(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 1 878 978 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
16.01.2008 Bulletin 2008/03

(21) Application number: **06731654.7**

(22) Date of filing: **12.04.2006**

(51) Int Cl.:
F24F 5/00 *(2006.01)* ***F24F 13/06*** *(2006.01)*

(86) International application number:
PCT/JP2006/307707

(87) International publication number:
WO 2006/115050 (02.11.2006 Gazette 2006/44)

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR

(30) Priority: **21.04.2005 JP 2005123447**

(71) Applicant: **DAIKIN INDUSTRIES, LTD.**
Osaka-shi, Osaka 530-8323 (JP)

(72) Inventor: **KIZAWA, Toshihiro,**
c/o DAIKIN INDUSTRIES, LTD.
Kusatsu-shi,
Shiga 525-8526 (JP)

(74) Representative: **HOFFMANN EITLE**
Patent- und Rechtsanwälte
Arabellastrasse 4
81925 München (DE)

(54) **AIR CONDITIONER AND METHOD OF INSTALLING THE SAME**

(57) An air conditioner that is easy to install and an installation method of the air conditioner are provided. The air conditioner (100) comprises a blowout chamber (3), a gap blockage panel (5), a radiating panel (1), and a supporting frame (6). The blowout chamber (3) comprises a blowout opening (31) through which air with temperature thereof adjusted is blown out, and is arranged such that the blowout opening (31) faces a side of a room (RS) through a blowout chamber opening (32) arranged on a ceiling surface (CL). The gap blockage panel (5) is fixed to the ceiling surface (CL), and is a plate-like member that blocks the gap between the blowout opening (31) and the blowout chamber opening (32) arranged on the ceiling surface (CL). The radiating panel (1) is arranged to cover the blowout opening (31) from the side of the room (RS), and forms a space (IS) in which air blown out from the blowout opening (31) is taken. In addition, the radiating panel (1) is formed by a material of the fiber system that has a predetermined radiation rate and through which air passes. Then, the supporting frame (6) is arranged such that it is supported on the gap blockage panel (5), and supports the radiating panel (1).

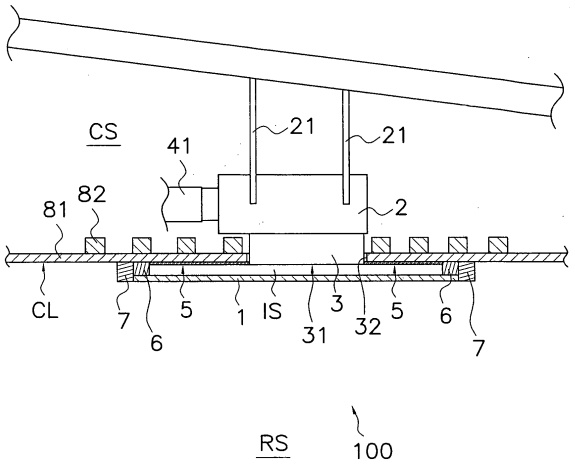

Fig. 2

EP 1 878 978 A1

Description

TECHNICAL FIELD

[0001] The present invention relates to an air conditioner and an installation method of the air conditioner.

BACKGROUND ART

[0002] An air conditioner is disclosed (refer to Patent Document 1) in which temperature-adjusted air is sent to a radiating panel formed by woven fabric and the like having a predetermined radiation rate and the adjustment of indoor temperature is carried out by the radiation from the radiating panel and the blowing out of air from the radiating panel.
<Patent Document 1> JP-A Publication No. 2004-271057

DISCLOSURE OF THE INVENTION

<PROBLEM TO BE SOLVED BY THE INVENTION>

[0003] When installing an above described kind of radiating panel to a ceiling surface, it is necessary to mount a supporting frame that supports the radiating panel to an area around the ceiling surface. However, it is not always possible to mount the supporting frame to any place, and the mounting position thereof may be limited due to the structure of the ceiling surface. In this case, the mounting of the supporting frame to an area around the ceiling surface becomes difficult, and the installation of the radiating panel becomes difficult.
[0004] The object of the present invention is to provide an air conditioner that is easy to install, and an installation method of the air conditioner.

<MEANS OF ACHIEVING THE OBJECT>

[0005] The air conditioner of a first invention comprises a blowout portion, a gap blockage panel, a radiating panel, and a supporting frame. The blowout portion comprises a blowout opening from which air with temperature thereof adjusted is blown out, and is arranged such that the blowout opening faces the side of the room through an opening that is arranged on the ceiling surface. The gap blockage panel is fixed to the ceiling surface, and is a plate-like member that blocks the gap between the blowout opening and the opening that is arranged on the ceiling surface. The radiating panel is arranged to cover the blowout opening from the side of the room, and forms a space in which air blown out from the blowout opening is taken in. In addition, the radiating panel is formed by a material of fiber system that has a predetermined radiation rate and through which the air passes. And, the supporting frame is arranged to be supported on the gap blockage panel, and supports the radiating panel.
[0006] In this air conditioner, the supporting frame is supported on the gap blockage panel. Since the gap blockage panel has a plate-like shape, the degree of freedom of fixing it to the ceiling surface is high. For example, in the case that the gap blockage panel is fixed to the ceiling surface via screws, the range in selecting the portion to drive through the screws is wide, and it is easy to drive screws through a portion that is appropriate for the fixation thereof to the ceiling surface. Therefore, it is easy to install the supporting frame that is supported on the gap blockage panel. By doing so, in this air conditioner, installation can be done easily.
[0007] The air conditioner of a second invention is the air conditioner of the first invention, and that at least on a portion of the end portions of the gap blockage panel, fixation portions are arranged for fixing the supporting frame. And, the supporting frame that is a separate body from the gap blockage panel is fixed to the gap blockage panel via the fixation portions.
[0008] In this air conditioner, the supporting frame which is a separated body is fixed to the gap blockage panel via the fixation portions, and therefore, the supporting frame is supported on the gap blockage panel.
[0009] The air conditioner of a third invention is the air conditioner of the second invention, and that on the fixation portions, fitting structures that fit with the supporting frame are arranged.
[0010] In this air conditioner, fixation portions fit with the supporting frame. Therefore, it is possible to fix the supporting frame to the gap blockage panel easily and strongly.
[0011] The air conditioner of a fourth invention is the air conditioner of any of the first invention to the third invention, and that at least a portion of the supporting frame is formed integrally with the gap blockage panel.
[0012] In this air conditioner, at least a portion of the supporting frame is formed integrally with the gap blockage panel, and therefore, the supporting frame is supported on the gap blockage panel.
[0013] The air conditioner of a fifth invention is the air conditioner of any of the first invention to the fourth invention, and that the gap blockage panel is made of resin.
[0014] In this air conditioner, the gap blockage panel is made of resin, and therefore, it is possible to reduce the weight of the gap blockage panel.
[0015] The air conditioner of a sixth invention is the air conditioner of any of the first invention to the fifth invention, and that the supporting frame is made of resin.
[0016] In this air conditioner, the supporting frame is made of resin, and therefore, it is possible to reduce the weight of the supporting frame.
[0017] The air conditioner of a seventh invention is the air conditioner of any of the first invention to the sixth invention, and that the gap blockage panel has a first panel member. The first panel member includes a first end portion that is able to match both an additional panel member and a portion of the supporting frame which is a separate body, and is arranged in an area around the opening.

[0018] In this air conditioner, the first end portion of the first panel member is able to match both an additional panel member and at least a portion of the supporting frame. Therefore, in the case that a large gap blockage panel is necessary, it is possible to deal with by adding an additional panel member to the first end portion of the first panel member. In addition, in the case that an additional panel member is not needed, it is possible to close the first end portion with the supporting frame. By doing so, in this air conditioner, it is possible to handle the change of the size of the gap blockage panel easily.

[0019] The air conditioner of an eighth invention is the air conditioner of the seventh invention, and that the gap blockage panel further has a second panel member. The second panel member includes an end portion that matches the first end portion and is combined with the first panel member.

[0020] In this air conditioner, the second panel member is added to the first panel member. Therefore, it is possible to arrange a comparatively large gap blockage panel combined by the first panel member and the second panel member.

[0021] The air conditioner of a ninth invention is the air conditioner of the seventh invention, and that the supporting frame has a first member. The first member has a shape that matches the first end portion and is combined with the first panel member.

[0022] In this air conditioner, the first end portion of the first panel member and the first member of the supporting frame are combined. Therefore, the first end portion of the first panel member is closed by the first member. By doing so, it is possible to arrange a comparatively small gap blockage panel.

[0023] The air conditioner of a tenth invention is the air conditioner of any of the first invention to the ninth invention, and that on the gap blockage panel, a plurality of screw holes are arranged.

[0024] In this air conditioner, on the gap blockage panel, a plurality of screw holes are arranged. Therefore, for the fixation thereof to the ceiling surface, it is possible to drive screws through using the screw holes that are on a position that is appropriate. Therefore, it is possible to fix the gap blockage panel to the ceiling surface easily.

[0025] The air conditioner of an eleventh invention is the air conditioner of any of the first invention to the tenth invention, and that on the gap blockage panel, insulation is mounted.

[0026] In this air conditioner, by mounting the insulation, it is possible to suppress dew condensation from occurring on the ceiling surface with the improvement of the heat efficiency. In addition, the insulation is mounted on the gap blockage panel, and therefore, the mounting of the insulation is easy.

[0027] The air conditioner of a twelfth invention is the air conditioner of any of the first invention to the eleventh invention, and that it further comprises a temperature adjustment unit that adjusts the temperature of the air and sends it to the blowout portion.

[0028] In this air conditioner, the air with temperature thereof adjusted in the temperature adjustment unit passes through the blowout opening of the blowout portion and is sent to the space that the radiating panel forms.

[0029] The air conditioner of a thirteenth invention is the air conditioner of the twelfth invention, and that the temperature adjustment unit is arranged on the ceiling underside and positioned above the opening.

[0030] In this air conditioner, the temperature adjustment unit is arranged on the ceiling underside. Therefore, the temperature adjustment unit is prevented from being seen by the occupant and the like of the room, and it is possible to improve the beauty.

[0031] The air conditioner of a fourteenth invention is the air conditioner of any of the first invention to the thirteenth invention, and that it further comprises an outside frame that covers the perimeter of the supporting frame from the outside.

[0032] In this air conditioner, by having the outside frame cover the outside of the supporting frame, it is possible to hide the supporting portion between the radiating panel and the supporting frame. Therefore, it is possible to improve the beauty.

[0033] The installation method of an air conditioner of a fifteenth invention is an installation method of an air conditioner that adjusts the temperature of a room by a radiating panel that is installed on a ceiling surface, and it comprises a blowout portion installation step, gap blockage panel fixation steps, supporting frame fixation steps, and radiating panel installation steps. In the blowout portion installation step, a blowout portion having a blowout opening through which air with temperature thereof adjusted is blown out is arranged such that the blowout opening faces the side of the room through an opening arranged on the ceiling surface. In the gap blockage panel fixation steps, a plate-like gap blockage panel that blocks the gap between the blowout opening and the opening arranged on the ceiling surface is fixed to the ceiling surface. In the supporting frame fixation steps, at least a portion of a supporting frame that supports the radiating panel and is a separate body from the gap blockage panel is fixed to the gap blockage panel. In the radiating panel installation steps, the radiating panel that forms a space in which air blown out from the blowout opening is taken, and formed by a material of fiber system that has a predetermined radiation rate and through which the air passes, is fixed to the supporting frame to cover the blowout opening from the side of the room.

