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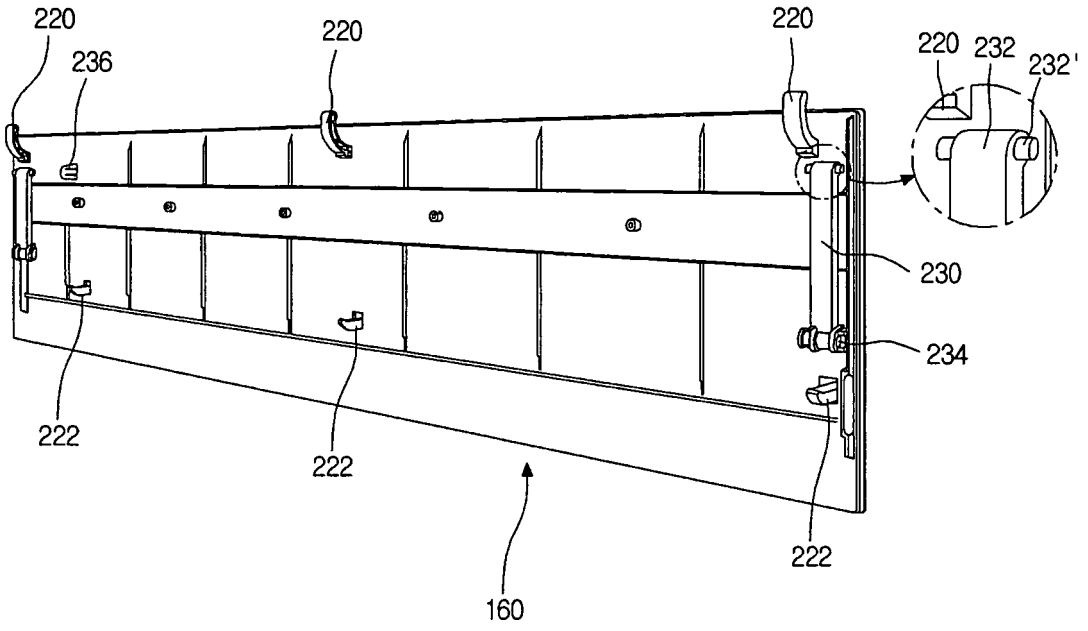
(54) Indoor unit for air conditioner

(57) An indoor unit (100) for an air conditioner includes a front frame (130), a front panel (160) pivotally coupled to the front frame (130), one or more coupling ribs (220) provided on a side of the front panel to function as a pivot shaft of the front panel, and a supporting link (222) for maintaining an opened state of the front panel (160) from the front frame (130).

Fig.11



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Description

Field of the Invention

[0001] The present invention relates to an air conditioner for an indoor unit.

Description of the Related Art

[0002] Generally, an air conditioner is a system that is used to control the temperature, relative humidity or purity of air, ad to circulate cooled air in an enclosed space such as a room. The air conditioner is classified into an integration type where all of components are provided in a unit and a separation type having indoor and outdoor units separated from each other.

[0003] Fig. 1 shows a perspective view of an indoor unit of a conventional air conditioner.

[0004] Referring to Fig. 1, an indoor unit of a conventional air conditioner includes a main chassis 1 mounted on an inner wall of a room, a front panel 3 installed in front of the main chassis 1, an air intake grill 5a formed on the front panel 3, and an air exhaust grill 7 installed on a lower end of the front panel 3. A display unit 9 for display a current operation state and guiding the manipulation of a user is installed between the air intake and exhaust grills 5a and 7.

[0005] Meanwhile, another intake grill 5b may be further provided on a top surface of the main chassis 1.

[0006] The conventional air conditioner has the following problems.

[0007] Since the front panel 3 is coupled to the main chassis 1 by a plurality of screws, it is troublesome to release all of the screws in order to replace an internal filter (not shown) or to perform the maintenance for the internal components.

[0008] That is, it is difficult to mount or dismount the front panel 3 on or from the main chassis 1 and the dismounted front panel must be kept in custody so as not to lose the same.

SUMMARY OF THE INVENTION

[0009] It would be desirable to provide an indoor unit for an air conditioner that substantially obviates one or more problems due to limitations and disadvantages of the related art.

[0010] It would be desirable to provide an indoor unit for an air conditioner, which has a front panel that can be opened frontward by being pivoted about its upper end.

[0011] It would be desirable to provide an indoor unit for an air conditioner, which has a front panel that can maintain its opened state in a state where it is supported by a link.

[0012] Accordingly, the invention provides an indoor unit for an air conditioner, including: a front frame; a front panel pivotally coupled to the front frame; one or more coupling ribs provided on a side of the front panel to function as a pivot shaft of the front panel; and a supporting link for maintaining an opened state of the front panel from the front frame.

[0013] In another aspect of the present invention, there is provided an indoor unit for an air conditioner, including: a front frame; a front panel pivotally coupled to the front frame about an upper end thereof; a supporting link for maintaining an opened state of the front panel from the front frame; and a hinge unit for pivotally coupling an end of the supporting link to the front panel.

[0014] In still another aspect of the present invention, there is provided an indoor unit for an air conditioner, including: a front frame provided at both sides with respective link seating portions; a front panel coupled to the front frame to be capable of being spaced away from the front frame; a supporting link having a first end connected to the front frame and a second end connected to the front panel; and a coupling rib extending from a rear surface of the front panel and inserted in the front frame to function as a pivot shaft of the front panel.

[0015] According to the present invention, the front panel pivots upward about its upper end. Therefore, when it is required to perform the maintenance for the internal components such as an air filter of the indoor unit that is generally located at a high location on an inner wall of a room at a high position, the front panel can be easily opened by simply pulling a lower end frontward.

[0016] Furthermore, when the front panel is opened, the supporting link is fixed by a stopper. Therefore, the maintenance can be performed in a state where the front panel is not fully separated from the indoor unit.

[0017] As described above, since the lower portion of the front panel is opened, even the worker is short or the indoor unit is located at a high location, the maintenance can be easily performed. In addition, since the maintenance is performed without fully separating the front panel from the indoor unit, the possibility of losing of the front panel can be prevented and the working efficiency can be improved.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] 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 embodiment(s) 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 indoor unit of a conventional separation type air conditioner;

Figs. 2 and 3 are perspective views of an indoor unit for an air condition according to an embodiment of the present invention;

Fig. 4 is an exploded perspective view of the indoor

unit of Figs. 2 and 3;

Fig. 5 is a sectional view taken along line I-I' of Fig. 2;

Figs. 6 and 7 are perspective views of a front frame of Figs. 2 and 3, when an air exhaust panel is coupled to a front upper panel;

Fig. 8 is a rear perspective view of the front frame of Figs. 6 and 7;

Fig. 9 is a sectional view taken along line II-II' of Fig. 8;

Fig. 10 is a sectional view taken along line III-III' of Fig. 8;

Fig. 11 is a rear perspective view of a front panel according to an embodiment of the present invention;

Fig. 12 is a partly broken, perspective view of a front portion of an air exhaust panel according to an embodiment of the present invention;

Fig. 13 is a partly broken, perspective view of a front portion of an air exhaust panel according to an embodiment of the present invention;

Fig. 14 is a partly broken, perspective view of a rear portion of an air exhaust panel according to an embodiment of the present invention; and

Fig. 15 is a perspective view of an indoor unit according to an embodiment of the present invention, when a front panel is opened.

DETAILED DESCRIPTION OF THE INVENTION

[0019] While the present invention has been particularly shown and described with reference to exemplary embodiments thereof, it will be understood by those of ordinary skill in the art that various changes in form and details may be made therein without departing from the scope of the present invention as defined by the following claims.

[0020] Figs. 2 and 3 show an indoor unit for an air conditioner according to an embodiment of the present invention.

[0021] Referring to Figs. 2 and 3, an indoor unit 100 includes a casing 102, a front panel 160 coupled to a front portion of the casing 102, an air exhaust panel 170 slidably coupled to a lower end of the front panel 160, a front-upper panel 172 slidably coupled to an upper end of the front panel 160, and an air exhaust vane 122 slidably coupled to a lower end of the casing 102.

[0022] The casing 102 includes a main chassis 110 and a front frame 130 coupled to a front portion of the main chassis 110 and a front frame 130 coupled to a front portion of the main chassis 110. An air intake grill 132 is formed on a top surface of the front frame 130 and a remote control signal receiving portion 150 is formed on a lower portion of the casing 102.

[0023] The air introduced through the air intake grill 132 passes through a heat exchanger installed in the indoor unit and is then exhausted to the room through the air exhaust vane 122. By the vertical movement of the air exhaust panel 170, the air is exhausted frontward from the indoor unit 100. This will be described later.

[0024] Fig. 4 is an exploded perspective view of the indoor unit and Fig. 5 is a side sectional view of the indoor, which is taken along line I-I' of Fig. 2.

