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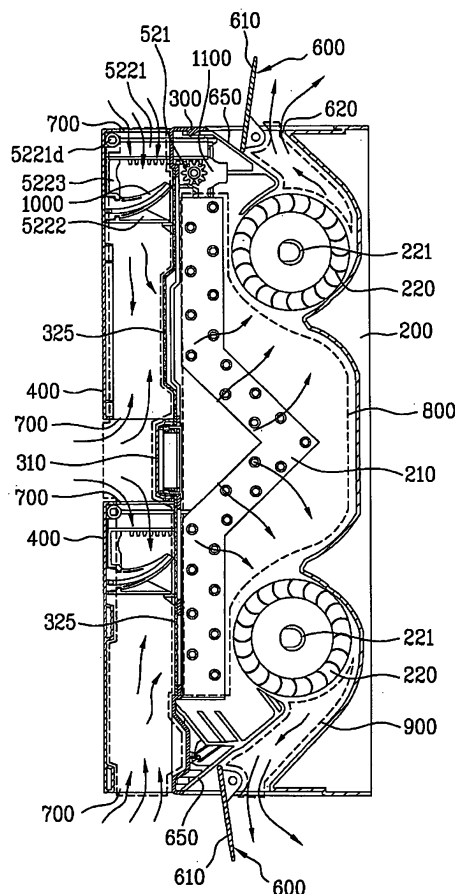
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(54) **Air conditioner**

(57) The present invention relates to air conditioners. More specifically, the present invention relates to an air conditioner in which air suction openings are opened/closed selectively by a plurality of separated front panels, moving backward and forward by a driving unit, to discharge conditioned air upward/downward, for securing an adequate air flow rate to be heat exchanged, not being interfered with an air inflow from front, and making convenient opening/closing control of a flow passage according to various modes.

For this, the present invention provides an air conditioner including a case having a heat exchanger and a fan mounted thereto, a front panel movably mounted in front of the case for opening/closing a plurality of air suction openings, an air discharge opening in a top and/or a bottom of the case, and a driving unit for moving the front panel backward/forward.

FIG. 3



Description

TECHNICAL FIELD

[0001] The present invention relates to air conditioners. More specifically, the present invention relates to an air conditioner in which a plurality of front panels, moving backward and forward closely and smoothly by a driving unit, open/close suction openings selectively, for effective heat exchange of room air, and discharges the room air in upward and downward with a reduced flow resistance, to optimize room air according to a required mode without interfering with an incoming air flow from front.

BACKGROUND ART

[0002] Generally, in the air conditioners each for cooling or heating a room by using a refrigerating cycle having a compressor, a four-way valve, an outdoor heat exchanger, an expansion device, and an indoor heat exchanger, there are split type air conditioners and package type air conditioners.

[0003] Though the split type air conditioners and package type air conditioners are the same in view of function, the split type air conditioner has the indoor unit having a cooling/heat dissipation device, a room fan and a room fan motor mounted thereto, the outdoor unit having a heat dissipation/cooling device, an outdoor fan and an outdoor fan motor mounted thereto, and refrigerant pipe lines connected between the indoor unit and the outdoor unit, and the package type air conditioner has unitized cooling/heat dissipation functions, for mounting to an opening in a wall of a house, or a window with securing device, directly.

[0004] FIG. 16 illustrates an exploded perspective view of a related art air conditioner, and FIG. 17 illustrates a section of an assembly of the related art air conditioner.

[0005] Referring to FIGS. 16 and 17, the related art air conditioner is provided with a case 102, a front frame 110 mounted to a front of the case 102 having an air suction opening 104, suction grill 106, and air discharge opening in a lower side of a front or an underside, a suction grill 112 rotatably connected to the front of the front frame 110, a motor 114 mounted to the case 102, a fan 116 connected to the motor 114, and a heat exchanger 118 arranged between the fan 116, the front air suction opening 104, and the suction grill 106.

