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(54) **BUILT-IN TYPE AIR CONDITIONING DEVICE**

EINGEBAUTE KLIMAAANLAGENVORRICHTUNG

DISPOSITIF DE CONDITIONNEMENT D'AIR ENCASTRABLE

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Description

Technical Field

[0001] The present invention relates to a built-in type air conditioning device having an indoor unit mounted in a ceiling portion of a building.

Background Art

[0002] There has been hitherto known a built-in type air conditioning device having an indoor unit mounted in a ceiling portion such as a space under the roof or the like of a building and an outdoor unit connected to the indoor unit through a refrigerant pipe. In this kind of built-in type air conditioning device, a compressor and an outdoor heat exchanger are mounted in the outdoor unit, and an indoor heat exchanger and an air blower are mounted in the indoor unit. The compressor, the outdoor heat exchanger and the indoor heat exchanger are connected to one another through the refrigerant pipe to constitute a refrigerant circuit. Air is blown to the indoor heat exchanger by the air blower, and air-conditioning air heat-exchanged with refrigerant flowing in the indoor heat exchanger is blown through an air blow-out duct to a room to be air-conditioned (see Patent Document 1, for example). The indoor unit of the built-in type air conditioning device is mounted in a ceiling portion which is limited in mount space. Therefore, there are known two flat-plate type indoor heat exchangers (upper heat exchange portion and lower heat exchange portion) which are arranged to be connected to each other and V-shaped (doglegged) in side view in order to increase the capacity of the indoor heat exchanger with suppressing the height of the indoor unit.

Prior Art Document

Patent Document

[0003] Patent Document 1: JP-A-2002-162064
Further built-in type air conditioning devices are disclosed in WO 2010/089920 A1, US 2010 000711 and US 4000779.

Summary of the Invention

Problem to be solved by the Invention

[0004] However, when the indoor heat exchangers are arranged to be connected to each other in V-shape in side view, the upper heat exchange portion is disposed away from a drain pan. Therefore, drain water from the upper heat exchange portion scatters from the V-shaped connection portion, so that the drain water is blown out from the blow-out port by air which is blown by the air blower. Furthermore, in the indoor heat exchangers arranged in V-shape in side view, the positions or distances

of the respective parts within the heat exchange face with respect to or from the air blower are uneven. Therefore, difference in air flowing velocity or unevenness of temperature occurs among the respective parts within the heat exchange face, and thus there is a problem that the heat exchange efficiency of the indoor heat exchanger cannot be made uniform.

[0005] Furthermore, in order to fix an indoor heat exchanger having a V-shape in side view in an indoor unit, the fixing structure tends to be complicated. When the fixing structure is complicated, fixing jigs protrude into an air flowing path of the indoor unit and thus they serve as resistors to air flow. Or, the number of parts for sectioning and thermally insulating a secondary side chamber at the downstream side of the heat exchanger from a primary side chamber at the upstream side of the heat exchanger is large, so that the fixing work performance is degraded. Furthermore, since the built-in type air conditioning device is mounted in the ceiling, it is very difficult to remove the air conditioning device for maintenance once it is mounted in the ceiling.

[0006] In the built-in type air conditioning device, the refrigerant pipe connected to the indoor heat exchanger and a drain pipe connected to a drain pump for discharging drain water which is generated in the indoor heat exchanger and received in the drain pan are made to penetrate through the side plate of a unit case and drawn out from the unit main body. Therefore, when the indoor heat exchanger is removed from the unit main body for maintenance or the like of the indoor heat exchanger, it is necessary to perform a work of removing the refrigerant pipe and the drain pipe from the indoor heat exchanger and the drain pump in the unit main body in a narrow space under the roof, or a work of removing the unit main body integrally with the refrigerant pipe from the space under the roof and then removing the indoor heat exchanger from the unit main body, so that the workability is bad.

[0007] The present invention has an object to provide a built-in type air conditioning device that can solve the problem of the prior art and prevent scattering of drain water from a heat exchanger with increasing the capacity of the indoor heat exchanger. Furthermore, the present invention has another object to provide a built-in type air conditioning device that can make the heat exchange efficiency uniform with increasing the capacity of the indoor heat exchanger. Still furthermore, the present invention has a further object to provide a built-in type air conditioning device that can solve the problem of the prior art and secure an indoor heat exchanger with a simple construction and a small number of parts. Still furthermore, the present invention has a further object to provide a built-in type air conditioning device that can solve the problem of the prior art and enhance the maintenance performance of the indoor heat exchanger.

Means of solving the Problem

[0008] In order to attain the above objects, according to the present invention, a built-in type air conditioning device according to claim 1 is provided.

[0009] According to the present invention, the upper heat exchange portion is disposed to be nearer to the air blower side than the upper end of the lower heat exchange portion, and a step is provided between an air flow-out side surface of the upper heat exchange portion and an upper end of the lower heat exchange portion.

[0010] Furthermore, in order to attain the above object, according to the present invention, a built-in type air conditioning device has a unit main body configured to accommodate a heat exchanger and an air blower, wherein the heat exchanger contains an upper heat exchange portion and a lower exchange portion that are connected to each other substantially in V-shape in side view, a blow-out port of the air blower is provided so as to confront an apex of the V-shape, the lower heat exchange portion and the upper heat exchange portion are configured to have the same width and accommodated substantially fully over a unit width in the unit main body, and a heat exchange area of the lower heat exchange portion is set to be larger than a heat exchange area of the upper heat exchange portion.

[0011] According to the present invention, the heat exchange area of the upper heat exchange portion is set to substantially 60% of the heat exchange area of the lower heat exchange portion.

[0012] Furthermore, according to the present invention, the inside of the unit main body is partitioned into an air blow chamber in which the air blower is accommodated and a heat exchange chamber in which the heat exchanger is accommodated, a drain pan is provided so as to over an overall bottom portion of the heat exchange chamber, and a lower end of the lower heat exchange portion is mounted on the drain pan.

[0013] In order to attain the above object, according to the present invention, in a built-in type air conditioning device in which an inside of an unit main body is partitioned through a partitioning plate into a heat exchange chamber for accommodating a heat exchanger and an air blow chamber for accommodating an air blower, and air sucked by the air blower is heat-exchanged by the heat exchanger and blown out, both the end portions of the heat exchanger are provided with resin fixing members that are fixed to a front plate and a top plate of the unit main body and fix the heat exchanger to an inside of the unit main body.

[0014] According to the present invention, in the above built-in type air conditioning device, the fixing member at one end side of both the ends of the heat exchanger is provided with vent holes through which U-shaped tubes of the heat exchanger penetrate, the fixing member at the other end side is provided with a V-shaped groove formed along the shape of the heat exchanger, and a refrigerant pipe of the heat exchanger penetrates from

the groove .

[0015] In order to attain the above object, according to the present invention, in a built-in type air conditioning device in which an inside of an unit main body is partitioned through a partitioning plate into a heat exchange chamber for accommodating a heat exchanger and an air blow chamber for accommodating an air blower, and air sucked by the air blower is heat-exchanged by the heat exchanger and blown out, the heat exchanger is configured to be mounted detachably from an opening portion of a lower surface of the unit main body into the heat exchange chamber, a side plate of the unit main body is provided with an inverted U-shaped groove that is opened downwards so that a refrigerant of the heat exchanger projecting outwards from the side plate is insertable from the opening portion side into the heat exchange chamber integrally with the heat exchanger, and a lid member having a U-shaped groove is secured to the side plate so that the refrigerant pipe can be held by the side plate through cooperation between the U-shaped groove of the lid member and the inverted U-shaped groove of the side plate.

[0016] According to the present invention, in the above built-in type air conditioning device, the unit main body contains a drain pan for receiving drain water generated at the heat exchanger, and a drain pump for discharging drain water pooled in the drain pan through a drain pipe to the outside of the unit main body, and a pump unit in which the drain pump and the drain pipe are integrally assembled with each other is freely detachably mounted in the side plate of the unit main body.

[0017] According to the present invention, in the above built-in type air conditioning device, an open side of the V-shape of the heat exchanger is disposed to confront the blow-out port of the air blower.

[0018] According to the present invention, the open side of the V-shape of the heat exchanger is disposed to confront a downstream side of the heat exchanger.

[0019] According to the present invention in the above built-in type air conditioning device, the air blower is a centrifugal air blower.

Effect of the Invention

[0020] According to the present invention, both the end portions of the heat exchanger are provide with the fixing members formed of resin which are fixed to the front plate and top plate of the unit main body to fix the heat exchanger to the inside of the unit main body. Accordingly, it is unnecessary that a fixing member for fixing the heat exchanger is separately provided in the unit case, and further the heat exchanger can be removed from the unit main body integrally with the fixing members. Therefore, the heat exchanger can be secured to the inside of the unit main body with a simple construction and with a small number of parts, and also the maintenance of the indoor heat exchanger can be easily performed under the state that the built-in type air conditioning device is mounted

at the ceiling portion. Furthermore, according to the present invention, the heat exchanger is detachably insertable from the opening portion of the lower surface of the unit main body into the indoor heat exchange chamber, the side plate of the unit main body is provided with the inverted U-shaped groove which is opened to the lower side so that the refrigerant pipe of the heat exchanger projecting outwards from the side plate is insertable from the opening portion side into the heat exchange chamber integrally with the heat exchanger, the lid member having the U-shaped groove is secured to the side plate, and the refrigerant pipe can be held in the side plate through the cooperation between the U-shaped groove of the lid member and the inverted U-shaped groove of the side plate. Accordingly, when the heat exchanger is secured, the refrigerant pipe can be held in the side plate through the cooperation between the U-shaped groove of the lid member and the inverted U-shaped groove. Furthermore, when the heat exchanger is detached or attached, the heat exchanger and the refrigerant pipe can be easily attached or detached from the opening portion of the lower surface of the unit main body integrally with each other without removing the refrigerant pipe from the heat exchanger. Accordingly, the maintenance performance of the indoor heat exchanger can be enhanced. Furthermore, the pump unit in which the drain pump and the drain pipe are integrally assembled with each other is freely detachably mounted in the neighborhood of the lid member in the side surface of the unit main body. Accordingly, even after piping, the pump unit can be easily removed from the unit case, and the maintenance performance of the drain pump can be easily performed.

Brief Description of the Drawings

[0021]

[Fig. 1] is a side view showing a built-in type air conditioning device according to an embodiment of the present invention.

[Fig. 2] is a perspective view showing the outlook of an indoor unit.

[Fig. 3] is a perspective view of the outlook of the indoor unit when the indoor unit is viewed from the lower side.

[Fig. 4] is a diagram showing the internal construction of the indoor unit.

[Fig. 5] is a cross-sectional view showing the indoor unit.

[Fig. 6] is a cross-sectional view showing a heat exchange chamber.

[Fig. 7] is a perspective view showing an indoor heat exchange unit.

[Fig. 8] is a perspective view showing a one-side fixing member.

[Fig. 9] is a diagram showing the other-side fixing-member, wherein (A) is a front view of the other-side

fixing member, and (B) is a front view showing a state that the other-side fixing member is secured to an indoor heat exchanger.

[Fig. 10] is a perspective view showing a pipe draw-out side of the indoor unit when the indoor heat exchange unit is removed.

[Fig. 11] is a perspective view showing a pump unit.

Best Mode for carrying out the Invention

[0022] An embodiment according to the present invention will be described hereunder with reference to the drawings.

[0023] A built-in type air conditioning device 1 according to an embodiment to which the present invention is applied comprises an outdoor unit (not shown) and an indoor unit 5 connected to the outdoor unit through a refrigerant pipe. As not shown, the outdoor unit is disposed outdoors, for example, on the roof of a building or the like, and serves to perform heat-exchange with outdoor air so that refrigerant is condensed to discharge heat to outside air under cooling operation and evaporated to take in heat from the outside air under heating operation. The built-in type air conditioning device 1 circulates the refrigerant between the outdoor unit and the indoor heat exchanger (heat exchanger) 60 of the indoor unit 5 to air-condition a room 2 to be air-conditioned.

[0024] As shown in Fig. 1, the indoor unit 5 is disposed while hung in an under-roof space 34 between a ceiling 32 of a building 31 and a ceiling plate 33. The indoor unit 5 is configured to accommodate an indoor heat exchanger (heat exchanger) 60 and an air blower 50 for blowing air to the indoor heat exchanger 60. The indoor unit 5 is configured to have a suction duct 53 extending from the unit main body 10 to the ceiling plate 33 and a blow-out duct 54.

[0025] The unit case 11 of the unit main body 10 is formed in a substantially rectangular shape, and has a top plate 12, a bottom plate 13, side plates 14A, 14B, a suction-side panel 15 and a blow-out-side panel (front plate) 16. Plural suspending clasps 41 are fixed to the side plates 14A, 14B of the unit case 11. Four suspending bolts 42 are hung from the ceiling 32. The unit main body 10 is provided to be suspended in the under-roof space 34 by fixing the suspending clasps 41 to these suspending bolts 42. A freely detachable ceiling panel 35 is secured to the ceiling plate 33 at a proper position, particularly in the neighborhood of the just-below position of the unit main body 10. Various kinds of maintenance can be performed from the air-conditioning target room 2 side by detaching the ceiling panel 35.

[0026] The suction-side panel 15 and the blow-out-side panel 16 are respectively disposed at a pair of confronting side surfaces of the unit case 11. The suction-side panel 15 is disposed at the upstream side of the air blower 50, and a suction port 17 is formed in the suction-side panel 15. The blow-out-side panel 16 is disposed at the downstream side of the indoor heat exchanger 60,

and a blow-out port 18 is formed in the blow-out-side panel 16. An air suction port 51 and an air supply port 52 through which the air-conditioning target room 2 and the under-roof space 34 intercommunicate with each other are formed at proper positions of the ceiling plate 33. The suction port 17 of the unit case 11 and the air suction port 51 of the ceiling plate 52 are connected to each other through the suction duct 53. The blow-out port 18 of the unit case 11 and the air supply port 52 of the ceiling plate 33 are connected to each other through the blow-out duct 54.