[0025] Referring to Figs. 4 and 5, the indoor unit 100 of the air conditioner is formed in a hexahedron shape and the casing defines a contour of the indoor unit 100.

[0026] That is, the indoor unit 100 includes a heat exchanger 118 coupled to a front portion of the main chassis 110 to allow the air introduced to heat-exchange with a refrigerant, a blower fan 114 installed in rear of the heat exchanger 118 to intake and exhaust the indoor air, a motor assembly 116 installed on a side portion of the main chassis 110 to drive the blower fan 114, and an air filter 144 and electric dust collector 146 detachably mounted on the front portion of the front frame 130.

[0027] The main chassis 110 includes a rear chassis unit 110' defining a rear contour of the main chassis 110 and a front chassis unit 110" positioned in front of the rear chassis 110'. The main chassis 110 is provided at the top with an air inlet 112 through which the indoor air is introduced. The air intake grill is positioned on the air inlet 112.

[0028] The blower fan 114 may be a cross flow fan arranged horizontally. The air introduced through the air inlet 112 is exhausted through the air exhaust vane 122 by the blower fan 114.

[0029] The motor assembly 116 is installed at right side of the flower fan 114 to generate rotational force using electric power applied from an external side. The rotational force generated by the motor assembly 116 is transmitted to the flower fan 114.

[0030] In addition, the heater exchanger 118 is installed in front of the front chassis 110" to heat-exchange the air introduced through the air inlet 112 with the air. That is, like the blower fan 114, the heat exchanger 118 is disposed to extend horizontally such that it can enclose the front and upper portions of the blower fan 114. The main display unit 120 is formed on the front-upper end of the front chassis 10". The main display unit 120 displays a variety of information and is selectively screened by the front-upper panel 172.

[0031] The air exhaust vane 122 installed on the lower end of the front chassis unit 110" over the lower end of the front frame 130.

[0032] The air exhaust vane 122 is driven by a driving unit (not shown) and simultaneously or independently opened and closed together with or from the air exhaust

panel 170 and the front-upper panel 172.

[0033] A mode display unit 124 is further provided on the front-right-lower end of the front chassis unit 110". The mode display unit 124 displays a current operation mode or a current setting state of the air conditioner.

[0034] The front frame is installed in front of the main-chassis. That is, the front frame 130 defines a front contour of the indoor unit 100. The front frame 130 is coupled to enclose the front chassis unit 110" of the main chassis 110. The air intake grill 132 is formed on a top of the front frame 130. That is, the air intake grill 132 is positioned above the air inlet 112 of the main chassis 110 when the front frame 130 is coupled to the main chassis 110. The air intake grill 132 is provided with a plurality of slits through which the air passes.

[0035] The front frame 130 is provided with a filter supporting portion 134 and dust collector supporting portion 136 for respectively supporting the air filter 144 and dust collector 146. A checking hole 138 is formed near a front-right end of the front frame 130. A checking plate 138' is selectively mounted in the checking hole 138. Therefore, the checking plate 138' selectively opens and closes the checking hole 138.

[0036] A display window 140 is formed on a front-upper end of the front frame 130. The display window 140 is sized to correspond to the main display unit 120 of the main chassis 110 and formed in a transparent material. Therefore, the information displayed on the main display unit 120 can be identified in front of the front frame 130.

[0037] Meanwhile, a mode display window 142 is formed on a front-lower right side of the front frame 130. The mode display window 142 is also formed of a transparent material and sized to correspond to the mode display unit 124 of the main chassis 110. Therefore, the information displayed on the mode display unit 124 can be identified in front of the front frame.

[0038] As described above, the air filter 144 and the electric dust collector 146 are mounted on the front frame 130. Here, the air filter 144 functions to filter off foreign objects contained in the air introduced through the air inlet 112. The air filter 130 is installed on the front and upper portions of the front frame 130. The air filter 144 is formed of a flexible material so that it can curved at a predetermined curvature when viewed from a side.

[0039] In addition, the electric dust collector 146 functions to collect foreign objects such as dusts contained in the air through an ionizing process using electric power applied from the external side. The electric dust collector 146 is installed in rear of the air filter 144 and supported by the dust collector supporting portion 136.

[0040] In addition, the remote control signal receiving unit 150 has a circular button structure for receiving a signal transmitted from a remote controller, thereby controlling the operation of the air conditioner. As described above, the remote control signal receiving unit 150 is provided on the bottom of the front frame 130 considering that the indoor unit 100 is generally mounted at a predetermined height of the inner wall of the room.

[0041] In addition, the front panel 160 installed in front of the front frame 130 is formed in a rectangular flat plate to define a front contour of the indoor unit 100. That is, the front panel 160 includes a decoration glass 162 that is transparent while, if required, having a predetermined color, and a decoration frame 164 on which the decoration glass 162 is mounted.

[0042] Furthermore, the decoration frame 164 is sized and shaped to correspond to the decoration glass 162. The decoration glass 162 may be attached to the decoration frame 164 using an adhesive or coupled to the decoration frame 164 using a coupling unit such as a hook or a screw.

[0043] The air exhaust panel 170 coupled to a lower portion of the front panel 160 has a length corresponding to a left-and-right length of the front panel 160. The air exhaust panel 170 can move upward or downward by a lower panel driving unit 190' (see Fig. 8) that will be described later.

[0044] In the indoor unit 100, when the blower fan 114 is driven, the indoor air is introduced into the indoor unit 100 through the air intake grill 132 and air inlet. Then, the air passes through the air filter 144 and electric dust collector 146, in the course of which the foreign objects contained in the air is filtered off. Then, the air is heat-exchanged with the refrigerant while passing through the heat exchanger. In the heating mode, the room temperature increases. In the cooling mode, the room temperature decreases. The air heat-exchanged with the refrigerant is exhausted to the room through the air outlet opened by the air exhaust vane 122 and air exhaust panel 170.

[0045] Figs. 6 and 7 are perspective views of the front frame of Figs. 2 and 3, when an air exhaust panel is coupled to the front upper panel.

[0046] Referring to Figs. 6 and 7, a frontward air outlet 174 is formed on a lower -center portion of the front frame 130. That is, the frontward air outlet 174 is formed to extend from the mode display window 142 to a left end. The air introduced by the blower fan 114 is exhausted frontward of the indoor unit 100. Then, the frontward air outlet 174 is selectively screened by the air exhaust panel 170. When the air exhaust panel 170 moves upward, the frontward air outlet 174 is opened. When the air exhaust panel 170 moves downward, the frontward air outlet 174 is screened.

[0047] In addition, the front frame 130 is provided at a bottom with a receiving hole 152 in which the remote control signal receiving unit 150. A cover 154 is further installed at a lower portion of the remote control signal unit 150 to enclose the remote control signal receiving unit 150. The cover 154 of the remote control signal receiving unit 150 may be formed of a transparent material.

[0048] In addition, the front frame 130 is provided at a front portion with a plurality of coupling and supporting grooves 180 and 182. That is, the coupling and supporting grooves 180 and 192 are portions in which coupling and supporting projections 220 and 222 (see Fig. 11) are

inserted. Here, the number and forming positions of the coupling and supporting grooves 180 and 182 are not limited to this embodiment.

[0049] Meanwhile, link seating portions 210 are formed on respective front-left and front-right side ends of the front frame 130. Supporting links 230 (see Fig. 11) selectively seat on the link seating portions 210. That is, the supporting lines 230 slide on the link seating portion 210. The link seating portions 210 are sized to correspond to the supporting links 230 and concaved rearward. That is, in a state where the front panel 160 is closed, the supporting links 230 are inserted into the line seating portion 210 and thus no gap is formed between the front panel 160 and the front frame 130.

[0050] In addition, a hinge receiving groove 212 is formed on a lower end of the link seating portions 210. The hinge receiving groove 212 is a portion in which a hinge unit 234 (see Fig. 11) is inserted. In addition, the hinge receiving groove 212 has a width greater than a left-right width of the link seating portion 210. That is, the hinge receiving groove 212 has a width corresponding to a left-right width of the hinge unit 234. Preferably, the width of the hinge receiving groove 212 is slightly greater than the left-right width of the hinge unit 234.

[0051] In addition, a stopper projection 214 is further formed on the link seating portion 210 to stop the supporting end 232 of the supporting line 230 that will be described later. That is, the stopper projection 214 protrudes frontward from a bottom of the link seating portion 210.

[0052] Furthermore, a mounting/dismounting guide 216 is further formed on the link seating portion 210. That is, the mounting/dismounting guide 216 is provided to allow the supporting end 232 of the supporting link 230 to be easily inserted in the link seating portion 210. The mounding/dismounting guide 216 is symmetrically formed on upper edge of the link seating portion 210. The mounding/dismounting guide 216 has an opened top. Therefore, the supporting end 232 of the supporting link 230 and the link projection 232' are inserted through the opened top of the mounting/dismounting guide 216.

