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

(11) **EP 3 182 023 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
**21.06.2017 Bulletin 2017/25**

(51) Int Cl.:
***F24F 1/22*** *(2011.01)* ***F24F 13/20*** *(2006.01)*

(21) Application number: **16188722.9**

(22) Date of filing: **14.09.2016**

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**
Designated Extension States:
**BA ME**
Designated Validation States:
**MA MD**

(30) Priority: **18.12.2015 KR 20150182060**
**18.12.2015 KR 20150182083**

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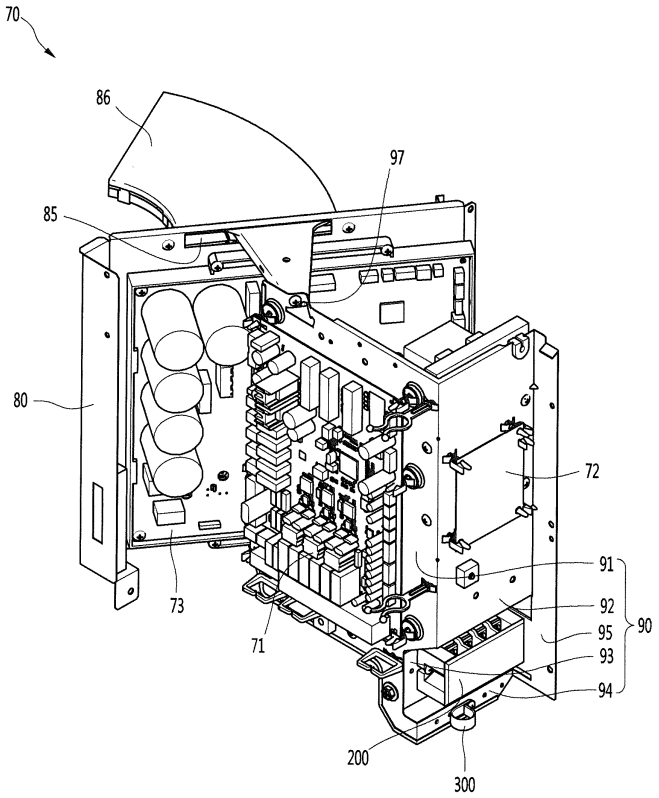
(54) **AIR CONDITIONER**

(57) An air conditioner having an outside unit that includes an electric chamber in which an electric part is provided and a case having a heat exchange chamber which is provided in one side of the electric chamber and includes a heat exchanger, wherein the electric part includes a plurality of electric components, an electric panel in which the plurality of electric components are provided, and a terminal block provided on one side of the electric panel and including a terminal part.

Fig. 5

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## Description

**[0001]** An air conditioner is disclosed herein.

**[0002]** An air conditioner is a home appliance which maintains inside air in an optimal state according to intended uses and purposes thereof. The air conditioner may include an inside unit and an outside unit. The air conditioner may be a separated type air conditioner in which an inside unit and an outside unit are separated from each other, and an integrated type air conditioner in which the inside unit and the outside unit are integrated in one unit.

**[0003]** The air conditioner drives a refrigeration cycle. Devices which drive the refrigeration cycle generally include a compressor to compress a refrigerant, a condenser to condense the compressed refrigerant, an expander to expand the refrigerant passing through the condenser, and an evaporator to evaporate the refrigerant passing through the expander.

**[0004]** The outside unit and the inside unit of the separated type air conditioner are configured separately. The flow of refrigerant in the pipe connecting the outside and inside units together decreases as the distance between the outside and inside units increases. Thus, having the outside unit and the inside unit located adjacent to each other is advantageous for purposes of cooling efficiency and cost.

**[0005]** For example, a high-rise building such as an apartment or office building, may have an outside unit provided on a space such as a balcony (hereinafter, referred to as an "outside unit installation space"), so that the outside unit may be disposed adjacent to the inside unit. More particularly, an outlet unit provided in the outside unit may be arranged to face an exhaust port such as a window of the balcony. The outlet unit may be disposed at a front surface part of the outside unit. Thus, air discharged through the outlet unit may be directly discharged to the outside. A display unit showing an operational state of the air conditioner may be provided in the front surface part of the outside unit.

**[0006]** Such conventional configuration provides a narrow space between the front surface part of the outside unit and a window of the balcony for a user to work or operate, which is problematic. Moreover, the display unit may be shielded by a panel that forms an exterior of the front surface part of the outside unit. Accordingly, the panel must be separated for a user to determine or read the display unit, which is problematic given space constraints.

**[0007]** Moreover, when the air conditioner is installed in the outside unit installation space, air discharged from the front surface part may be re-introduced into the inside of the outside unit. In order to avoid this phenomenon, a guide member which is limiting the discharged air from flowing to a suction side of the outside unit may be installed in the panel of the outside unit.

**[0008]** When it comes to the outside unit in which such a guide member is installed, in order to confirm the display unit, the guide member should be dismantled first and then the panel should be separated, and therefore the efficiency of work is lowered.

**[0009]** In addition, when the outside unit is installed on an outer wall of a building, there is a problem that an operator cannot substantially separate the panel of the outside unit installed on the outer wall.

**[0010]** Korean Patent Application No. 10-2004-010127, titled "Multi Air Conditioning Systems," which is incorporated herein by reference, discloses a conventional method and configuration of a multi air conditioning system. In particular, the reference discloses an air conditioner having a connection port and a communication interface to control the state and operation of the air conditioner. However, in order to connect the connection port to the outside unit, the panel of the outside unit must be removed first. Such configuration is problematic in that it is difficult for a user to confirm the operation state of the outside unit easily because the user must operate in a narrow space between the front surface part of the outside unit and, for example, a window of the balcony.

**[0011]** A conventional separated type air conditioner may further include a power cable to provide power to the outside unit and the inside unit. Specifically, the power cable may include an inside side power cable connected to the inside unit and an outside side power cable connected to the outside unit. At least a portion of the inside side power cable and the outside side power cable may be positioned inside of the outside unit. Additionally, the conventional separated type air conditioner may include a signal cable to transmit a control signal to the outside unit and inside unit. Specifically, the signal cable may include an inside side signal cable connected to the inside unit and an outside side signal cable connected to the outside unit. At least a portion of the outside and inside signal cable may be positioned in the inside of the outside unit. Such configurations are problematic in that because a plurality of cables are located within the outside unit, there is an increased risk that the cables will become intertwined and either disconnect or short-circuit.

**[0012]** To prevent such problems, the air conditioner may include a cable extended to the outside unit from outside and a terminal block for accessing the cable positioned inside the outside unit. For example, a cable extended to the outside unit from the outside may be connected to one side of the terminal block and a cable located inside the outside unit may be connected to the other side of the terminal block. However, such configuration is problematic.

**[0013]** For example, Korean Patent Application No. 10-2003-0024914, titled " The Outdoor Unit Controller Of An Air Conditioner," which is incorporated herein by reference, discloses a conventional method and configuration of an outside unit controller of an air conditioner. In particular, the reference discloses a multistage terminal block configuration having a power cable and a signal cable that are attached at different ends of the terminal

block. Although this configuration may reduce the risk of short-circuit between the cables because it requires an additional electric panel for attaching the terminal block, there is an increased risk of interference between the added extra electric panel and an electric part and/or an increased risk that the cable is separated from the terminal block. Moreover, the additional electric panel may block air flow that would otherwise cool the electric part.

**[0014]** In view of the foregoing, a structure for preventing entanglement between a plurality of cables, preventing interference with a plurality of electric components, and not disturbing the flow of air which is flowing in the electric part is required.

**[0015]** The present disclosure is directed to an improved configuration for an air conditioner having an inside unit and an outside unit.

**[0016]** According to an aspect of the present disclosure, there is provided an outside unit of an air conditioner including an electric part comprising a display device, and a case including a heat exchange chamber provided at a side of the electric part and in which a heat exchanger is provided, a front surface part having an outlet port, a side surface part provided at both sides of the front surface part, and an upper surface part provided at an upper side of the front surface part, wherein the side surface part includes an inspection window having an opening to provide access to the display device, and a service cover attached to the inspection window to selectively cover the display device.

**[0017]** According to another aspect of the present disclosure, there is provided an outside unit of an air conditioner including a case having an electric chamber in which an electric part in provided and a heat exchange chamber in which a heat exchanger is provided, wherein the electric part includes an electric panel at which an electric component is provided, a terminal block provided at one side of the electric panel, the terminal block having a first terminal part and a second terminal part, a first cable connected to the first terminal part and providing power or a signal to the electric component, a second cable extended from outside of the outside unit and connected to the second terminal part, and a fixing member that is spaced apart from the terminal block and supports the second cable, wherein the electric panel includes an installation part at which the electric component is provided, and an opening part provided at a side of the installation part and attached to the terminal block.

**[0018]** The details of one or more embodiments are set forth in the accompanying drawings and the description below. Other features will be apparent from the description and drawings, and from the claims.

**[0019]** The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this application, illustrate embodiments of the invention and together with the description serve to explain the principle of the invention. In the drawings:

FIG. 1 is a perspective view of an outside unit of an air conditioner according to an embodiment of the present disclosure;

FIG. 2 is a perspective view illustrating a flow of a refrigerant and a configuration of the air conditioner according to the embodiment of the present invention;

FIG. 3 is an exploded view of the outside unit of the air conditioner according to the embodiment of the present disclosure;

FIG. 4 is a top view illustrating a state in which an upper surface panel is removed from the outside unit of the air conditioner according to the embodiment of the present disclosure;

FIG. 5 is a front perspective view illustrating an electronic component part of the air conditioner according to the embodiment of the present disclosure;

FIG. 6 is a rear perspective view of the electronic component part of the air conditioner according to the embodiment of the present disclosure;

FIG. 7 is a view illustrating a display device of an air conditioner according to an embodiment of the present disclosure;

FIG. 8 is a view illustrating a terminal block of the air conditioner according to an embodiment of the present disclosure;

FIG. 9 is a rear perspective view illustrating a state in which the terminal block of the air conditioner is attached to the electric panel according to an embodiment of the present disclosure;

FIG. 10 is a cross-sectional view illustrating a state in which the terminal block of the air conditioner is attached to the electric panel according to an embodiment of the present disclosure;

FIG. 11 is a perspective view illustrating a state in which the service cover of the air conditioner is separated according to an embodiment of the present disclosure;

FIG. 12 is a view illustrating a state in which the service cover is attached to the service panel of the air conditioner according to an embodiment of the present disclosure;

FIG. 13 is a cross-sectional view illustrating a fastened structure of the service panel and the service cover of the air conditioner according to an embodiment of the present disclosure.

**[0020]** Reference will now be made in detail to the embodiments of the present disclosure, examples of which are illustrated in the accompanying drawings. It is understood that the description herein is not intended to limit the claims to the specific embodiments described. On the contrary, it is intended to cover alternatives, modifications, and equivalents as may be included within the spirit and scope of the present disclosure.