[0034] In this installation method of the air conditioner, the gap blockage panel is fixed to the ceiling surface, and the supporting frame is fixed to the gap blockage panel. Since the gap blockage panel has a plate-like shape, the degree of freedom of fixing it to the ceiling surface is high. For example, in the case that the gap blockage-panel is fixed to the ceiling surface by screws, the range in selecting the portion of driving through the screws is wide, and it is easy to drive screws through a portion that is appropriate for the fixation thereof on the ceiling surface.

Therefore, the installation of the supporting frame fixed on the gap blockage panel is also easy. Therefore, in this air conditioner installation method, installation can be done easily.

[0035] The installation method of an air conditioner of a sixteenth invention is an installation method of an air conditioner that adjusts the temperature of a room by a radiating panel that is installed on a ceiling surface, and it comprises a blowout portion installation step, gap blockage panel fixation steps, and radiating panel installation steps. In the blowout portion installation step, a blowout portion having a blowout opening through which air with temperature thereof adjusted is blown out is arranged such that the blowout opening faces the side of the room through an opening arranged on the ceiling surface. In the gap blockage panel fixation steps, a plate-like gap blockage panel that blocks the gap between the blowout opening and the opening arranged on the ceiling surface is fixed to the ceiling surface, and at least a portion of a supporting frame that supports the radiating panel is arranged integrally. In the radiating panel installation steps, the radiating panel that forms a space in which air blown out from the blowout opening is taken, and formed by a material of fiber system that has a predetermined radiation rate and through which the air passes, is fixed to the supporting frame to cover the blowout opening from the side of the room.

[0036] In this installation method of the air conditioner, the supporting frame and the gap blockage panel are integrated, and the gap blockage panel is fixed on the ceiling surface. Since the gap blockage panel has a plate-like shape, the degree of freedom of fixing it to the ceiling surface is high. For example, in the case that the gap blockage panel is fixed to the ceiling surface by screws, the range in selecting the portion of driving through the screws is wide, and it is easy to drive screws through a portion that is appropriate for the fixation thereof on the ceiling surface. Therefore, the installation of the supporting frame that is arranged integrally on the gap blockage panel is also easy. Therefore, in this air conditioner installation method, installation can be done easily.

<EFFECT OF THE INVENTION>

[0037] In the air conditioner of the first invention, since the gap blockage panel has a plate-like shape, the degree of freedom of fixing it to the ceiling surface is high. Therefore, the installation of the supporting frame supported on the gap blockage panel is also easy. Therefore, in this air conditioner, installation can be done easily.

[0038] In the air conditioner of the second invention, the supporting frame of a separate body is fixed to the gap blockage panel via fixation portions, and therefore, the supporting frame is supported on the gap blockage panel.

[0039] In the air conditioner of the third invention, the fixation portions fit with the supporting frame, and therefore, it is possible to fix the supporting frame to the gap blockage panel easily and strongly.

[0040] In the air conditioner of the fourth invention, at least a portion of the supporting frame is formed integrally with the gap blockage panel, and therefore, the supporting frame is supported on the gap blockage panel.

[0041] In the air conditioner of the fifth invention, the gap blockage panel is made of resin, and therefore, it is possible to reduce the weight of the gap blockage panel.

[0042] In the air conditioner of the sixth invention, the supporting frame is made of resin, and therefore, it is possible to reduce the weight of the supporting frame.

[0043] In the air conditioner of the seventh invention, it is possible to handle the change of the size of the gap blockage panel easily.

[0044] In the air conditioner of the eighth invention, it is possible to arrange a comparatively large gap blockage panel combined by the first panel member and the second panel member.

[0045] In the air conditioner of the ninth invention, the first end portion of the first panel member is closed by the first member, and it is possible to arrange a comparatively small gap blockage panel.

[0046] In the air conditioner of the tenth invention, it is possible to drive through screws using screw holes on a position that is appropriate for the fixation to the ceiling surface, and it is possible to fix the gap blockage panel to the ceiling surface easily.

[0047] In the air conditioner of the eleventh invention, it is possible to suppress dew condensation from occurring on the ceiling surface with the improvement of the heat efficiency. In addition, the mounting of the insulation is easy.

[0048] In the air conditioner of the twelfth invention, the air with temperature thereof adjusted in the temperature adjustment unit passes through the blowout opening of the blowout portion and is sent to the space that the radiating panel forms.

[0049] In the air conditioner of the thirteenth invention, since the temperature adjustment unit is arranged on the ceiling underside, it is possible to improve the beauty.

[0050] In the air conditioner of the fourteenth invention, it is possible to hide the supporting portion between the radiating panel and the supporting frame by the outside frame, and it is possible to improve the beauty of appearance.

[0051] In the installation method of an air conditioner of the fifteenth invention, since the gap blockage panel has a plate-like shape, the degree of freedom of fixing it to the ceiling surface is high. Therefore, the installation of the supporting frame fixed to the gap blockage panel is also easy. Therefore, in this air conditioner installation method, installation can be done easily.

[0052] In the installation method of an air conditioner of the sixteenth invention, since the gap blockage panel has a plate-like shape, the degree of freedom of fixing it to the ceiling surface is high. Therefore, the installation of the supporting frame arranged integrally with the gap blockage panel is also easy. Therefore, in this air condi-

tioner installation method, installation can be done easily.

BRIEF DESCRIPTION OF THE DRAWINGS

[0053]

Figure 1 is a perspective view of an air conditioner looking from the side of the room.
Figure 2 is a side section view showing the configuration of the air conditioner.
Figure 3 is a pattern diagram that shows the installation method 1 of the air conditioner.
Figure 4 is a pattern diagram that shows the installation method 1 of the air conditioner.
Figure 5 is a flowchart showing the installation method 1 of the air conditioner.
Figure 6 is a flowchart showing the installation method 1 of the air conditioner.
Figure 7 is a flowchart showing the installation method 2 of the air conditioner.
Figure 8 is a pattern diagram that shows the installation method 2 of the air conditioner.
Figure 9 is a pattern diagram that shows another installation method of the air conditioner.

DESCRIPTION OF THE REFERENCE SYMBOLS

[0054]

1	Radiating panel
2	Temperature adjustment unit
3	Blowout chamber (blowout portion)
5	Gap blockage panel
6	Supporting frame
7	Outside frame
31	Blowout opening
32	Blowout chamber opening (opening)
51	Insulation
52	First panel member
53	Second panel member
55	First end portion
59	First fixation portion (fixation portion)
65	Fifth frame portion (first member)
100	Air conditioner
CL	Ceiling surface
RS	Room

BEST MODE FOR CARRYING OUT THE INVENTION

(First Embodiment)

<Configuration>

[0055] An air conditioner 100 of a first embodiment of the present invention is shown in Figs. 1 and 2. This air conditioner 100 is an air conditioner 100 that adjusts the temperature in a room RS via a radiating panel 1 that is installed on the ceiling surface CL, and it is possible to air condition the room RS with cooling and heating and the like by the radiation and the blowing out of air of which the temperature thereof is adjusted. In addition, Fig. 1 shows the air conditioner 100 looking from the side of the room RS, and Fig. 2 is a side section view that shows the structure of the ceiling surface CL and the configuration of the air conditioner 100. The air conditioner 100 comprises a temperature adjustment unit 2, a blowout chamber 3, a suction chamber 4 (refer to Fig. 3(b)), a gap blockage panel 5, a radiating panel 1, a supporting frame 6, and an outside frame 7.

<Temperature Adjustment Unit>

[0056] The temperature adjustment unit 2 is a built-in type of indoor unit, and it is an apparatus that adjusts the temperature of the air taken in from the suction chamber 4, and sends it to an interior space IS comprised by the radiating panel 1, via the blowout chamber 3.

[0057] The temperature adjustment unit 2 is arranged on the ceiling underside CS, and fixed to a beam on the ceiling underside CS by hanging bolts 21 and the like. The temperature adjustment unit is arranged above a blowout chamber opening 32 to be described later. The temperature adjustment unit 2 forms a refrigerant circuit with an outdoor unit not shown in the figure, and performs heat exchange between refrigerant and air. A suction duct 40 that is connected to the suction chamber 4 is connected to the temperature adjustment unit 2, and the air in room RS drawn in from the suction chamber 4 passes through the suction duct 40 and is taken into the interior of the temperature adjustment unit 2. The temperature adjustment unit 2 comprises a blower and a heat exchanger in the interior thereof that are not shown in the figure, and it passes the air that was taken in through the heat exchanger, blows out the air that has been heat exchanged with the refrigerant, and sends it to the blowout chamber 3.

<Blowout Chamber>

[0058] The blowout chamber 3 (blowout portion) is mounted to the bottom of the temperature adjustment unit 2, and it is a member in a shape of a box that comprises a blowout opening 31 on the under surface thereof from which air with temperature thereof adjusted is blown out. The blowout opening 31 is an opening through which the air that was blown out from the temperature adjustment unit 2, passed via the interior of the blowout chamber 3, and blown into room RS passes. Most part of the blowout chamber 3 is positioned on the side of the ceiling underside CS, and the blowout opening 31 is arranged to face the side of the room RS, through an opening (hereinafter referred to as "blowout chamber opening 32") that is arranged on the ceiling surface CL.

[0059] In addition, the blowout chamber opening 32 (opening) is arranged with a ceiling board 81 that forms the ceiling surface CL cut out, and penetrates from room

RS to the ceiling underside CS. The blowout chamber opening 32 has a shape that approximately matches the blowout opening 31, and is formed to be slightly larger than the blowout opening 31. The blowout opening 31 has a square shape, and the blowout chamber opening 32 also has a square shape. In addition, the blowout chamber opening 32 is positioned on an area around the center of the radiating panel 1, looking from below.

<Suction Chamber>

[0060] The suction chamber 4 is a portion that takes in air in room RS and sends it to the temperature adjustment unit 2, and as shown in Fig. 3(b), it comprises a suction opening 41. The suction opening 41 is arranged on the under surface of the suction chamber 4. Most part of the suction chamber 4 is positioned on the side of the ceiling underside CS, and the suction opening 41 is arranged to face the side of the room RS, through an opening (hereinafter referred to as "suction chamber opening 42", (refer to Fig. 3 (a))) that is arranged on the ceiling surface CL. The suction chamber 4 is connected to the suction duct 40 that is connected to the temperature adjustment unit 2, and sends the air taken in from the room RS via the suction duct 40 to the temperature adjustment unit 2.