[0006] The front frame 110 has the front air suction opening 104 in the front, the suction grill 106 in a top formed as a unit, and a pre-filter 105 for filtering foreign matters from the air drawn through the air suction opening 104.

[0007] The suction grill 112, provided for protecting the front air suction opening and the pre-filter 105, has an upper portion rotatably connected to an upper portion of the front frame 110.

[0008] Mounted to an inner side of a lower side of the front frame 110, there are a condensed water pan 119

for receiving condensed water falling from the indoor heat exchanger 118, and a discharge grill 124 having a louver 120 for changing left/right directions of air from the air discharge opening 108, and a vane 122 for changing up/down directions of the air.

[0009] In the related art air conditioner, if the fan 116 is rotated by the motor 114, room air in front of the suction grill 112 has foreign matters filtered with the filter 105 as the room air passes through the suction grill 112 and the front air suction opening 104, and is drawn through a space between the front frame 110 and the case 102.

[0010] Room air over the front frame 110 passes through the upper suction grill 106, and is drawn through the space between the front frame 110 and the case 102.

[0011] The room air drawn thus is cooled or heated by refrigerant passing through the indoor heat exchanger 118 as the room air passes through the indoor heat exchanger 118, guided by the louver 120 and the vane 122 after the room air passes through the fan 116, and discharged to the room passing through the air discharge opening 108.

[0012] However, the above related art air conditioner has the following disadvantage.

[0013] Because the related art air conditioner has the room air drawn through the front and upper suction grills, and discharged to the room through the underside after being cooled/heated at the heat exchanger 118, the related art air conditioner has a problem in that, if the related art air conditioner is installed at a low place, a time period required for uniform spreading of the cold air throughout the room is long in cooling, and, if installed at a high place, the air is discharged to a face of the user in heating, to give unpleasant feeling to the user.

SUMMARY OF INVENTION

[0014] To solve the problems, it is desirable to provide an air conditioner of which control of cooling/heating operation is convenient, and which has no great installation height limitation, enables not only uniform spreading the cold air throughout the room in cooling, but also indirect discharge of the warm air in heating to eliminate the unpleasant feeling of the user, and can reduce a flow passage resistance, and cool/heat the room air, adequately.

[0015] It would also be desirable to provide an air conditioner in which a front panel can be moved closely and smoothly, and secured accurately at a limited position, and a driving motor and a securing device can be secured, conveniently.

[0016] Accordingly, the invention provides an air conditioner that includes a case having a heat exchanger and a fan mounted thereto, a front panel movably mounted in front of the case for opening/closing a plurality of air suction openings, an air discharge opening in a top and/or a bottom of the case, and a driving unit for moving the front panel backward/forward.

[0017] The driving unit is provided to every one of the plurality of the front panels separated from each other.

[0018] The driving unit includes a driving source unit for generating driving force, a power transmission unit for transmission of driving power from the driving source unit to the front panel, and the power transmission unit is provided to every one of the plurality of front panels.

[0019] The power transmission unit is provided to every one of the plurality of front panels at opposite corners thereof.

[0020] Preferably, the power transmission units are connected with a cooperating unit such that the power transmission units are driven by one driving source unit.

[0021] The driving source unit is a driving motor, and the power transmission unit includes a pinion gear connected to a rotation shaft of the driving motor, and a rack rail connected to the front panel, the rack rail for engagement with the pinion gear.

[0022] The pinion gears are connected to each other with a connection shaft such that the pinion gears are driven at the same time with one driving motor.

[0023] Preferably, the air suction opening is formed in a front of the case.

[0024] More preferably, the driving unit is provided to every front panel formed as one pair arranged in up/down direction with a space therebetween.

[0025] Moreover, the driving unit transmits driving force so that the front panel moves forward/backward.