**[0021]** FIG. 1 is a perspective view of an outside unit of an air conditioner according to an embodiment of the present disclosure, FIG. 2 is a perspective view illustrat-

ing a flow of a refrigerant and a configuration of the air conditioner according to an embodiment of the present disclosure, FIG. 3 is an exploded view of the outside unit of the air conditioner according to an embodiment of the present disclosure, and FIG. 4 is a top view illustrating a state in which an upper surface panel is removed from the outside unit of the air conditioner according to an embodiment of the present disclosure.

**[0022]** Referring to FIGS. 1 through 4, an air conditioner includes an outside unit 10 which exchanges heat with outside air, and an inside unit (not shown) which is provided at an inside space to condition inside air.

**[0023]** The outside unit 10 may include a case which forms an exterior of the outside unit 10 and in which a plurality of components may be provided. The case may include a front panel 11 which forms a front surface of the outside unit 10. The front panel 11 may include an outlet port 11 A. The front panel 11 may be arranged to face a window and an outer wall (e.g., a wall proximate an outside space) of a space in which the outside unit is installed. That is, the front panel 11 may be installed so that the outlet port 11A faces an exhaust port, such as a window.

**[0024]** In addition, the case further includes at least one of a rear panel 12, which is spaced apart and rearward from the front panel 11 , and an upper surface panel 13 that forms an upper surface of the outside unit. The rear panel 12 may include a first suction port 12A.

**[0025]** In addition, the case may include side surface panels 14 and 15 configuring both side surfaces of the outside unit (e.g., right and left side surfaces). The side surface panel includes a left side surface panel 14 in which a second suction port 14A is provided, and a right side surface panel 15 in which a third suction port 15A is provided.

**[0026]** According to an embodiment of the present disclosure, the front panel 11 may be referred to as a "front surface part" of the case, the rear panel 12 may be referred to as a "rear surface part" of the case, and the both side surface panels 14 and 15 may be referred to as "both side surface part" of the case.

**[0027]** The outside unit 10 may include an internal space (e.g., cavity) surrounded by the case. A compressor or the like may be provided inside the internal space.

**[0028]** The case of the outside unit 10 may include the suction ports 12A, 14A, and 15A through which the outside air is suctioned. The case of the outside unit 10 may further include an outlet port 11A through which the suctioned air is discharged. The outlet port 11A may be formed at a front surface of the outside unit 10, and the suction ports 12A, 14A and 15A may be formed at a rear and/or a side surface of the case. More specifically, the outlet port 11 A may be formed at the front panel 11, and the suction ports 12A, 14A and 15A may be located on at least one of the rear panel 12, the left side panel 14, and the right side panel 15.

**[0029]** The outside unit 10 may further include a service panel 100. The service panel 100 may be formed to be rounded from the front surface of the outside unit toward one side surface thereof. For example, the service panel 100 may be formed to be rounded from the front surface of the outside unit toward a right side surface thereof. One end of the service panel 100 may be attached to a right end of the front panel 11, and the other end of the service panel 100 may be attached to a front end of the right side panel 15. The service panel 100 may open and close both of the front and the side with a single panel, making it easier for an installer or manager to access an electronic chamber.

**[0030]** The outside unit 10 may further include a base 17 which forms a lower surface of the outside unit 10. The compressor or the like may be installed on an upper surface of the base 17. A lower surface of the base 17 may be in contact with a ground surface (e.g., floor), and thus the outside unit 10 may be fixed to the ground.

**[0031]** The outside unit 10 may include a partition wall 18 which extends upward from the base 17 and divides the internal space into at least a heat exchange chamber 50 and an electric chamber 60. The partition wall 18 may prevent water in the heat exchange chamber 50 from permeating into the electric chamber 60.

**[0032]** Here, the heat exchange chamber 50 is a space where a heat exchanger 24 and a fan 32 may be provided, and in which heat may be exchanged between a refrigerant passing through the heat exchanger 24 and external air flowing by the fan 32. The electric chamber 60 is a space where an electric part 70 may be provided. The electric part 70 may be provided at an upper portion of the electric chamber 60 so that water does not permeate the electric part 70.

**[0033]** The partition wall 18 is a plate which extends vertically. One end of the partition wall 18 may be attached to the upper surface of the base 17, and the other end may be attached to a first electric panel 80. The partition wall 18 may include a curved surface which is formed to be rounded. The partition wall 18 may have a curved surface corresponding to a configuration which is provided at the electric part 70.

**[0034]** At least one of a compressor 21, an oil separator 22, a flow switching part 23, an outside heat exchanger 24, an expansion valve 35, a gas-liquid separator 25 and a plurality of refrigerant pipes 26 may be provided inside the outside unit 10.

**[0035]** The outside unit 10 includes the compressor 21 which compresses the refrigerant and the oil separator 22 which is provided at an outlet side of the compressor 21 to separate oil from the refrigerant discharged from the compressor 21.

**[0036]** The flow switching part 23 which guides the refrigerant discharged from the compressor 21 toward the outside heat exchanger 24 or the inside unit (not shown) is provided at an outlet side of the oil separator 22. For example, the flow switching part 23 may include a 4-way valve.

**[0037]** The flow switching part 23 may be connected to a first connection pipe 27 which is connected to the

outside heat exchanger 24, a second connection pipe 28 which is connected to the gas-liquid separator 25, and a third connection pipe 29 which is connected to the inside unit (not shown).

**[0038]** When the air conditioner performs a cooling operation, the refrigerant is introduced from the flow switching part 23 into the outside heat exchanger 24 through the first connection pipe 27. However, when the air conditioner performs a warming operation, the refrigerant is introduced from the flow switching part 23 into an inside heat exchanger of the inside unit (not shown) through the third connection pipe 29.

**[0039]** In the outside heat exchanger 24, heat is exchanged between the external air and the refrigerant, and the outside heat exchanger 24 serves as the condenser when the air conditioner performs the cooling operation, and also serves as the evaporator when the air conditioner performs the warming operation.

**[0040]** When the air conditioner performs the cooling operation, the refrigerant passed through the outside heat exchanger 24 passes through an expansion valve 35. That is, the expansion valve 35 may be provided at an outlet side of the outside heat exchanger 24 based on the cooling operation. When the cooling operation is performed, the main expansion valve 35 is completely opened, and thus a decompressing action of the refrigerant is not performed.

**[0041]** The refrigerant passed through the expansion valve 35 flows to the inside unit through an inside pipe 38, and the refrigerant evaporated in the inside heat exchanger (not shown) is introduced into the outside unit 10 through the inside pipe 38.

**[0042]** The refrigerant introduced into the inside unit is introduced into the flow switching part 23 through the third connection pipe 29, and discharged from the flow switching part 23 through the second connection pipe 28.

**[0043]** The refrigerant passed through the flow switching part 23 flows to the gas-liquid separator 25. The gas-liquid separator 25 may separate a gas refrigerant before the refrigerant is introduced into the compressor 21, and the separated gas refrigerant may be introduced into the compressor 21.

**[0044]** The outside unit 10 may further include a motor 31, the fan 32 and a motor bracket 33.

**[0045]** The motor 31 serves to provide a rotating force to the fan 32, and the fan 32 is attached to a rotating shaft of the motor 31, and thus enables the air to flow by the rotating force. The fan 32 is attached to the motor bracket 33, and the motor bracket 33 supports the motor 31 and the fan 32.

**[0046]** The fan 32 is located corresponding to the outlet port 11A provided at the front panel 11, and the motor bracket 33 may be a structure formed between the base 17 and the upper surface panel 13. That is, one end thereof is attached to the upper surface of the base 17, and the other end thereof is attached to a lower surface of the upper surface panel 13, and the motor 31 attached to the front surface is located corresponding to the outlet port 11A.

**[0047]** FIG. 5 is a front perspective view illustrating the electronic component part of the air conditioner according to the embodiment of the present disclosure, and FIG. 6 is a rear perspective view of the electronic component part of the air conditioner according to the embodiment of the present disclosure.

**[0048]** Referring to FIGS. 5 and 6, the outside unit 10 includes a electric part 70 controlling the air conditioner. For example, the electric part 70 may include at least one of the electric components from a main PCB 71, the display device 72, an inverter PCB 73, a heat sink 75, a noise filter 78 and a reactor 79.

**[0049]** In another example, the electric part 70 may include a terminal block 200 accessed to a plurality of cables which is connected to the electric part or a fixing member 300 fixing the cable.

**[0050]** Also, the electric part 70 may include a first electric panel 80 to which the plurality of electric components are attached, and a second electric panel 90 which is spaced apart from the first electric panel 80.

**[0051]** The first electric panel 80 may be located at an upper side of the partition wall 18, and the partition wall 18 and the first electric panel 80 may divide the heat exchange chamber 50 and the electric chamber 60.

**[0052]** The inverter PCB 73 may be attached to a front surface of the first electric panel 80, and the heat sink 75 may be attached to a rear surface thereof. Here, the front surface is a surface which is adjacent to the electric chamber 60, and the rear surface is a surface which is adjacent to the heat exchange chamber 50.

**[0053]** Also, the inverter PCB 73 and the heat sink 75 may be attached to positions corresponding to each other based on the first electric panel 80. Therefore, heat of the inverter PCB 73 may pass through the first electric panel 80, may be transferred to the heat sink 75, and then may be discharged.

**[0054]** Also, the first electric panel 80 may include a suction part 85. The suction part 85 is located at an upper portion of the first electric panel 80, and may be an opening which passes through the first electric panel 80. For example, the suction part 85 may be located at an upper side further than the point to which an inverter PCB 73 is attached.

**[0055]** An air guide 86 may be located at a rear surface of the suction part 85, and the air in front surface of the suction part 85 may flow to the introduction port of the air guide 86. The second electric panel 90 includes at a front surface part 91 which faces the front panel 11.

**[0056]** The front surface part 91 may be disposed in parallel with the front panel 11 or the rear panel 12.

**[0057]** Also, the second electric panel 90 may further include side surface parts 92, 93 and 94 bended and extended at the front surface part 91. The side surface parts 92, 93 and 94 may include at least one of a first side surface part 93 bended and extended at the front surface part 91, a second side surface part 92 bended and extended from at the front surface part 91 and located

above the first side surface part 93, and a third side surface part 94 bended and extended at the front surface part 91 and located at the lower side of the first side surface part 93.

**[0058]** The second side surface part 92 may be positioned parallel with the service panel 100, and the first side surface part 93 or the third side surface part 94 may be positioned parallel with the left side panel 14 or the right side panel 15.

**[0059]** The second electric panel 90 may further include a rear surface part 95 that is bent and extends at the first, second and third side surface parts 92, 93 and 94. The rear surface part 95 may be positioned parallel with the front panel 11, the rear panel 12, or the front surface part 91.