[0053] In addition, a switch groove 214 is formed on a right side of the front frame 130. An operation switch (not shown) is installed in the switch groove 214. The operation switch is provided to forcedly operate or stop the air conditioner by the user.

[0054] Meanwhile, the operation switch is separately provided on the side surface of the front frame 130 or integrally provided with the remote control signal receiving unit 150. That is, the on/off operation switch is inserted in the receiving hole 152 formed on the bottom of the front frame and a remote control signal receiving unit 150 may be installed in the operation switch. At this point, the cover of the operation switch may be formed of a transparent material.

[0055] A plurality of guide units 200 and 200' are formed on a front-lower portion of the front frame 130 to guide the vertical movement of the air exhaust panel 170 without shaking or moving in a side direction. The guide units 200 and 200' will be described in more detail with reference to the accompanying drawings later.

[0056] Fig. 8 is a rear perspective view of the front frame.

[0057] Referring to Fig. 8, panel driving units 190 and 190' are respectively installed on a rear surface of the front frame to control the vertical movement of the air exhaust panel 170 and the front-upper panel 172. That is, the upper panel driving unit 190 is provided near the rear-upper end of the front frame 130 and the lower panel driving unit 190' is provided on the rear-lower end of the front frame to control the vertical movement of the air exhaust panel 170.

[0058] The upper and lower panel driving units 190 and 190' are identical in the structure to each other. The upper and lower panel driving units 190 and 190' are symmetrically installed in the vertical direction. In the following description, only the lower panel driving unit 190' will be described.

[0059] The panel driving unit 190' includes a driving motor 192 installed on a rear left end or a rear right end of the front frame 130 to generate rotational force, a driving shaft installed on the rear surface of the front frame 130 horizontally transmit the rotational force generated by the driving motor 192, a shaft supporting unit 195 for supporting the driving shaft 194, and a link 196 for connecting the driving shaft 194 to the front-upper panel 172 or the air exhaust panel 170.

[0060] The driving motor 192 may be a step motor installed on the rear surface of the front frame 130. The driving shaft 194 extends from a central axis of the driving motor 192 to transmit the rotational force generated from the driving motor 192 to the link 196. The driving shaft 194 extends from a left end to a right end of the front frame 130. The link 196 is pivotally installed on the both ends of the driving shaft 194.

[0061] The link 196 is provided by a plurality to convert the rotation motion of the driving shaft 194 into a vertical motion and transmit the vertical motion to the air exhaust panel 170 or the front-upper panel 172.

[0062] That is, the link 196 includes a shaft link 196' fixedly coupled to the driving shaft 194 and a panel link 196" hingedly coupled to the air exhaust panel 170 or front-upper panel 172. The shaft link 196' is pivotally coupled to the panel line 196″. Therefore, the shaft link 196' and the panel link 196″ may be linearly arranged or arranged with a between angle. Therefore, the air exhaust panel 170 or front-upper panel 172 can move upward or downward.

[0063] Connecting slits 198 are formed on left and right side ends of the front frame 130 and the panel link 196″ is connected to the air exhaust panel 170 or front-upper panel 172 through the connecting slits 198. Therefore, by the rotational force of the driving motor 192, the air exhaust panel 170 and the front-upper panel 172 move upward or downward as the between angle θ is reduced and increased. That is, as the between angle is reduced,

the air exhaust panel 170 moves upward to open the frontward air outlet 174. The front-upper panel 172 moves downward to expose the display window to the external side.

[0064] On the contrary, when the angle between the shaft link 196' and the panel link 196" increases or becomes 180°, the air exhaust panel 170 moves downward and the front-upper panel 172 moves upward. Therefore, the frontward air outlet 174 is screened by the air exhaust panel 170 and the display window is 140 closed by the front-upper panel 172 so that the information display on the main display unit 120 cannot be identified from the external side.

[0065] In addition, a link guide 199 is further formed on a rear portion of the connecting slit 198. The link guide 199 receives a panel supporting unit 240 (see Fig. 12). That is, the link guide 199 guides the vertical movement of the panel supporting unit 240 to which an end of the panel link 196" is coupled.

[0066] Meanwhile, the front frame 130 is further provided with guide units 200 and 200' for guiding the vertical movement of the air exhaust panel 170.

[0067] That is, the guide unit 200 is provided on a left side of the front frame 130 when viewed from a front side and the guide unit 200' is provided on a right side of the front frame 130. The guide units 200 and 200' are symmetrically disposed. The coupling structure of the guide units 200 and 200' will now be described in detail with reference to the accompanying drawings.

[0068] Fig. 9 is a sectional view taken along line II-II' of Fig. 8 and Fig. 10 is a sectional view taken along line III-III'.

[0069] Referring to Figs. 9 and 10, the guide unit 200, 200' includes a frame guide 202, 202' and a panel guide 204, 204'.

[0070] That is, the left guide unit 200 includes the left frame guide 202 and the left panel guide 204. The right guide unit 200' includes the right frame guide 202' and the right panel guide 204'.

[0071] That is, the left and right guide units 200 and 200' are symmetrical with reference to the vertical line. That is, the left and right frame guides 202 and 202' are symmetrical with each other and the left and right panel guides 204 and 204' are also symmetrical with each other.

[0072] For example, the left panel guide 204 extends downward from the bottom of the air exhaust panel 170 and perpendicularly bent rightward to have a ㄴ-shape. The right panel guide 204' extends downward from the bottom of the air exhaust panel 170 and bent leftward to have a ㅗ-shape.

[0073] In addition, the left frame guide 202 extends vertically upward from the top of the front frame 130 and bent leftward to have ㄱ-shape and the right frame guide 202' extends upward from the top of the front frame 130 and bent right ward to have a ㄱ-shape.

[0074] Accordingly, the left panel guide 204 and the left frame guide 202 slide in a state where they are combined and the right panel guide 204' and the right frame guide 202' slide in a state where they are combined.

[0075] The reason for symmetrically forming the left and right guide units 200 and 200' is to prevent the air exhaust panel 170 and the front frame 130 from being sided during the sliding motion thereof and thus prevent them from being separated from the front frame 130.

[0076] Fig. 11 is a rear perspective view of the front panel according to an embodiment of the present invention.

[0077] Referring to Fig. 11, a plurality of coupling and supporting ribs 220 and 222 are formed on the rear surface of the front panel 160. That is, three coupling ribs 220 are formed to extend rearward at a central-left and central-right ends near the rear-upper end of the front panel 160.

[0078] The coupling ribs 220 are inserted into coupling grooves 180 of the front frame 130. The coupling ribs 220 are curved with a predetermined curvature. The coupling ribs 200 extend upward and may be integrally formed with the front panel 160 through an injection molding process. That is, the coupling ribs 160 is gradually rounded as it goes rearward and upward.

[0079] As described above, since the coupling ribs 220 are curved, the coupling ribs 220 are not removed from the coupling grooves 180 when the front panel 160 is opened frontward.

[0080] In addition, the supporting ribs 222 are formed on a rear-lower portion of the front panel 160. Here, the supporting ribs 222 extend rearward from the rear portion of the front panel 160 and inserted in the supporting grooves 182.

[0081] Extreme ends of the supporting ribs 222 are bent upward. Therefore, in a state where the supporting ribs 222 are inserted in the supporting grooves 182 of the front frame 130, the supporting ribs 222 are not removed from the supporting grooves 182 unless predetermined pulling force is applied thereto. Therefore, the front panel 160 maintains its closed state. Here, the number and forming positions of the coupling and supporting ribs 220 and 222 are not limited to this embodiment.

[0082] Meanwhile, supporting links 230, the supporting links 230 are installed on the opposite ends of the front panel 160 to control the frontward pivot motion of the front panel 160. That is, the supporting links 230 are pivotally installed on central-left and central-right end portions of the front panel 160 to connect the front frame 130 to the front panel 160.

[0083] Lower ends of the supporting links 230 are pivotally connected to the front panel 160 and upper ends of the supporting links 230 are connected to the front frame 130. Therefore, upper ends of the supporting links 230 are slidably inserted in the link seating portions 210 of the front frame 130. That is, supporting ends 232 corresponding to the upper ends of the supporting links 230 are inserted in the link seating portion 210 to be capable of sliding in a vertical direction.

[0084] Link projections 232' extend leftward and rightward from the left and right sides of the supporting ends 232 of the supporting links 230. That is, the supporting ends 232 of the supporting links 230 are not removed from the link seating portions 210 by the link projections 232'. The link projections 232' are inserted in the link seating portions through the mounting/dismounting guide 216 of the front frame 130. That is, the link projections 232' are inserted into or removed from the link seating portions 210 through the top openings of the mounting/dismounting guides 216. Namely, the top openings of the mounting/dismounting guides 216 function as entrances for the link projections 232'.