[0026] In another aspect of the present invention, an air conditioner includes a case having a heat exchanger and a fan mounted thereto, a plurality of front panels mounted in front of the case for opening/closing air suction openings as the front panels are moved by the driving unit, discharge units for opening/closing air discharge openings in a top and a bottom of the case respectively, and a control unit for controlling the discharge units at the top and the bottom respectively such that extents of opening of the discharge units are different from each other in room cooling.

[0027] The control unit opens the air discharge openings at the top and/or the bottom when the front panel moves forward, and closes the air discharge openings at the top and/or the bottom when the front panel moves to an original position.

[0028] The control unit puts the fan into operation when the front panel moves forward, and stops the fan when the front panel moves to an original position.

[0029] Preferably, of the front panels, the control unit moves forward the front panel at the top in room cooling, and moves the front panel at the bottom forward in room cooling.

[0030] The control unit puts the fan for the front panel that moves forward into operation, and stops other fans in various kinds of operation.

[0031] In the meantime, of the front panels, the control unit moves the front panel at the top forward and the front panel at the bottom to an original position in room cooling, and moves the front panel at the bottom forward and the front panel at the top to an original position in room heating.

[0032] The control unit closes the air discharge opening at the bottom in sleeping.

[0033] As an alternative, the control unit controls operation of the front panel, the fan, and the driving unit according to user's input through input means.

[0034] The control unit closes the air discharge opening at the bottom in room cooling, and closes the air discharge opening at the top in heating.

[0035] In the meantime, the control unit controls the discharge unit such that the air discharge opening at the bottom is opened greater than the air discharge opening at the top in room heating, and the air discharge opening at the top is opened greater than the air discharge opening at the bottom in room cooling.

[0036] The present invention has following advantageous effects.

[0037] First, an adequate flow rate of room air can be secured at the heat exchanger, flow passage open/close control for various modes is convenient, the front panel moves stably, and uniform spreading of the air being discharged can be induced in cooling/heating operation while the air conditioner is not limited by an installation height of the air conditioner substantially.

[0038] Second, flow resistance of air introduced from a room can be reduced, to make upward/downward discharge smoother, and the indirect discharge of hot air while the indirect discharge of hot air does not interfere with the inflow of air from front resolves user unpleasant feeling.

[0039] Third, the driving unit having a combination of the rack rail connected to every separated front panel and the pinion permits close and smooth movement of the front panels in forward/backward horizontally, and accurate securing at a limited position.

BRIEF DESCRIPTION OF THE DRAWINGS

[0040] The accompanying drawings, which are included to provide further understanding of the disclosure and are incorporated in and constitute a part of this application, illustrate embodiments of the disclosure and together with the description serve to explain the principle of the disclosure.

[0041] In the drawings:

FIG. 1 illustrates an exploded perspective view of an air conditioner in accordance with a preferred embodiment of the present invention;

FIG. 2 illustrates a perspective view of an assembly of an air conditioner in accordance with a preferred embodiment of the present invention;

FIG. 3 illustrates a section of an assembly of an air conditioner in accordance with a preferred embodiment of the present invention;

FIG. 4 illustrates a front view of an air conditioner in accordance with another preferred embodiment of the present invention;

FIG. 5 illustrates a section of an assembly of an air

conditioner in accordance with another preferred embodiment of the present invention;

FIGS. 6 and 7 illustrate perspective views each showing a driving unit of an air conditioner in accordance with a preferred embodiment of the present invention;

FIGS. 8 and 9 illustrate perspective views each showing a driving unit of an air conditioner in accordance with a preferred embodiment of the present invention;

FIG. 10 illustrates a section of a driving unit of an air conditioner in accordance with another preferred embodiment of the present invention;

FIG. 11 illustrates a block diagram of the air conditioner in FIG. 1;

FIGS. 12 to 15 illustrate perspective views each showing a state of use for respective modes of the air conditioner in FIG. 1;

FIG. 16 illustrates an exploded perspective view of a related art air conditioner; and

FIG. 17 illustrates a section of an assembly of a related art air conditioner.