<Gap Blockage Panel>

[0061] The gap blockage panel 5 is a plate-like member that is arranged across from the blowout chamber opening 32 to the supporting frame 6, and blocks the gap between edge of the blowout opening 31 of the blowout chamber 3 and the blowout chamber opening 32 arranged on the ceiling surface CL. The gap blockage panel 5 is made of resin, and a plurality of screw holes are arranged thereon. The number of screw holes is set to be more than the number used for fixing the gap blockage panel 5, and the gap blockage panel 5 is fixed to the ceiling surface CL by the screws passing through the screw holes to the base sheets 82. In addition, in Fig. 2, only one of the base sheets 82 is numbered, and the others are omitted. The gap blockage panel 5 is thinner than the thickness of the supporting frame 6, and has an outer shape that is rectangle, same as the supporting frame 6. As shown in Fig. 4(c), on the under surface of the gap blockage panel 5, an insulation 51 is mounted. The gap blockage panel 5, as a whole, as shown in Fig. 4(b), has a rectangular shape, combined by a plurality of panel members 52 to 54, and comprises a first panel member 52, a second panel member 53, and a third panel member 54.

<First Panel Member>

[0062] The first panel member 52 is arranged around the blowout chamber opening 32, and on the center portion of the first panel member 52, an opening in order for the blowout opening 31 of the blowout chamber 3 to face the side of the room RS is arranged. This opening of the first panel member 52 is arranged to match the blowout chamber opening 32. The first panel member 52 has an outer shape that is square, and as shown in Fig. 4(a), comprises a first end portion 55, a second end portion 56, a third end portion 57, and a fourth end portion 58. Each of the end portions 55 to 58 forms each of the four sides of the square. The first end portion 55 and the second end portion 56 are parallel, and the third end portion 57 and the fourth end portion 58 are parallel.

[0063] On the first end portion 55, a first fixation portion 59 (fixation portion) is arranged, and on the second end portion 56, a second fixation portion 50 (fixation portion) is arranged. The first fixation portion 59 and the second fixation portion 50 are portions for fixing the supporting frame, and also, they are able to fix additional panel members. In other words, in the case of arranging additional panel members, the additional panel members are fixed to the first end portion 55 and the second end portion 56, and in the case that additional panel members are not arranged, the supporting frame is fixed to the first end portion 55 and the second end portion 56. On each of the first fixation portion 59 and the second fixation portion 50, a fitting structure that fits with the supporting frame portion or an additional panel member is arranged.

[0064] On the third end portion 57 and the fourth end portion 58, fixation portions same as the first fixation portion 59 and the second fixation portion 50 are arranged, and a first frame portion 61 and a second frame portion 62 to be describe later are fixed integrally.

<Second Panel Member and Third Panel Member>

[0065] The second panel member 53 and the third panel member 54 are additional panel members added to the first panel member 52.

[0066] The second panel member 53 has an outer shape that is rectangular, and comprises four end portions that form the four sides of the rectangle respectively. A second panel side bonding portion 91, which is one of the four end portions, has a same length as the first end portion 55 of the first panel member 52, and has a shape that matches the first end portion 55. On the second panel side bonding portion 91, a fitted structure that fits with the fitting structure of the first fixation portion 59 is arranged, and with the second panel side bonding portion 91 and the first fixation portion 59 of the first end portion 55 fitted together, the second panel side bonding portion 91 and the first end portion 55 are fixed, and the first panel member 52 and the second panel member 53 are combined. On the other three end portions of the second panel member 53, a third frame portion 63 to be described later is fixed.

[0067] The third panel member 54 has a shape that is same as the second panel member 53. A third panel side bonding portion 92, which is one of the four end portions of the third panel member 54, has a same length as the

second end portion 56 of the first panel member 52, and has a shape that matches the second end portion 56. On the third panel side bonding portion 92, a fitted structure that fits with the fitting structure of the second fixation portion 50 is arranged, and with the third panel side bonding portion 92 and the second fixation portion 50 of the second end portion 56 fitted together, the third panel side bonding portion 92 and the second end portion 56 are fixed, and the first panel member 52 and the third panel member 54 are combined. On the other three end portions of the third panel member 54, a fourth frame portion 64 to be described later is fixed.

<Supporting Frame>

[0068] The supporting frame 6 is formed from resin, and it is a member that is fixed to the ceiling surface CL, and supports the radiating panel 1. The supporting frame 6, as shown in Fig. 4(b), is a frame having a rectangular outer shape, and is arranged in a position away in a predetermined distance from the blowout chamber opening 32, and is arranged to surround the perimeter of the blowout chamber opening 32. The thickness of the supporting frame 6 (dimension in the vertical direction) is small compared to the dimension thereof in the horizontal direction, and the entire supporting frame 6 has a thin shape in the vertical direction. The supporting frame 6 fits with the end portions of the gap blockage panel 5, and is fixed to the gap blockage panel 5 by screw cramp. The supporting frame 6 is formed by a plurality of members 61 to 64, and comprises a first frame portion 61, a second frame portion 62, a third frame portion 63, and a fourth frame portion 64. The first frame portion 61, the second frame portion 62, the third frame portion 63, and the fourth frame portion 64 are arranged along the end portions of the gap blockage panel 5, and with the first frame portion 61, the second frame portion 62, the third frame portion 63, and the fourth frame portion 64 being combined integrally, a shape that is rectangular and shaped like a frame is formed.

[0069] The first frame portion 61 and the second frame portion 62 are in a linear shape that is the same length as the third end portion 57 and the fourth end portion 58 of the first panel member 52, and have a shape that is shaped like a rail. The first frame portion 61 has a shape that matches the third end portion 57 of the first panel member 52, and the second frame portion 62 has a shape that matches the fourth end portion 58. The first frame portion 61 is fixed to the third end portion 57, and the second frame is fixed to the fourth end portion 58, and they are each supported on the first panel member 52. The first frame portion 61 and the second frame portion 62, with the first frame portion 61 and the second frame portion 62 being separate bodies, are fixed to the first panel member 52, by a fixation means such as screw cramp and the like.

[0070] The third frame portion 63 is combined with the second panel member 53, and arranged along three end portions, excluding the second panel side bonding portion 91 of the second panel member 53. The third frame portion 63 is fixed by screw cramp on three end portions excluding the second panel side bonding portion 91 of the second panel member 53, and is supported on the second panel member 53.

[0071] The fourth frame portion 64 is combined with the third panel member 54, and arranged along three end portions, excluding the third panel side bonding portion 92 of the third panel member 54. The fourth frame portion 64 is fixed by screw cramp to three end portions excluding the third panel side bonding portion 92 of the third panel member 54, and is supported on the third panel member 54.

<Radiating Panel>

[0072] The radiating panel 1 is mounted on the supporting frame 6 from below, to cover the entire under surface of the supporting frame 6, and is supported on the supporting frame 6. The radiating panel 1 is arranged to cover the blowout opening 31 from the side of the room RS, and is arranged approximately parallel to the ceiling surface CL separated from the ceiling surface CL by a distance corresponding to the thickness of the supporting frame 6. Therefore, the radiating panel 1 forms an interior space IS in which air blown out from the blowout opening 31 is taken in. In other words, this interior space IS is formed by the gap blockage panel 5, the supporting frame 6, and the radiating panel 1, and the upper side thereof is closed by the gap blockage panel 5 excluding the blowout chamber opening 32, the sides thereof closed by the supporting frame 6, and the bottom side thereof closed by the radiating panel 1. The radiating panel 1 is formed by a material of fiber system, such as a fabric and the like that air passes through. As a material of fiber system, a woven fabric is preferable. However, it may be a nonwoven fabric or other material of the fabric system. In addition, the radiating panel 1, as shown in Figs. 1 and 2, has a shape that is flat and small in the thickness thereof. Due to the air from the blowout opening 31 with the temperature thereof adjusted being sent to the interior space IS formed by the radiating panel 1, a pressure is generated that is greater than the atmosphere pressure. In addition, the material of the fabric system that forms the radiating panel 1 is soft and air is able to pass through it, and has a radiation rate of approximately 0.9. Therefore, the air being sent to the interior space IS is blown out to the room RS peacefully, from the gaps of the holes in the fabric of the radiating panel 1. In addition, due to the temperature of the radiating panel 1 being adjusted by the air sent to the interior space IS, radiation is generated from the radiating panel 1. For this reason, it is possible to adjust the temperature in the room RS via the radiation and the blowing out of air quietly. In addition, the material of fabric system has stretching properties. The radiating panel 1 with an outer shape that is plate-like, flat, and thin has a rectangular projection geometry

with respect to the room RS below. The radiating panel 1, for example, has a size to the extent that covers a bedding arranged in room RS in plane.

<Outside Frame>

[0073] The outside frame 7 is a frame shaped member that covers the area around the supporting frame 6, in which the radiating panel 1 is mounted, from the outside. The outside frame 7 has a rectangular outside shape that is slightly larger than the supporting frame 6, and has a thickness that is approximately the same as the supporting frame 6. The outside frame 7 is fixed to the supporting frame 6 or fixed to the ceiling surface CL. The outside frame 7 is formed from resin or wood, and for example, by forming it from wood, beautiful wood grain shown on the exterior improves the beauty thereof.

<Installation Method>

[0074] An installation method when installing this air conditioner 100 in a residential building will be described based on Figs. 3 to 6.

(Installation Method 1)

[0075] In this air conditioner 100, it is possible to install a radiating panel 1 with a size that is different freely. Here, an installation method in the case of installing a comparatively large size radiating panel 1 will be described.

[0076] First, in a first step S1 shown in Fig. 5, the blowout chamber opening 32 is made. Here, as shown in Fig. 3(a), the ceiling board 81 that forms the ceiling surface CL is perforated, and the blowout chamber opening 32 is arranged on the ceiling surface CL. This blowout chamber opening 32 has a size approximately equal to the outside shape of the blowout opening 31 of the blowout chamber 3, and smaller than the radiating panel 1 and the supporting frame 6. In addition, the blowout chamber opening 32 is arranged above a bed and the like arranged in the room RS, arranged to suit the layout and the like of the room RS.

[0077] In a second step S2, the suction chamber opening 42 is made. Here, as shown in Fig. 3(a), the ceiling board 81 is perforated, and the suction chamber opening 42 is arranged on the ceiling surface CL. In addition, the suction chamber opening 42 is arranged in a position that is comparatively unnoticeable, such as in a corner and the like of the ceiling surface CL.

[0078] In addition, the first step S 1 and the second step S2 can be omitted, in the case that openings are arranged on the ceiling surface CL from the beginning, like in a newly built building and the like.

[0079] Next, in a third step S3, the temperature adjustment unit 2 is installed. Here, as shown in Fig. 3(b), the temperature adjustment unit 2 is carried into the ceiling underside CS, and fixed to a beam and the like arranged on the ceiling underside CS. The temperature adjustment unit 2 is fixed by hanging bolts 21 (refer to Fig. 1) and the like, and suspended from the beam.