**[0060]** The first, second, and third side surface parts 92, 93 and 94 may be spaced apart from each other in an upward and downward direction relative to the ground or base 17. For example, the upward and downward direction is a direction which is directed from the base 17 toward the upper surface panel 13 or a direction which is directed from the upper surface panel 13 toward the base 17.

**[0061]** The first, second, and third side surface parts 92, 93 and 94 may be spaced apart from each other in an order of the second side surface part 92, the first side surface part 93 and the third side surface part 94 from an upper side toward a lower side.

**[0062]** The first, second, and third side surface parts 92, 93 and 94 may be spaced apart from each other in a left and right direction. For example, the left and right direction is a direction which is directed from the right side panel 15 toward the left side panel 14, or a direction which is directed from the left side panel 14 toward the right side panel 15.

**[0063]** For example, among the first, second, and third side surface parts 92, 93 and 94, the second side surface part 92 may be provided closest to the right side panel 15, and the first side surface part 93 may be provided closest to the left side panel 14, and the third side surface part 94 may be provided between the first and second side surface parts 92 and 93 to be spaced apart therefrom. In other words, the first, second, and third side surface parts 92, 93 and 94, may be spaced apart from each other in an order of the second side surface part 92, the third side surface part 94, and the first side surface part 93 from a right side toward a left side.

**[0064]** Space parts 98 and 99 may be formed in a space between the first, second, and third side surface parts 92, 93 and 94. For example, as shown in FIG. 10, a first space part 98 may be formed between the first side surface part 93 and the second side surface part 92, and a second space part 99 may be formed between the first side surface part 93 and the third side surface part 94.

**[0065]** A first cable 205 attached to the terminal block 200 may penetrate the first space part 98 and attach to the electric component. As a result, the length of the cable wire may be shortened and the friction of the air generated by the wire may be reduced. Also, because air may flow through the second space part 99, the flow path of the air may be ensured.

**[0066]** The space part 98 may be referred to as an "opening part" of the front panel because it is formed to be opened vertically at a one portion of the front panel.

**[0067]** The main PCB 71 may be attached to a front surface of the front surface part 91. The reactor 79 may be attached to a rear surface of the front surface part 91. The main PCB 71 and the reactor 79 may be alternately disposed.

**[0068]** For example, the main PCB may be attached to an upper side of the front surface of the front surface part, and the reactor 79 may be attached to a lower side of the rear surface of the front surface part. In such a configuration, because the air guide 86 discharges the air close to the rear surface of the front surface part 91 to the heat exchange chamber 50, the reactor 79 - which has a higher heat generation rate than a main PCB 71 - is located at the rear surface of the front surface part 91, which prevents heat generated from the reactor 79 from being transferred to the main PCB 71.

**[0069]** The display device 72 may be attached to a front surface of the side surface part 92. The noise filter 78 may be attached to a rear surface of the side surface part 92.

**[0070]** The display device 72 may be disposed toward the service panel 100. More specifically, the display device 72 may be disposed toward the service window of the service panel 100 such that the display device 72 can be monitored or viewed through the service window.

**[0071]** FIG. 7 is a view illustrating a display device of an air conditioner according to an embodiment of the present disclosure. Referring to FIG. 7, the display device 72 is provided on a circuit board and includes a display part 72A. The display part 72A displays information about an operational status of the air conditioner. The display part 72A may include, for example, a plurality of segments.

**[0072]** The circuit board may include a control part 72B. The control part 72B may include, for example, a plurality of switches.

**[0073]** The circuit board may include a communication part 72C. Through the communication part 72C, communication with an external device of the outside unit may be enabled. The operator may receive information about the operating status of the outside unit 10 by using the communication part 72C, and may upload a program or the like to the outside unit 10 by using the communication part 72C.

**[0074]** FIG. 8 is a view illustrating a terminal block of the air conditioner according to an embodiment of the present disclosure, FIG. 9 is a rear perspective view illustrating a state in which the terminal block of the air conditioner is attached to the electric panel according to an embodiment of the present disclosure, and FIG. 10 is a cross-sectional view illustrating a state in which the terminal block of the air conditioner is fasted to the electric

panel according to an embodiment of the present disclosure.

**[0075]** Referring to FIGS. 5, 6, 8, 9, and 10, a terminal block 200 may be attached to the front surface of the first side surface part 93. One end of a power cable or a signal cable which is connected from the outside of the outside unit 10 to an inside thereof may be attached to the terminal block 200. The terminal block 200 may function to distribute electric power or a signal to the each of the electric parts 70. As shown, the power cable or the wire of the signal cable may pass through the first, second, and third side surface parts 92, 93, and 94, which may be spaced apart from each other, and may be connected to each of the electric parts 70.

**[0076]** A fixing member 300 at which a part of the power cable or the signal cable is fixed may be attached to a front surface of the third side surface part 94.

**[0077]** The front surface part 91 may be referred to as a "connection part" in the aspect of connecting the first side surface part 93, the second side surface part 92 and the third side surface part 94. The second side surface part 92 may be referred to as an "installation part" since the electric component is installed therein. Since the first side surface part 93 supports the terminal block 200, it may be referred to as a "supporting surface", and the third side surface part 94 may be referred to as a "fixing surface" since the fixing member 300 which is fixing the power cable or the signal cable is located thereat.

**[0078]** The terminal block 200 may electrically connect the power cable and signal cable, and connect the power and signal of the outside of the outside unit to the electric part 70 of the inside of the outside unit.

**[0079]** The terminal block 200 may include a main body 210 and a terminal part 230. One end of each of the power cable and the signal cable may be attached to the terminal part 230. There may be a plurality of terminal parts 230 so as to correspond to the number of the cables, and the plurality of terminal parts 230 may be arranged in parallel so as to correspond to each other.

**[0080]** For example, the terminal part 230 may be configured in two rows, and the terminal part 230 may include a first terminal part 230A and the second terminal part 230B. The first terminal part 230A may be referred to as an output terminal in which the power and the signal is transmitted to the electric part 70, and the second terminal part 230B may be referred to as an input terminal in which the power and the signal is inputted from the outside of the outside unit.

**[0081]** According to an embodiment of the invention, the power cable and the signal cable are attached to the first terminal part 230A, attached to the first cable 205 connected to the electric part 70 and the second terminal part 230B, and may include a second cable 206 which is transferring the power and the signal of the outside to the first terminal part 230A. The first cable 205 may be referred to as an output cable and the second cable 206 may be referred to as an input cable.

**[0082]** The terminal part 230 may include the same number of second terminal parts 230B as that of the first terminal parts 230A. The first terminal part 230A may be provided on one side of the main body, and the second terminal part 230B may be provided on the other side of the main body.

**[0083]** As shown in FIG. 8, four first terminal parts 230A and four second terminal parts 230B are provided in two rows. However, it is understood that the invention is not limited thereto and the numbers of the first terminal parts 230A and second terminal parts 230B may vary depending on the number of power and signals used in the outside unit.

**[0084]** The terminal part 230 may include a terminal 231 which is provided on an upper surface of the main body and electrically connected to one end of the cable, and an abutment member 232 which presses against the terminal 231 and fixing the one end of the cable.

**[0085]** As shown, the terminal 231 and the abutment member 232 may be a screw penetrating the plate and the plate. However, it is understood that the invention is not limited thereto and any structure which connects one end of the cable electrically and may fix the one end of the cable may be applied.

**[0086]** The terminal block may include a partition wall 250. As shown, the partition wall 250 may be provided at an upper surface of the main body and provided between each of the terminal parts 230 in order to electrically separate the terminal part 230. For example, the partition wall 250 may be extended to the side surface from the upper surface of the main body.

**[0087]** The terminal block 200 may include a cover part 270. As shown, the cover part 270 may be attached to the upper surface of the main body 210 in order to prevent the terminal part 230 from being exposed to the upper side. Therefore, the terminal part 230 and the partition wall 250 may be provided between the main body 210 and the cover part 270, and a cable which is attached to the terminal part 230 may be extended to both sides of the main body 210.

**[0088]** The terminal block 200 may include a fastening part 290 attaching the terminal block to the first side surface part 93. As shown, the fastening part 290 may include an opening which penetrates the main body 210 and a fastening member which penetrates the opening. The terminal block 200 may be attached to one surface of the first side surface part 93 by the fastening part.

**[0089]** One surface of the terminal block 200 may be provided to face the upper surface panel 13 and the other surface of the terminal block 200 may be provided to face the base 17. For example, relative to the ground or base 17, the first terminal part 230A may face upward and the second terminal part 230B may face downward.

**[0090]** The first side surface part 93 and the second side surface part 92 may be spaced part horizontally with a greater distance between them than the height of the main body 210 of the terminal block 200, and a cable connected to the first terminal part 230A may pass through the first space part 98 provided between the first

side surface part 93 and the second side surface part 92 and may be connected to the electric part 70. That is, the first cable 205 attached to the first terminal part 230A may pass through the first space part 98 and be attached to each electric part.

**[0091]** For example, the first cable 205 attached to the first terminal part 230A may pass through the first space part 98 and may be connected to the noise filter 78.

**[0092]** On the other hand, the first side surface part 93 and the third side surface part 94 may be spaced apart in a horizontal direction with a distance between them that is the same as the height of the main body 210 of the terminal block 200. It is understood that the height is a distance from a lower surface of the terminal block 200, that is, the first side surface part 93 to the terminal part 230.

**[0093]** The second cable 206 connected to the second terminal part 230B may be fixed by a fixing member 300 provided on one surface of the third side surface part 94. The fixing member 300 may be, for example, a clamping device.

**[0094]** According to an embodiment of the invention, a distance from the first side surface part 93 to the second terminal part 230B may correspond to a distance from the first side surface part 93 to the second cable which is fixed to the fixing member 300, and a distance from the first side surface part 93 to the second terminal part 230B or a distance from the first side surface part 93 to the second cable may be less than or equal to 1 cm.

**[0095]** According to this configuration, since the second cable 206 is fixed by the fixing member 300, the second cable 206 may be attached to the terminal block without a break, and since the second cable 206 is double-fixed by the terminal block 200 and the fixing member 300, the second cable 206 may be prevented from being removed from the terminal block 200.

**[0096]** The terminal part 230 and the fixing member 300 may be located on a single virtual plane. According to this configuration, the first side surface part 93 and the third side surface part 94 may be disposed to face one direction. For example, the first side surface part 93 and the third side surface part 94 may be extended in a parallel relationship and the first side surface part 93 and the third side surface part 94 may be disposed to face both sides of the case.

**[0097]** The fixing member 300 may be provided in the plural according to the number of the second cables 206.

**[0098]** FIG. 11 is a perspective view illustrating a state in which the service cover of the air conditioner is separated according to an embodiment of the present disclosure, FIG. 12 is a view illustrating a state in which the service cover is attached to the service panel of the air conditioner according to an embodiment of the present disclosure, and FIG. 13 is a cross-sectional view illustrating a fastened structure of the service panel and the service cover of the air conditioner according to an embodiment of the present disclosure.