[0085] Furthermore, a hinge unit 234 is provided on a lower end of the supporting link 230. The hinge unit 234 allows the supporting link 230 to be pivotally coupled to the front panel 160.

[0086] The state of the supporting links 230 shown in Fig. 11 shows that it closely contacts the front frame 130 as the front frame 130 is closed. In this state, the supporting links 230 are inserted in the link seating portion 210. In addition, the hinge unit 234 is received in the hinge receiving groove 212. The hinge unit 234 will be described in more detail later.

[0087] A power off rib 236 extends from the rear surface of the front panel 160. The power off rib 236 functions to selectively turn off the power applied to the electric dust collector 146. That is, when the front panel 160 is opened, the power off rib 236 cuts off the power so that the power is not applied to the electric dust collector 146. When the front panel 160 is closed, the power off rib 236 allows the power to be applied to the electric dust collector 146.

[0088] Fig. 12 is an enlarged view of the hinge unit. Referring to Fig. 12, the hinge unit 234 includes a hinge shaft 234' about which the supporting link 230 rotates and a hinge support 234" supporting the hinge shaft 234'.

[0089] The hinge support 234" extends from the rear surface of the front panel 160 and includes a pair of supporting members for supporting the opposite ends of the hinge shaft 234'. At this point, the opposite ends of the hinge shaft 234' penetrate the hinge support 234". The supporting link 230 is provided at a lower end with a through hole in which the hinge shaft 234' is inserted.

[0090] The hinge shaft 234' may be formed in a circular-rod shape or formed by two members combined with each other. That is, the two members of the hinge shafts 234' are inserted through the respective right and left sides of the supporting link 230 and combined with each other. At this point, the two members of the hinge shaft 234' may be combined with each other by, for example, a screw.

[0091] In addition, - or +-shaped driver groove may be formed on a top or bottom surface of the hinge shaft 234' so that the hinge shaft 234' can be easily rotated using a screwdriver.

[0092] That is, when a user intends to rotate the hinge shaft 234' and thus the screwdriver contacts the driver groove, the rotation of the hinge shaft 234' can easily done.

[0093] A hinge projection 234'a may extends from one end of the hinge shaft 234' and a fixing rib 235 on which the hinge projection 234'a is hooked extends from the rear surface of the front panel 160.

[0094] The hinge projection 234'a is hooked on the fixing rib 235 to prevent the hinge shaft 234' from rotating. A fixing step 235' extends from the fixing rib 235. The hinge projection 234'a is hooked on the fixing step 235' so as not to rotate.

[0095] Meanwhile, the coupling process of the hinge unit 234 will now be described.

[0096] First, a lower end of the supporting link 230 is disposed between two members of the hinge support 234" and then the hinge shaft 234' is inserted from a side to the other side. That is, the hinge shaft 234' penetrates the lower end of the supporting link 230 and the hinge support 234".

[0097] Then, the hinge shaft 234' rotates such that the hinge projection 234'a contacts the fixing rib 235.

[0098] Describing in more detail, from a state shown in Fig. 12, when the hinge shaft 234' rotates to rotate the hinge projection 234'a from the rear side to the front side, the hinge projections 234'a interferes with the fixing rib 235. In this state, when the hinge projection 234'a further rotates, the hinge projection 234'a is hooked on the fixing step 235' to prevent the rotation of the hinge shaft 234'.

[0099] Fig. 13 is a partial perspective view of the front portion of the air exhaust panel according to an embodiment of the present invention.

[0100] Referring to Fig. 13, the panel supporting units 240 are respectively formed on opposite ends of the air exhaust panel 170. That is, the panel supporting units 240 are provided to support the air exhaust panel 170 mounted on the front frame 130. Ends of the panel supporting units 240 are inserted in the link guides 199 to be guided upward and downward.

[0101] A link coupling hook 242 is formed on the end of the panel supporting unit 240. The link coupling hook 242 has a circular groove to which one end of the link 196 is connected.

[0102] In addition, a fixing groove 244 is further formed on the lower end of the panel supporting unit 240. The fixing groove 244 is concaved upward from the bottom of the panel supporting unit 240 to receive the lower end of the connecting slit 198. That is, when the air exhaust panel 170 moves downward and the lower end of the connecting slit 198 is inserted into the fixing groove 244, the air exhaust panel 170 cannot move downward any more.

[0103] In addition, a plurality of panel projections 250 are further formed on the front portion of the air exhaust panel 170. That is, the panel projections 250 functions to space the front panel 160 away from the air exhaust panel 170 when the air exhaust panel 170 moves upward and downward. That is, during the vertical motion of the air exhaust panel 170, an extreme end of the panel pro-

jection 250 slides along the rear surface of the front panel 160.

[0104] Fig. 14 is a partial perspective view of the rear portion of the air exhaust panel according to an embodiment of the present invention.

[0105] Referring to Fig. 14, the frame projection 252 is formed on the rear surface of the air exhaust panel 170. That is, the frame projection 252 allows the front frame 130 to be spaced away from the air exhaust panel 170 when the air exhaust panel 170 moves upward and downward. That is, when the air exhaust panel 170 moves in the vertical direction, the rear end of the frame projection 252 contacts the front frame 130.

[0106] By forming the panel projection 250 and the frame projection 252 on the front and rear portions of the air exhaust panel 170, respectively, the contact area of the front panel 160 with the front frame 130 is minimized during the movement of the air exhaust panel 170. Therefore, the frictional force between the front panel 160 and the front frame 130 is minimized during the movement of the air exhaust panel 170.

[0107] Meanwhile, an end of the panel link 196" is pivotally coupled to the link coupling hook 242 of the panel supporting unit 240.

[0108] That is, from a state shown in Fig. 13, a first link shaft 196" a that is pivotally inserted in the link coupling hook 242 protrudes from the left side of the panel link 196" . A second link shaft 196"b that is coupled to the shaft link 196' protrudes from the upper-right side of the panel link 196".

[0109] In addition, a first fixing hook 196'a having a shape identical to that of the link coupling hook 242 is formed on the lower end of the shaft link 196'. A second fixing hook 196'b is formed on an upper end of the shaft link 196'. That is, a second link shaft 196"b of the panel link 196" is inserted in the first fixing hook 196"a. Then, the driving shaft 194 is fixedly inserted in the second fixing hook 196'b. Therefore, the shaft link 196' integrally rotates together with the driving shaft 194.

[0110] Fig. 15 shows a perspective view of the indoor unit for the air conditioner, when the front panel is opened.

[0111] Referring to Fig. 15, in order to replace or repair the internal components such as the air filter, the front panel 160 is opened.

[0112] That is, when the lower end of the front panel 160 is pulled, the upper ends of the supporting lines 230 slides down and the front panel 160 pivots to open the front portion of the indoor unit 100.

[0113] Describing in more detail, in a state where the front panel 160 closes contacts the front frame 130, the supporting links 230 is in close contact with the rear surface of the front panel 160 and received in the link seating portions 210 of the front frame 130. Then, the supporting ribs 222 of the front panel 160 maintain their inserted states in the supporting grooves 182 of the front frame 130.

[0114] In the above state, when the lower end of the front panel 160 is pulled by the user, the supporting ribs 222 of the front panel 160 are removed from the supporting grooves 182 of the front frame 130 and then the front panel 160 pivots about the coupling ribs 220 formed at the upper end of the front panel 160.

[0115] At this point, the coupling ribs 220 of the front panel 160 rotate in a state where they are inserted in the coupling grooves 180 of the front frame 130. Then, the supporting end 232 of the supporting link 230 slides along the link seating portion 210 of the front frame 130. At this point, the supporting end 232 of the supporting link 230 is not removed from the link seating portion 210 by the link projection 232' of the supporting end 232.

[0116] Describing in more detail, when the lower end of the front panel 160 is further pulled frontward, the front panel 160 moves as shown in Fig. 15. At this point, the supporting end 232 of the supporting link 230 is disposed at a location lower than the hinge unit 234. In addition, the supporting end 232 of the supporting link 230 is hooked by the stopper projection 214 of the link seating portion 210. Therefore, the front panel 160 is supported by the supporting link 230 and thus it maintains its opened state as shown in Fig. 15 even when the outer force is released.

[0117] When the front panel 160 is opened, the user can replace or repair the internal components.

[0118] Meanwhile, in order to close the front panel 160, the process is done in a reverse direction to the above-described opening process. That is, the supporting end 232 of the coupling rib 220 is pushed upward. Then, the supporting end 232 of the coupling rib 220 slides upward along the link seating portion 210.

[0119] As the supporting end 232 of the supporting link 230 slides upward, the front panel 160 is gradually closed. At this point, when the front panel 160 is further pushed rearward, the supporting rib 222 of the front panel 160 is inserted in the supporting groove 182 of the front frame 130. Then, the front panel 160 is not removed frontward unless predetermined outer force is applied thereto. When the front panel 160 is fully closed, the hinge unit 234 of the supporting link 230 is received in the hinge receiving groove 212.