[0027] The indoor unit 5 sucks air in the air-conditioning target room 2 through the air suction port 51, the suction duct 53 and the suction port 17 into the unit main body 10 by driving the air blower 50, and blows the sucked air to the indoor heat exchanger 60 to heat-exchange the air with refrigerant flowing in the indoor heat exchanger 60. The air-conditioning air which is heat-exchanged with the refrigerant flowing in the indoor heat exchanger 60 is supplied into the air-conditioning target room 2 through the blow-out port 18, the blow-out duct 54 and the air supply port 52. That is, the indoor unit 5 sucks the air in the air-conditioning target room 2, heat-exchanges the air with the refrigerant flowing in the indoor heat exchanger 60 and blows out the air-conditioning air heat-exchanged with the refrigerant into the air-conditioning target room 2 again.

[0028] As shown in Fig. 2, one side surface of the unit case 11 is constructed by a side plate 14A. A maintenance panel 56, a pump unit 75 and a lid body (pipe holding member) 68 are freely detachably secured to the side plate 14A. A maintenance opening (not shown) for performing maintenance of an electrical equipment unit is provided to the side plate 14A, and the maintenance panel 56 is secured to the side plate 14A so as to block the maintenance opening.

[0029] The pump unit 75 comprises a drain pump 78 for pumping up drain water from a drain pan 70 described later, and a fixing member 79 of the drain pump 78. The side plate 14A is provided with an opening 75A for securing the pump, and the drain pump 78 is accommodated in the unit case 11 through the pump securing opening 75A. The fixing member 79 fixes the drain pump 78, and is secured to the side plate 14A so as to block the pump securing opening 75A.

[0030] The side plate 14A is further provided with a cut-out 68 through which an auxiliary refrigerant pipe (refrigerant pipe) 67 penetrates. The lid body 68 is configured to hold the auxiliary refrigerant pipe 67 penetrating through the side plate 14A via the cut-out 68C and blocks the cut-out 68C.

[0031] As described above, plural maintenance openings for performing various kinds of maintenance on the indoor unit 5 are formed in the side plate 14A of the unit case 11 in a lump. Therefore, the maintenance performance of the indoor unit 5 can be enhanced.

[0032] A cut-out 19 for a drain pipe is provided at the lower side of the pump unit 75 by cutting out the side

plate 14A so that the side plate 14A is opened downwardly. The cut-out 19 for the drain pipe is provided with a drain pipe holding member 76 so that the drain pipe holding member 76 is freely detachably fitted to cut-out 19 for the drain pipe. The drain pipe holding member 76 is provided with a hole 76A through which a drain discharging pipe 77 penetrates (see Fig. 10). The drain discharging pipe 77 connected to the drain pan 70 is disposed so as to protrude from the hole 76A, and the details thereof will be described later. For example, when drain water remaining in the drain pan 70 is discharged under maintenance of the unit main body 10, the drain water can be discharged through the drain discharging pipe 77 to the outside of the unit main body 10.

[0033] Screw holes 69A, 69A are formed in the blow-out-side panel 16 so as to be arranged vertically at both the outsides of the blow-out port 18. Screw holes 69B, 69B are formed in the top plate 12 so as to be located substantially at the same position as the screw holes 69A in the direction of the unit width W of the unit case 11. Screws 4 (see Fig. 5) for fixing the indoor heat exchanger 60 to the unit case 11 are fitted in the respective screw holes 69A, 69B, and the details thereof will be described later.

[0034] In the unit main body 10, air sucked from the suction port 17 flows to the blow-out port 18 along the depth L direction of the unit case 11. The refrigerant circulated between the outdoor unit and the indoor unit 5 flows in the indoor heat exchanger 60 so as to be substantially perpendicular to the flow of the air. That is, in the indoor heat exchanger 60, the refrigerant flows along the direction of the unit width W of the unit case 11.

[0035] As shown in Fig. 3, the bottom plate 13 is divided into an air blowing chamber side bottom plate 13B at the suction port 17 side and a heat-exchange chamber side bottom plate 13A at the blow-out port 18 side in the depth L direction of the unit case 11. Beads 71, 72 extending in the width direction of the unit case 11 are formed in the heat-exchange chamber side bottom plate 13A so as to be located at predetermined positions in the depth L direction of the unit case 11. The beads 71, 72 may be configured as a single continuous bead like the bead 71 or as plural divided beads like the beads 72. The bottom plate 13 is formed of a metal thin plate-like member, and the beads 71, 72 are formed by subjecting the plate-like member to press work or the like. Since the heat-exchange chamber side bottom plate 13A has the beads 71, 72, the strength thereof is enhanced. The lengths, the forming positions and the numbers of the beads 71, 72 may be properly changeable in accordance with the size, shape and thickness of the bottom plate 13. Furthermore, the dimension of the depth L of the unit case 11 may be properly changeable in accordance with the output of the indoor unit 5. In the case of the unit case 11 having a small dimension of the depth L, the bottom plate 13 is also short. In this case, the beads 71, 72 may be configured to have the same length and provided fully over the width W direction of the unit case 11.

[0036] Fig. 4 is a diagram showing a state that the top plate 12 is detached from the unit case 11. As shown in Fig. 4, the inside of the unit case 11 is sectioned into an air blow chamber R1 for accommodating the air blower 50 therein and a heat-exchange chamber R2 for accommodating the indoor heat exchanger 60 by a partition plate 55 which is provided substantially vertically to the top plate 12 and the bottom plate 13. The partition plate 55 is formed of a metal plate member or the like, and intercepts air flow between the air blow chamber R1 and the heat-exchange chamber R2. The partition plate 55 is provided with openings 55A, and air blowing ports (blow-out ports) 50D of the air blowers 50 are connected to the openings 55A and exposed to the heat-exchange chamber R2 side.

[0037] A sirrocco fan as a centrifugal air blower is used as the air blower 50. The air blower 50 is constructed by accommodating a cylindrical fan body 50A having many vanes in a fan case 50B. The air blower 50 has a motor shaft 50C extending in the axial direction of the fan body 50A. The motor shaft 50C of the air blower 50 is connected to a fan motor 20, and the fan body 50A is rotated by driving the fan motor 20. The number of the air blowers 50 accommodated in the air blow chamber R1 may be properly changeable in conformity with the dimension of the unit case 11 (the output capacity of the indoor unit). Furthermore, in this embodiment, in the air blow chamber R1, the plural air blowers 50 are connected to one another through one motor shaft 50C, and these plural air blowers 50 are likewise rotated by a single fan motor 20. However, the present invention is not limited to this style, and each of the plural air blowers 50 may be configured to have a fan motor 20.

[0038] As shown in Fig. 5, the indoor heat exchanger 60 comprises a flat-plate type upper heat exchange portion 61 and a flat-plate type lower heat exchange portion 62. The upper heat exchange portion 61 and the lower heat exchange portion 62 are connected to each other so as to be substantially V-shaped in side view. Accordingly to this construction, the indoor heat exchanger 60 is constructed by connecting the two flat-plate type heat exchange portions 61, 62 substantially in V-shape in side view. Therefore, as compared with a case where a flat-plate type heat exchanger is vertically mounted, the height of the heat exchanger can be reduced to a lower position, and the heat exchange area can be increased to a larger value.

[0039] Each of the upper heat exchange portion 61 and the lower heat exchange portion 62 comprises a fin-and-tube type heat exchanger, and it is configured to have a pair of tube plates extending in an air flowing direction, plural fin plates disposed to be spaced from one another between the tube plates and plural tubes penetrating through these fin plates. The tubes are arranged on plural lines in the front-and-rear direction (three lines in this embodiment) and on plural stages in the up-and-down direction, and connected to one another through U-shaped portions (U-vents) to form a single refrigerant

pipe.

[0040] The upper heat exchange portion 61 is disposed so that the upper end portion 61C thereof extends to a position near to the lower surface of the top plate 12. The lower heat exchange portion 62 is disposed so that the lower end portion 62C thereof is mounted on the drain pan 70 described later. Accordingly, the heat exchange chamber R2 is sectioned into a primary side chamber 65A at the upstream side of the indoor heat exchanger 60, and a secondary side chamber 65B at the downstream side of the indoor heat exchanger 60 by the indoor heat exchanger 60. The upper heat exchange portion 61 and the lower heat exchange portion 62 are formed to have the same width, and accommodated substantially fully over the unit width W.

[0041] The upper heat exchange portion 61 and the lower heat exchange portion 62 are arranged so that the lower end portion (lower end) 61A of the upper heat exchange portion 61 is placed and stacked on an air flow-in side surface 62A of the lower heat exchange portion 62, which is a surface of the lower heat exchange portion 62 confronting the primary side chamber 65A. As described above, the upper heat exchange portion 61 and the lower heat exchange portion 62 are connected to each other so as to be substantially perpendicular to each other in a substantial V-shape in side view so that the lower end portion (lower end) 61A of the upper heat exchange portion 61 is stacked on the air flow-in side surface 62A of the lower heat exchange portion 62. That is, the apex 60A of the V-shape of the indoor heat exchanger 560 is formed from the corner portion at the blow-out port 18 side of the upper end portion (upper end) 62B of the lower heat exchange portion 62. Furthermore, the upper heat exchange portion 61 is disposed to be nearer to the air blower 50 side, that is, the primary side chamber 65A side than the upper end portion 62B of the lower heat exchange portion 62. Accordingly, a step 60C having a step width W is formed between an air flow-out side surface of the upper heat exchange portion 61 and the upper end portion 62B of the lower heat exchange portion 62.

[0042] Drain water such as dew condensation water or the like which occurs at the upper heat exchange portion 61 and flows along the flow-out side surface 61B by its own weight is received by the step 60C formed between the air flow-out side surface 61B of the upper heat exchange portion 61 and the upper end portion 62B of the lower heat exchange portion 62, and then flows along the surface of the lower side heat exchange portion 62. Accordingly, the drain water occurs at the upper heat exchange portion 61 can be prevented from scattering from the connection portion 60B between the upper heat exchange portion 61 and the lower heat exchange portion 62.

[0043] The air blower 50 is disposed so that the air blowing port 50D thereof faces an obliquely downward direction and thus the blow-out direction from the air blowing port 50D face the connection portion 60B between the upper heat exchange portion 61 and the lower heat

exchange portion 62. The indoor heat exchanger 60 is configured so that the stage number of the tubes of the upper heat exchange portion 61 is equal to six stages. Furthermore, the indoor heat exchanger 60 is configured so that the stage number of the tubes of the lower heat exchange portion 62 is equal to 10 stages. That is, the upper heat exchange portion 61 and the lower heat exchange portion 62 are formed to have the same thickness and the same width so that the heat exchange area of the lower heat exchange portion 62 is larger than the heat exchange area of the upper heat exchange portion 61. Particularly, in this embodiment, the heat exchange area of the upper heat exchange portion 61 is set to substantially 60% of the heat exchange area of the lower heat exchange portion 62. According to this construction, the blow-out direction of the air blower 50 is the downward direction and the heat exchange area of the lower heat exchange portion 62 is larger than the heat exchange area of the upper heat exchange portion 61. Therefore, the amounts of air passing through the upper heat exchange portion 61 and the lower heat exchange portion 62 can be set to be substantially equal to each other. Accordingly, the temperature difference within the heat exchange face between the upper heat exchange portion 61 and the lower heat exchange portion 62 can be reduced, and the heat exchange efficiency in the indoor heat exchanger 60 can be made uniform.

[0044] As shown Figs. 5 and 6, the indoor heat exchanger 60 may be disposed so that the open side of the V-shape faces the air blowing port 50D of the air blower 50 or the apex 60A side of the V-shape faces the air blowing port 50D of the air blower 50 (not shown). The indoor heat exchanger 60 is disposed so that the tilt angle α of the lower heat exchange portion 62 with respect to the horizontal direction is not smaller than a predetermined angle, for example, 37° . The tilt angle α of the lower heat exchange portion 62 with respect to the horizontal direction is set to 37° or more, the drain water can be prevented from being difficult to flow along the lower heat exchange portion 62. Accordingly, the heat-exchange capability of the indoor heat exchanger 60 can be prevented from degrading due to adhesion of drain water thereto.

[0045] The drain pan 70 for receiving drain water of the indoor heat exchanger 60 is disposed below the indoor heat exchanger 60. The drain pan 70 covers the whole bottom surface of the heat exchange chamber R2, and is supported by the bottom plate 13. The drain pan 70 is formed of foamed polystyrene, and the interior thereof which receives drain water of the indoor heat exchanger 60 is covered by resin sheet or the like for waterproof and mildew proofing, whereby the drain pan 70 can be designed to be light in weight. Furthermore, a drain pool 70A whose bottom portion is located to be lower by one step is formed on the drain pan 70. As not shown, a suction port of the drain pump 78 is disposed in the drain pool 70A.

[0046] A mount portion 73 on which a part of the lower

end portion 62C of the lower heat exchange portion 62 is formed on the drain pan 70. As not shown, the mount portion 73 may be configured so that a buffer member extends substantially fully over the width direction of the drain pan 70.

[0047] The bottom plate 13 is divided into the air blowing chamber side bottom plate 13B covering the bottom surface of the air blowing chamber R1 side and the heat exchange chamber side bottom plate 13A covering the bottom surface of the heat exchange chamber R2 side. The drain pan 70 is provided to be freely detachable from the unit case 1 by removing the heat exchange chamber side bottom plate 13A. The drain pan 70 is formed in a box-shape so that four side surfaces are erected from the bottom surface. Plural positioning plates 74 which come into contact with the upper ends of the side surfaces of the drain pan 70 are provided to the surfaces at the heat exchange chamber R2 side of the partition plate 55 and the blow-out side panel 16 so as to be spaced from one another at predetermined intervals in the width direction of the unit case 11. That is, the drain pan 70 is held while being sandwiched between the positioning plates 74 and the heat exchange chamber side bottom plate 13A. As described above, the drain pan 70 is accommodated in the unit case 11 while supported by the heat exchange chamber side bottom plate 13A, so that the drain pan 70 can be easily detached from the bottom surface side of the unit case 11 by removing the heat exchange chamber side bottom plate 13A.