DETAILED DESCRIPTION

[0042] Reference will now be made in detail to the specific embodiments of the present invention, examples of which are illustrated in the accompanying drawings. Wherever possible, the same reference numbers will be used throughout the drawings to refer to the same or like parts.

[0043] Referring to FIGS. 1 to 3, the air conditioner includes a case 200, a front frame 300, a front panel 400, a driving unit 500, a suction flow passage 700 formed with a discharge unit 600, a heat exchange flow passage 800, and a discharge flow passage 900.

[0044] The case 200 has a portion of each of an inside, a front, an upper side and a lower side opened, and a heat exchanger 210 vertically mounted therein parallel to the front, and one pair of fans 220 mounted in rear of the heat exchanger 210 arranged in an up/down direction with a space therebetween.

[0045] It is preferable that a central portion of the heat exchanger 210 has a shape that can reduce a flow resistance of air introduced thereto from the room and induce a slanted direction movement of the air, and, besides, as shown in FIG. 5, the heat exchanger 210 may have a rectangular shape for convenience of fabrication.

[0046] There are one pair of the front frames 300 secured to the front of the case 200 in an up/down direction with a space therebetween, and a display unit 310 arranged in a lateral direction between the two front frames 300.

[0047] The front frame 300 has an air suction opening 320 in a front for drawing room air from a front direction, with a filter 325 mounted thereto.

[0048] One pair of the front panels 400 are arranged in an up/down direction with the display unit 310 there-

between in conformity with the front frames 300, for moving forward/backward to open/close the air suction opening 320 in the front of the front frame 300.

[0049] Each of the front panel 400 includes a flat front portion 410 and bent portions 420 on opposite sides each bent backward and extended from opposite edges of the flat portion 410 to move along sloped opposite sides of the front frame 300.

[0050] Referring to FIG. 4, as another preferred embodiment of the present invention, if there are one pair of the front panels 400 arranged in a lateral direction with a vertical space therebetween, it is preferable that the display unit 310 is arranged in a vertical direction between the left and the right front panels 400.

[0051] Referring to FIGS. 6 to 9, the driving unit 500, provided for moving the front panels 400 backward/forward from the front frames 300 horizontally, includes a driving source unit 510 and a power transmission unit 520.

[0052] It is preferable that the driving unit 500 is mounted to opposite corners of each of the front panels 400.

[0053] The driving source unit 510 may be, for an example, a driving motor 511 for generating driving force, and the power transmission unit 520 may be a pinion gear 521 and a rack rail 522 for transmission of the driving force from the driving source unit 510 to the front panel 400.

[0054] The pinion gear 521 is fixed to a rotation shaft 512 for receiving rotation force from the driving motor 511, and the rack rail 522 has a body portion 5221, a guide portion 5222, and a connection portion 5223 for converting the rotation force of the pinion gear 521 to reciprocating movement.

[0055] The body portion 5221 has a rack gear 5221a formed on an underside thereof for engagement with the pinion gear 521, the guide portion 5222 is arranged parallel to the body portion spaced therefrom, and the connection portion 5223 connects one sides of each of the body portion 5221 and the guide portion 5222, vertically.

[0056] That is, the rack rail 522 having the body portion 5221, the guide portion 5222, and the connection portion 5223 forms a D shape in overall.

[0057] The case 200 has a guide hole (not shown) for receiving the rack rail 522 when the rack rail 522 moves in/out of the front frame 300 following rotation of the pinion gear 521.

[0058] Particularly, the body portion 5221 at an upper portion has a ledge 5221b which is in contact with a body portion supporter 240 formed at an upper portion of the case 200, for moving forward/backward, smoothly.

[0059] The body portion 5221 has a hinge hole 5221c at an upper portion of a front end, to which the front panel 400 is connected with a hinge pin 5221d, such that the body portion 5221 is forwardly/backwardly movable together with the front panel 400.