**[0099]** Referring to FIGS. 11 through 13, the service panel 100 of the outside unit 10 may include a body part 101 formed to be rounded to one side from the front surface of the outside unit. As shown, the body part 101 includes a first panel part 101 A disposed to face the front and a second panel part 101B bent at the first panel part 101A, extended to one side and disposed to face the one side part. According to a different perspective, the first panel part 101 A is a portion which is extended in a right and left direction, and the second panel part 101 B is a portion which is bent at the first panel part 101A and extended in a front and rear direction.

**[0100]** Here, the front panel 11 and the first panel part 101A may be referred to as the "front surface part of the case" because they are disposed toward the front of the case. The side surface panels 14 and 15 and the second panel part 101B may be referred to as the "side surface part of the case." The upper surface panel 13 may be referred to as the "upper surface part of the case."

**[0101]** The service panel 100 may include an inspection window 110 which is formed through the body part 101. The inspection window 110 may include an opening penetrating the body part 101. The inspection window 110 may be formed in a shape corresponding to a shape of the display device 72 and may be disposed in a position corresponding to the display device 72.

**[0102]** According to this configuration, because the display device 72 may be exposed to the outside through the inspection window 110, an installer or user only needs to open the service cover 150 which opens and closes (e.g., covers and uncovers) the inspection window 110 without separating the service panel 100 and may determine the state of the outside unit 10 through the inspection window 110.

**[0103]** The inspection window 110 may be provided at the second panel part 101B. According to this configuration, even when it is difficult for the installer or user to work in front of the outside unit 10 due to space constraints (for example, when the outside unit is disposed in a narrow space such as a balcony or a wall surface of the building), the state of the outside unit can be determined through the inspection window 110 provided at the second panel part 101B, and therefore making it more convenient for the user or operator.

**[0104]** As shown, the inspection window 110 is provided at the second panel part 101B; however, the configuration is not limited thereto and the inspection window 110 be provided at either of the side surface panels 14 and 15. That is, the inspection window 110 may be provided at the side surface part of the case.

**[0105]** The service panel 100 may further include a depression part 103 which is depressed from the body part 101 to the inside direction of the outside unit. The depression part 103 may be formed having a size corresponding to a service cover 150. In one example, the depression part 103 may be formed in the second panel part 101 B.

**[0106]** In addition, the inspection window 110 may be formed through the depression part 103. The inspection

window 110 may be formed in the center of the depression part 103. That is, the depression part 103 may be located in the vertical direction or the horizontal direction with the inspection window 110 as the center. According to a different perspective, the depression part 103 may be located at a corner portion of the inspection window 110.

**[0107]** The depth in which the depression part 103 is depressed the inside the outside unit 10 may correspond to the thickness of the service cover 150. For example, the depth of the depression of the depression part 103 may be the same as the thickness of the service cover 150. In such configuration, an external surface of the body part 101 and an external surface of the service cover 150 are positioned on the same plane. The external surface refers to a surface formed in a direction opposite to a direction toward the inside of the inside unit.

**[0108]** The service panel 100 may include a ramp 102 extended from the body part 101 to the depression part 103. The ramp 102 may connect the body part 101 and the depression part 103 which are stepped to each other.

**[0109]** The service panel 100 may include a fastening part 120 formed through the depression part 103. The fastening part 120 may allow the service cover 150 to be attached through a fastening member 170.

**[0110]** There may be more than one fastening part 120. When there is more than one fastening part 120, the fastening parts 120 may be symmetrically arranged relative to the inspection window 110. For example, one of the fastening parts 120 may be formed in a depression part 103 which is located above the inspection window 110, and another of the fastening parts 120 may be formed in a depression part 103 which is located below the inspection window 110.

**[0111]** The service panel 100 may further include a fastening reinforcement 121. The fastening reinforcement 121 may prevent the size of the fastening part 120 from being expanded and loosened by the fastening member 170. The fastening reinforcement 121 may extend from the fastening part 120 to the inside of the outside unit.

**[0112]** The fastening part 120 and the fastening reinforcement 121 may be integrally formed.

**[0113]** For example, the fastening part 120 may be formed by a punching process. That is, the fastening part 120 may be formed by punching the depression part 103, and the fastening reinforcement 121 may be formed by processing a burr formed on the rear of the depression part 103 by the punching process.

**[0114]** The outside unit 10 may include a service cover 150. The service cover 150 may be selectively attached to the depression part 103. The service cover 150 may be used to selectively open and close the inspection window 110.

**[0115]** The service cover 150 may include a body part 151 and an end part 153 that is bent toward the service panel 100 from the body part 151. Therefore, the end part 153 may access inside the depression part 103.

**[0116]** The end part 153 may include an upper end 155 formed in an upper edge of the service cover 150, a front end 156 formed in a front edge of the service cover 150, a rear end 157 formed in a rear edge of the service cover 150, and a lower end 158 formed in a lower edge of the service cover 150.

**[0117]** The front refers to a direction in which the outlet port 11A is formed in the outside unit 10, and the rear refers to an opposite direction of the front. The upper side refers to a direction toward the upper surface panel, and lower side refers to an opposite direction of the upper side.

**[0118]** The upper end 155 may be formed having a different inclination from one point. More specifically, the upper end 155 may include a first upper end 155A formed to be inclined to one side from a one point and a second upper end 155B formed to be inclined to the other side from a one point.

**[0119]** The one point may be the center of the upper end 155. The center may refer to a point in which a distance from the front end 156 and a distance from the rear end 157 are equivalent.

**[0120]** For example, the first upper end 155A may have a slope that is inclined downward while progressing toward the front from the center. On the other hand, the second upper end 155B may have a slope that is inclined downward while progressing toward the rear from the center.

**[0121]** In addition, the first upper end 155A and the second upper end 155B may be formed to be symmetrical between the front and rear relative to the center of the service cover. According to this configuration, water flowing down from the external surface of the service panel 100 to the service cover 150 may be divided into the first upper end 155A and the second upper end 155B, and water flowing in the first supper end 155A may flow to the front end 156, and water flowing in the second upper end 155B may flow to the rear end 157.

**[0122]** The first upper end 155A and the second upper end 155B allow water in the upper end 155 to be discharged without stagnating in the upper end 155. The first upper end 155A and the second upper end 155B may also prevent the water in the upper end from penetrating between the service cover 150 and the depression part 103.

**[0123]** The service cover 150 may include a penetration part 152 which is formed through the body part 151. A fastening member 170 may penetrate the penetration part 152 to fasten the service cover 150 to the service panel 100.

**[0124]** More than one penetration part 152 may be formed such that the number of penetration parts 152 correspond to the number of fastening parts 120. For example, when the fastening part 120 is formed up and down relative to the inspection window 110, the penetration part 152 may also be formed up and down so as to correspond to the fastening part 120.

**[0125]** The service cover 150 may include a penetration reinforcement 159 that extends from the penetration

part 152 to a side of the service panel 100.

**[0126]** The penetration reinforcement 159 and the fastening reinforcement 121 are functionally identical, but they are provided at different locations relative to the penetration part 152.

**[0127]** The outside unit 10 may include an insulation 160 to prevent moisture from absorbing on the inspection window 110. The insulation 160 may be provided between the service panel 100 and the service cover 150 and/or may be provided between the service panel 100 and the inspection window 110.

**[0128]** Thus, for example, the insulation 160 may prevent external water of the service panel 100 from penetrating onto the inspection window when one surface of the insulation 160 is in contact with the inner surface of the service cover 150 and the other surface thereof is in contact with the external surface of the service panel 100,. The insulation 160 may be referred to as a "waterproof member" or a "seal" which prevents water from penetrating onto the inspection window.

**[0129]** It is understood that the insulation 160 may comprise any one of a sponge, rubber, or plastic material. More particularly, for example, the insulation 160 may comprise a hygroscopic material or a porous material.

**[0130]** The outside unit 10 may include a fastening member 170 to attach the service cover 150 to the service panel 100. As shown, the fastening member 170 may penetrate the penetration part 152 and be attached to the fastening part 120. More than one fastening member 170 may be provided such that the number of fastening members 170 correspond to the number of penetration parts 152 or the number of fastening parts 120.

**[0131]** The outside unit may include a washer 180. As shown, the washer 180 may be disposed at the head of the fastening member 170 and the external surface of the service cover 150 so as to prevent the fastening member 170 from loosening due to vibration. The washer 180 may also prevent water from penetrating into the outside unit 10 through the penetration part 152. Accordingly, the washer 180 may be referred to as a "waterproof member" or "seal."

**[0132]** The insulation 160 and the washer 180 thus prevent water from penetrating into the inside of the outside unit.

**[0133]** As provided above, the present disclosure provides many advantages over conventional methods and structures. For example, the present disclosure makes it easier for an installer or user to determine information displayed on a display device of an outside unit because the display device may be provided at a side surface part of the outside unit.

**[0134]** In addition, the present disclosure makes it is easier for an installer or user to determine the operation state of the outside unit through the inspection window by separating only the service cover and not the entire panel of the outside unit because an inspection window may be provided at the outside unit, the display device may be disposed inside of the inspection window, and a service cover may be provided at the inspection window.

**[0135]** In addition, the present disclosure prevents moisture from penetrating inside of the electric part because the service cover may include insulation.

**[0136]** In addition, the present disclosure may prevent a short circuit or disconnection of the cable because a plurality of cables may be attached to the terminal block in a configuration such that the cables are not tangled or intertwined.

**[0137]** In addition, the present disclosure may prevent the cable from bending or twisting because the cable attached to the terminal block may be guided by a fixing member. Thus, the cable may be disposed in the outside unit in a stretched state.

**[0138]** In addition, the present disclosure may prevent the cable from being separated from the terminal block because the cable attached to the terminal block may be guided by the fixing member.

**[0139]** In addition, the present disclosure may prevent the cable from being attached in a bent state because the fixing member may be disposed to correspond to a terminal part of the terminal block.

**[0140]** In addition, the present disclosure may allow for wiring to be more easily performed because the wiring may be provided in a space which is spaced apart from an electric panel in which an electric component is attached.

## Claims

**1.** An outside unit of an air conditioner comprising:

a case having an electric chamber (60) in which an electric part (70) is provided and a heat exchange chamber (50) in which a heat exchanger (24) is provided,
wherein the electric part (70) comprises:

an electric panel (80) at which an electric component is provided,
a terminal block (200) provided at one side of the electric panel (80), the terminal block (200) comprising a first terminal part (230A) and a second terminal part (230B),
a first cable (205) connected to the first terminal part (230A) and providing power or a signal to the electric component,
a second cable (206) extended from outside of the outside unit and connected to the second terminal part (230B), and
a fixing member (300) that is spaced apart from the terminal block (200) and supports the second cable (206), and

wherein the electric panel (80) comprises:

an installation part (92) at which the electric

component is provided, and
an opening part (98) provided at a side of the installation part (92) and attached to the terminal block (200).