[0048] As shown in Fig. 6, the beads 71, 72 described above are formed on the heat exchange chamber side bottom plate 13A. The bead 71 is provided at the position corresponding to the mount portion 73 of the drain pan 70 on which the lower end portion 62C of the lower heat exchange portion 62 is mounted. That is, the contact portion between the lower end portion 62C of the lower heat exchange portion 62 and the mount portion 73 of the drain pan 70 and the bead 71 of the heat exchange chamber side bottom plate 13A are substantially vertically aligned with each other in the up-and-down direction under the state that the indoor heat exchanger 60, the drain pan 70 and the heat exchange chamber side bottom plate 13A are secured to the unit case 11.

[0049] Furthermore, the beads 72 are provided at the positions corresponding to the positioning plates 74 secured to the partition plate 55. That is, the positioning plates 74 secured to the partition plate 55, the side surface of the drain pan 70 and the beads 72 are substantially vertically aligned with one another in the up-and-down direction under the state that the drain pan 70 and the heat exchange chamber side bottom plate 13A are secured to the unit case 11.

[0050] The partition plate 55 comprises an upper partition plate 55B and a lower partition plate 55C. The lower partition plate 55C is provided integrally with a connection portion 74B obtained by folding one plate in a substantially L-shape and adhesively attaching the L-shaped plate to the upper partition plate 55B, a bottom plate por-

tion 74C which forms a part of the bottom surface of the unit case 11. Furthermore, the positioning plates 74 are integrally formed in the lower partition plate 55C. Plural extension sites which are provided to the upper portion of the connection portion 74B so as to be spaced from one another at predetermined intervals in the width direction of the unit case 1 are folded substantially perpendicularly to the connection portion 74B in the opposite direction to the bottom plate portion 74C, thereby forming the positioning plates 74.

[0051] The heat exchange chamber side bottom plate 13A is configured so that one side thereof in the depth L direction of the unit case 11 protrudes from the partition plate 55 to the air blowing chamber R1 side. One side of the heat exchange chamber side bottom plate 13A are fixed from the bottom surface side to the lower partition plate 55c with screws 3 at plural places which are spaced from one another at predetermined intervals in the width direction of the unit case 11.

[0052] The upper and lower sides of the blow-out side panel 16 are folded to the inside of the unit case 11 to be substantially U-shaped in cross-sectional view, thereby forming a top portion 16A and a bottom portion 16B. The other side of the heat exchange chamber bottom plate 13A is fixed to the bottom portion 16B from the bottom surface side with screws 3 at plural places which are spaced from one another at predetermined intervals in the width direction of the unit case 11. As described above, the heat exchange chamber side bottom plate 13A is fixed to the bottom portion 16B and the bottom plate portion 74C form the bottom surface side of the unit case 11 with the screws 3 while both the end portions thereof in the length direction are pressed against to the bottom portion 16B and the bottom plate portion 74C. Accordingly, the heat exchange chamber side bottom plate 13A can be easily removed even from the air-conditioning target room 2 side from which the ceiling panel 35 is removed, and the maintenance performance of the heat exchange chamber R2 can be enhanced.

[0053] Furthermore, the top plate 12 is fixed to the top portion 16A by a screw. A heat insulating plate 21 which is formed of foamed material or the like and covers the upper surface of the secondary side chamber 65 is secured between the upper end 60D of the indoor heat exchanger 60 and the top plate 12.

[0054] The indoor heat exchanger 60 serves as a resistor to air flow in the heat exchange chamber R2, and thus static pressure increases in the primary side chamber 65A. In the primary side chamber 65A, the drain pan 70 is held while sandwiched between the lower end portion 62C of the lower heat exchange portion 62 and the bead 71 and between the positioning plate 74 and the bead 72. That is, the beads 71, 72 serve to subsidiarily fix the drain pan 70. Accordingly, the drain pan 70 can be prevented from being floated by the static pressure at the primary side chamber 65A with a simple construction.

[0055] As shown in Fig. 7, a fixing member 63A at one

end side and a fixing member 63B at the other end side are secured to both the width end portions in the width direction of the indoor heat exchanger 60. The fixing members 63A, 63B are formed of resin. The indoor heat exchanger 60 is fixed integrally with the fixing members 63A, 63B so as to be pinched by the fixing members 63A, 63B.

[0056] One end portion of the indoor heat exchanger 60 is provided with fixing portions 8 which are formed integrally with the tube plate secured to the one end portion (see Fig. 6). The fixing portions 8 extend from the upper end portion 61C of the upper heat exchange portion 61, the air flow-out side surface 61B of the upper heat exchange portion 61 and the air flow-out side surface 62D of the lower heat exchange portion 62 to the outside of the indoor heat exchanger 60. The one-end-side fixing member 63A is screwed to the fixing portions 8 by screws 8a, whereby the one-end-side fixing member 63A is fixed to the indoor heat exchanger 60.

[0057] Fig. 8 is a diagram of the one-end-side fixing member 63A when the one-end-side fixing member 63A is viewed from the direction of an arrow shown in Fig. 7. As shown in Fig. 8, plural vent holes 81 in which U-vents projecting from the tube plate of the indoor heat exchanger 60 are inserted are formed in the one-end-side fixing member 63A. The respective vent holes 81 are formed in correspondence with the positions of the U-vents projecting from the tube plate. The U-vents of the indoor heat exchanger 60 are inserted into the respective vent holes 81, whereby the one-end-side fixing member 63A is positioned and temporarily fixed at a predetermined position with respect to the indoor heat exchanger 60. As described above, the one-end-side fixing member 63A is fixed to the fixing portions 8 by the screws, whereby the one-end-side fixing member 63A can be simply secured to the indoor heat exchanger 60.

[0058] A peripheral wall 81a is formed along the outer periphery of the vent hole 81. The peripheral wall 81A is formed at substantially the same height as the U-vent inserted in the vent hole 81. The width W2 of the one-end-side fixing member W2 is formed to be substantially equal to the height of the U-vent inserted in the vent hole 81. Accordingly, the peripheries of the U-vents projecting from the tube plate are surrounded by the peripheral walls 81A and the one-end-side fixing member 63A, whereby the U-vents can be prevented from abutting against other members when the indoor heat exchanger 60 is detached from the unit case 11.

[0059] As shown in Fig. 7, the other-end-side fixing member 63B is secured to the other end side of the indoor the exchanger 60. The other-end-side fixing member 63B is fixed to the indoor heat exchanger 60 so as not to obstruct an auxiliary refrigerant pipe 67, an electrically-operated expansion valve 91, a silencer, etc. which extend from the indoor heat exchanger 60.

[0060] The auxiliary refrigerant pipe 67 comprises a gas-pipe auxiliary refrigerant pipe 67A for connection to a gas pipe and a liquid-pipe auxiliary refrigerant pipe 67B

for connection to a liquid pipe. The auxiliary refrigerant pipe 67 is placed in a lump at the other-end-side fixing member 63B side. That is, the indoor heat exchanger 60 is configured so that nothing projects to the outside of the one-end-side fixing member 63a.

[0061] As shown in Fig. 9(A), Fig. 9(B), the other-end-side fixing member 63B has a groove 25 which is formed in a substantial V-shape along the air flow-out side surfaces 61B, 62D of the upper heat exchange portion 61 and the lower heat exchange portion 62. Recess portions 26 are formed in the groove 25. Screw holes 26 for fixing the tube plate 9 of the indoor heat exchanger 60 with screws 7 are provided in the recess portions 26. The other-end-side fixing member 63B is fixed to the tube plate 9 from the secondary side of the indoor heat exchanger 60 so that the groove 25A is along the air flow-out side surfaces 61B, 62A of the upper heat exchange portion 61 and the lower heat exchange portion 62. The tube plate 9 has plate members 9A which are formed integrally with the tube plates 9 and extend from the tube plate 9. The plate members 9A are inserted in the recess portions 26 formed in the groove 25. The plate member 9A and the recess portion 26 are fixed to each other with the screw 7, whereby the other-end-side fixing member 63B is integrally fixed to the indoor heat exchanger 60. As described above, the other-end-side fixing member 63B has the groove 25 extending along the tube plate 9 at the secondary side of the indoor heat exchanger 60, so that it can be secured without interfering with parts such as the auxiliary refrigerant pipe 67, the electrically operated expansion valve 91, the silencer 92, etc. which are connected to the indoor heat exchanger 60.

[0062] As described above, the indoor heat exchanger 60, the fixing members 63A, 63B and the auxiliary refrigerant pipe 67 are integrated with one another as an indoor heat exchange unit 80. The indoor heat exchange unit 80 is integrally freely detachably secured to the unit case 11.

[0063] As shown in Figs. 7, 8 and 9, screw holes 64A, 64B for fixing the indoor heat exchange unit 80 to the unit case 11 are formed in the fixing members 63A, 63B. The screw holes 64A are provided at positions corresponding to the screw holes 69B formed in the top plate 12 of the unit case 11. The indoor heat exchange unit 80 is fixed to the top plate 12 of the unit case 11 by inserting screws (not shown) into the screw holes 69B and the screw holes 64. The screw holes 64A may be formed integrally with the one-end-side fixing member 63A when it is provided to the one-end-side fixing member 63A, or may be formed in a metal bracket or the like which is fixed integrally to the other-end-side fixing member 63B. The fixing members 63A, 63B may be provided with boss portions 64C in which screw holes 64B are formed, and the insides of the boss portions 64C are threaded so that screws are threadably inserted through the screw holes 64A into the boss portions 64C.

[0064] The screw holes 64B are provided at positions corresponding to the screw holes 69A formed in the blow-

out side panel 16 of the unit case 11. A plurality of screw holes 69A are provided in the neighborhood of the blow-out port 18 formed to have substantially the same width as the indoor heat exchanger 60 so as to be arranged in the up-and-down direction. The indoor heat exchange unit 80 is fixed to the blow-out side panel 16 of the unit case 11 by threadably inserting screws into the screw holes 69A and the screw holes 64B.

[0065] As described above, the fixing members 63A, 63B are brought into contact with and fixed to the top plate 12 and the blow-out side panel 16, and the indoor heat exchange unit 80 serves to partition the inside of the heat exchange chamber R2 into the primary side chamber 65A at the upstream side of the indoor heat exchanger 60 and the secondary side chamber 65B. The fixing members 63A, 63B are formed of a resin material having excellent heat insulation performance. Therefore, the secondary side chamber 65B and the primary side chamber 65A can be thermally insulated without attaching any heat insulating material to the fixing members 63A, 63B. Accordingly, the secondary side chamber 65B and the ambient atmosphere of the unit main body 10 can be thermally insulated from each other by merely attaching the heat insulation materials to the top plate 12 and the lower side of the blow-out port 18 of the blow-out side panel 16. Accordingly, the amount of the heat insulating material to be used can be reduced, and also a labor of attaching the heat insulating material can be reduced.

[0066] Furthermore, the indoor heat exchanger 60 is fixed to the top plate 12 and the blow-out side panel 16 by using the screw holes formed in the fixing members 63A, 63B which are secured to both the side end portions in the width direction of the indoor heat exchanger 60. Accordingly, as compared with a case where the indoor heat exchanger 60 is fixed to the partition plate 55, there is no protrusion of any fixing member from the indoor heat exchanger 60 to the air blower 50 side, so that the resistance to air flow between the air blowing port 50D of the air blower 50 and the indoor heat exchanger 60 can be reduced.

[0067] The indoor heat exchange unit 80 is fixed to the top plate 12 and the blow-out side panel 16 by using the screw holes 64A, 64B formed in the fixing members 63A, 63B which are secured to both the side end portions in the width direction, and thus can be fixed to the inside of the unit main body 10. As described above, the fixing members 63A, 63B serves to partition the primary side chamber 65A and the secondary side chamber 65B at both the side surface sides of the indoor heat exchanger 60, and also serves to fix the indoor heat exchanger 60 in the unit main body 10. According to this construction, for example, as compared with a case where the partition plate 55 is provided with a fixing member for fixing the indoor heat exchanger 60 to fix the indoor heat exchanger 60 to the inside of the unit main body 10, the number of parts can be reduced, and the installation working performance can be enhanced. Furthermore, there is no pro-

trusion of any fixing member from the indoor heat exchanger 60 to the air blower 50 side, and the resistance to air flow in the primary side chamber 65A of the heat exchange chamber R2 can be reduced.

[0068] Furthermore, according to the construction of this embodiment, the one-end-side fixing member 63A secured to the one end side of the indoor heat exchanger 60 is provided with the vent holes 81 in which the U-vents projecting from the tube plate 9, and the other-end-side fixing member 63B secured to the other end side of the indoor heat exchanger 60 is provided with the groove 25 which is shaped along the shape of the secondary side of the tube plate 9. Accordingly, the fixing members 63A, 63B can be secured so as to sandwich the indoor heat exchanger 60 from both the ends of the indoor heat exchanger 60 without interfering with any member protruding outwards from both the ends of the indoor heat exchanger 60. As described above, the indoor heat exchanger 60 can be freely detachably provided in the unit main body 10 integrally with the auxiliary refrigerant pipe 67 connected to the indoor heat exchanger 60, and thus the maintenance performance of the indoor heat exchanger 60 can be enhanced. As described in detail later, the indoor heat exchanger unit 80 is provided so as to be insertable from the lower opening portion 40 shown in Fig. 10 into the heat exchange chamber R2.

[0069] Fig. 10 is a diagram showing the unit main body 10 from which the heat exchange chamber side bottom plate 13A and the drain pan 70 are detached when the unit main body 10 is viewed from the obliquely lower side. As described above, the lower opening portion (opening portion) 40 is formed in the lower surface of the unit case 11 over the whole bottom of the heat exchange chamber R2 by detaching the heat exchange chamber side bottom plate 13A and the drain pan 70.