[0080] In a fourth step S4 (blowout portion installation step), the blowout chamber 3 is installed. Here, as shown in Fig. 3(b), the blowout chamber 3 is arranged such that the blowout opening 31 faces the side of the room RS, through the blowout chamber opening 32 arranged on the ceiling surface CL. The blowout chamber 3 is carried into the ceiling underside CS, and the blowout chamber 3 is installed such that the blowout opening 31 of the blowout chamber 3 is inserted from the side of the ceiling underside CS into the blowout chamber opening 32. In this state, the blowout opening 31 is exposed on the side of the room RS from the blowout chamber opening 32.

[0081] Note that in the case that the temperature adjustment unit 2 and the blowout chamber 3 are arranged integrally, the third step S3 and the fourth step S4 may be carried out simultaneously.

[0082] In a fifth step S5, the suction chamber 4 is installed. Here, as shown in Fig. 3(b), the suction chamber 4 is arranged such that the suction opening 41 faces the side of the room RS, through the suction chamber opening 42. The suction chamber 4 is carried into the ceiling underside CS, and the suction chamber 4 is installed such that the suction opening 41 of the suction chamber 4 is inserted from the side of the ceiling underside CS into the suction chamber opening 42.

[0083] In a sixth step S6, the connection of the suction duct 40 is performed. Here, as shown in Fig. 3(b), the suction chamber 4 and the temperature adjustment unit 2 are connected by the suction duct 40. In addition, the suction duct 40 is arranged on the ceiling underside CS.

[0084] Next, in a seventh step S7 (supporting frame fixation step) shown in Fig. 6, the first frame portion 61 and the second frame portion 62 are fixed. Here, as shown in Fig. 4(a), the first frame portion 61 is fixed to the third end portion 57 of the first panel member 52, and the second frame portion 62 is fixed to the fourth end portion 58 of the first panel member 52.

[0085] In an eighth step S8 (gap blockage panel fixation step), the first panel member 52 is fixed. Here, as shown in Fig. 4(a), the first panel member 52 is fixed to the ceiling surface CL, and the gap between the blowout opening 31 of the blowout chamber 3 and the blowout chamber opening 32 is blocked. The size of the blowout chamber opening 32 is nearly equal to that of the blowout opening 31. However, in order to install the blowout chamber 3, it is formed slightly bigger than the blowout opening 31. The first panel member 52 is arranged in order to block this gap. Screws pass through the screw holes that match the positions of the base sheets out of the screw holes arranged on the first panel member 52, and the first panel member 52 is fixed to the base sheets.

[0086] In addition, the first panel member 52 may be fixed to the ceiling surface CL after the first frame portion 61 and the second frame portion 62 are mounted to the first panel member 52, or the first frame portion 61 and the second frame portion 62 may be mounted to the first

panel member 52 after the first panel member 52 is fixed to the ceiling surface CL. In addition, before the first panel member 52 is fixed to the ceiling surface CL, as shown in Fig. 3(c), a marking off line may be drawn for mounting the gap blockage panel 5 to the ceiling surface CL.

[0087] In a ninth step S9 (supporting frame fixation step), the third frame portion 63 is fixed. Here, as shown in Fig. 4(b), the third frame portion 63 is fixed to the second panel member 53.

[0088] In a tenth step S10 (gap blockage panel fixation step), the second panel member 53 is fixed. Here, as shown in Fig. 4(b), the second panel member 53 is fixed to the ceiling surface CL. At this time, the second panel member 53 is combined with the first panel member 52 such that the second panel side bonding portion 91 matches the first end portion 55 of the first panel member 52. In addition, the second panel member 53 is screwed to the ceiling board 81 and the base sheets 82.

[0089] In an eleventh step S11 (supporting frame fixation step), the fourth frame portion 64 is fixed. Here, as shown in Fig. 4(b), the fourth frame portion 64 is fixed to the third panel member 54.

[0090] In a twelfth step S12 (gap blockage panel fixation step), the third panel member 54 is fixed. Here, as shown in Fig. 4(b), the third panel member 54 is fixed to the ceiling surface CL. At this time, the third panel member 54 is combined with the first panel member 52 such that the third panel side bonding portion 92 matches the second end portion 56 of the first panel member 52. In addition, the third panel member 54 is screwed to the ceiling board 81 and the base sheets 82.

[0091] In addition, the second panel member 53 may be fixed to the ceiling surface CL after the third frame portion 63 is mounted to the second panel member 53, or the third frame portion 63 may be mounted to the second panel member 53 after the second panel member 53 is fixed to the ceiling surface CL. This is the same also with regard to the fourth frame portion 64 and the third panel member 54.

[0092] In a thirteenth step S 13, the insulation 51 is mounted. Here, as shown in Fig. 4(c), the insulation 51 is fixed to the under surface of the gap blockage panel 5. The insulation 51 is mounted to almost the entire surface of the under surface of the gap blockage panel 5 excluding the opening that allows the blowout opening 31 to face the room RS.

[0093] In a fourteenth step S14 (radiating panel installation step), the radiating panel 1 is installed. Here, the radiating panel 1 is, as shown in Figs. 2 and 4(d), fixed to the supporting frame 6 to cover the blowout opening 31 from the side of the room RS. The radiating panel 1 is fixed in a stretched state, so that accidental rotation does not occur.

[0094] In a fifteenth step S15, the outside frame 7 is mounted. Here, as shown in Fig. 4(e), the outside frame 7 is mounted to the outer circumference of the supporting frame 6 and the radiating panel 1.

[0095] In addition, if possible, the order of the processes from the above described first step S 1 to the fifteenth step S 15 may be switched, if necessary.

(Installation Method 2)

[0096] Next, an installation method in the case of installing a comparatively small size radiating panel 1 will be described. The processes from the first step S1 to the sixth step S6 are same as the above described installation method 1. In this installation method 2, following the sixth step S6, it proceeds to a sixteenth step S16 shown in Fig. 7. Below, the description is based on Figs. 7 and 8.

[0097] In a sixteenth step S16, the first frame portion 61 is fixed. Here, as shown in Fig. 8(a), the first frame portion 61 is fixed to the third end portion 57 of the first panel member 52.

[0098] In a seventeenth step S 17, the second frame portion 62 is fixed. Here, as shown in Fig. 8(a), the second frame portion 62 is fixed to the fourth end portion 58 of the first panel member 52.

[0099] In an eighteenth step S 18, a fifth frame portion 65 (first member) is fixed. Here, as shown in Fig. 8(a), the fifth frame portion 65 is fixed to the first end portion 55 of the first panel member 52. The fifth frame portion 65 is in a linear shape same as the first frame portion 61 and the second frame portion 62, and is a shape that matches the third end portion 57 of the first panel member 52. The fifth frame portion 65 has a fitted structure that fits with the fitting structure of the first fixation portion 59, and it is screwed in a state that the fitted structure of the fifth frame portion 65 and the fitting structure of the first fixation portion 59 are fitted together, and the first panel member 52 and the fifth frame portion 65 are fixed.

[0100] In a nineteenth step S 19, a sixth frame portion 66 is fixed. Here, as shown in Fig. 8(a), the sixth frame portion 66 is fixed to the second end portion 56 of the first panel member 52. The sixth frame portion 66 is in a linear shape same as the first frame portion 61 and the second frame portion 62, and is a shape that matches the second end portion 56 of the first panel member 52. The sixth frame portion 66 has a fitted structure that fits with the fitting structure of the second fixation portion 50, and is screwed in a state that the fitted structure of the sixth frame portion 66 and the fitting structure of the second fixation portion 50 are fitted together, and the first panel member 52 and the sixth frame portion 66 are fixed.

[0101] Through the above sixteenth step S16 to the nineteenth step S 19 (supporting frame fixation steps), the four sides of the first panel member 52 are closed by the supporting frame 6. In addition, in this case, the supporting frame 6 has a square outer shape, same as the first panel member 52.

[0102] Next, in a twentieth step S20 (gap blockage panel fixation step), the first panel member 52 is fixed. Here, same as the eighth step S8 of the installation method 1, the first panel member 52, or the gap blockage panel 5, is fixed to the ceiling surface CL.

[0103] In addition, the first panel member 52 may be

fixed to the ceiling surface CL after the first frame portion 61 through the fourth frame portion 64 are mounted to the first panel member 52, or the first frame portion 61 through the fourth frame portion 64 may be mounted to the first panel member 52 after the first panel member 52 is fixed to the ceiling surface CL. In addition, only a portion of each of the frame portions 61, 62, 65, and 66 may be mounted to the first panel member 52, and the remaining frame member may be mounted to the first panel member 52 after the first panel member 52 is fixed to the ceiling surface CL.

[0104] Then, in a twenty first step S21, the insulation 51 is mounted. In a twenty second step S22 (radiating panel installation step), the radiating panel 1 is installed. In a twenty third step S23, the outside frame 7 is mounted (refer to Figs. 8(b) to (d)). These are the same as the thirteenth step S 13 to the fifteenth step S 15 of the installation method 1.

<Characteristics>

(1)

[0105] In this air conditioner 100, air with temperature thereof adjusted is sent from the blowout opening 31 to the interior space IS of the radiating panel 1. The radiating panel 1 is formed by a material having a predetermined radiation rate, and therefore, by adjusting the temperature of the radiating panel 1 by the air with temperature thereof adjusted, radiation is generated from the surface thereof. In addition, since the material that forms the radiating panel 1 is a material of fiber system, if the pressure in the interior space IS becomes greater than the pressure in the room RS, air with temperature thereof adjusted is blown out to the room RS from the gaps in the fabric of the radiating panel 1. As a result, it is possible to adjust the temperature in the room RS by the combination of the radiation and the blowing out of air, and it is possible to adjust the temperature of the room RS via the blowing out of air quietly, better than the case that temperature is adjusted by only the blowing out of air. In addition, the air that blows out from the radiating panel 1 flows quietly, since it is blown out from the gaps in the fabric. Therefore, it is possible to adjust the temperature in room RS with little feeling of the draft, and it is possible to adjust the temperature that is comfortable for the occupant of the room RS.

(2)

[0106] In the above described kind of air conditioner 100, since temperature of the room RS is adjusted with little feeling of the draft, it is preferable that the radiating panel 1 has an area that is comparatively large. In the case that the radiating panel 1 is large in plane, it is difficult to fill air sufficiently in the interior thereof. For example, in the case that a blowout opening is mounted on one end portion of the radiating panel 1 and air with temperature thereof adjusted is sent to the interior thereof from one end portion of the radiating panel 1, it is difficult to have the air reach the other end portion sufficiently. In addition, if the flow speed of the air is increased in order for air to sufficiently reach the other end portion, there is the possibility that a negative pressure is generated near the blowout opening 31, and to the contrary, the air in the room RS may be drawn into the interior of the radiating panel 1.

[0107] However, in this air conditioner 100, as described above, since the blowout opening 31 is arranged in an area around the center of the radiating panel 1, the air with temperature thereof adjusted is sent to the interior of the radiating panel 1 from the center portion of the radiating panel 1. For this reason, it is possible for the air with temperature thereof adjusted to easily reach the end portions of the radiating panel 1.