**2.** The outside unit of claim 1, wherein the electric panel (80) comprises a supporting surface (93) at which the terminal block (200) is supported, and wherein the opening part (98) is formed at an upper side of the supporting surface (93).

**3.** The outside unit of claim 2, wherein:

the installation part (92) is provided at an upper side of the opening part (98),
the supporting surface (93) is provided at a lower side of the opening part (98), and
the first cable (205) is extended from the terminal block (200) and through the opening part (98) to the electric component.

**4.** The outside unit of claim 2, or 3, wherein the electric panel (0) comprises a connection part (91) that extends in a direction which intersects with the installation part (92) and in which another electric component is installed, and wherein the supporting surface (93) is attached to the connection part (91).

**5.** The outside unit of claim 2, 3, or 4, wherein the electric panel (80) comprises a fixing surface (94) at which the fixing member (300) is provided, whereby the fixing surface (94) is located at a lower side of the supporting surface (93), and
wherein the supporting surface (93) and the fixing surface (94) are disposed to face a same direction.

**6.** The outside unit of claim 5, wherein the case comprises a front surface part (11), a side surface part (14, 15), and a rear surface part (12),
wherein the supporting surface (93) and the fixing surface (94) each are disposed to face the side surface part.

**7.** The outside unit of any one of claims 2 to 6, wherein a distance from the supporting surface (93) to the second terminal part (230B) corresponds to a distance from the supporting surface (93) to the second cable (206) which is fixed to the fixing member (300).

**8.** The outside unit of any one of claims 1 to 7, wherein the case comprises:

a front surface part (11) having an outlet port (11A);
a side surface part (14, 15) provided at both sides of the front surface part, and
an upper surface part (13) provided at an upper side of the front surface part (11),
wherein the side surface part comprises an inspection window (110) having an opening to provide access to a display device (72) and a service cover (150) attached to the inspection window (110) to selectively cover the display device (72).

**9.** The outside unit of claim 8, wherein the front surface part (11) comprises:

a front panel (11) at which the outlet port (11A) is provided; and
a first panel part (101A) attached to a side of the front panel (11) to shield a front side of the electric part (80).

**10.** The outside unit of claim 9, wherein the side surface part comprises:

a second panel part (101B) bent from the first panel part (101A) and extending in a rearward direction to shield a side of the electric part (80); and
a side panel attached to a side of the second panel part (101 B).

**11.** The outside unit of claim 8, 9, or 10, wherein the display device (72) comprises:

a circuit board having a control part (72B) and a communication part (72C) installed thereon; and
a display part (72A) installed on the circuit board and configured to display information about an operational status of the air conditioner, and

wherein the display part (72A) is disposed to face the side surface part, and the control part (72B) and the communication part (72C) are each disposed to face the side surface part.

**12.** The outside unit of any one of claims 8 to 11, wherein the electric part (80) comprises a plate (18) having an electric component and the display device (72) installed thereon, whereby the plate (18) is disposed to face the side surface part.

**13.** The outside unit of any one of claims 8 to 12, wherein the side surface part comprises a depression part that forms a corner portion of the inspection window (110) and is attached to the service cover (150).

**14.** The outside unit of any one of claims 1 to 14, wherein an upper surface of the service cover (150) extends obliquely in a downward direction, and
wherein the service cover (150) comprises:

a first upper end (155A) having a downward incline relative to a first direction from an upper

end (155) of the service cover (150), and
a second upper end (155B) having a downward incline relative to a second direction from the upper end (155) of the service cover (150).

**15.** The outside unit of any one of claims 8 to 14, further comprising an insulation (160) provided at a rear surface of the service cover (150) to prevent water from penetrating inside the case.