[0070] The lid body 68, the fixing member 79 for fixing a drain pump and the maintenance panel 56 are formed separately from one another in the side plate 14A so as to be freely detachable. Fig. 10 shows a state that the lid body 68 is removed from the unit case 11 for convenience' sake of description.

[0071] The side plate 14A of the unit case 11 is provided with a cut-out 68C in which the lid body 68 is secured. The cut-out 68C is formed to be opened to the lower side of the unit case 11 and intercommunicate with the lower opening portion 40. The auxiliary refrigerant pipe 67 projecting to the outside of the side plate 14A is inserted from the lower opening portion 40 into the heat exchange chamber R2 integrally with the indoor heat exchanger 60 through the cut-out 68C. Semicircular inverted U-shaped grooves 66A, 66B which are opened downwards are formed in the side plate 14A so that the auxiliary refrigerant pipe can be inserted into the cut-out 68C. Each of the inverted U-shaped grooves 66A, 66B is formed at the position corresponding to the auxiliary refrigerant pipe 67 inserted through the cut-out 68.

[0072] U-shaped grooves 68A, 68B which are upwards opened are formed at the positions corresponding to the

inverted U-shaped grooves 66A, 66B in the lid body 68. The lid body 68 is fixed to the side plate 14A by screws (not shown) inserted in screw holes 68D, 68D provided at the lower portion of the lid body 68. Accordingly, the lid body 68 blocks the cut-out 68C of the side plate 14A. The lid body 68 is provided with a grip 68E at the upper side of the screw holes 68D, 68D so as to extend over the length dimension L2 of the lid body 68. The lid body 68 is configured so as to be attachable and detachable to and from the side plate 14A while the grip 68 is held by a hand. When the lid body 68 is secured to the side plate 14A, the auxiliary refrigerant pipe 67 is held by the side plate 14A in cooperation of the U-shaped grooves 68A, 68B of the lid body 68 and the inverted U-shaped grooves 66A, 66B of the side plate 14A.

[0073] Furthermore, a water pouring opening 85 is formed between the U-shaped groove 68B and the grip 68E in the lid body 68. The water pouring opening 85 is normally closed by a lid 86 which is fixed to the lid member 68 by a screw or the like. When a work of checking flow of drain water in the unit main body 10 is performed in a fixing work of the unit main body 10 or the like, the lid 86 is removed from the water pouring opening 85, and water is poured into the heat exchange chamber R2 through the water pouring opening 85, whereby flow of drain water can be checked.

[0074] The lid member 68 can be removed from the unit case 11 by removing the screws inserted in the screw holes 68D, 68D, and the cut-out 68C intercommunicates with the lower opening portion 40 by removing the lid member 68 from the side plate 14A. Accordingly, the bottom surface side of the unit case 11 is opened so that the indoor heat exchange unit 80 can be drawn out downwards and removed from the unit case 11 without removing the auxiliary refrigerant pipe 67 from the indoor heat exchange unit 80.

[0075] When the indoor heat exchange unit 80 is removed, a pump down operation of the built-in type air conditioning device 1 is first performed. In the pump down operation, all refrigerant in the indoor heat exchanger 60 is withdrawn in the outdoor unit or a refrigerant withdrawing machine (not shown) and a valve is closed, whereby the indoor heat exchanger 60 is insulated from the refrigerant circuit. Subsequently, the heat exchange chamber side bottom plate 13A, the drain pan 70 and the lid member 68 are removed from the unit case 11 through the opening of the top plate 33 from which the ceiling panel 35 is removed, whereby the lower opening portion 40 for removing the indoor heat exchange unit 80 downwards is formed at the lower portion of the unit case 11.

[0076] The drain discharge pipe 77 connected to the drain pan 70 projects to the outside of the unit case 11 through a drain pipe holder 76 which is fitted to a pipe cut-out 19 which is formed in the side plate 14A and opened downwards. When the drain pan 70 is removed from the unit main body 10, the drain pipe holder 76 and the drain discharge pipe 77 penetrating through the drain pipe holder 76 can be removed together with the drain

pan 70 from the lower opening portion 40 from which the bottom plate 13 of the unit case 11.

[0077] Subsequently, the screws 4 by which the indoor heat exchange unit 80 is fixed to the unit case 11 are removed. Specifically, the screws 4 threadably inserted in the screw hole 64B and the screw hole 69A are removed from the outside of the unit case 11, and the screws 4 threadably inserted in the screw hole 64A, the screw hole 69B are removed from the inside of the unit case 11. As described above, the indoor heat exchange unit 80 is integrally drawn out to the lower side of the unit case 11 through the lower opening portion 40 of the heat exchange chamber R2, whereby the indoor heat exchange unit 80 can be removed from the unit main body 10. According to this construction, the indoor heat exchange unit 80 can be removed from the unit case 11 by merely removing totally six (every three at each of the right and left sides) screws 4A, 4B threadably inserted in the screw holes 64A, 64B from the unit case 11 under a state that the unit case 11 is suspended in the under-room space 34 as shown in Fig. 1, that is, under a vertically reversed state shown in Fig. 4 or under a state that the bottom plate 13A is removed from the unit case 11 like a state shown in Fig. 10. Accordingly, the indoor heat exchange unit 80 can be easily removed from the air-conditioning target room 2 side by removing the ceiling panel 35. Accordingly, the work in the under-room space 34 which is limited in working space can be alleviated, and the maintenance performance of the indoor heat exchanger 60 can be enhanced.

[0078] Furthermore, the pump unit 75 is secured in the neighborhood of the pipe holder 68. As shown in Fig. 11, the pump unit 75 is integrally provided with the drain pump 78 and the fixing member 79 to which the drain pump 78 is fixed. The fixing member 79 is molded with resin integrally with a pump fixing portion 79A fixed to the drain pump 78 and a lid portion 79B for blocking the pump fixing opening 75A which is formed in the side plate 14A to fix the pump unit 75. A drain pipe 76 for discharging, to the outside of the unit case 11, water pumped up from the drain pan 70 by the drain pump 78 is connected between the drain pump 78 and the lid portion 79B.

[0079] The pump unit 75 is provided so that the drain pump 78 and the fixing member 79 are freely detachable from the side plate 14A, and the lid portion 79B is fixed to the side plate 14A by a screw or the like, whereby the drain pump 78 can be easily removed from the unit case 11 integrally with the pump unit 75. Accordingly, even after piping installation for connecting the auxiliary refrigerant pipe 67 to the indoor heat exchanger 60 is executed, the pump unit 75 can be easily removed from the unit case 11, and the maintenance of the drain pump 78 can be easily performed.

[0080] As described above, according to this embodiment to which the present invention is applied, the unit main body 10 configured to accommodate the heat exchanger 60 and the air blower 50 is provided, the heat exchanger 60 contains the upper heat exchange portion

and the lower heat exchange portion which are connected to each other in a substantial V-shape in side view, the air blow port 50D of the air blower 50 is provided so as to confront the apex 60A of the V-shape, the lower heat exchange portion 62 and the upper heat exchange portion 61 are configured to have the same width and accommodated substantially fully over the unit width D, and the lower end portion 61A of the upper heat exchange portion 61 is overlaid on the lower heat exchange portion 62 at the apex 60A of the substantial V-shape. Accordingly, the drain water can be made to flow from the upper heat exchange portion 61 along the lower heat exchange portion 62 with increasing the capacity (heat exchange area) of the indoor heat exchanger 60, and the drain water can be prevented from scattering from the connection portion 60B between the upper heat exchange portion 61 and the lower heat exchange portion 62.

[0081] Furthermore, according to the embodiment to which the present invention is applied, the upper heat exchange portion 61 is disposed to be nearer to the air blower 50 side than the upper end portion 62B of the lower heat exchange portion 62, and the step 60C is provided between the air flow-out side surface 61B of the upper heat exchange portion 61 and the upper end portion 62B of the lower heat exchange portion 62. Accordingly, drain water which occurs at the upper heat exchange portion 61 and flows along the flow-out side surface 61D by its own weight is received by the step 60C formed at the connection portion between the upper heat exchange portion 61 and the lower heat exchange portion 62, and then flows along the lower heat exchange portion 62. Accordingly, the drain water can be prevented from scattering from the connection portion 60B between the upper heat exchange portion 61 and the lower heat exchange portion 62.

[0082] Furthermore, according to the embodiment to which the present invention is applied, the unit main body 10 which is configured to accommodate the indoor heat exchanger 60 and the air blower 50 is provided, the indoor heat exchanger 60 contains the upper heat exchange portion 61 and the lower heat exchange portion 62 which are connected to each other substantially in V-shape in side view, the air blow port 50D of the air blower 50 is provided so as to confront the apex 60A of the V-shape, the lower heat exchange portion 62 and the upper heat exchange portion 61 are configured to have the same width and accommodated substantially fully over the unit width W in the unit main body 10, and the heat exchange area of the lower heat exchange portion 62 is set to be larger than that of the upper heat exchange portion 61. Accordingly, the amounts of air passing through the upper heat exchange portion 61 and the lower heat exchange portion 62 can be made substantially equal to each other with increasing the capacity (heat exchange area) of the indoor heat exchanger 60. Therefore, the temperature difference within the heat exchange face between the upper heat exchange portion 61 and the lower heat exchange portion 62 can be reduced, and the heat

exchange efficiency of the indoor heat exchanger 60 can be made uniform.

[0083] Furthermore, according to the embodiment to which the present invention is applied, the heat exchange area of the upper heat exchange portion 61 is set to substantially 60% of that of the lower heat exchange portion 62. Accordingly, the amounts of air passing through the upper heat exchange portion 61 and the lower heat exchange portion 62 can be made substantially equal to each other. Accordingly, the temperature difference within the heat exchange face between the upper heat exchange portion 61 and the lower heat exchange portion 62 can be reduced, and the heat exchange efficiency of the indoor heat exchanger 60 can be made uniform.

[0084] According to the embodiment to which the present invention is applied, the inside of the unit main body 10 is partitioned into the air blow chamber R1 in which the air blower 50 is accommodated and the heat exchange chamber R2 in which the indoor heat exchanger 60 is accommodated, the drain pan 70 is provided so as to cover the whole bottom portion of the heat exchange chamber R2, and the lower end portion 62C of the lower heat exchange portion 62 is mounted on the drain pan 70. Accordingly, the air blower 50 can be provided substantially fully in the height direction of the air blow chamber R1, and drain water from the upper heat exchange portion 61 and the lower heat exchange portion 62 can be collected by the drain pan 70 with suppressing the dimension in the height direction of the unit main body 10.

[0085] Furthermore, according to the embodiment to which the present invention is applied, in the built-in type air conditioning device 1 in which the inside of the unit main body 10 is partitioned through the partition plate 55 into the heat exchange chamber R2 for accommodating the heat exchanger 60 and the air blow chamber R1 for accommodating the air blower 50 and air sucked by the air blower 50 is heat-exchanged by the heat exchanger 60 and blown out, both the end portions of the heat exchanger 60 are provided with fixing members 63A, 63B of resin which are fixed to the front plate 16 and the top plate 12 of the unit main body 10 to fix the heat exchanger 60 to the inside of the unit main body 10. Accordingly, it is unnecessary to separately provide a fixing member for fixing the heat exchanger 60 so that the fixing member projects from the partition plate 55 or the like, for example. Therefore, the heat exchanger 60 can be fixed to the inside of the unit main body 10 with a simple construction, the number of parts can be reduced, and the fixing workability can be enhanced.

[0086] According to the embodiment to which the present invention is applied, the fixing member 64 at one end side of both the ends of the heat exchanger 60 is provided with the vent holes 81 through which the U-shaped tubes of the heat exchanger 60, and the fixing member 63B at the other end side is provided with the V-shaped groove 25 which are formed along the shape of the heat exchanger 60, and the refrigerant pipe penetrates from the groove 25. Accordingly, the one-end-

side fixing member 63A is positioned and temporarily fixed by passing the U-shaped tubes of the heat exchanger 60 through the vent holes 81. Accordingly, the one-end-side fixing member 63A can be easily integrally fixed to the heat exchanger 60. Furthermore, the other-end-side fixing member 63B is provided with the groove 25 which is formed along the shape of the heat exchanger 60, and it can be easily integrally fixed to the heat exchanger 60 without interfering with the auxiliary refrigerant pipe 67 connected to the heat exchanger 60.

[0087] Furthermore, according to the embodiment to which the present invention is applied, in the built-in type air conditioning device 1 in which the inside of the unit main body 10 is partitioned through the partition plate 55 into the heat exchange chamber R2 for accommodating the heat exchanger 60 therein and the air blow chamber R1 for accommodating the air blower 50 therein and air sucked by the air blower 50 is heat-exchanged by the heat exchanger 60 and blown out, the heat exchanger 60 is detachably inserted from the opening portion 40 of the lower surface of the unit main body 10 into the heat exchange chamber R2, the side plate 14A of the unit main body 10 is provided with the inverted U-shaped grooves 66A, 66B which are opened downwards so that the auxiliary refrigerant pipe 67 of the heat exchanger 60 protruding outwards from the side plate 14 can be inserted from the opening portion 40 side into the heat exchange chamber R2 integrally with the heat exchanger 60, the lid member 68 having the U-shaped grooves 68A, 68B is secured to the side plate 14A, and the auxiliary refrigerant pipe 67 can be held by the side plate 14A in cooperation of the U-shaped grooves 68A, 68B of the lid member 68 and the inverted U-shaped grooves 66A, 66B of the side plate 14A. Accordingly, when the heat exchanger 60 is secured to the unit main body 10, the auxiliary refrigerant pipe 67 can be held in the side plate 14A through the cooperation between the U-shaped grooves 68A, 68B of the lid member 68 and the inverted U-shaped grooves 66A, 66B of the side plate 14A. Furthermore, when the heat exchanger 60 is removed, the heat exchanger 60 and the auxiliary refrigerant pipe 67 can be easily detached integrally with each other from the opening portion 40 of the lower surface of the unit main body 10 without removing the auxiliary refrigerant pipe 67 from the heat exchanger 60 by removing the lid member 68 from the side plate 14A. Accordingly, the maintenance performance of the heat exchanger 60 can be enhanced.