(3)

[0108] In this air conditioner 100, the supporting frame 6 is fixed to the gap blockage panel 5, and the gap blockage panel 5 is fixed to the ceiling surface CL. The gap blockage panel 5 has a plate-like shape, and a great number of screw holes are arranged thereon. Therefore, it is possible to easily fix the gap blockage panel 5 to the ceiling surface CL. In other words, in the state that the gap blockage panel 5 is aligned on the ceiling surface CL, screws are driven through the screw holes that match the positions on the base sheets 82, to fix the gap blockage panel 5 and the ceiling surface CL. By doing so, it is possible to easily fix the gap blockage panel 5 to the base sheets 82. In this way, in this air conditioner 100, the installation of the gap blockage panel 5 and the supporting frame 6 is easy. In addition, since the gap blockage panel 5 is fixed to the base sheets 82, a strong fixation is possible.

(4)

[0109] In this air conditioner 100, the size of the radiating panel 1 is selected depending on the size of the room and the necessary temperature adjustment ability, and it is possible to determine whether or not to add panel members 52 and 53 that form the gap blockage panel 5 depending on the size of the radiating panel 1 that is selected. In addition, depending on the selected panel members 52 and 53, it is possible to select frame portions 63 to 66 that close off the end portions of the panel members 52 and 53. By doing so, it is possible to easily install the radiating panel 1 of various sizes.

(5)

[0110] In this air conditioner 100, it is possible to freely select also the orientation of the radiating panel 1. In other words, as shown in Fig. 9, when mounting the first panel member 52, the first panel member 52 is mounted in a

different orientation from that in Fig. 4(a). For example, in Fig. 9(a), the first panel member 52 is mounted in an orientation that is 90 degrees different from the first panel member 52 in Fig. 4(a). Then, as shown in Fig. 9(b), by adding the second panel member 53 and the third panel member 54 and combining them with the first panel member 52, a gap blockage panel 5 that has a different orientation from that in the installation method 1 is mounted. By doing so, it is possible to install the radiating panel 1 in a different orientation from that in the installation method 1. The other processes shown in Figs. 9(c) to 9(e) are the same processes shown in each of the Figs. 4(c) to 4 (e).

[0111] In addition, since the first panel member 52 is square, the mounting direction of the first panel member 52 is not changed, and alternatively by changing the mounting positions of the first frame portion 61 and the second frame portion 62, it is possible to mount the gap blockage panel 5 in a direction that is different from that in the installation method 1, same as described above.

(6)

[0112] In this air conditioner 100, since the opening that is arranged on the ceiling surface CL as the blowout chamber opening 32 can be comparatively small, the construction work is simple. In other words, in the case that an opening with a size same as the radiating panel 1 is arranged on the ceiling surface CL in order to mount the radiating panel 1 to the ceiling surface CL, the construction work becomes difficult since it is necessary to bore a large opening on the ceiling surface CL. However, in this air conditioner 100, since the blowout chamber opening 32 is comparatively small, the construction work of the blowout chamber opening is easy.

(Second Embodiment)

[0113] In the above described first embodiment, the supporting frame 6 and the gap blockage panel 5 are separate bodies, and the supporting frame 6 is fixed to the gap blockage panel 5 when installing the air conditioner 100. However, at least a portion of the supporting frame 6 may be formed integrally with the gap blockage panel 5.

[0114] For example, the first frame portion 61 and the second frame portion 62 are formed integrally with the first panel member 52 in advance. In this case, the first frame portion 61, the second frame portion 62, and the first panel member 52 may be shaped integrally. In addition, the first frame portion 61 and the second frame portion 62 may be fixed integrally in advance by screw cramp, bonding, welding, and the like to the first panel member 52.

[0115] In addition, this is the same also with regard to the second panel member 53, the third frame portion 63, the third panel member 54, and the fourth frame portion 64.

[0116] In this case, in the above described installation method 1 and installation method 2, each of the processes of the fixation of the first frame portion 61, the fixation of the second frame portion 62, the fixation of the third frame portion 63, and the fixation of the fourth frame portion 64 is omitted, and it is possible to simplify the installation process.

<Other Embodiments>

(1)

[0117] In the above described embodiment, the supporting frame 6 is made of resin. However, it may be made of sheet metal. However, from the standpoint of reducing the weight, it is more preferable that it is made of resin.

(2)

[0118] In the above described embodiment, the radiation rate of the material of fiber system that forms the radiating panel 1 is 0.9. However, it is acceptable as long as the radiation rate is 0.6 or more. However, it is more preferable that it is 0.9 or more, from the standpoint of improving the adjustment of temperature by radiation.

(3)

[0119] In addition to the second panel member 53 and the third panel member 54, furthermore, other panel members may be added.

(4)

[0120] In the above described embodiment, the blowout chamber 3 is mounted to the under surface of the temperature adjustment unit 2. However, the temperature adjustment unit 2 may be arranged in a position away from the blowout chamber 3, and the blowout chamber 3 and the temperature adjustment unit 2 may be connected by a duct. By doing so, the air with temperature thereof adjusted blown out from the temperature adjustment unit 2 passes through the duct, and is sent to the blowout chamber 3, and is blown out from the blowout opening 31.

(5)

[0121] In the above described embodiment, the gap blockage panel 5 is fixed to the ceiling surface CL by screws. However, it may be fixed by other fixation means, such as nails, bolts and nuts, and the like.

(6)

[0122] In the above described embodiment, the blowout chamber opening 32 is square. However, it may be

in another shape such as a rectangle, a circle, and the like.

INDUSTRIAL APPLICABILITY

[0123] It is possible to make the installation of an air conditioner easy according to the present invention, and it is useful as an air conditioner and an installation method of the air conditioner.

Claims

1. An air conditioner (100), comprising:

a blowout portion (3) having a blowout opening (31) from which air with temperature thereof adjusted is blown out, and is arranged such that said blowout opening (31) faces a side of a room (RS) through an opening (32) that is arranged on a ceiling surface (CL);
a plate-like gap blockage panel (5) that is fixed to said ceiling surface (CL), and blocks the gap between said blowout opening (31) and said opening (32) that is arranged on said ceiling surface (CL);
a radiating panel (1) that is arranged to cover said blowout opening (31) from the side of said room (RS), and forms a space (IS) in which air blown out from said blowout opening (31) is taken, and is formed by a material of fiber system that has a predetermined radiation rate and through which said air passes; and
a supporting frame (6) that is arranged to be supported on said gap blockage panel (5), and supports said radiating panel (1).

2. The air conditioner (100) as recited in Claim 1 or 2, wherein
at least on a portion of the end portions of said gap blockage panel (5), fixation portions (59, 50) are arranged for fixing said supporting frame (6), and
said supporting frame (6) that is a separate body from said gap blockage panel (5) is fixed to said gap blockage panel (5) via said fixation portions (59, 50).

3. The air conditioner (100) as recited in Claim 2, wherein
on said fixation portions (59, 50), fitting structures that fit with said supporting frame (6) are arranged.

4. The air conditioner (100) as recited in any of Claims 1 to 3, wherein
at least a portion of said supporting frame (6) is formed integrally with said gap blockage panel (5).

5. The air conditioner (100) as recited in any of Claims 1 to 4, wherein
said gap blockage panel (5) is made of resin.

6. The air conditioner (100) as recited in any of Claims 1 to 5, wherein
said supporting frame (6) is made of resin.

7. The air conditioner (100) as recited in any of Claims 1 to 6, wherein
said gap blockage panel (5) has a first panel member (52) that includes a first end portion (55) that is able to match both an additional panel member (53) and at least a portion of said supporting frame (6) which is a separate body, and is arranged in an area around said opening (32).

8. The air conditioner (100) as recited in Claim 7, wherein
said gap blockage panel (5) further has a second panel member (53) that includes an end portion that matches said first end portion (55) and is combined with said first panel member (52).

9. The air conditioner (100) as recited in Claim 7, wherein
said supporting frame (6) has a first member (65) having a shape that matches said first end portion (55) and is combined with said first panel member (52).

10. The air conditioner (100) as recited in any of Claims 1 to 9, wherein
a plurality of screw holes are arranged on said gap blockage panel (5).

11. The air conditioner (100) as recited in any of Claims 1 to 10, wherein
an insulation (51) is mounted on said gap blockage panel (5).

12. The air conditioner (100) as recited in any of Claims 1 to 11, further comprising a temperature adjustment unit (2) that adjusts the temperature of said air and sends it to said blowout portion (3).

13. The air conditioner (100) as recited in Claim 12, wherein
said temperature adjustment unit (2) is arranged on a ceiling underside (CS) and positioned above said opening (32).

14. The air conditioner (100) as recited in any of Claims 1 to 13, further comprising an outside frame (7) that covers the perimeter of said supporting frame (6) from the outside.

15. An installation method of an air conditioner (100) that adjusts the temperature of a room (RS) by a radiating panel (1) that is installed on a ceiling surface (CL),

the installation method of the air conditioner (100) comprising:

a blowout portion installation step (S4) in which a blowout portion (3) having a blowout opening (31) through which air with temperature thereof adjusted is blown out is arranged such that said blowout opening (31) faces the side of said room (RS) through an opening (32) arranged on said ceiling surface (CL);
gap blockage panel fixation steps (S8, S10, S12, S20) in which a plate-like gap blockage panel (5) that blocks the gap between said blowout opening (31) and said opening (32) arranged on said ceiling surface (CL) is fixed to said ceiling surface (CL);
supporting frame fixation steps (S7, S9, S11, S16 to S 19) in which at least a portion of a supporting frame (6) that supports said radiating panel (1) and is a separate body from said gap blockage panel (5) is fixed to said gap blockage panel (5); and
radiating panel installation steps (S14, S22) in which the radiating panel (1) that forms a space (IS) in which air blown out from said blowout opening (31) is taken, and formed by a material of fiber system that has a predetermined radiation rate and through which said air passes, is fixed to said supporting frame (6) to cover said blowout opening (31) from the side of said room (RS).

16. An installation method of an air conditioner (100) that adjusts the temperature of a room (RS) by a radiating panel (1) that is installed on a ceiling surface (CL), the installation method of the air conditioner (100) comprising:

a blowout portion installation step (S4) in which a blowout portion (3) having a blowout opening (31) through which air with temperature thereof adjusted is blown out is arranged such that said blowout opening (31) faces the side of said room (RS) through an opening (32) arranged on said ceiling surface (CL);
gap blockage panel fixation steps (S8, S10, S12, S20) in which at least a portion of a supporting frame (6) that supports said radiating panel (1) is arranged integrally, and a plate-like gap blockage panel (5) that blocks the gap between said blowout opening (31) and said opening (32) arranged on said ceiling surface (CL) is fixed to said ceiling surface (CL); and
radiating panel installation steps (S14, S22) in which the radiating panel (1) that forms a space in which air blown out from said blowout opening (31) is taken, and formed by a material of fiber system that has a predetermined radiation rate and through which said air passes, is fixed to said supporting frame (6) to cover said blowout opening (31) from the side of said room (RS).