Fig. 1

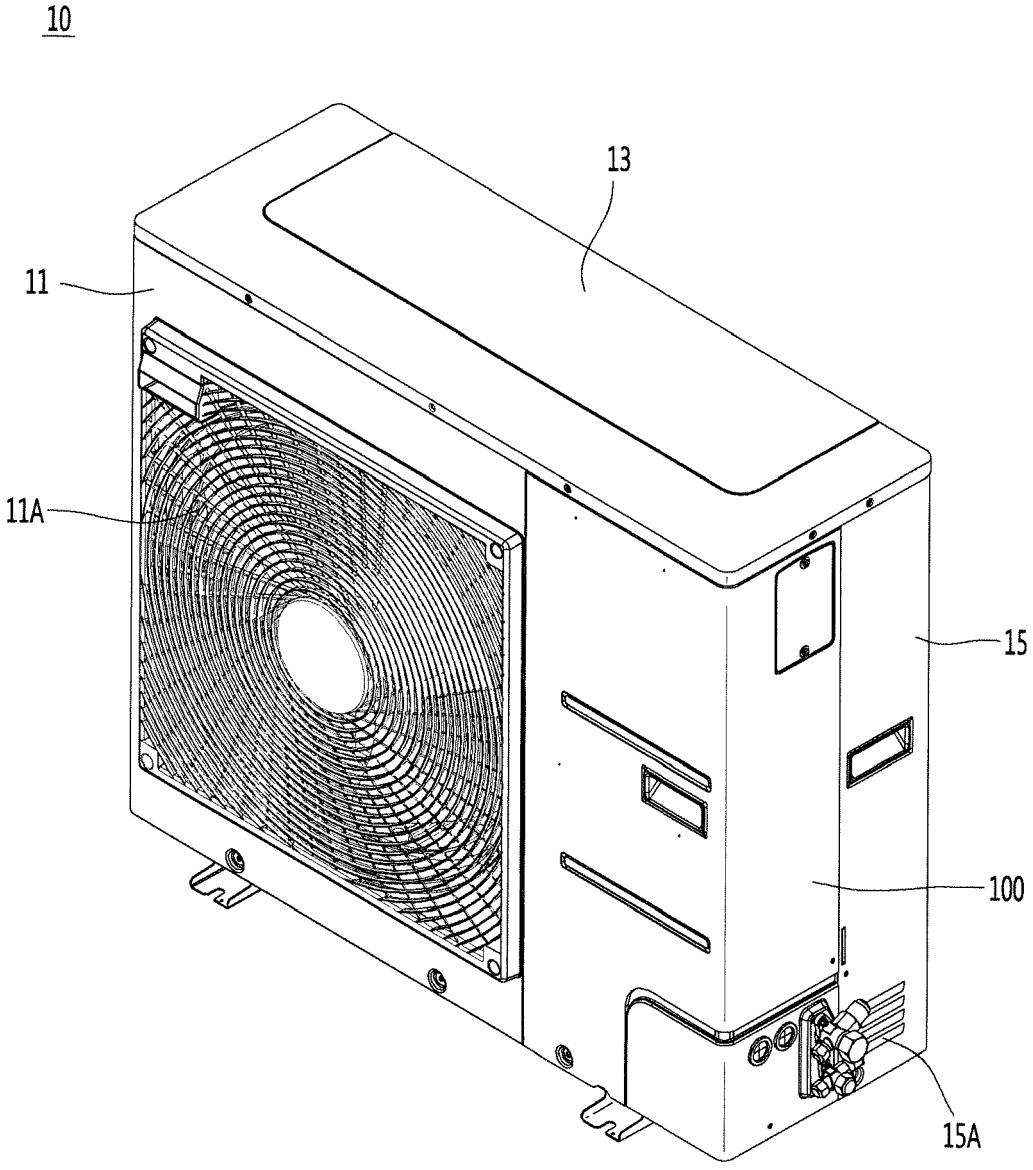


Fig. 2

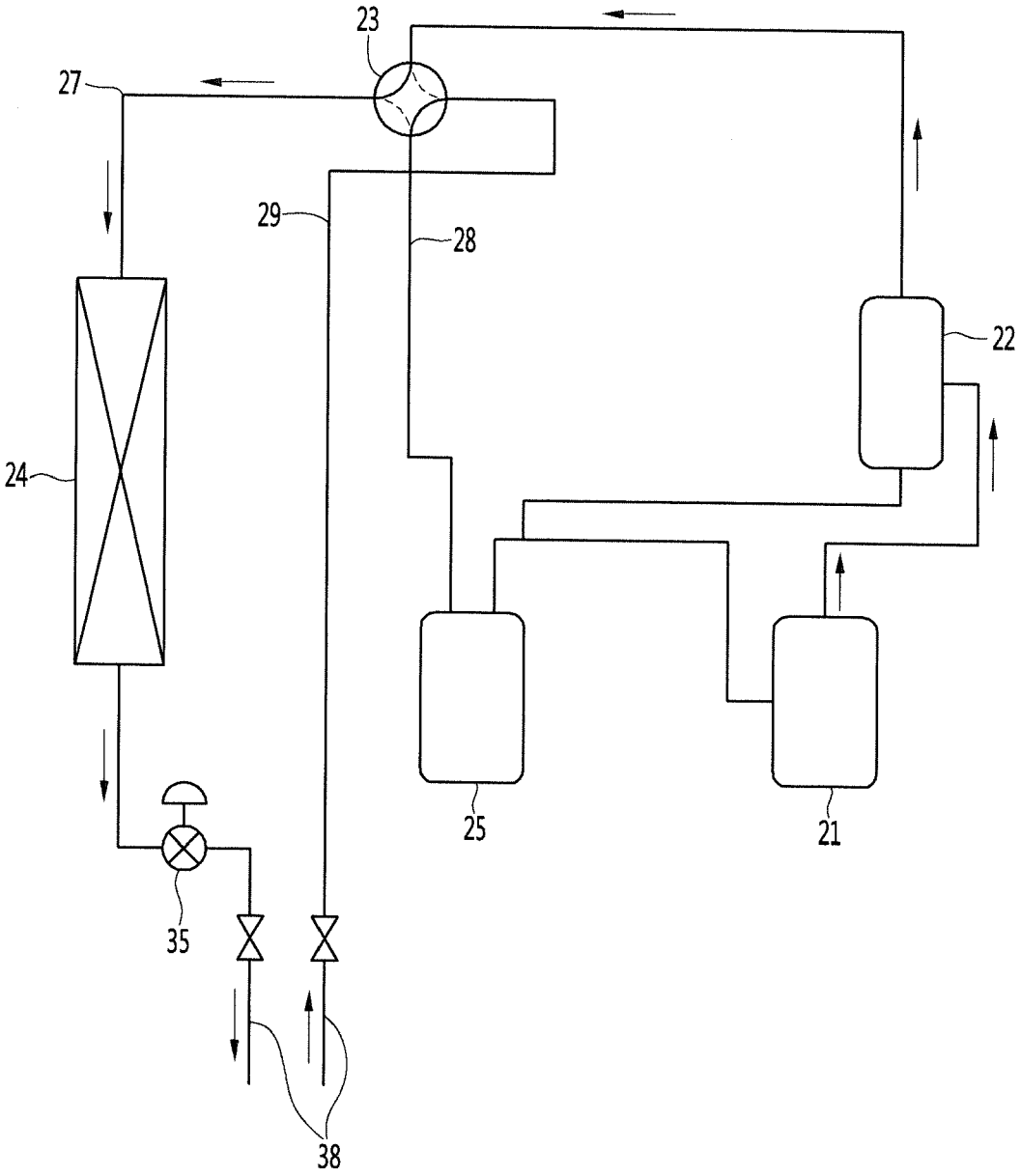


Fig. 3

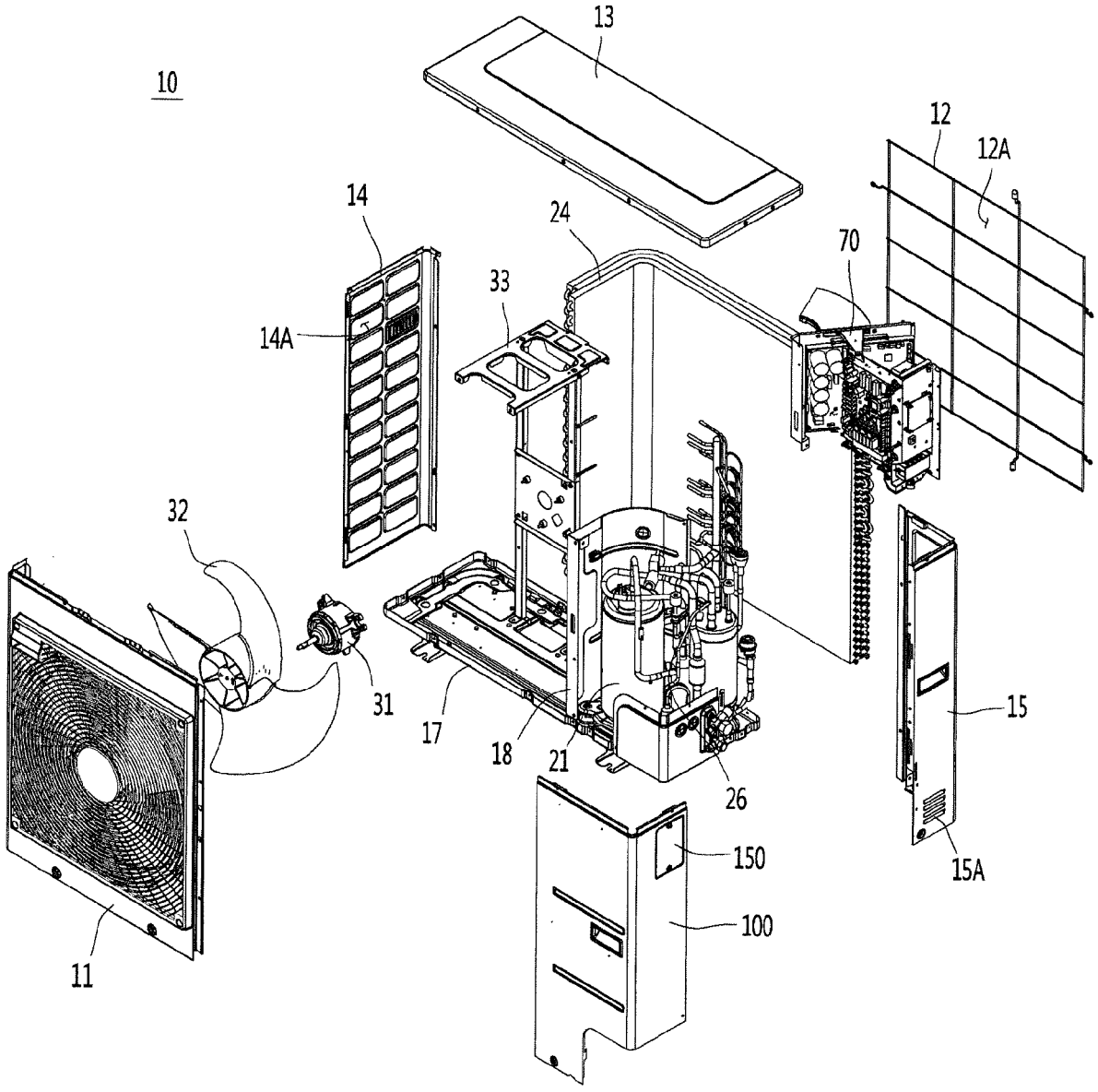


Fig. 4

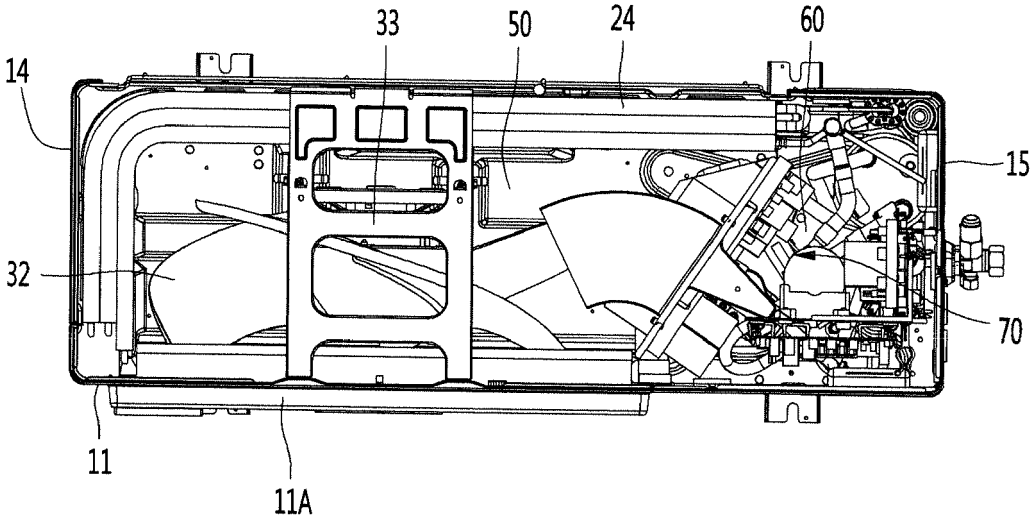


Fig. 5

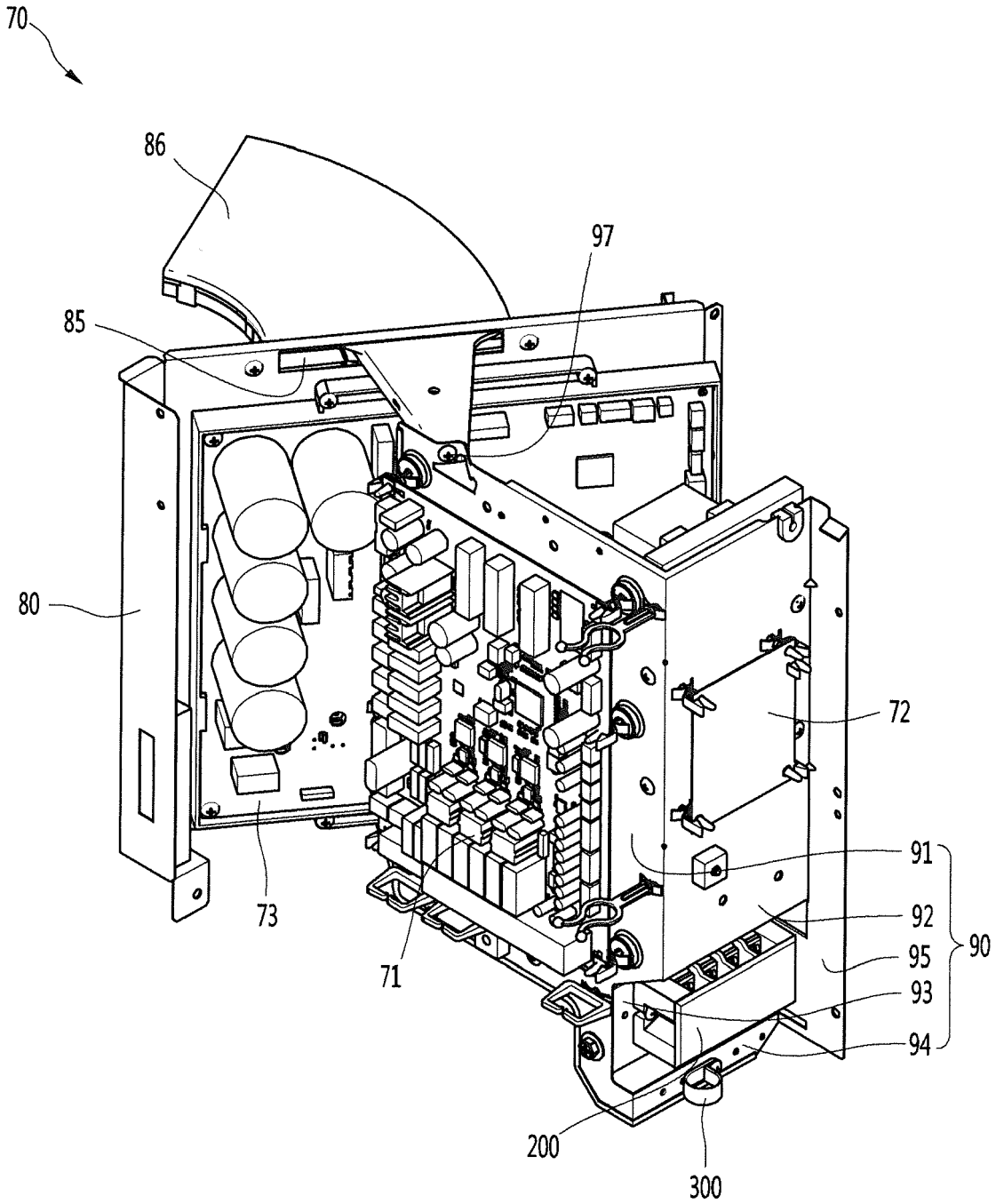


Fig. 6

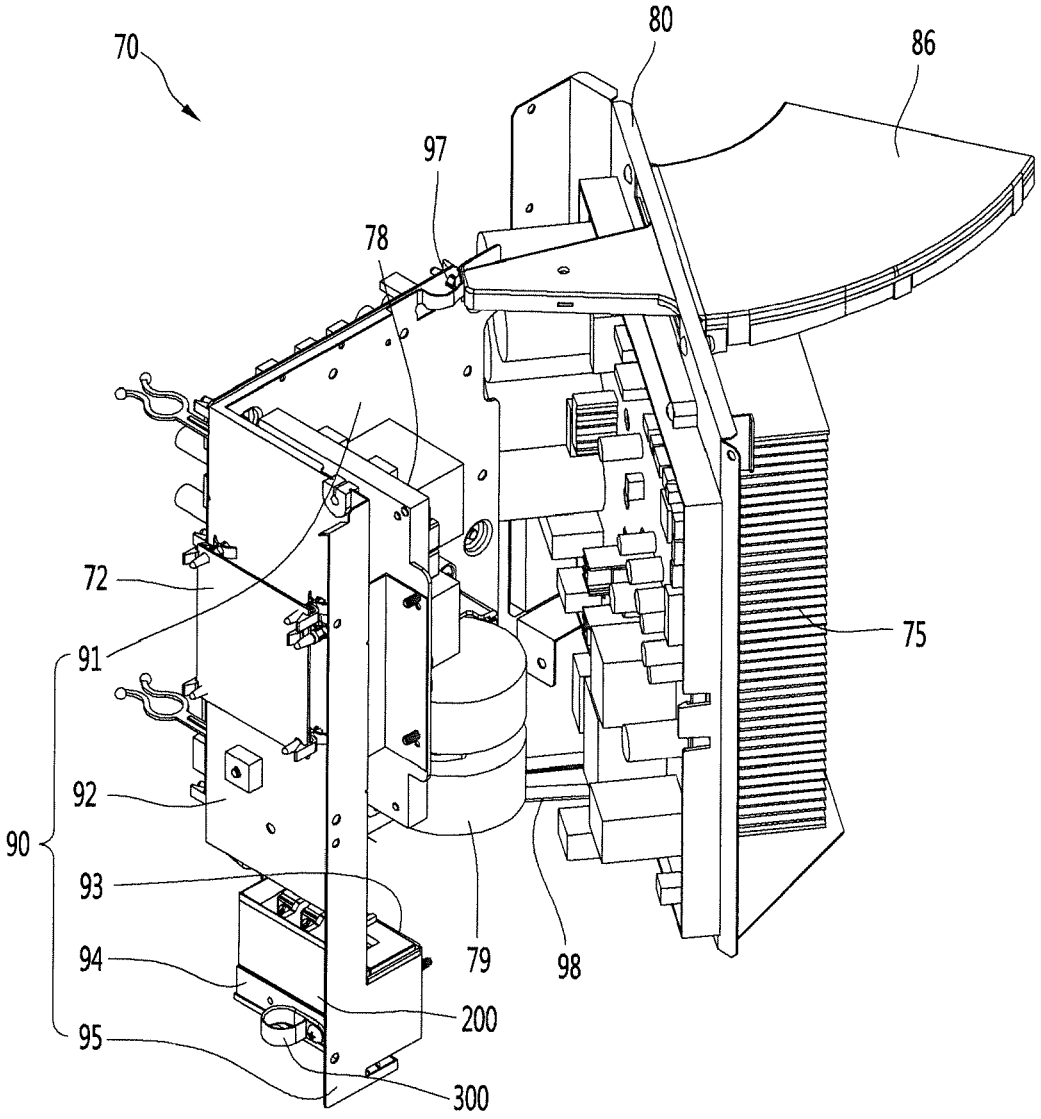


Fig. 7

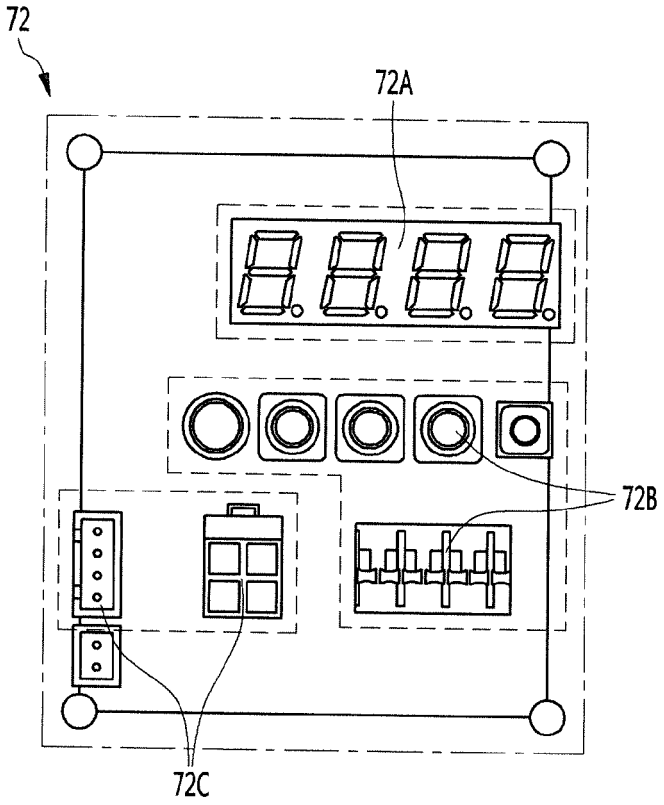



Fig. 8

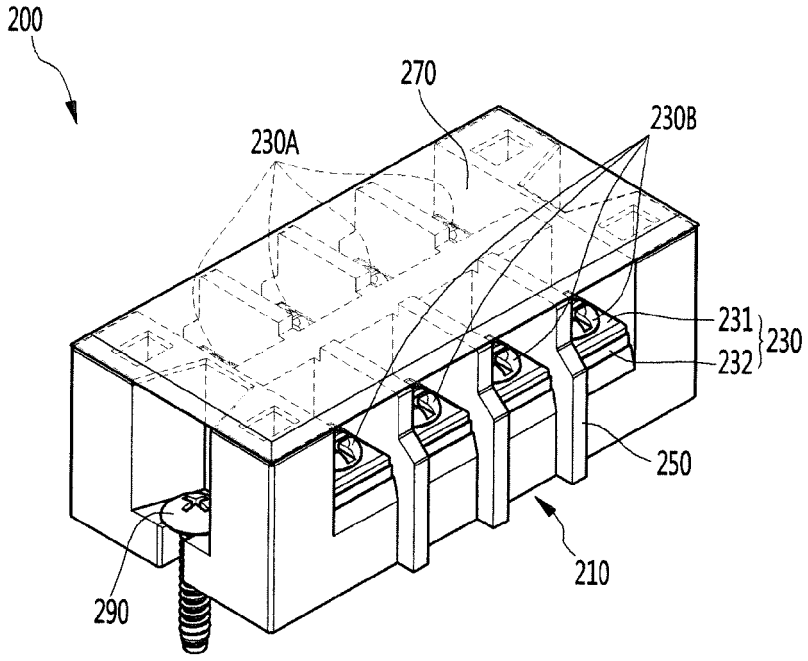


Fig. 9

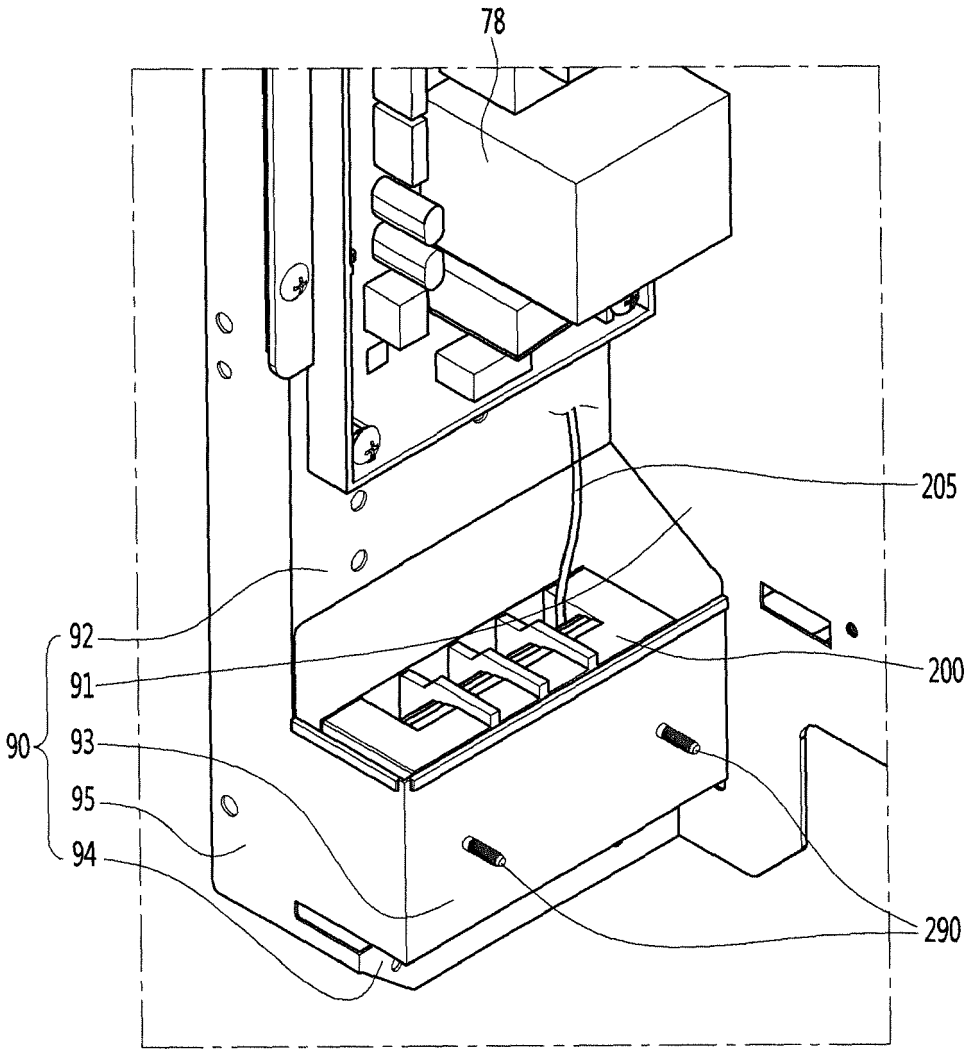


Fig. 10