[0088] Still furthermore, according to the embodiment to which the present invention is applied, the unit main body 10 contains the drain pan 70 for receiving drain water generated at the heat exchanger 60 and the drain pump 78 for discharging drain water pooled in the drain pan 70 through the drain pipe 78 to the outside of the unit main body 10. The pump unit 75 in which the drain pump 78 and the drain pipe 76 are integrally assembled with each other is freely detachably disposed in the neighborhood of the lid member 68 in the side surface 14 of the unit main body 10. Accordingly, the drain pump 78

can be easily removed from the unit main body 10 integrally with the pump unit 75. The pump unit 75 can be easily removed from the unit main body 10 even after the heat exchanger 60 and the auxiliary refrigerant pipe 67 are installed. Accordingly, the maintenance of the drain pump 78 can be easily performed.

[0089] Still furthermore, according to the embodiment to which the present invention is applied, there are provided the resin fixing members 63A, 63B which are provided to both the end portions of the heat exchanger 60, inserted from the opening portion 40 side into the heat exchange chamber R2 integrally with the heat exchanger 60, fixed to the blow-out side panel 16 and the top plate 12 of the unit main body 10 and fix the heat exchanger 60 to the inside of the unit main body 10. Accordingly, when the heat exchanger 60 is detached, the fixing members 63A, 63B are removed from the front plate 16 and the top plate 12, whereby the heat exchanger 60 can be simply removed from the opening portion 40 of the lower surface of the unit main body 10 integrally with the fixing members 63A, 63B. Accordingly, the maintenance performance of the heat exchanger 60 can be enhanced.

[0090] Still furthermore, according to the embodiment to which the present invention is applied, the heat exchanger 60 contains the upper heat exchange portion 61 and the lower heat exchange portion 62 which are connected to each other substantially in V-shape in side view, and the blow-out port 50D of the air blower 50 is provided so as to confront the apex of the V-shape. Accordingly, the capacity (heat exchange area) of the heat exchanger 60 can be increased without changing the height dimension of the unit case 11.

[0091] Still furthermore, according to the embodiment to which the present invention is applied, the open side of the V-shape of the indoor heat exchanger 60 is made to confront the blow-out port 50D of the air blower 50. Accordingly, the shape of the air entrance side of the indoor heat exchanger 60 can be set to correspond to the distribution of air flow from the air blower 50, and the heat exchange efficiency can be enhanced.

[0092] Still furthermore, according to the embodiment to which the present invention is applied, the open side of the V-shape of the indoor heat exchanger 60 is made to face the downstream side of the indoor heat exchanger 60. Accordingly, a gap can be formed between the blow-out port 50D of the air blower 50 and the indoor heat exchanger 60, and thus the air blowing range of air from the blow-out port 50D can be broadened. Therefore, air can be also fully blown to even the upper and lower ends of the indoor heat exchanger 60, so that the heat exchange efficiency can be enhanced.

[0093] Still furthermore, according to the embodiment to which the present invention is applied, the air blower 50 is a sirrocco fan as a centrifugal air blower. Therefore, large static pressure can be obtained, and a large air flow amount can be obtained even in the built-in type air conditioning device in which the indoor heat exchanger 60 and the relatively long blow-out duct 54 extending to the

ceiling plate 33 are provided at the downstream side of the air blower 50.

Description of Reference Numerals

[0094]

1 built-in type air conditioning device
 R1 air blow chamber
 R2 heat exchange chamber
 W width
 10 unit main body
 11 unit case
 12 top plate
 14A side plate (side surface)
 16 blow-out side panel (front plate)
 40 lower opening portion (opening portion)
 50 air blower (air blower)
 50D air blow port (blow-out port)
 60 indoor heat exchanger (heat exchanger)
 63A one-end-side fixing member (fixing member)
 63B other-end-side fixing member (fixing member)
 66A, 66B inverted U-shaped groove
 67 auxiliary refrigerant pipe (refrigerant pipe)
 68 lid member
 68A, 68B U-shaped groove
 70 drain pan
 75 pump unit
 76 drain pipe
 78 drain pump

Claims

1. A built-in type air conditioning device (1) having a unit main body (10) whose inside is partitioned by a partition plate (55) which is provided vertically to a top plate (12) and a bottom plate (13) of the unit main body (10) into an air blower chamber (R1) in which an air blower (50) is accommodated and a heat exchange chamber (R2) in which a heat exchanger (60) is accommodated, the unit main body (10) has a drain pan (70) that is provided at the bottom plate (13) of the unit main body (10) at the heat exchange chamber (R2) side, and a lower end of the lower heat exchange portion is mounted on the drain pan, the heat exchanger (60) contains an upper heat exchange portion (61) and a lower exchange portion (62) that are connected to each other substantially in V-shape in side view at a connection portion (60B), a blow-out port (50D) of the air blower (50) is provided so as to confront an apex (60A) of the V-shape, the lower heat exchange portion (62) and the upper heat exchange portion (61) are configured to have the same width and accommodated substantially fully over a unit width of the unit main body (10), and a lower end (61A) of the upper heat exchange portion (61) is disposed to run on and be stacked on an air

flow-in side surface (62A) of the lower heat exchange portion (62), **characterized in that:**

- an upper end portion (62B) of the lower heat exchange portion (62) extends from an air flow-out side surface (61B) of the upper heat exchange portion (61) to form a step (60C) that has a step width (W1), the step width (W1) being defined by the upper heat exchange portion (61) being disposed nearer to the air blower (50) side than the upper end portion (62B) of the lower heat exchange portion (62), and the blow-out port (50D) of the air blower (50) is disposed to face an obliquely downward direction to the connection portion (60B) of the upper heat exchange portion (61) and the lower heat exchange portion (62), and a heat exchange area of the lower heat exchange portion (62) is set to be larger than a heat exchange area of the upper heat exchange portion (61).
2. The built-in type air conditioning device (1) according to claim 1, wherein the heat exchange area of the upper heat exchange portion (61) is set to substantially 60% of the heat exchange area of the lower heat exchange portion (62).
 3. The built-in type air conditioning device (1) according to claim 1 or 2, wherein a lower end (62C) of the lower heat exchange portion (62) is mounted on the drain pan (70).
 4. The built-in type air conditioning device (1) according to any one of claims 1 to 3 wherein both the end portions of the heat exchanger (60) are provided with resin fixing members (63A, 63B) that are fixed to a front plate (16) and the top plate (12) of the unit main body (10) to fix the heat exchanger (60) to an inside of the unit main body (10), a fixing member (63A) at one end side is provided with vent holes (81) through which U-shaped tubes of the heat exchanger (60) penetrate, a fixing member (63B) at the other end side is provided with a V-shaped groove (25) formed along air flow-out side surfaces (61B, 62D) of the upper heat exchange portion (61) and the lower heat exchange portion (62), and a refrigerant pipe of the heat exchanger (60) penetrates through the groove (25).
 5. The built-in type air conditioning device (1) according to claim 4, wherein the heat exchanger (60) and the resin fixing members (63A, 63B) that are fixed at both the end portions of the heat exchanger (60) constitute an indoor heat exchange unit (80), the indoor heat exchange unit (80) is configured to be detachably mounted from an opening portion (40) of a lower surface of the unit main body (10) into the heat exchange chamber (R2), a side plate (14A) of the unit main body (10) is provided with an inverted U-shaped groove (66A) that is opened downwards so that an auxiliary refrigerant pipe (67) of the heat exchanger (60) projecting outwards from the side plate (14A) is insertable from the opening portion (40) side into the heat exchange chamber (R2) integrally with the heat exchanger (60), and a lid member (68) having a U-shaped groove (68A, 68B) is secured to the side plate (14A) so that the auxiliary refrigerant pipe (67) can be held by the side plate (14A) through cooperation between the U-shaped groove (68A, 68B) of the lid member (68) and the inverted U-shaped groove (66A) of the side plate (14A).
 6. The built-in type air conditioning device (1) according to any one of claims 1 to 5, wherein the unit main body (10) contains a drain pump (78) for discharging drain water pooled in the drain pan (70) through a drain pipe (76) to the outside of the unit main body (10), and a pump unit (75) in which the drain pump (78) and the drain pipe (76) are integrally assembled with each other is freely detachably mounted in the side plate (14A) of the unit main body (10).
 7. The built-in type air conditioning device (1) according to any one of claims 1 to 6, wherein an open side of the V-shape of the heat exchanger (60) is disposed to confront the blow-out port (50D) of the air blower (50).
 8. The built-in type air conditioning device (1) according to any one of claims 1 to 6, wherein an open side of the V-shape of the heat exchanger (60) is disposed to confront a downstream side of the heat exchanger (60).
 9. The built-in type air conditioning device (1) according to any one of claims 1 to 8, wherein the air blower (50) is a centrifugal air blower.

Patentansprüche

1. Klimaanlage (1) vom Einbautyp, die einen Einheitshauptkörper (10) aufweist, dessen Inneres durch eine Trennplatte (55), die vertikal zu einer oberen Platte (12) und einer unteren Platte (13) des Einheitshauptkörpers (10) bereitgestellt ist, in eine Luftgebläsekammer (R1), in der ein Luftgebläse (50) aufgenommen ist, und eine Wärmetauschkammer (R2), in der ein Wärmetauscher (60) aufgenommen ist, unterteilt ist, wobei der Einheitshauptkörper (10) eine Ablaufwanne (70) aufweist, die an der unteren Platte (13) des Einheitshauptkörpers (10) auf der Seite der Wärmetauschkammer (R2) bereitgestellt ist und ein unteres Ende des unteren Wärmetauschteils auf der Ablaufwanne montiert ist, der Wärmetauscher (60) einen oberen Wärme-

tauschteil (61) und einen unteren Wärmetauschteil (62) enthält, die miteinander im Wesentlichen in V-Form in Seitenansicht an einem Verbindungsteil (60B) verbunden sind,

eine Ausblasöffnung (50D) des Luftgebläses (50) so bereitgestellt ist, dass sie einer Spitze (60A) der V-Form gegenüberliegt,

der untere Wärmetauschteil (62) und der obere Wärmetauschteil (61) so konfiguriert sind, dass sie dieselbe Breite aufweisen und im Wesentlichen vollständig über eine Einheitsbreite des Einheitshauptkörpers (10) aufgenommen sind, und

ein unteres Ende (61A) des oberen Wärmetauschteils (61) so angeordnet ist, dass es auf der Luftausströmseitenoberfläche (62A) des unteren Wärmetauschteils (62) verläuft und gestapelt ist,

dadurch gekennzeichnet, dass:

ein oberer Endteil (62B) des unteren Wärmetauschteils (62) sich von einer Luftausströmseitenoberfläche (61B) des oberen Wärmetauschteils (61) so erstreckt, dass es eine Stufe (60C) bildet, die eine Stufenbreite (W1) aufweist, wobei die Stufenbreite (W1) dadurch definiert ist, dass der obere Wärmetauschteil (61) näher an der Seite des Luftgebläses (50) angeordnet ist als der obere Endteil (62B) des unteren Wärmetauschteils (62), und

die Luftausblasöffnung (50D) des Luftgebläses (50) so angeordnet ist, dass sie einer schrägen Abwärtsrichtung zu dem Verbindungsteil (60B) des oberen Wärmetauschteils (61) und des unteren Wärmetauschteils (62) gegenüberliegt, und eine Wärmetauschfläche des unteren Wärmetauschteils (62) größer als eine Wärmetauschfläche des oberen Wärmetauschteils (61) festgesetzt ist.

2. Klimaanlage (1) vom Einbautyp gemäß Anspruch 1, wobei die Wärmetauschfläche des oberen Wärmetauschteils (61) auf im Wesentlichen 60 % der Wärmetauschfläche des unteren Wärmetauschteils (62) festgesetzt ist.

3. Klimaanlage (1) vom Einbautyp gemäß Anspruch 1 oder 2, wobei ein unteres Ende (62C) des unteren Wärmetauschteils (62) auf der Ablaufwanne (70) montiert ist.

4. Klimaanlage (1) vom Einbautyp gemäß einem der Ansprüche 1 bis 3, wobei beide Endteile des Wärmetauschers (60) mit Harzfixierelementen (63A, 63B) versehen sind, die an einer Frontplatte (16) und der oberen Platte (12) des Einheitshauptkörpers (10) befestigt sind, um den Wärmetauscher (60) an einer Innenseite des Einheitshauptkörpers (10) zu befestigen, wobei ein Fixierelement (63A) an einer Endseite mit Lüftungslöchern (81) versehen ist, durch

die U-förmige Rohre des Wärmetauschers (60) hindurchdringen, ein Fixierelement (63B) an der anderen Endseite mit einer V-förmigen Nut (25) versehen ist, die entlang von Luftausströmseitenoberflächen (61B, 62D) des oberen Wärmetauschteils (61) und des unteren Wärmetauschteils (62) gebildet ist, und eine Kältemittelleitung des Wärmetauschers (60) durch die Nut (25) hindurchdringt.