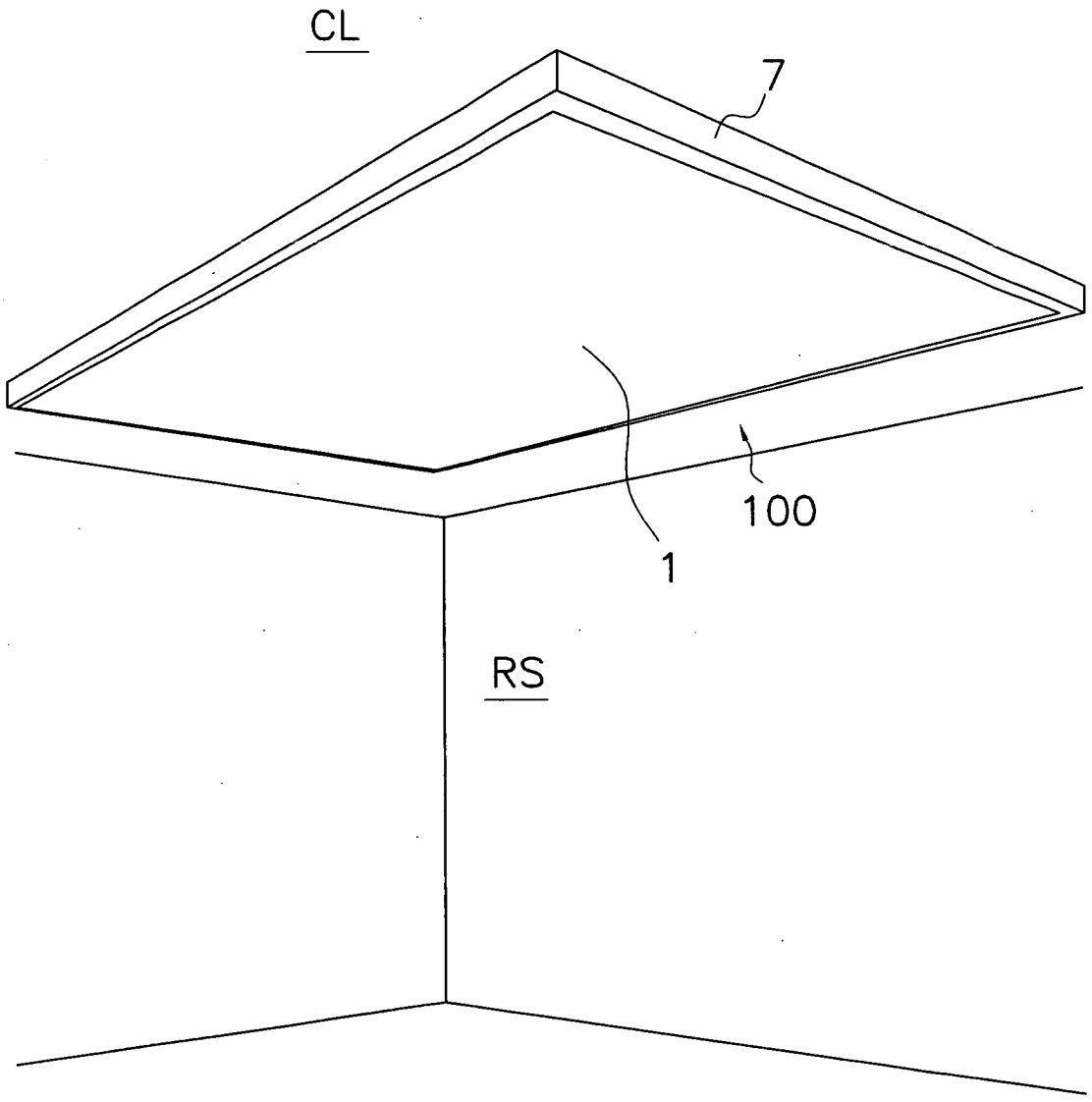

Fig. 1

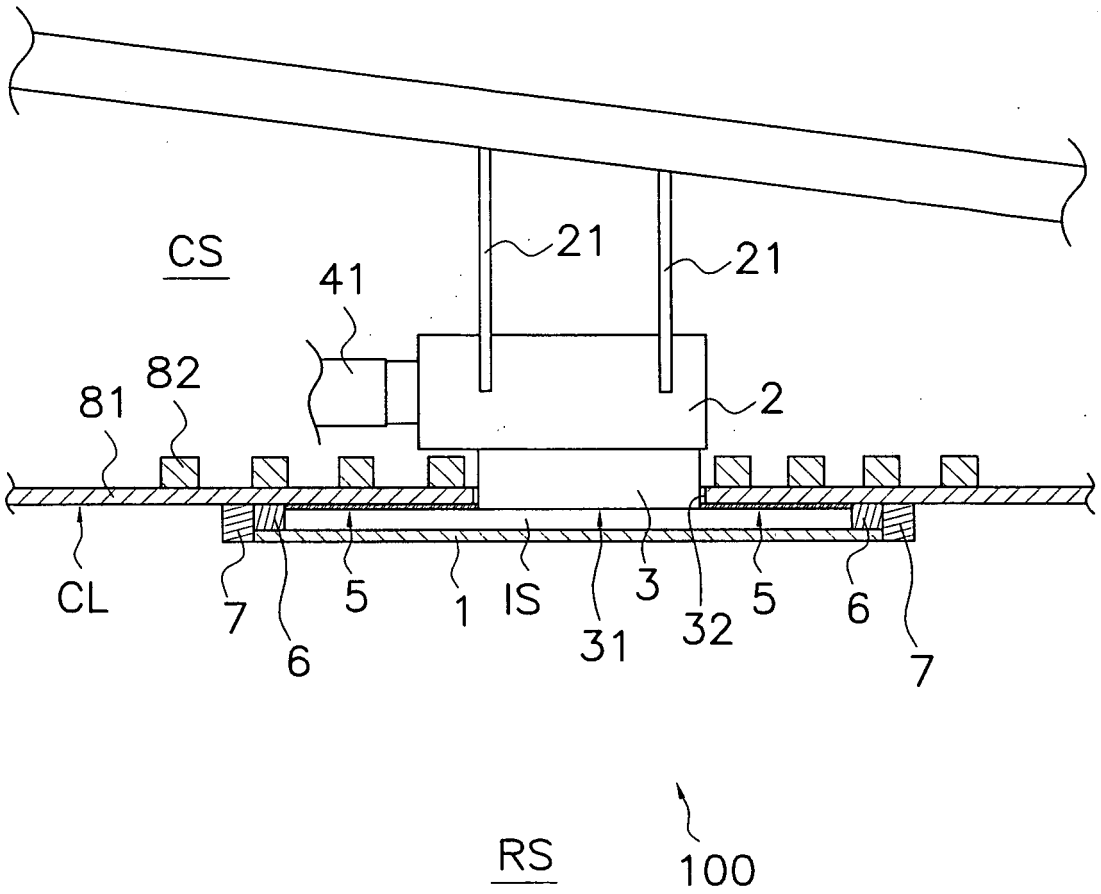

Fig. 2

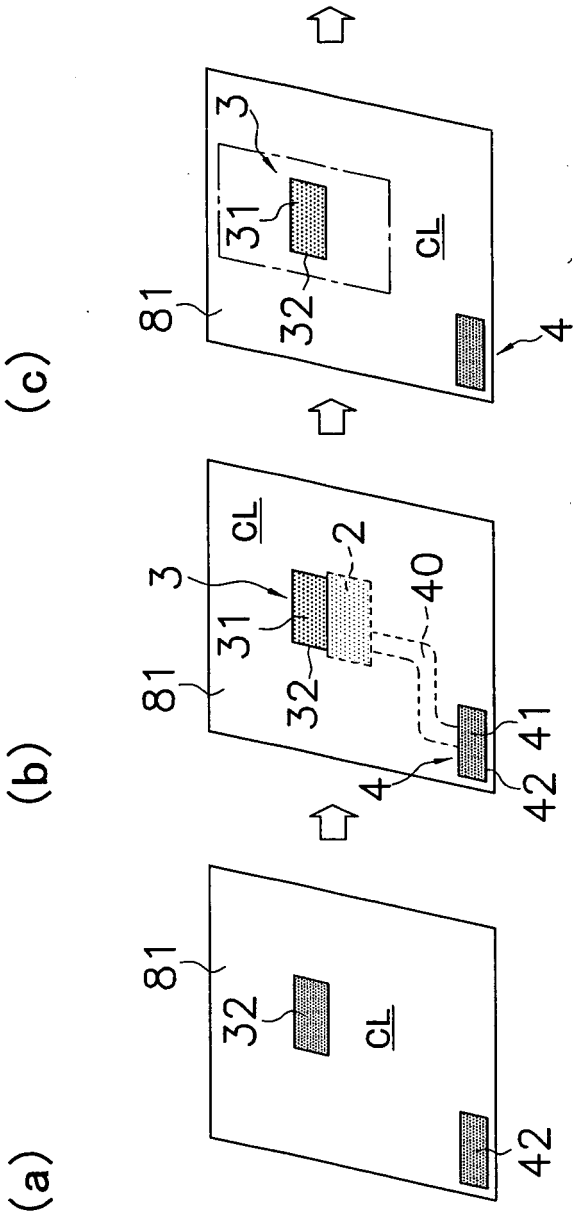

Fig. 3

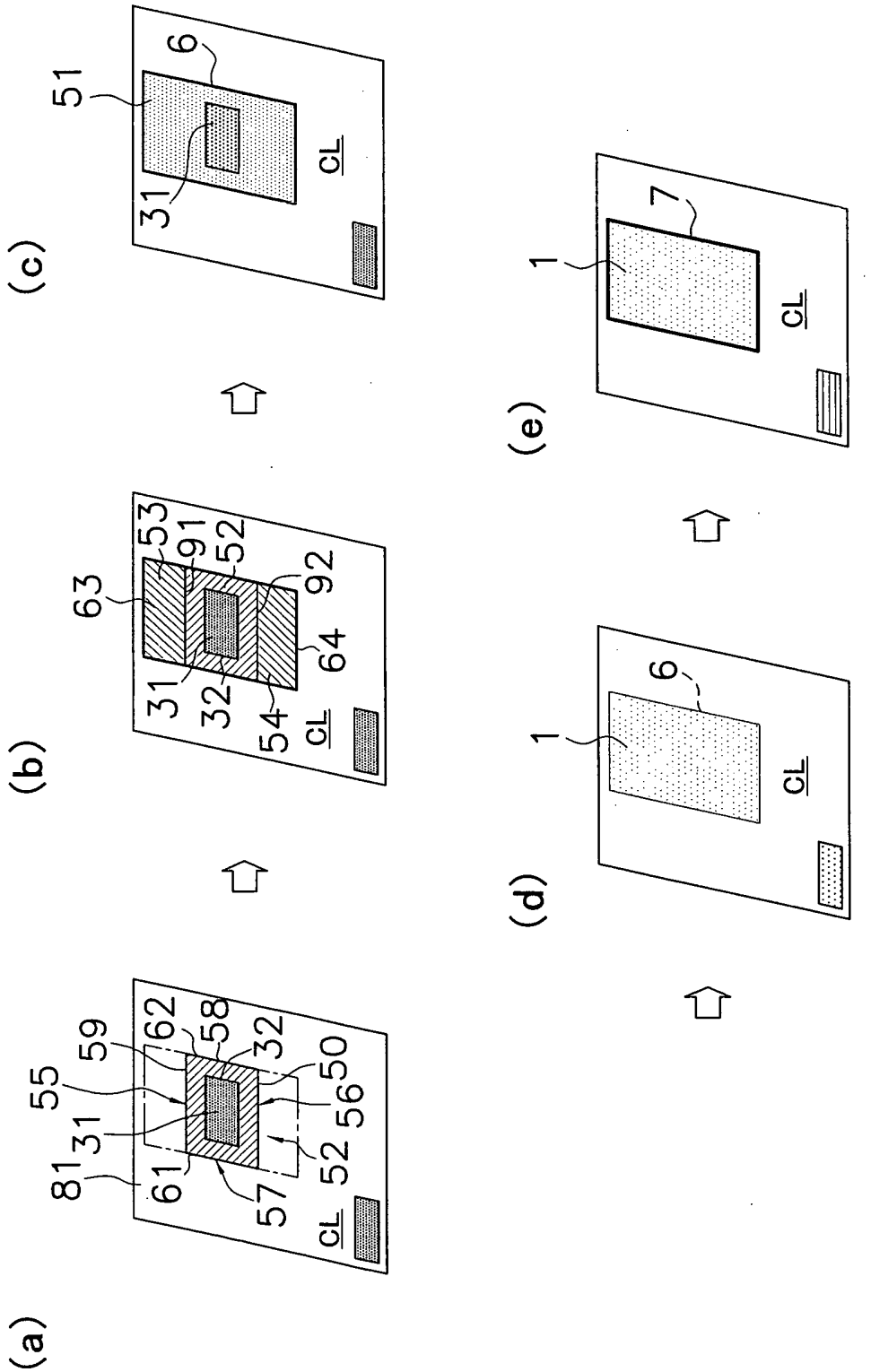

Fig. 4

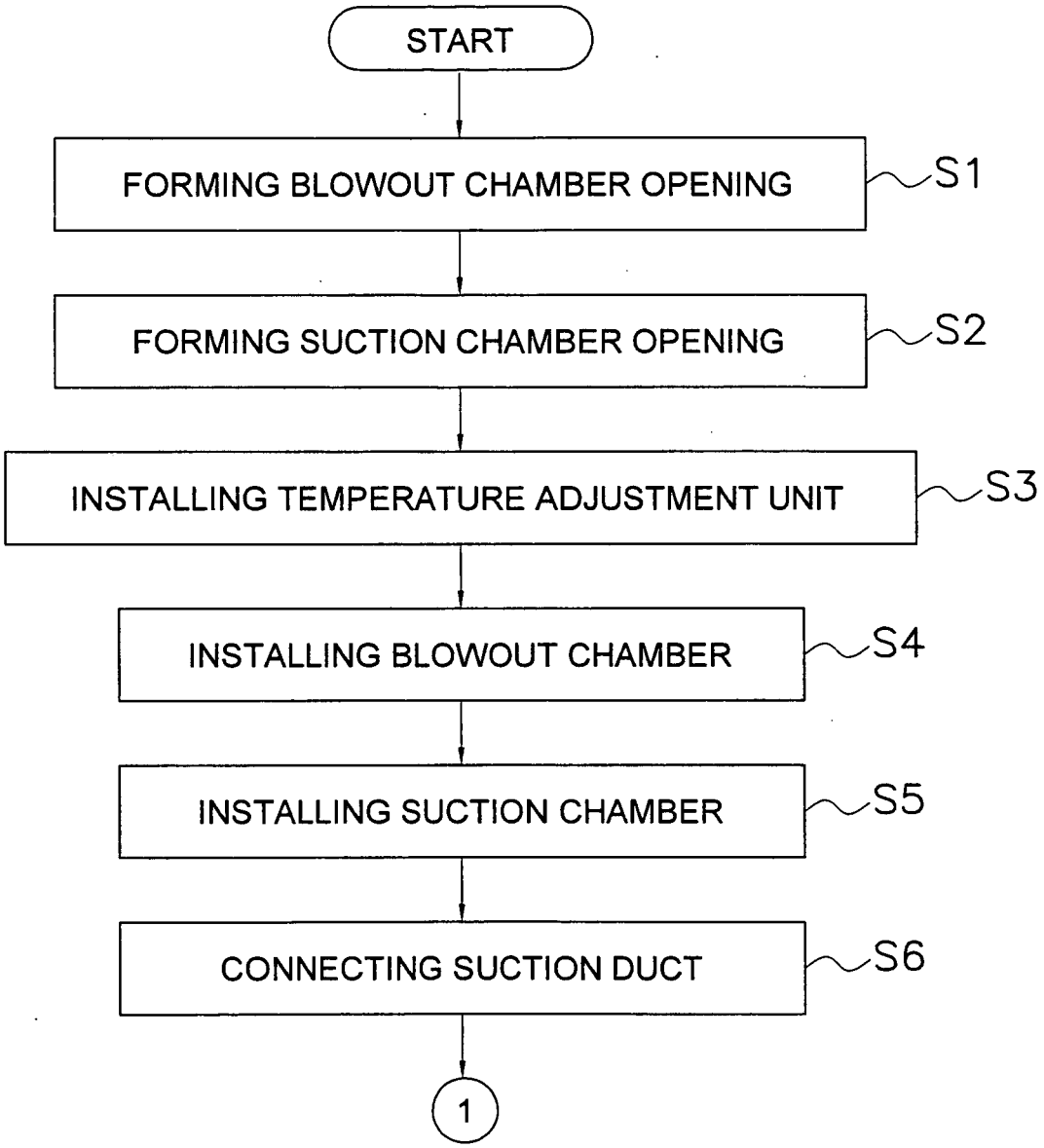
START
FORMING BLOWOUT CHAMBER OPENING
S1
FORMING SUCTION CHAMBER OPENING
S2
INSTALLING TEMPERATURE ADJUSTMENT UNIT
S3
INSTALLING BLOWOUT CHAMBER
S4
INSTALLING SUCTION CHAMBER