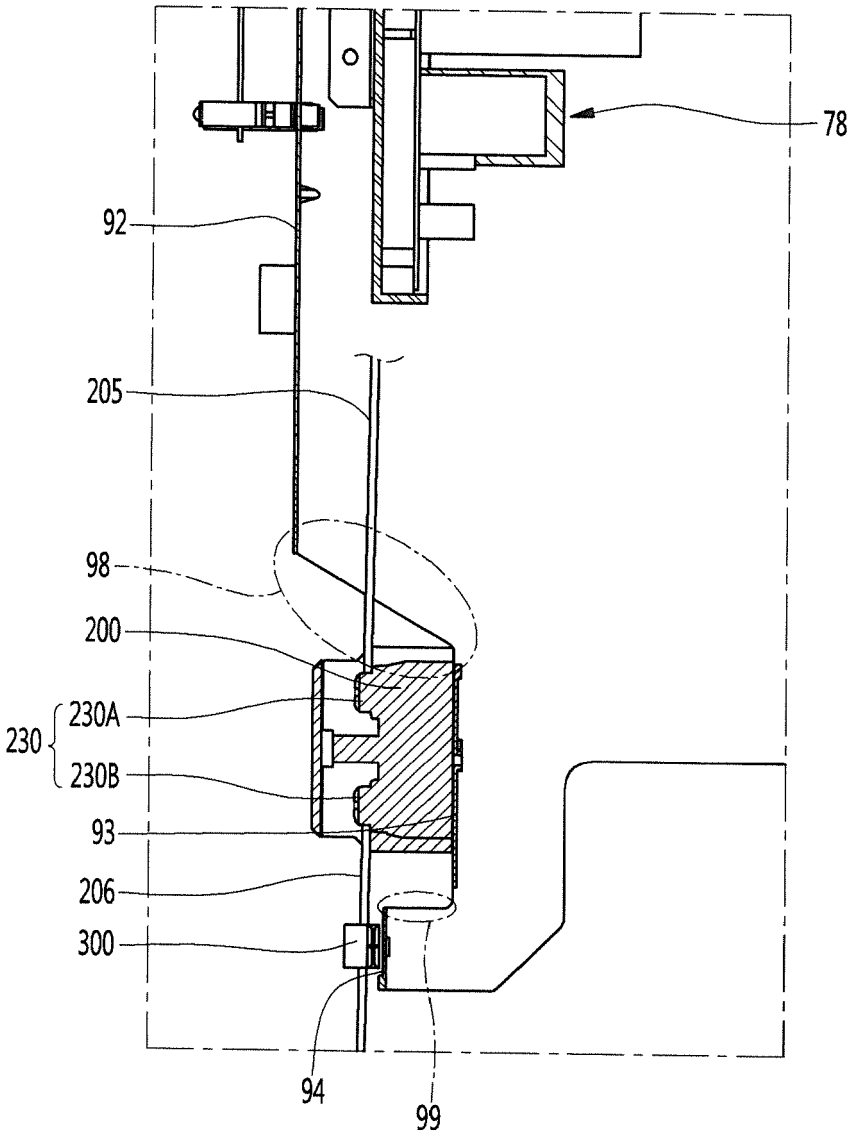


Fig. 11

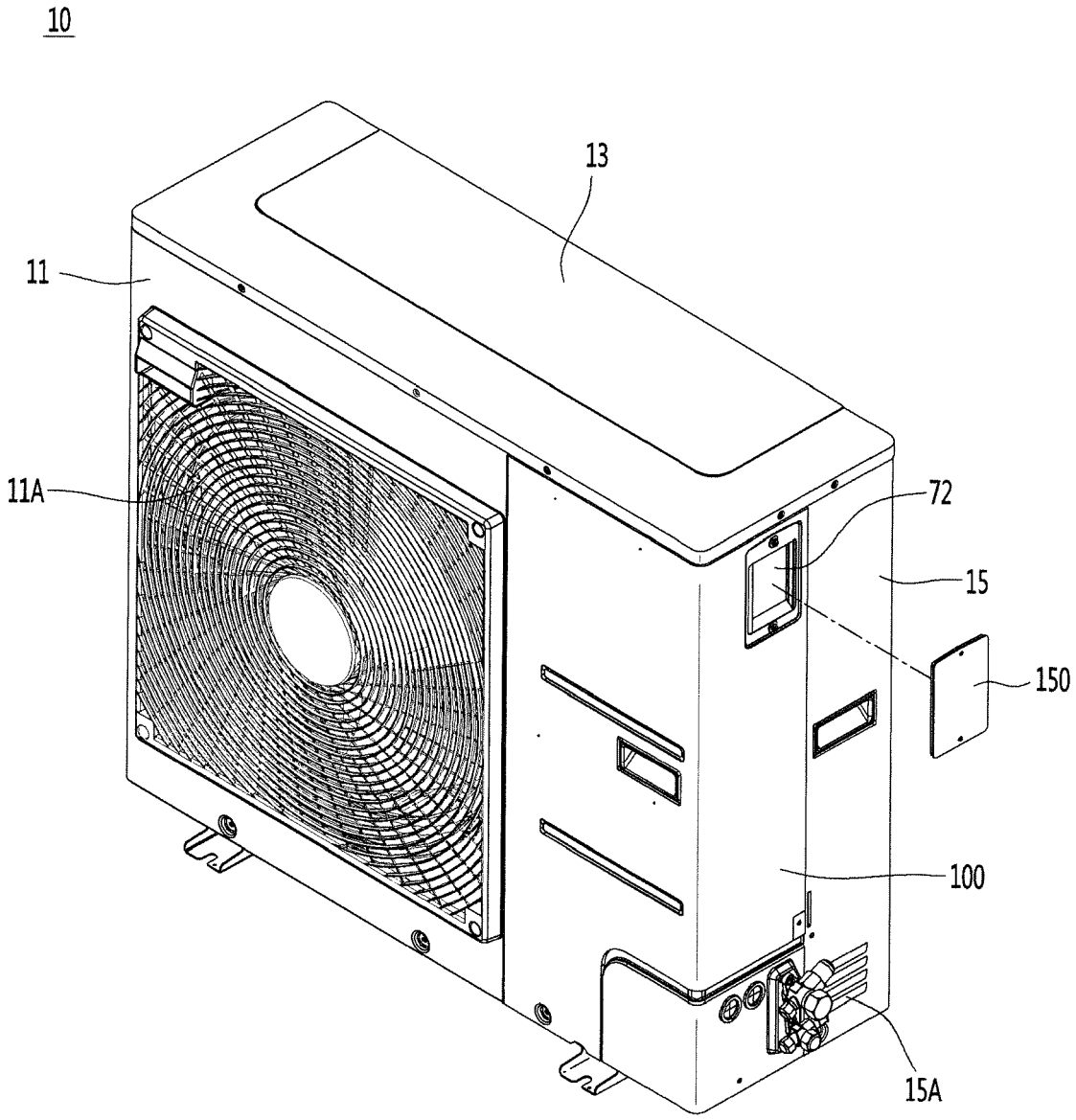


Fig. 12

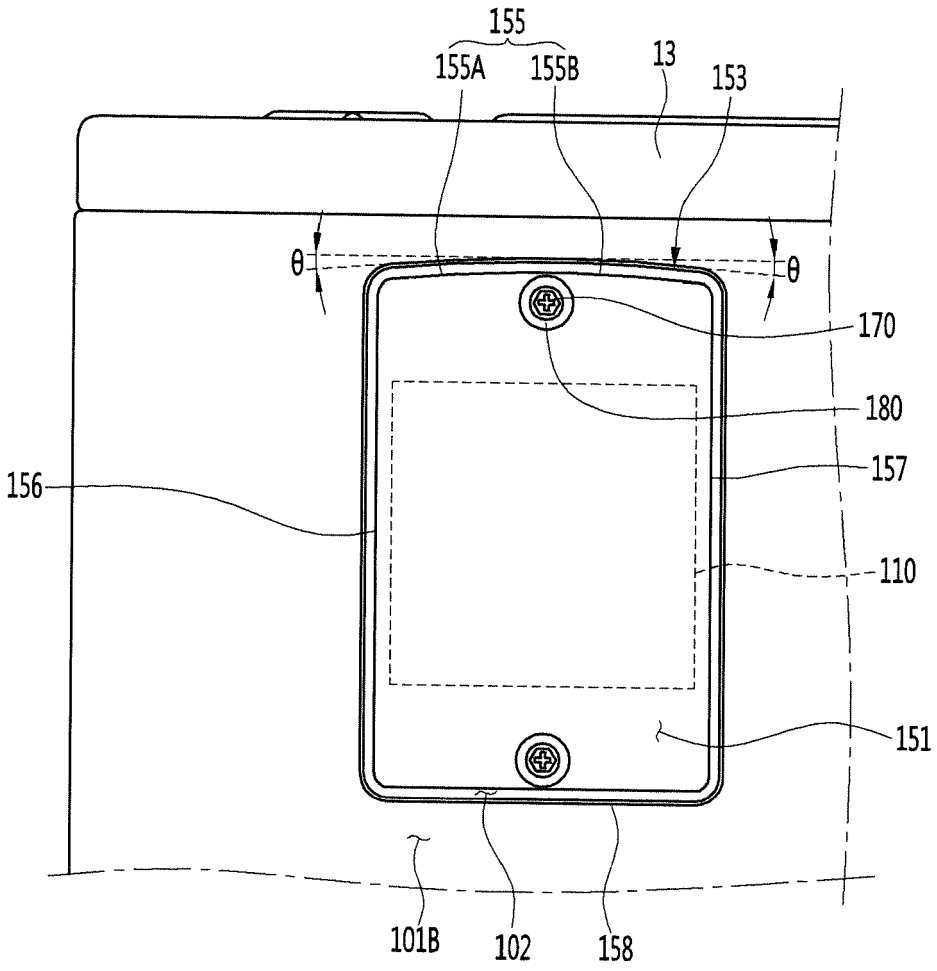
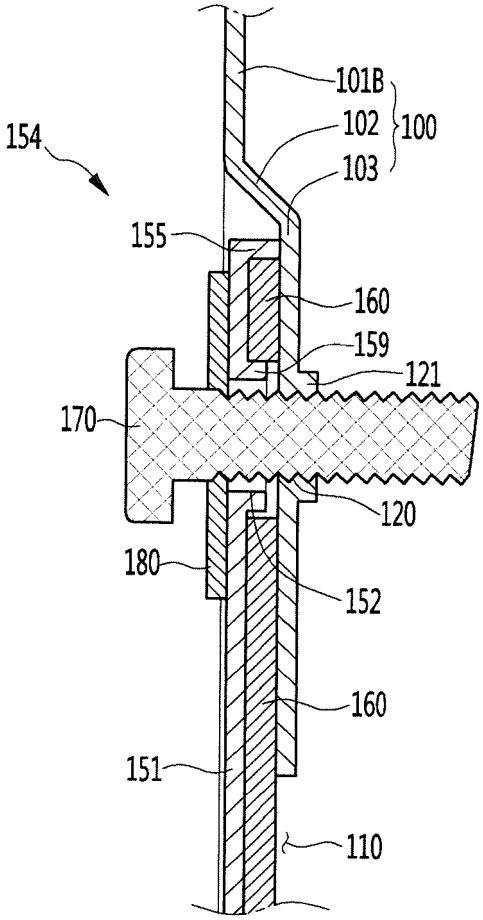


Fig. 13



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# EUROPEAN SEARCH REPORT

Application Number
EP 16 18 8722

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| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (IPC) |
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The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| Munich | 4 May 2017 | Degen, Marcello |

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)

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04-05-2017

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

## REFERENCES CITED IN THE DESCRIPTION

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### Patent documents cited in the description


- KR 102004010127 **[0010]**
- KR 1020030024914 **[0013]**