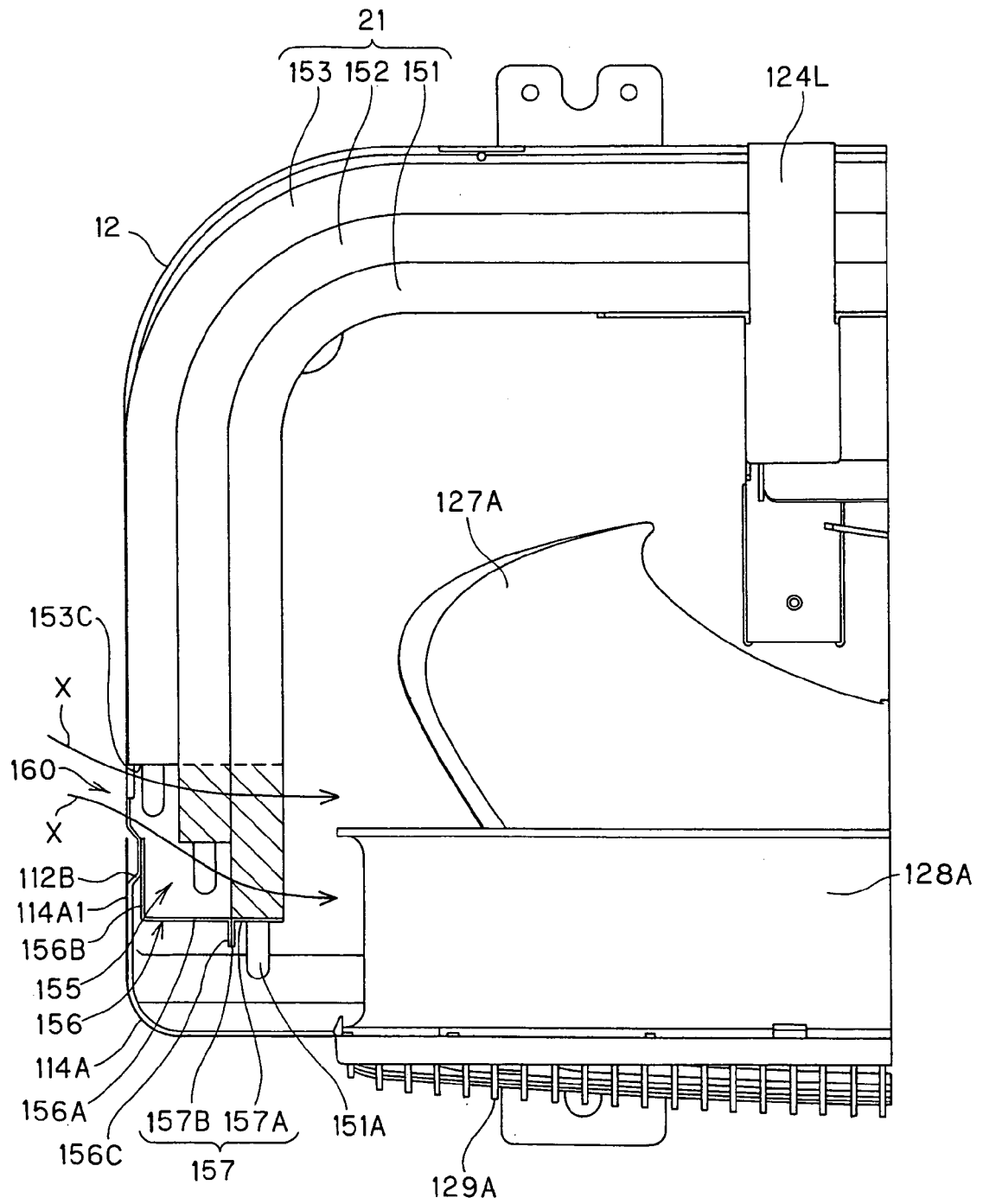


FIG.11



REFERENCES CITED IN THE DESCRIPTION

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