S5
CONNECTING SUCTION DUCT
S6
1

Fig. 5

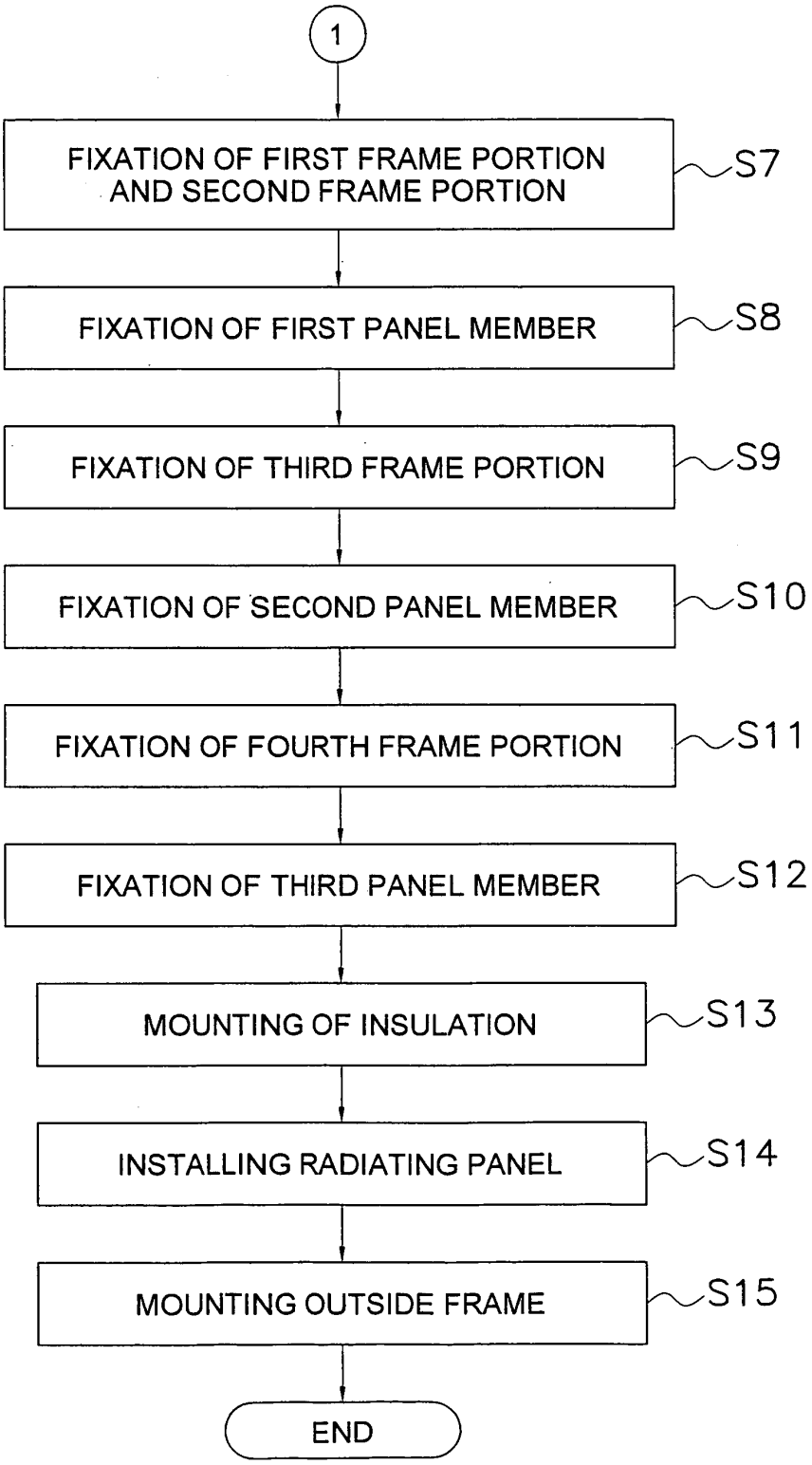
1
FIXATION OF FIRST FRAME PORTION AND SECOND FRAME PORTION
S7
FIXATION OF FIRST PANEL MEMBER
S8
FIXATION OF THIRD FRAME PORTION
S9
FIXATION OF SECOND PANEL MEMBER
S10
FIXATION OF FOURTH FRAME PORTION
S11
FIXATION OF THIRD PANEL MEMBER
S12
MOUNTING OF INSULATION
S13
INSTALLING RADIATING PANEL
S14
MOUNTING OUTSIDE FRAME
S15
END