5. Klimaanlage (1) vom Einbautyp gemäß Anspruch 4, wobei der Wärmetauscher (60) und die Harzfixierelemente (63A, 63B), die an beiden Endteilen des Wärmetauschers (60) befestigt sind, eine Innenwärmetauscheinheit (80) bilden, wobei die Innenwärmetauscheinheit (80) so konfiguriert ist, dass sie abnehmbar von einem Öffnungsteil (40) einer unteren Oberfläche des Einheitshauptkörpers (10) in die Wärmetauschkammer (R2) montiert ist, eine Seitenplatte (14A) des Einheitshauptkörpers (10) mit einer umgekehrten U-förmigen Nut (66A) versehen ist, die abwärts geöffnet ist, sodass eine Hilfskältemittelleitung (67) des Wärmetauschers (60), die von der Seitenplatte (14A) nach außen vorsteht, von der Seite des Öffnungsteils (40) in die Wärmetauschkammer (R2) integral mit dem Wärmetauscher (60) einführbar ist, und ein Deckelelement (68), das eine U-förmige Nut (68A, 68B) aufweist, an der Seitenplatte (14A) gesichert ist, sodass die Hilfskältemittelleitung (67) durch die Seitenplatte (14A) durch Zusammenwirkung zwischen der U-förmigen Nut (68A, 68B) des Deckelelements (68) und der umgekehrten U-förmigen Nut (66A) der Seitenplatte (14A) gehalten werden kann.

6. Klimaanlage (1) vom Einbautyp gemäß einem der Ansprüche 1 bis 5, wobei der Einheitshauptkörper (10) eine Ablaufpumpe (78) zum Abführen von Abwasser, das sich in der Ablaufwanne (70) gesammelt hat, durch eine Ablaufleitung (76) zur Außenseite des Einheitshauptkörpers (10) enthält und eine Pumpeneinheit (75), in der die Ablaufpumpe (78) und die Ablaufleitung (76) integral miteinander zusammengesetzt sind, frei abnehmbar in der Seitenplatte (14A) des Einheitshauptkörpers (10) montiert ist.

7. Klimaanlage (1) vom Einbautyp gemäß einem der Ansprüche 1 bis 6, wobei eine offene Seite der V-Form des Wärmetauschers (60) so angeordnet ist, dass sie der Luftausblasöffnung (50D) des Luftgebläses (50) gegenüberliegt.

8. Klimaanlage (1) vom Einbautyp gemäß einem der Ansprüche 1 bis 6, wobei eine offene Seite der V-Form des Wärmetauschers (60) so angeordnet ist, dass sie einer Abströmseite des Wärmetauschers (60) gegenüberliegt.

9. Klimaanlage (1) vom Einbautyp gemäß einem der Ansprüche 1 bis 8, wobei das Luftgebläse (50) ein Zentrifugalluftgebläse ist.

Revendications

1. Dispositif de conditionnement d'air de type encastrable (1) ayant un corps principal d'unité (10) dont l'intérieur est partagé par une plaque de séparation (55) qui est prévue verticalement sur une plaque supérieure (12) et une plaque inférieure (13) du corps principal d'unité (10) en une chambre de soufflante (R1) dans laquelle une soufflante (50) est logée et en une chambre d'échange de chaleur (R2) dans laquelle un échangeur de chaleur (60) est logé, le corps principal d'unité (10) a un bac de récupération (70) qui est prévu au niveau de la plaque inférieure (13) du corps principal d'unité (10) du côté de la chambre d'échange de chaleur (R2) et une extrémité inférieure de la partie d'échange de chaleur inférieure est montée sur le bac de récupération, l'échangeur de chaleur (60) contient une partie d'échange de chaleur supérieure (61) et une partie d'échange de chaleur inférieure (62) qui sont raccordées entre elles sensiblement en forme de V sur une vue latérale au niveau d'une partie de raccordement (60B), un orifice de sortie (50D) de la soufflante (50) est prévu afin de faire face à un sommet (60A) de la forme de V, la partie d'échange de chaleur inférieure (62) et la partie d'échange de chaleur supérieure (61) sont configurée pour avoir la même largeur et logées sensiblement complètement sur une largeur d'unité du corps principal d'unité (10), et une extrémité inférieure (61A) de la partie d'échange de chaleur supérieure (61) est disposée pour s'étendre sur et être empilée sur une surface du côté de l'entrée d'air (62A) de la partie d'échange de chaleur inférieure (62),
- caractérisé en ce que :**
- une partie d'extrémité supérieure (62B) de la partie d'échange de chaleur inférieure (62) s'étend à partir d'une surface du côté de la sortie d'air (61B) de la partie d'échange de chaleur supérieure (61) afin de former un gradin (60C) qui a une largeur de gradin (W1), la largeur de gradin (W1) étant définie par la partie d'échange de chaleur supérieure (61) qui est disposée plus à proximité du côté de la soufflante (50) que la partie d'extrémité supérieure (62B) de la partie d'échange de chaleur inférieure (62), et l'orifice de sortie (50D) de la soufflante (50) est disposé pour faire face, dans une direction obliquement descendante, à la partie de raccordement (60B) de la partie d'échange de chaleur

supérieure (61) et la partie d'échange de chaleur inférieure (62), et une zone d'échange de chaleur de la partie d'échange de chaleur inférieure (62) est déterminée pour être supérieure à une zone d'échange de chaleur de la partie d'échange de chaleur supérieure (61).

2. Dispositif de conditionnement d'air de type encastrable (1) selon la revendication 1, dans lequel la zone d'échange de chaleur de la partie d'échange de chaleur supérieure (61) est déterminée sensiblement sur 60 % de la zone d'échange de chaleur de la partie d'échange de chaleur inférieure (62).
3. Dispositif de conditionnement d'air de type encastrable (1) selon la revendication 1 ou 2, dans lequel une extrémité inférieure (62C) de la partie d'échange de chaleur inférieure (62) est montée sur le bac de récupération (70).
4. Dispositif de conditionnement d'air de type encastrable (1) selon l'une quelconque des revendications 1 à 3, dans lequel les deux parties d'extrémité de l'échangeur de chaleur (60) sont prévues avec des éléments de fixation en résine (63A, 63B) qui sont fixés sur une plaque avant (16) et la plaque supérieure (12) du corps principal d'unité (10) pour fixer l'échangeur de chaleur (60) sur un intérieur du corps principal d'unité (10), un élément de fixation (63A) d'un côté d'extrémité est prévu avec des trous d'aération (81) à travers lesquels des tubes en forme de U de l'échangeur de chaleur (60) pénètrent, un élément de fixation (63B) du côté de l'autre extrémité, est prévu avec une rainure en forme de V (25) formée le long des surfaces latérales de sortie d'air (61B, 62D) de la partie d'échange de chaleur supérieure (61) et de la partie d'échange de chaleur inférieure (62), et un tuyau de réfrigérant de l'échangeur de chaleur (60) pénètre à travers la rainure (25).
5. Dispositif de conditionnement d'air de type encastrable (1) selon la revendication 4, dans lequel l'échangeur de chaleur (60) et les éléments de fixation en résine (63A, 63B) qui sont fixés aux deux parties d'extrémité de l'échangeur de chaleur (60) constituent une unité d'échange de chaleur intérieure (80), l'unité d'échange de chaleur intérieure (80) est configurée pour être montée de manière détachable à partir d'une partie d'ouverture (40) d'une surface inférieure du corps principal d'unité (10) dans la chambre d'échange de chaleur (R2), une plaque latérale (14A) du corps principal d'unité (10) est prévue avec une rainure en forme de U inversé (66A) qui est ouverte vers le bas de sorte qu'un tuyau de réfrigérant auxiliaire (67) de l'échangeur de chaleur (60) faisant saillie vers l'extérieur à partir de la plaque latérale (14A), peut être inséré à partir du côté de la partie d'ouverture (40) dans la chambre

d'échange de chaleur (R2) de manière solidaire avec l'échange de chaleur (60), et un élément de couvercle (68) ayant une rainure en forme de U (68A, 68B) est fixé sur la plaque latérale (14A) de sorte que le tuyau de réfrigérant auxiliaire (67) peut être mainte-

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nu par la plaque latérale (14A) par le biais de la coopération entre la rainure en forme de U (68A, 68B) de l'élément de couvercle (68) et la rainure en forme de U inversé (66A) de la plaque latérale (14A).

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6. Dispositif de conditionnement d'air de type encastable (1) selon l'une quelconque des revendications 1 à 5, dans lequel le corps principal d'unité (10) contient une pompe de drainage (78) pour décharger l'eau de drainage versée dans le bac de récupération (70) en passant par un tuyau de drainage (76) à l'extérieur du corps principal d'unité (10), et une unité de pompe (75) dans laquelle la pompe de drainage (78) et le tuyau de drainage (76) sont assemblés de manière solidaire entre eux, est montée de manière librement détachable dans la plaque latérale (14A) du corps principal d'unité (10).

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7. Dispositif de conditionnement d'air de type encastable (1) selon l'une quelconque des revendications 1 à 6, dans lequel un côté ouvert de la forme de V de l'échangeur de chaleur (60) est disposé pour faire face à l'orifice de sortie (50D) de la soufflante (50).

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8. Dispositif de conditionnement d'air de type encastable (1) selon l'une quelconque des revendications 1 à 6, dans lequel un côté ouvert de la forme de V de l'échangeur de chaleur (60) est disposé pour faire face à un côté aval de l'échangeur de chaleur 60).

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9. Dispositif de conditionnement d'air de type encastable (1) selon l'une quelconque des revendications 1 à 8, dans lequel la soufflante (50) est une soufflante centrifuge.