[0120] The following will describe the operation of the above-described indoor unit.

[0121] When the air conditioner is turned on, it operates according to a preset mode.

[0122] At this point, the blower fan 114 rotates by the motor assembly 116 to generate air intake force. Then, the room air is introduced into the indoor unit 100 through the air intake grill 132.

[0123] Then, the introduced air passes through the air filter 144 and the electric dust collector 146, in the course of which the foreign objects contained in the air is filtered off. Then, the air is heat-exchanged with the refrigerant of the heat exchanger 118.

[0124] Then, the air is forcedly discharged by the blower fan 114 and then guided toward the air outlet by the air exhaust vane 122. The air guided by the air exhaust vane 114 is exhausted downward or frontward of the in-

door unit 100. Since the air exhaust panel 170 and the air exhaust vane 122 can be simultaneously or independently driven, the air can be selectively exhausted frontward and/or downward.

[0125] That is, the frontward air exhaust is controlled by selectively opening and closing the frontward air outlet 174 using the air exhaust panel 170 and the downward air exhaust can be controlled by the air exhaust vane 122. That is, when the air exhaust vane 122 is opened downward, the air forcedly driven by the blower fan 114 is exhausted downward. On the contrary, when the air exhaust vane 122 is not opened and the air exhaust panel 170 is moves upward, the air is exhausted frontward of the indoor unit 100.

[0126] According to the present invention, since the front panel is opened by pivoting about its upper end, the replace and repair of the internal components of the indoor unit located at a relatively high position on the inner wall of the room can be easily performed. Therefore, the present invention is very likely to be applied to the industry.

[0127] It will be apparent to those skilled in the art that various modifications and variations can be made in the present invention. Thus, it is intended that the present invention covers the modifications and variations of this invention provided they come within the scope of the above-described technologies and their equivalents.

Claims

1. An indoor unit for an air conditioner, comprising a heat exchanger, a blower fan, and a filter for filtering foreign objects contained in air introduced by the blower fan, **characterized in that** the indoor unit further comprises:

   a casing having a front frame having a front surface on which the filter seats and a main chassis for receiving the blower fan and the heat exchanger;
   a front panel pivotally coupled to the front frame;
   one or more coupling ribs provided on a side of the front panel to function as a pivot shaft of the front panel; and
   a supporting link for maintaining an opened state of the front panel from the front frame.

2. The indoor unit according to claim 1, **characterized in that** the indoor unit further comprises one or more supporting links provided on a side of the front panel to allow the front panel to closely contact the front frame.

3. The indoor unit according to claim 2, **characterized in that** an end of each supporting rib is bent or curved.

4. The indoor unit according to claim 1, **characterized in that** the coupling rib extends from a rear surface of the front panel and curved upward.

5. The indoor unit according to claim 1, **characterized in that** the supporting link has a first end hingedly coupled to the front panel and a second end slidably coupled to the front frame.

6. The indoor unit according to claim 1, **characterized in that** the indoor unit further comprises a power off rib extending from a rear surface of the front panel.

7. The indoor unit according to claim 1, **characterized in that** the front panel is provided with a link seating portion for receiving the supporting link.

8. The indoor unit according to claim 1, **characterized in that** the indoor unit further comprises a hinge unit for pivotally coupling an end of the supporting link to the front panel.

9. The indoor unit according to claim 8, **characterized in that** the hinge unit comprises a hinge shaft penetrating an end portion of the supporting link and a hinge support for supporting both ends of the hinge shaft.

10. The indoor unit according to claim 9, **characterized in that** the hinge shaft is formed of a single member penetrating the hinge support and the supporting link or two facing members inserted into the hinge support from opposite sides of the hinge support.

11. The indoor unit according to claim 9, **characterized in that** the indoor unit further comprises a hinge projection provided on an end of the hinge shaft and a fixing rib provided on the front panel to prevent the hinge projection from excessively rotating.

12. The indoor unit according to claim 11, **characterized in that** a fixing step extends from an end of the fixing rib to contact the hinge projection.

13. An indoor unit for an air conditioner, **characterized in that** the indoor unit comprises:

   a front frame provided at both sides with respective link seating portions;
   a front panel coupled to the front frame to be capable of being spaced away from the front frame;
   a supporting link having a first end connected to the front frame and a second end connected to the front panel; and
   a coupling rib extending from a rear surface of the front panel and inserted in the front frame to function as a pivot shaft of the front panel.

14. The indoor unit according to claim 13, **characterized in that** the supporting link has an upper end slidably coupled to the front frame in a vertical direction and a lower end hingedly coupled to the rear surface of the front panel.

15. The indoor unit according to claim 14, **characterized in that** the link seating portion is provided at a lower end with a hinge receiving groove for receiving the hinge unit.

16. The indoor unit according to claim 14, **characterized in that** when the front panel is fully open, the upper end of the supporting link is positioned as a location equal to or lower than the lower end.

17. The indoor unit according to claim 14, **characterized in that** the indoor unit further comprises a link projection extending from an upper end of the supporting link to prevent the supporting link from being separated during the sliding process.

18. The indoor unit according to claim 14, **characterized in that** the link seating portion is provided at an upper portion with mounting/dismounting guides for easily mounting and dismounting the end of the supporting link.

19. The indoor unit according to claim 18, **characterized in that** the mounting/dismounting guides have an opened top and face each other with reference to the link seating portion.

20. The indoor unit according to claim 14, **characterized in that** the indoor unit further comprises a stopper projection extending from a lower end of the link seating portion to control a maximum downward movement of the supporting link.