Fig. 6

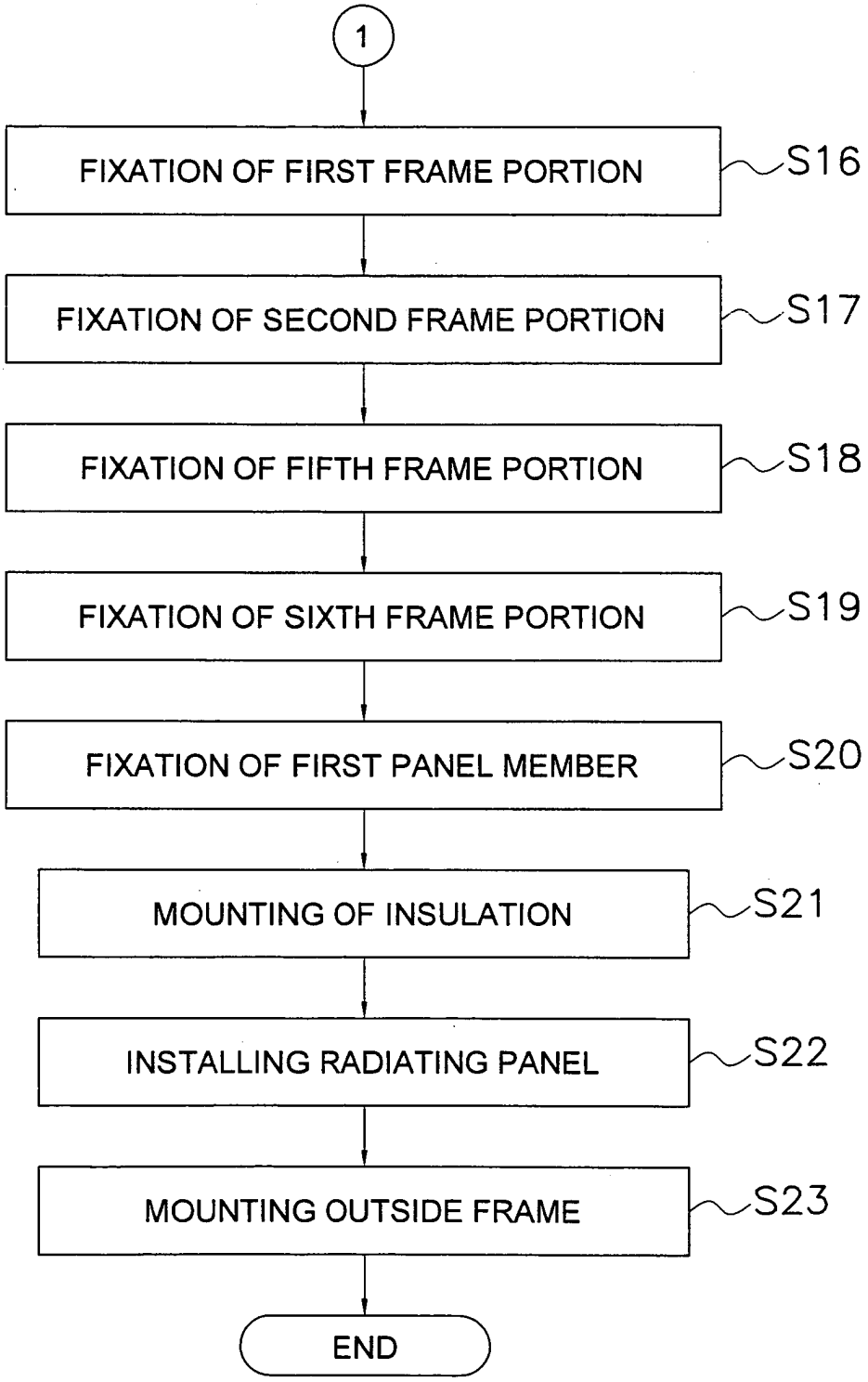
1
FIXATION OF FIRST FRAME PORTION
S16
FIXATION OF SECOND FRAME PORTION
S17
FIXATION OF FIFTH FRAME PORTION
S18
FIXATION OF SIXTH FRAME PORTION
S19
FIXATION OF FIRST PANEL MEMBER
S20
MOUNTING OF INSULATION
S21
INSTALLING RADIATING PANEL
S22
MOUNTING OUTSIDE FRAME
S23
END

Fig. 7

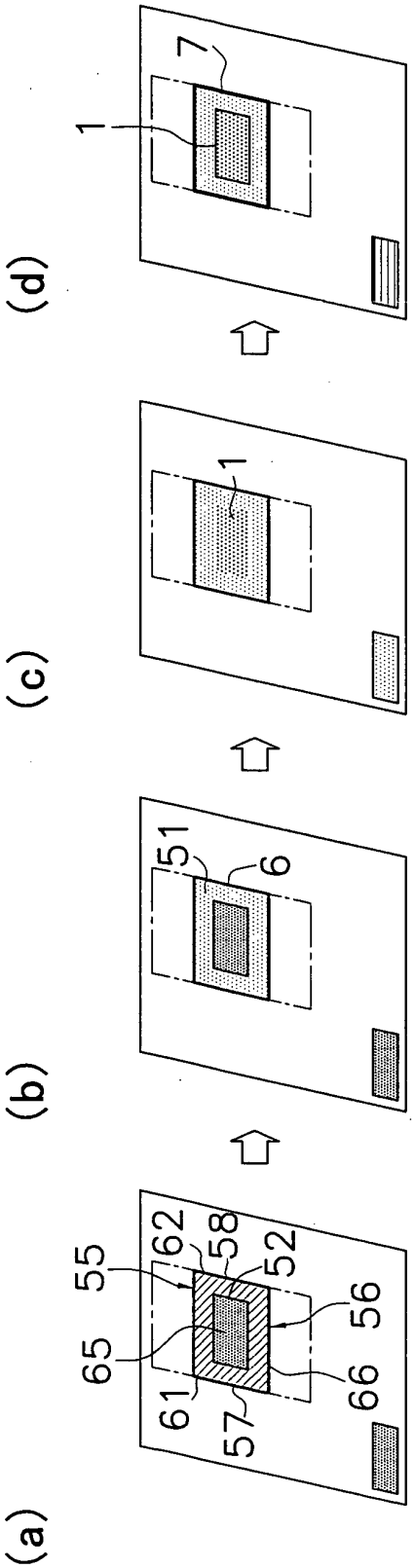

Fig. 8

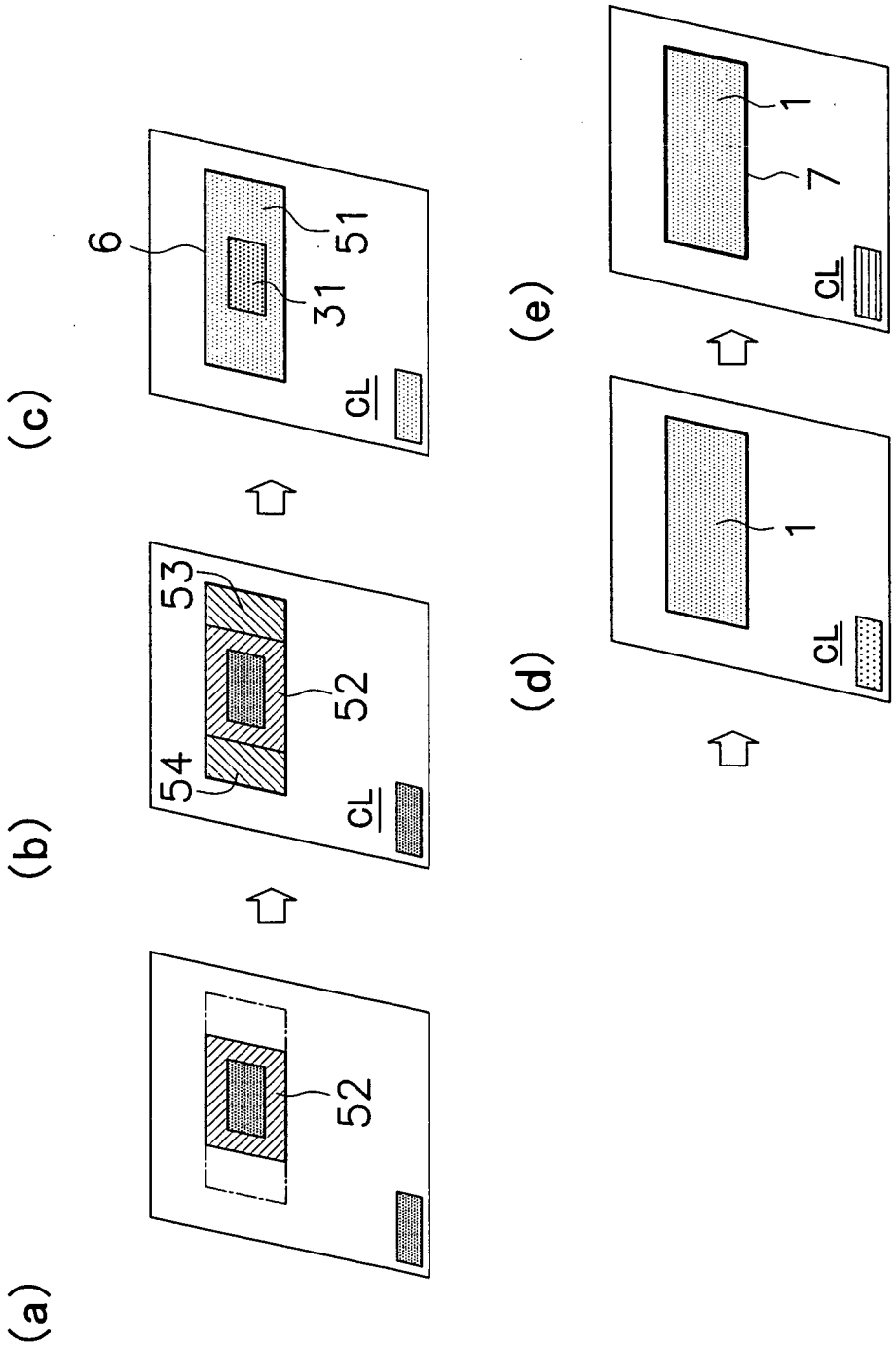

Fig. 9

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2006/307707

A. CLASSIFICATION OF SUBJECT MATTER
F24F5/00(2006.01), ***F24F13/06***(2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
F24F5/00(2006.01), ***F24F13/06***(2006.01)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2006
Kokai Jitsuyo Shinan Koho 1971-2006 Toroku Jitsuyo Shinan Koho 1994-2006

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 5-44965 A (Takasago Thermal Engineering Co., Ltd.), 23 February, 1993 (23.02.93), Figs. 2, 3 (Family: none)	1-16
A	JP 11-304195 A (Toyota Motor Corp.), 05 November, 1999 (05.11.99), Par. Nos. [0021] to [0022]; Fig. 1 (Family: none)	1-16
A	JP 1-63949 U (Shinko Kogyo Co., Ltd., Obayashi Corp.), 25 April, 1989 (25.04.89), Fig. 2 (Family: none)	1-16

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

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
08 May, 2006 (08.05.06)	16 May, 2006 (16.05.06)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (April 2005)

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- JP 2004271057 A **[0002]**