[0060] The guide portion 5222 at an underside is in contact with a guide portion supporter 245 spaced downward from the body portion supporter 240 of the case

200, for moving forward/backward smoothly, to guide the entire rack rail 522.

[0061] In the meantime, the body portion 5221 at a rear end has a hook shaped stopper 5221e for holding a holder 250 at an upper portion of the case 200 so that the body portion 5221 moves forward no more when the rack rail 522 moves to a front limit.

[0062] Referring to FIG. 10, as another preferred embodiment of the present invention, the pinion gears 521 at opposite sides of the front panel 400 may be made to cooperate, with a cooperating unit, such as a horizontal shaft 530.

[0063] In this case, even if only one driving motor 511 is provided to each side of the front panel 400, both of the power transmission units 520 can be driven at a time.

[0064] Though the opposite pinion gears 521 may be made to cooperate with each other by using the connection shaft 530, of course the opposite power transmission units 520 may be made to cooperate with each other by using other power transmission mechanism, such as pulley and belt, sprocket and chain, gear box, and so on as required.

[0065] The discharge unit 600 has a discharge panel 610 rotatably hinged to an upper side and a lower side of the case 200 for opening/closing an air discharge opening 620 formed between the case 200 and the front frame 300.

[0066] For blowing air to a user indirectly while the air blown thus does not interfere with an air inflow from front, the discharge panel 610 rotates in front/rear directions at predetermined angles from an underside of the case 200 respectively, to open/close the air discharge opening 620.

[0067] Though the drawing shows the discharge unit 600 both at a top and a bottom of the case 200, the discharge unit 600 may be provided to one of the top and the bottom as required.

[0068] Though the front panel 400 of the present invention is provided in one pair to upper/lower sides or left/right sides in the foregoing embodiment, of course the front panel 400 may be provided in three or more than three pieces to the upper/lower sides or left/right sides, or to over or under the air discharge opening 620 selectively, as another embodiment.

[0069] The suction flow passage 700 is a passage for guiding room air from front of the air suction opening 320 so that the room air is introduced into the case 200 through the air suction opening 320 when the front panel 400 moves forward.

[0070] Because there are a plurality of front panels 400, there are also a plurality of the suction flow passages 700 formed between the front frame 300 and the front panels 400, such that a plurality of the suction flow passages 700 are opened/closed following the forward/backward movement of the front panels 400.

[0071] Particularly, if there are one pair of the front panels at the upper side and the lower side with the display unit 310 at the middle as one embodiment of the present

invention, the suction flow passages 700 are formed at a middle portion, and upper and lower portions of a space between the case 200 and the front panels 400 following the movement of the front panels 400.

[0072] In detail, since the suction flow passages 700 are split at the middle portion of the space between the case 200 and the front panel 400 into two sides of an upper side and a lower side, an adequate amount of the room air can be introduced between the front panels 400.

[0073] In more detail, the suction flow passages 700 are formed throughout the middle portion of the space between the case 200 and the front panels 400 (from a left edge to a right edge) split into the upper and the lower sides, and throughout the upper portion and the lower portion of the case 200 (from a left edge to a right edge) following the movement of the front panels 400.

[0074] In this instance, it is preferable that opposite sides of the space between the case 200 and the front panel 400 are closed with the opposite bent portions 420 at the time of forward movement of the front panel 400.

[0075] As another preferred embodiment of the present invention, in a case one pair of the front panel 400 are arranged in a lateral direction with a middle vertical space, the suction flow passages 700 may be formed at a middle portion, and side portions of the space between the case 200 and the front panel 400 following the forward/backward movement of the front panels 400.

[0076] In the present invention, the heat exchange flow passage 800 is a passage that guides the room air to pass through the suction flow passage 700, be introduced into the case 200 through the air suction opening 320, and be heat exchanged as the room air passes through the heat exchanger 210 in the case 200.