Fig.1

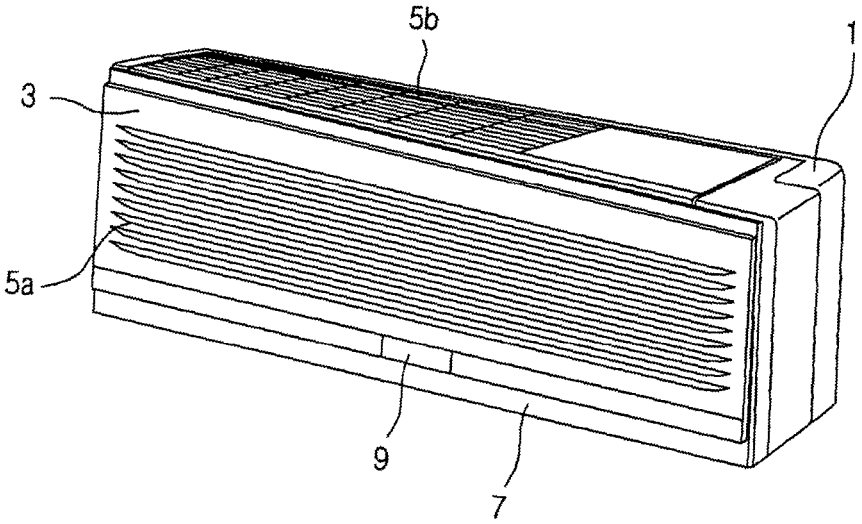


Fig.2

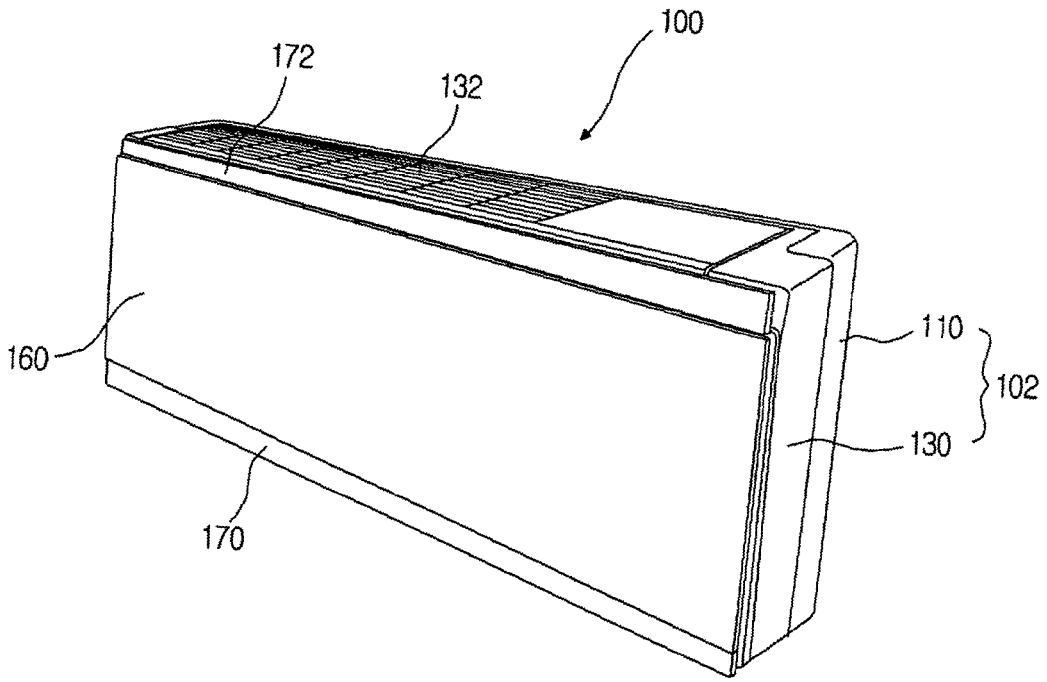
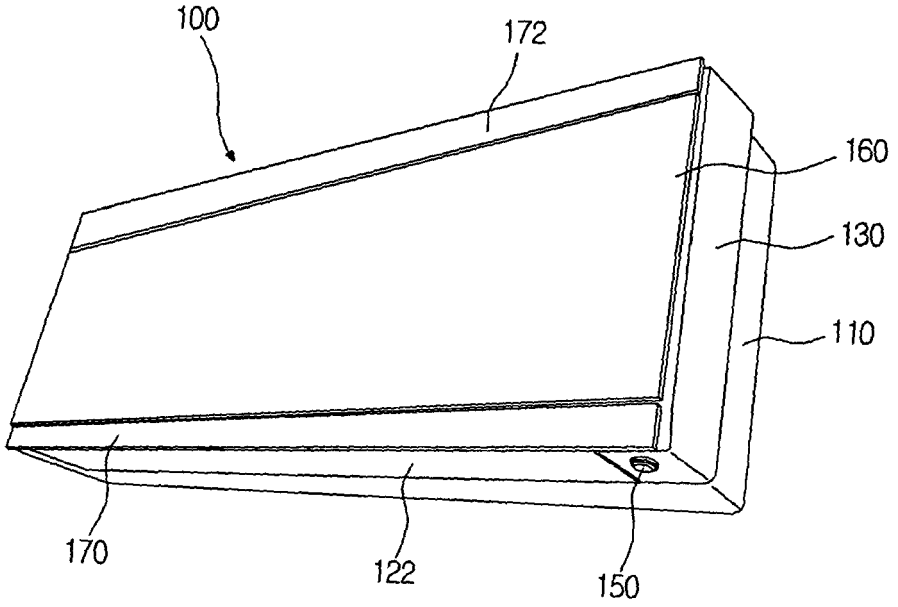


Fig.3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170
122
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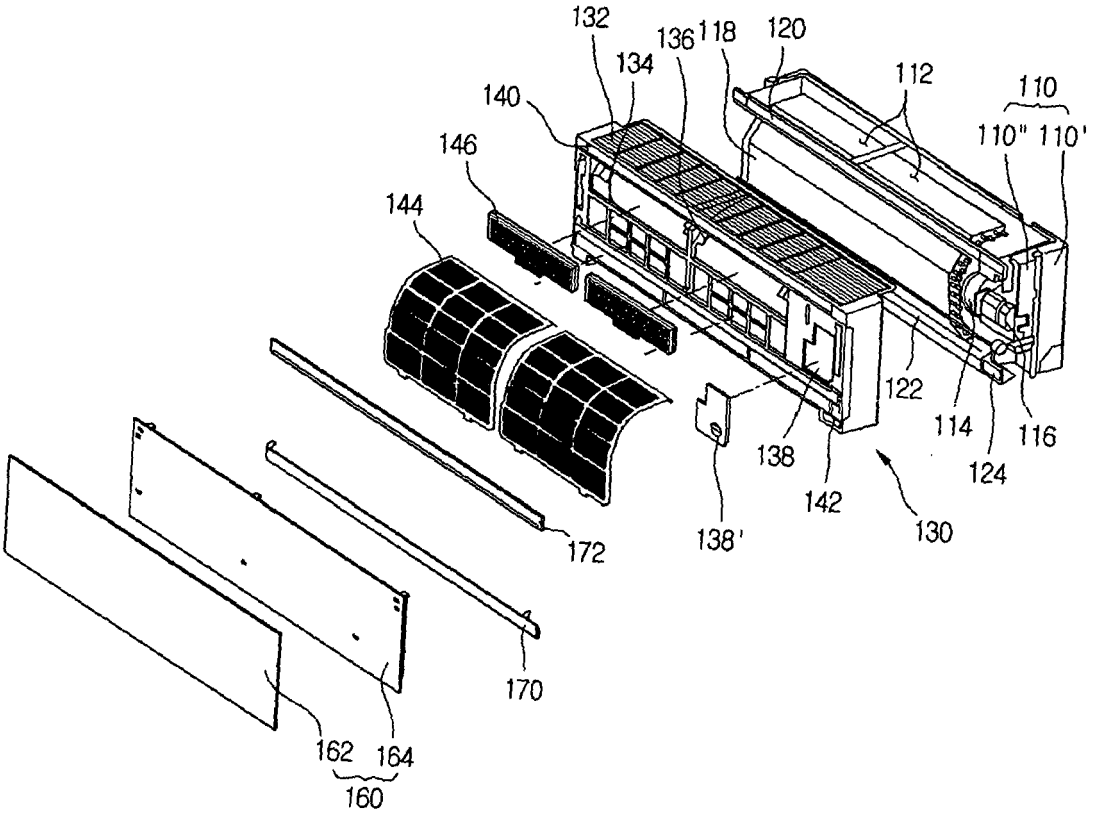
Fig.4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164
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Fig.5