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FIG. 1

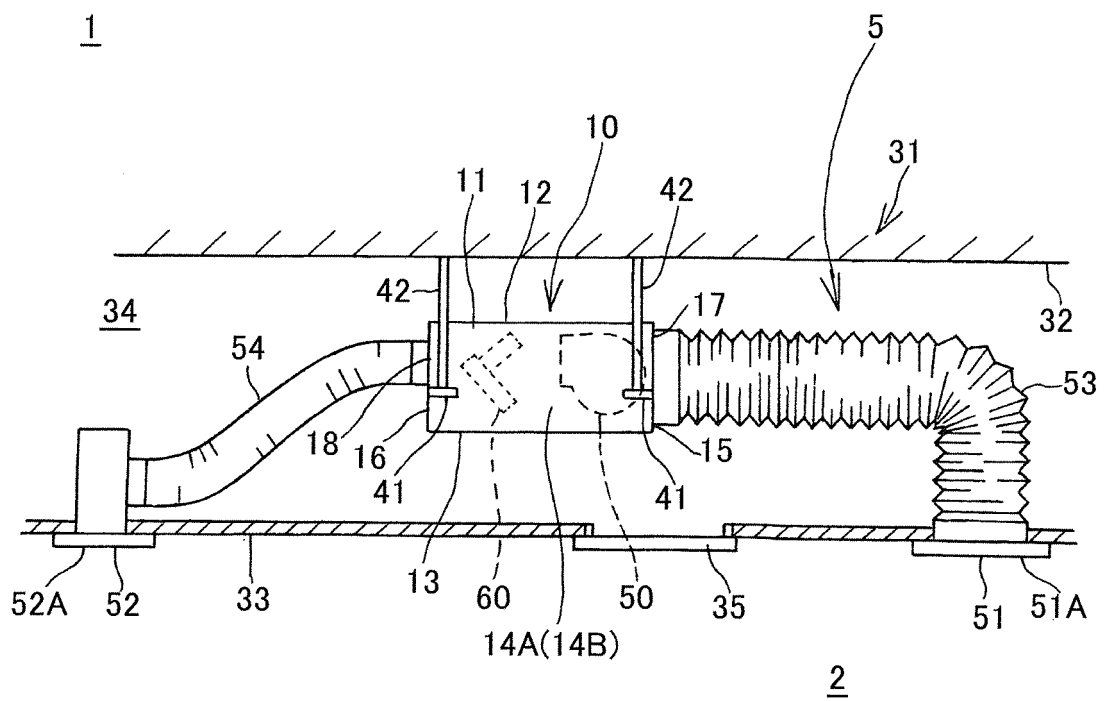


FIG. 2

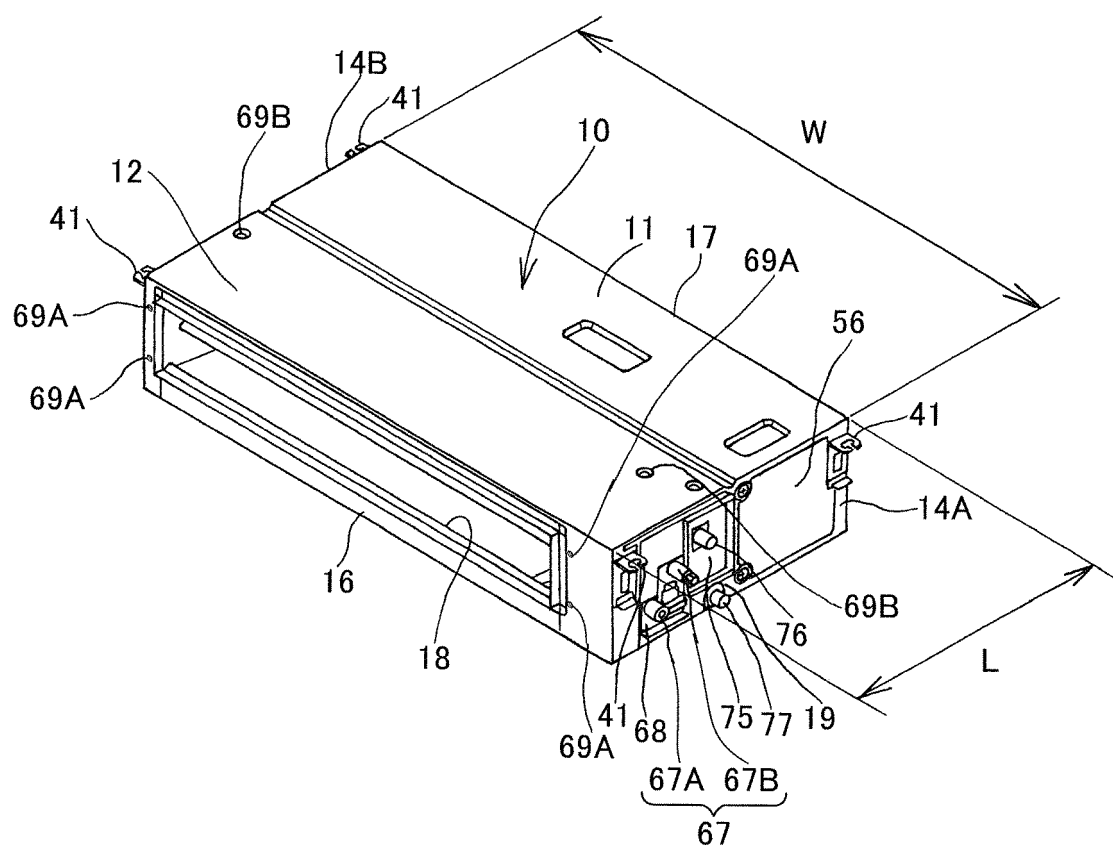


FIG.3

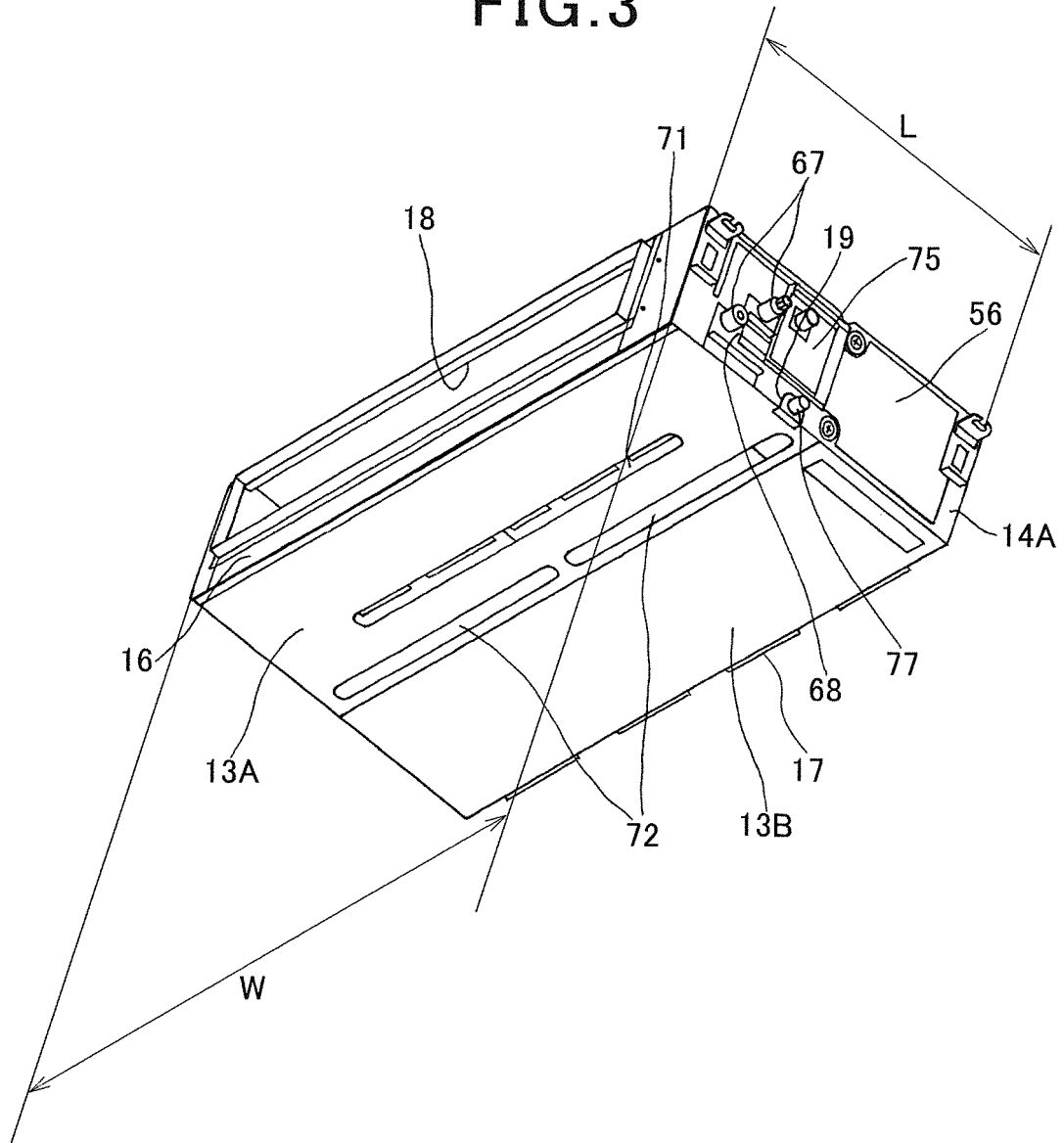


FIG.4

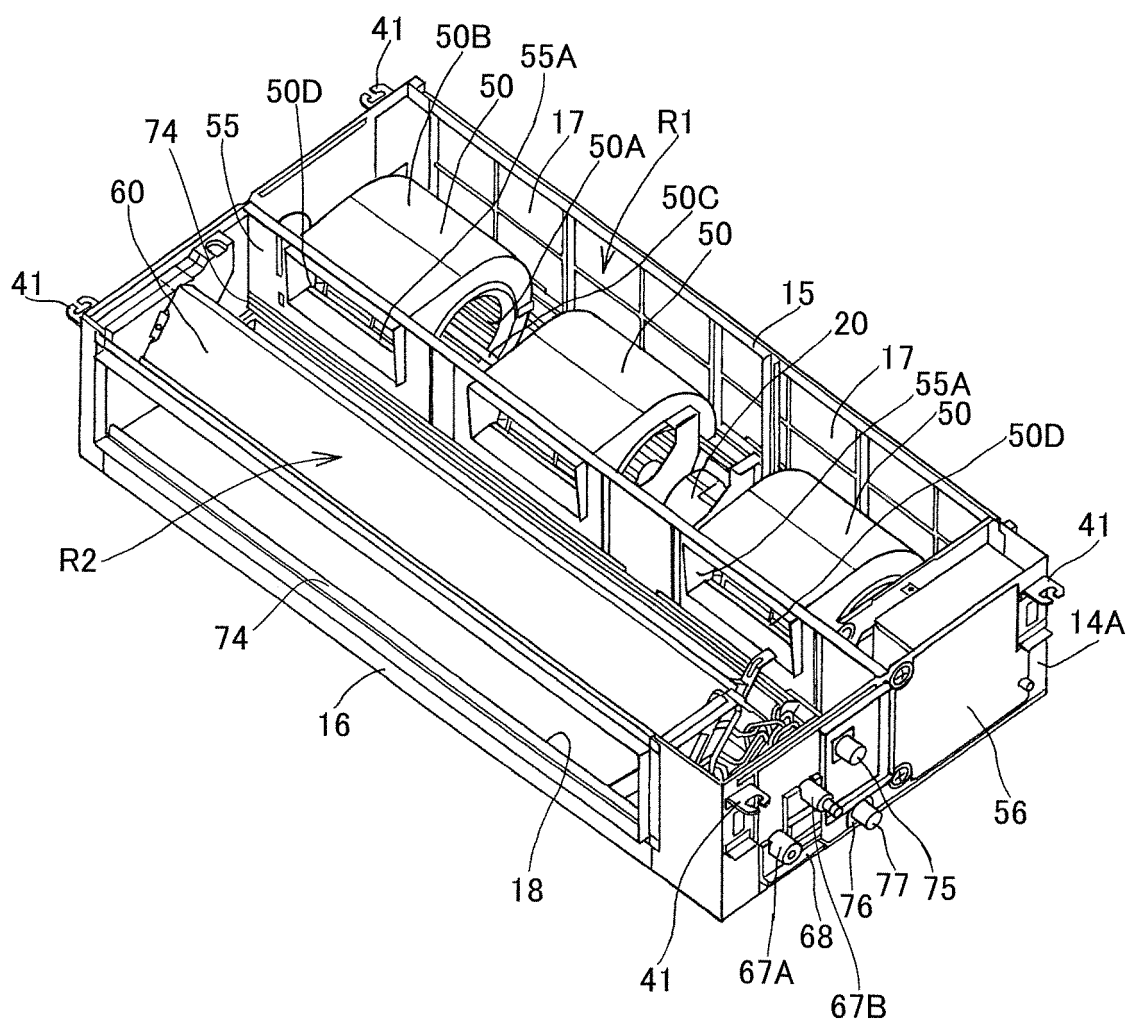


FIG. 5

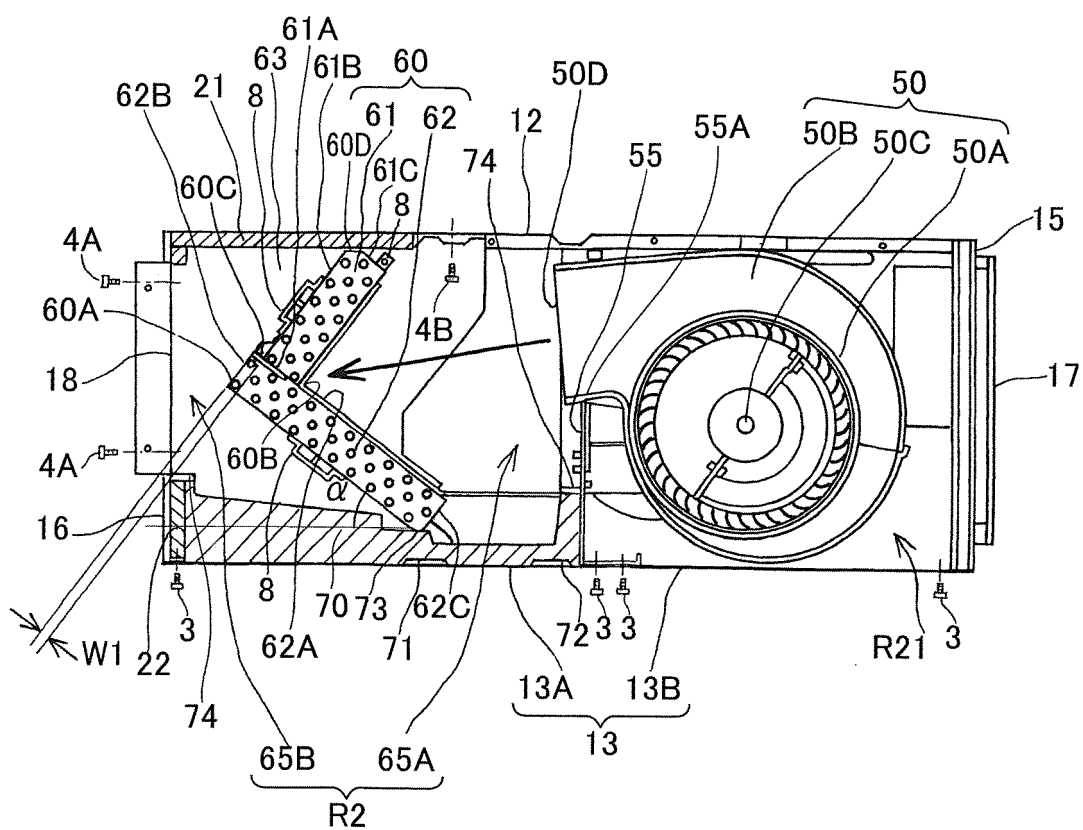


FIG.6

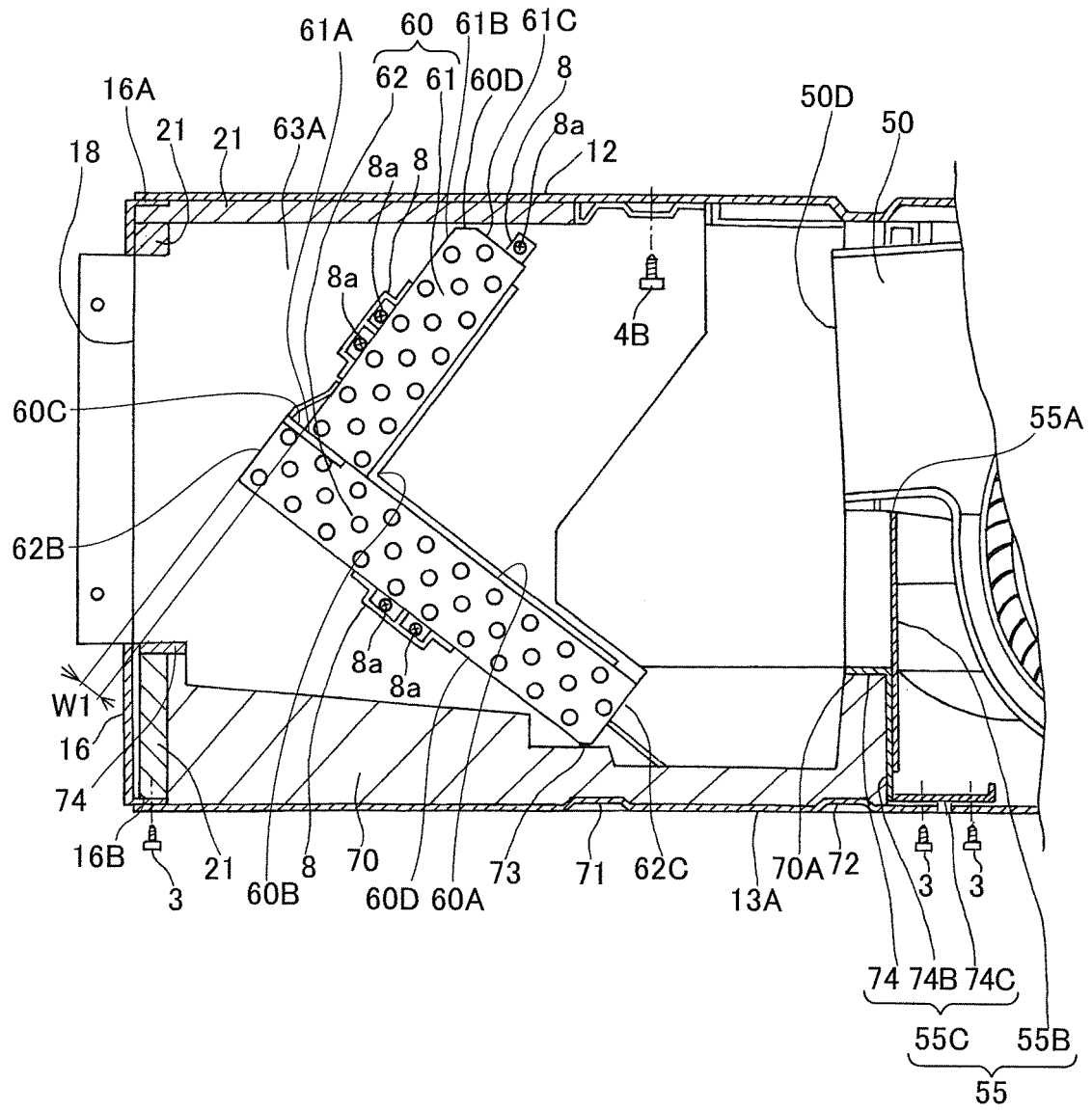