[0077] The heat exchange flow passage 800 is formed with the front frame 300 and the case 200 in rear of the air suction opening 320 when the front panel 400 moves forward to open the suction flow passage 700.

[0078] Particularly, since the heat exchanger 210 is vertically mounted in the heat exchange flow passage 800 and a middle portion of the heat exchanger 210 has a > shape, upward/downward slanted direction discharge of the room air introduced thereto from forward and heat exchanged thus becomes smoother.

[0079] In the meantime, in the present invention, the discharge flow passage 900 is a passage for discharging air conditioned as the air passed through the heat exchanger 800 to the room, again.

[0080] The discharge flow passages 800 are opened/closed with the discharge unit 600 at the upper portion and lower portion of the case 200 respectively, and have the air discharge openings 620 formed with the front frame 300 and the case 200.

[0081] Referring to FIG. 11, the air conditioner of the present invention further includes a control unit 1500 of a general microcomputer for general control of components, such as the fan 220, the driving unit 500, the discharge unit 600, and so on.

[0082] The operation of the air conditioner for each of

modes will be described.

[0083] Referring to FIG. 12, in room cooling operation, among a plurality of front panels 400 separated from each other, the control unit 150 moves the front panels 400 at a top side forward for opening an upper side suction flow passage 700.

[0084] In this instance, among the plurality of front panels 400 separated from each other, the control unit 1500 moves the front panels 400 at the bottom side to an original position (moves backward) for closing a lower side suction flow passage 700 (a state the front panel 400 is in close contact with the front frame 300).

[0085] Referring to FIG. 13, in room heating operation, among the plurality of front panels 400 separated from each other, the control unit 1500 moves the front panels 400 at the bottom side forward for opening a lower side suction flow passage 700.

[0086] In this instance, among the plurality of front panels 400 separated from each other, the control unit 1500 moves the front panels 400 at the top side to an original position (moves backward) for closing the upper side suction flow passage 700 (a state the front panel 400 is in close contact with the front frame 300).

[0087] At the time the front panel 400 moves forward, the control unit 1500 puts the fan 220 in rear of the front panel 400 into operation, and at the time the front panel 400 moves to an original position (moves backward), the control unit 1500 may stop the fan 220 in rear of the front panel 400.

[0088] Referring to FIGS. 12 and 13, when the front panel 400 moves forward, the control unit 1500 opens the discharge unit 600 adjacent to the front panel 400, and, when the front panel 400 moves to an original position (moves backward), the control unit 1500 may close the discharge unit 600 adjacent to the front panel 400.

[0089] By selective control of the plurality of front panels 400, the fans 220, the discharge units 600 thus, such that the room air is conditioned at the upper portion and discharged to upward in room cooling, and the room air is conditioned at the lower portion and discharged to downward in room heating, fast and uniform room air cooling/heating can be made.

[0090] As one embodiment of the present invention, in sleeping operation, in order to prevent conditioned air from blowing to the user directly, the control unit 1500 may close the bottom air discharge opening and open the top air discharge opening regardless of cooling/heating.

[0091] In the meantime, referring to FIG. 2, in a case room cooling/heating is inadequate only with the front panel 400 selected to move forward thus among the top and bottom front panels 400, the control unit 1500 may move entire front panels forward.

[0092] In a case the entire front panels 400 are moved forward, the control unit 1500 puts the entire fans 220 arranged at the upper portion and the lower portion, and opens or closes the upper and lower discharge units, selectively.

[0093] In the meantime, the control unit may control the discharge unit 600 such that the bottom air discharge opening 620 is opened greater than the top air discharge opening 620 as shown in FIG. 14 in room heating, or the control unit may control the discharge unit 600 such that the top air discharge opening is opened greater than the bottom air discharge opening as shown in FIG. 15 in room cooling.

[0094] It is preferable that a ratio of opening of the bottom air discharge opening 620 to the top air discharge opening 620 is 7:3 in room heating, and 3:7 in room cooling.