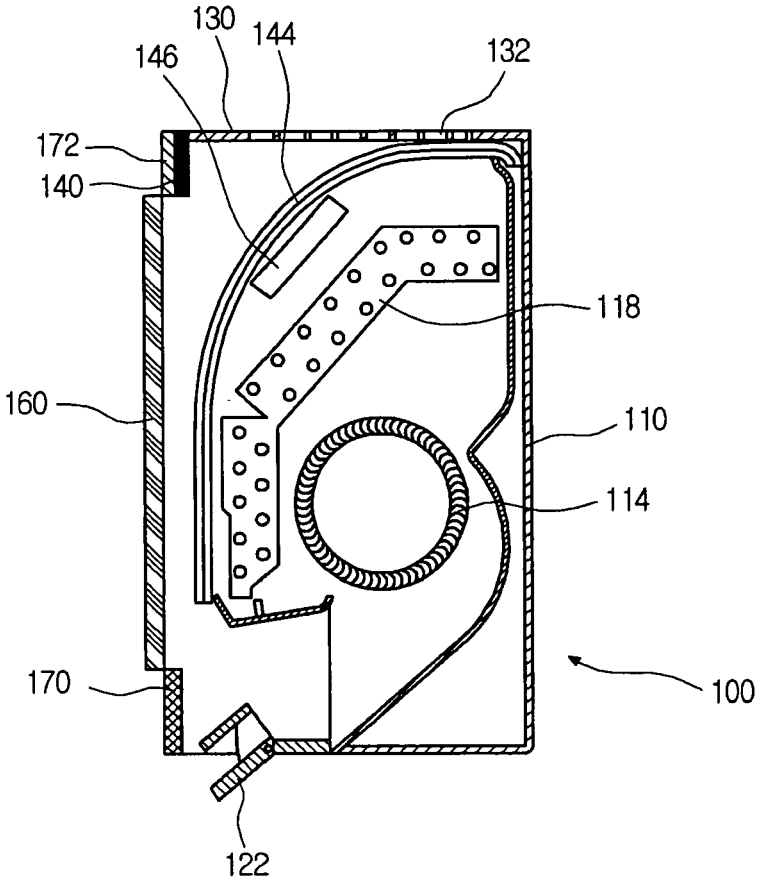

Fig.6

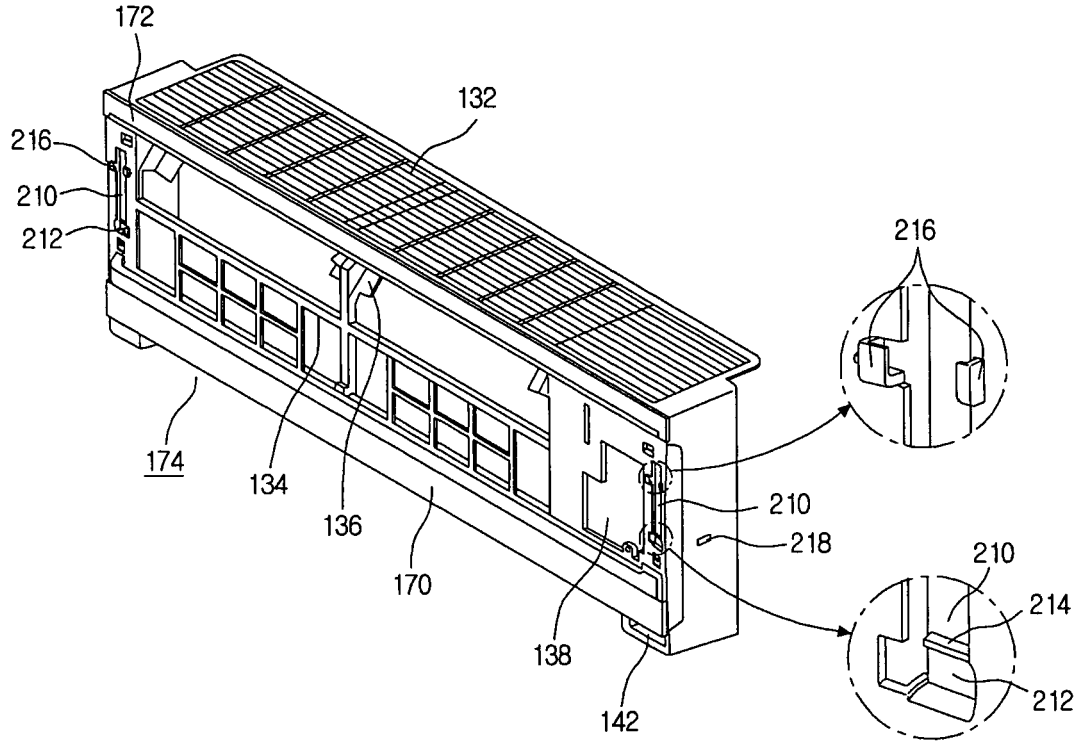
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Fig.7

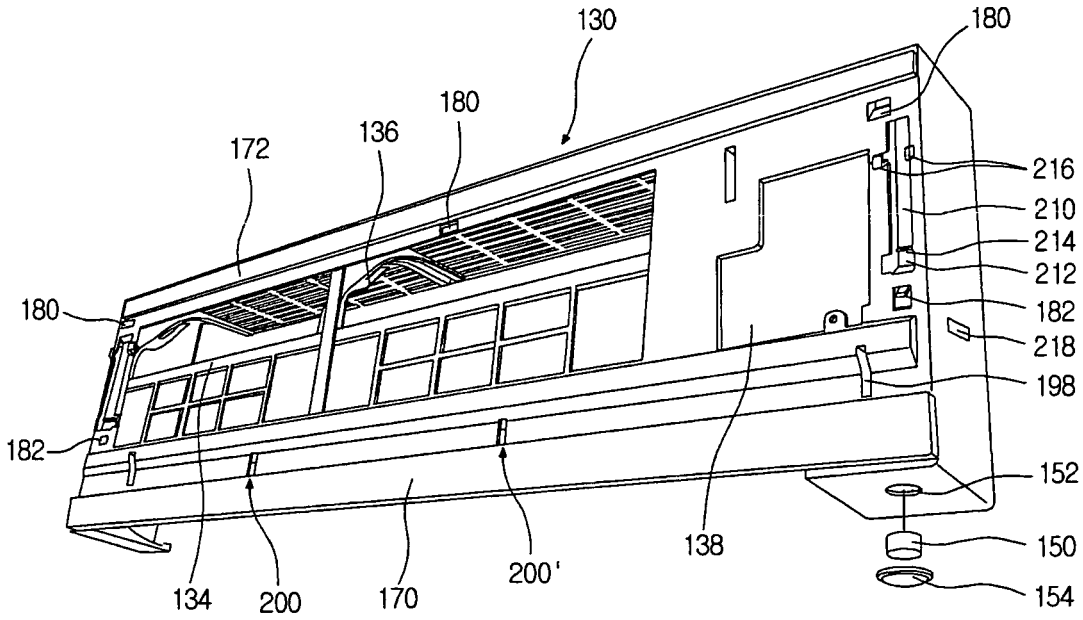
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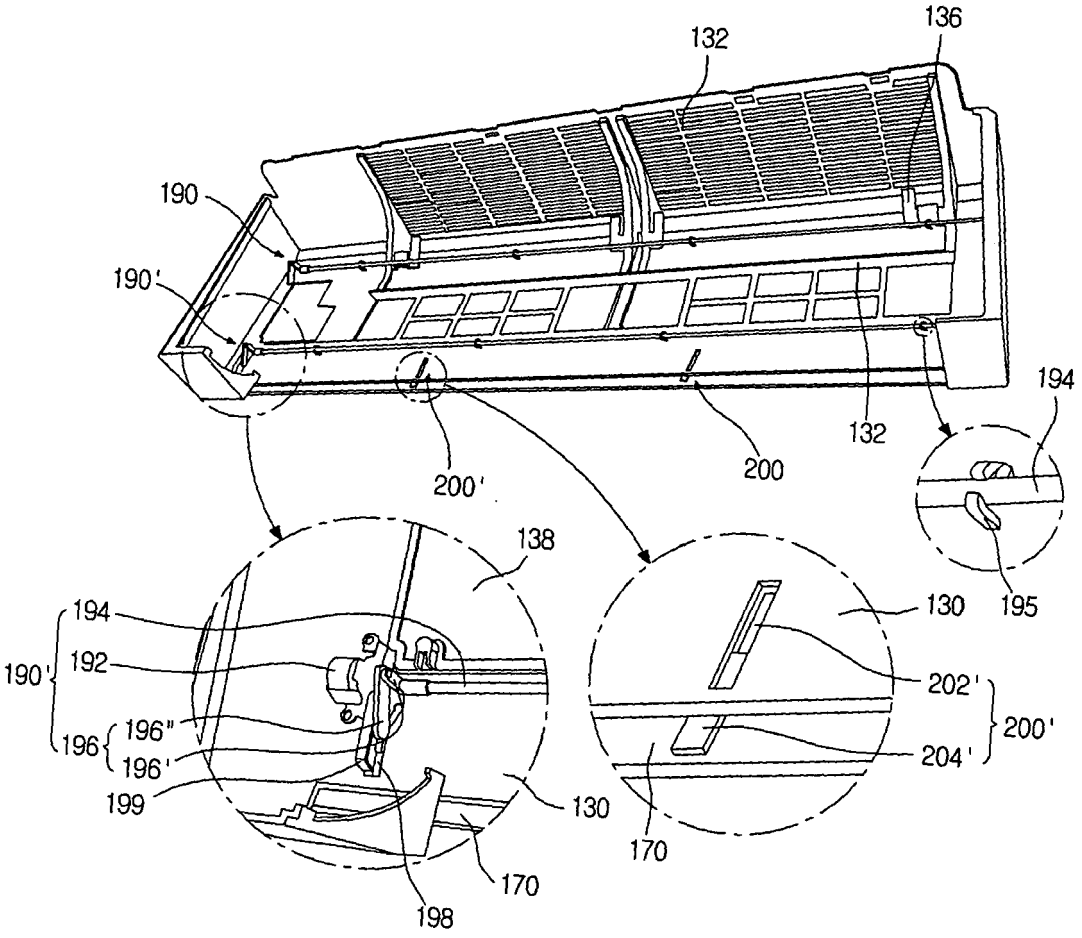
Fig.8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204'
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Fig.9