FIG. 7

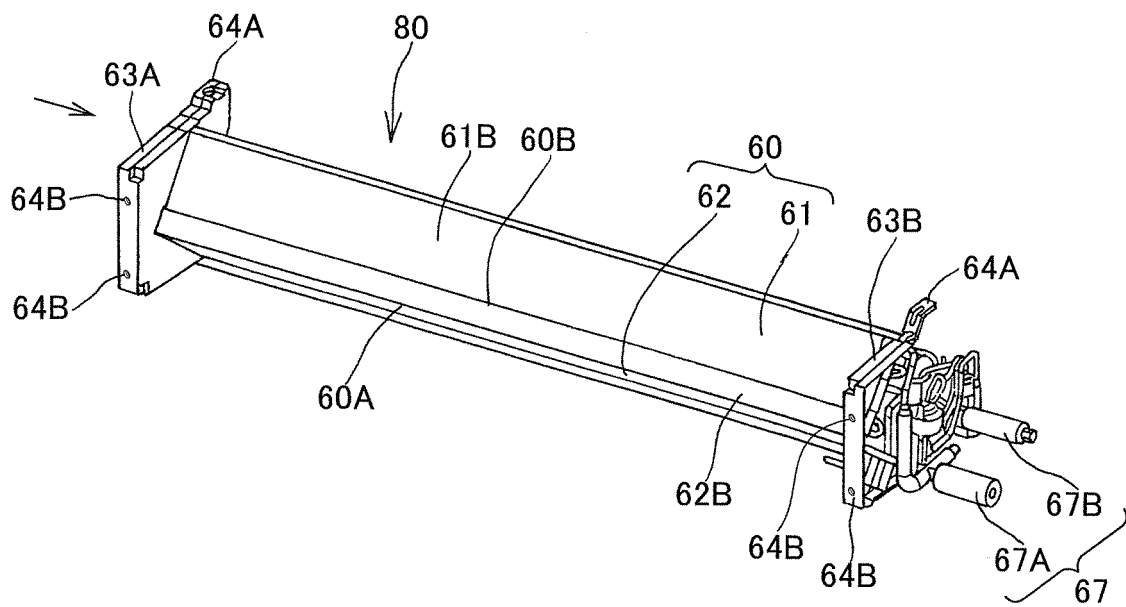


FIG. 8

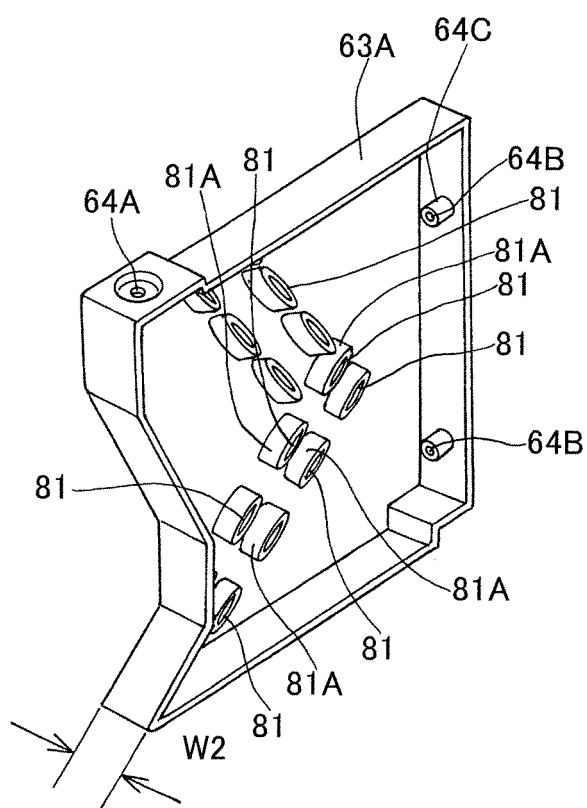


FIG. 9

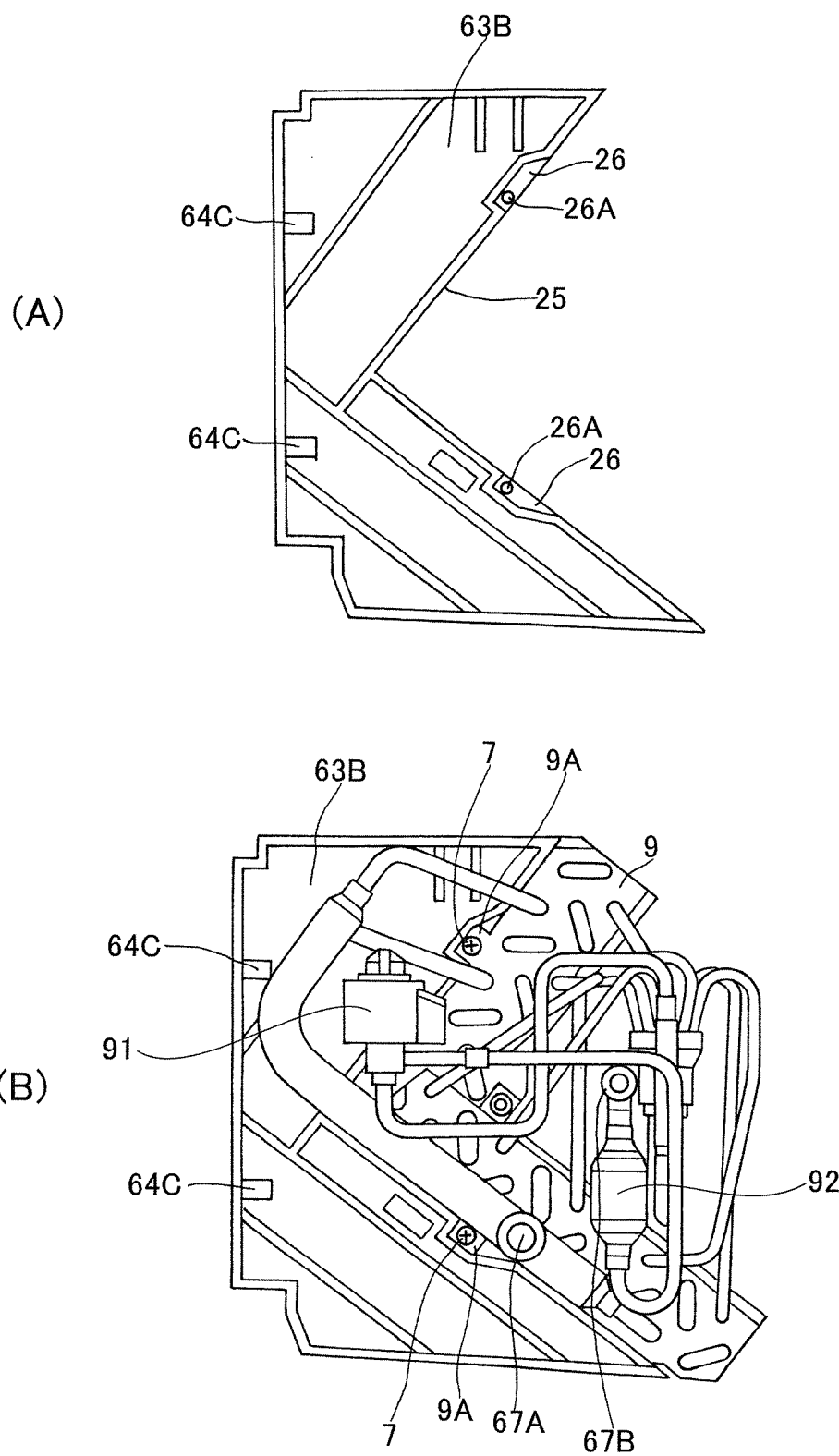


FIG. 10

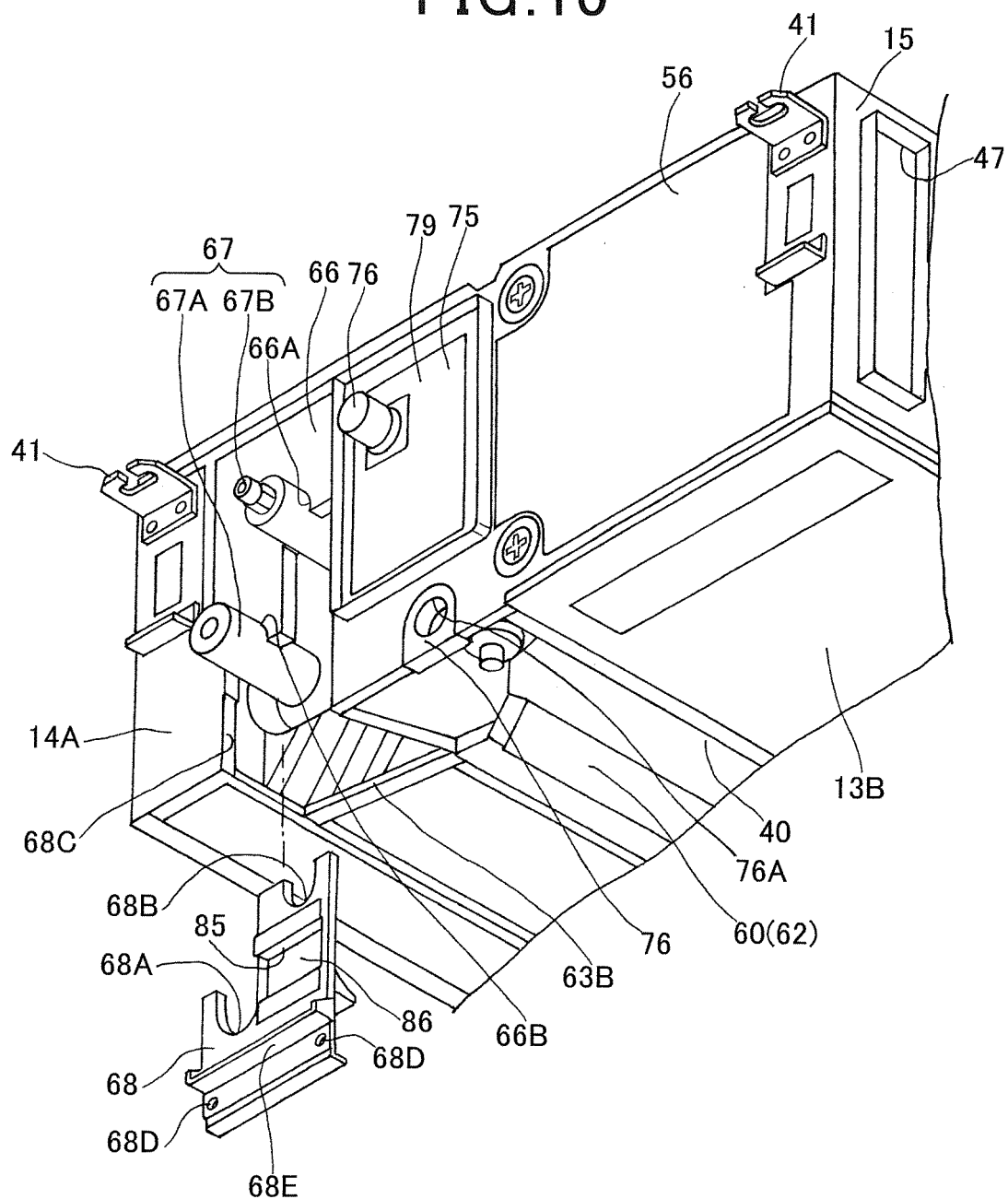
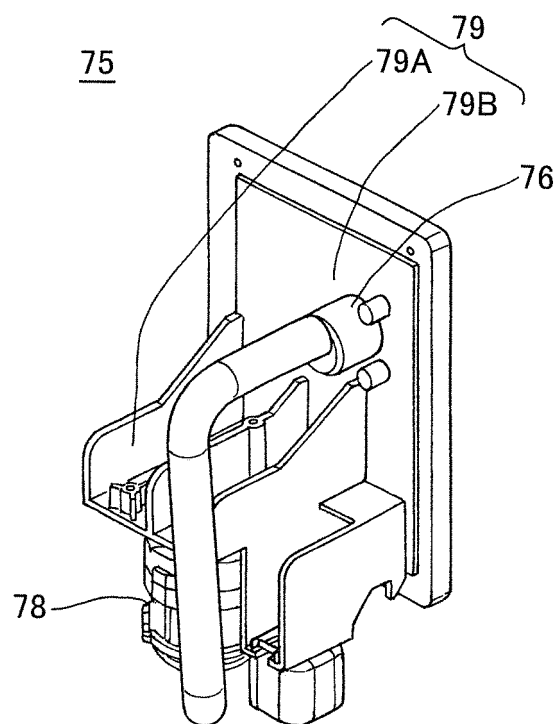


FIG. 11



REFERENCES CITED IN THE DESCRIPTION

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