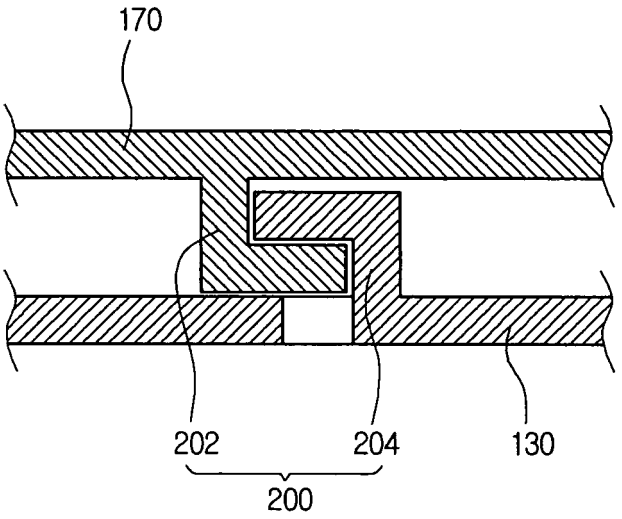

Fig.10

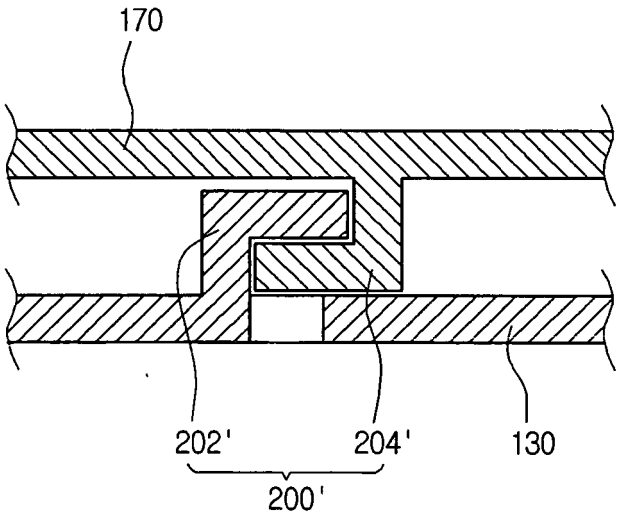

Fig.11

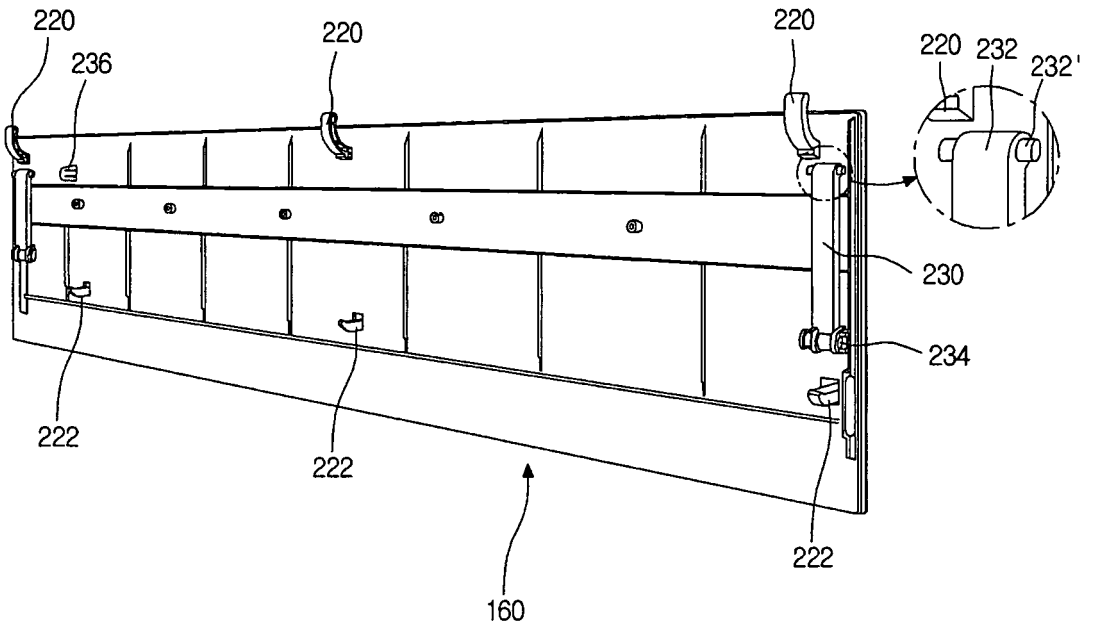
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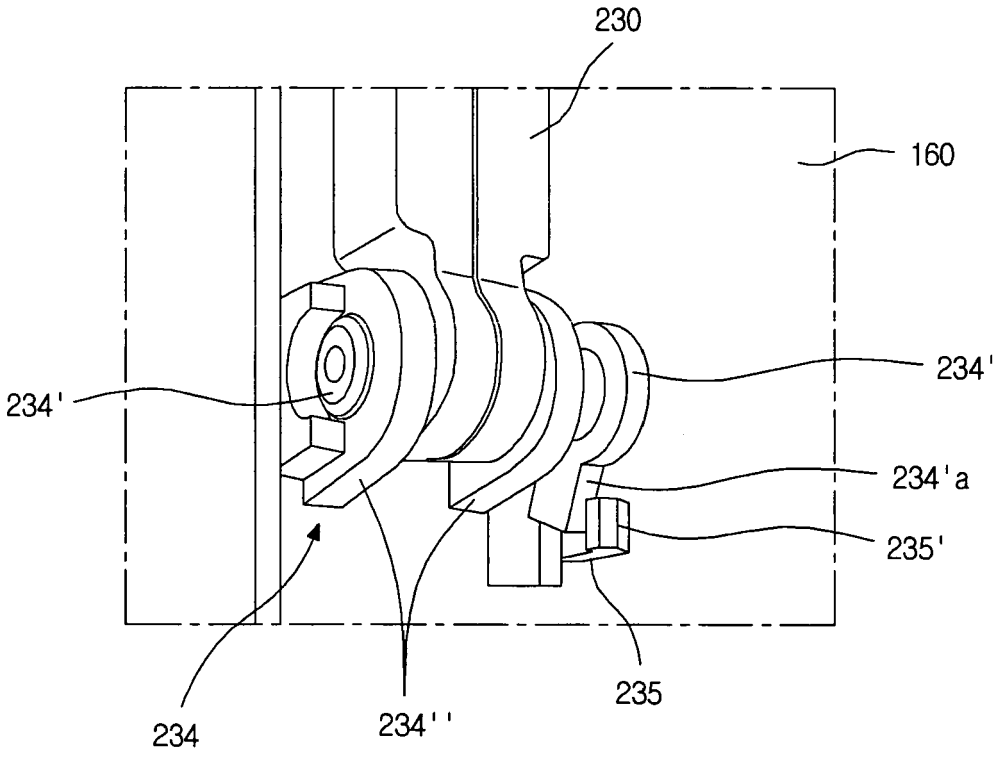
Fig.12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234'
234'
234'a
235'
234
234''
235

Fig.13

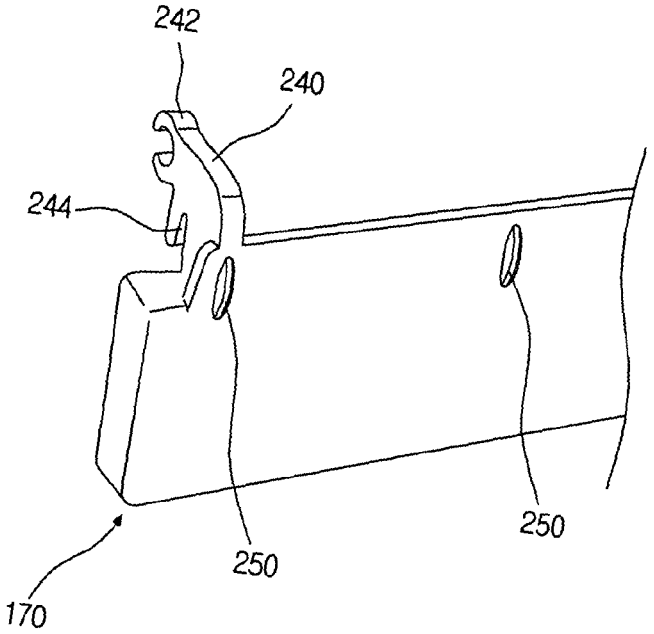

Fig.14

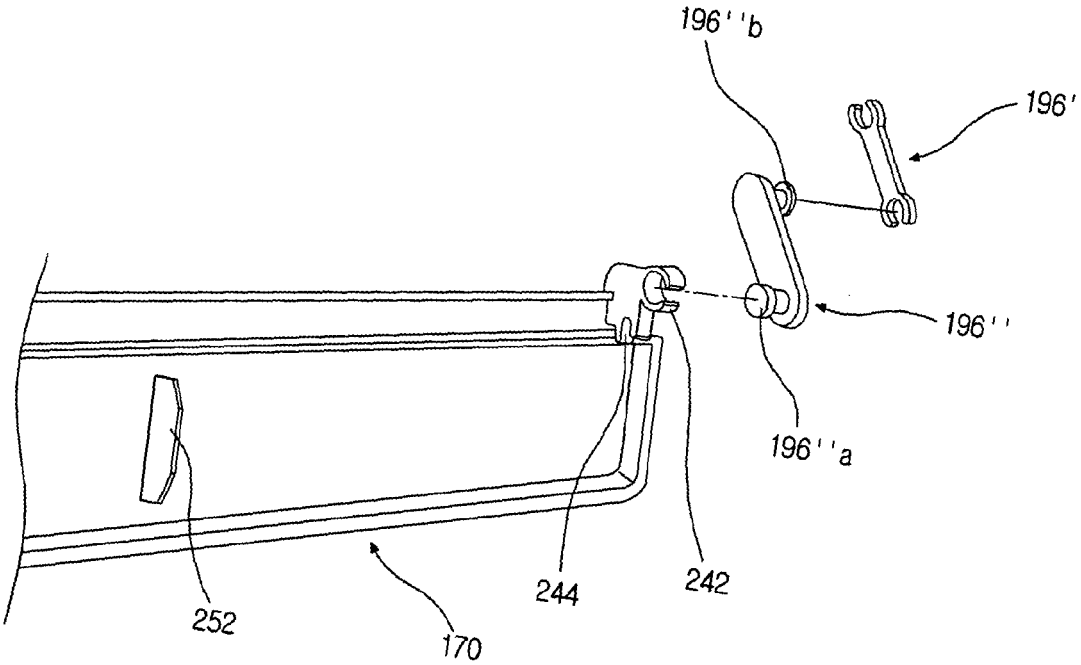

Fig.15