[0095] The air conditioner of the present invention can operate the plurality of front panels 400, the fans 220, and the discharge units 600 separated from each other selectively according to various operation modes not only of cooling, heating, and sleeping, but also of outing, and exercising. The operation modes may be selected according to input by a user through separate input means.

[0096] Unexplained reference symbols in the drawings are a fan bearing unit 221, a seating holder 297, a holding projection 523, a stopper 524, a discharge unit main frame 630, a discharge panel guide unit 650, an opening/closing guide 1000, an insertion slot 1010, a driving motor securing device 1100, a body 1110, a receiving portion 1120, a mounting leg 1150, and drain pan 1700.

[0097] The operation of the air conditioner of the present invention will be described.

[0098] The plurality of front panels 400 separated from each other move forward/backward by the driving units 500 horizontally, and the room air is introduced into the case 200 through the air suction openings 320 in the front of the front frame 300 following movement of the front panel 400.

[0099] In this instance, at the time the front panels 400 move forward, the plurality of suction flow passages 700 formed between the front panels 400 and the front frame 300 serve as passages for introducing the room air to the air suction openings 320.

[0100] Therefore, because the plurality of suction flow passages 700 are opened/closed as the front panels 400 are moved, air conditioning of an adequate amount of room air is made possible, an effective flow passage control becomes possible in cooling, heating and various other modes (sleeping, outing, and so on) by moving the plurality of front panels 400 backward/forward, selectively.

[0101] That is, convenient control of the air conditioner is possible, in which uniform room cooling/heating is possible by conditioning and discharging the room air from the upper portion in room cooling, and by conditioning and discharging the room air from the lower portion in room heating, and safe and comfortable use of the air conditioner is induced by making conditioned air to be discharged only through the top in sleeping.

[0102] Especially, the driving unit which has a combination of the pinion gear 521 and the rack rail 522 connected to the front panel 400 enables stable forward/

backward movement of the front panel 400 without shaking despite of an air suction flow.

[0103] Moreover, in a case the room air, introduced through the suction flow passages 700 in front of the case 200, is discharged to the air discharge openings 620 in the top and bottom of the case 200, uniform spreading of the discharged air can be induced in cooling/heating operation while an installation height of air conditioner is not limited, substantially.

[0104] In the meantime, the > shaped middle portion of the heat exchanger 210 in the case 200 reduces flow resistance in the heat exchange flow passage of the air drawn thereto, to enable smoother upward/downward discharge of the air.

[0105] Moreover, the forward/backward rotation of the discharge panel 610 with reference to the case 200 to open/close the discharge flow passage 900 along a rear side of the discharge panel 610 enables indirect discharge of hot air in heating operation while the indirect hot air discharge does not interfere with an air inflow from front, thereby resolving the unpleasant feeling of the user.

[0106] It will be apparent to those skilled in the art that various modifications and variations can be made in the present invention without departing from the scope of the invention. Thus, it is intended that the present invention cover the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

[0107] The air conditioner of the present invention has the following advantages.

[0108] First, an adequate flow rate of room air can be secured at the heat exchanger, flow passage open/close control for various modes is convenient, the front panel moves stably, and uniform spreading of the air being discharged can be induced in cooling/heating operation while the air conditioner is not limited by an installation height of the air conditioner substantially.

[0109] Second, flow resistance of air introduced from a room can be reduced, to make upward/downward discharge smoother, and the indirect discharge of hot air while the indirect discharge of hot air does not interfere with the inflow of air from front resolves user unpleasant feeling.

[0110] Third, the driving unit having a combination of the rack rail connected to every separated front panel and the pinion permits close and smooth movement of the front panels in forward/backward horizontally, and accurate securing at a limited position.

Claims

1. An air conditioner comprising:

a case having a heat exchanger and a fan mounted thereto;

a front panel movably mounted in front of the case for opening/closing a plurality of air suction

openings;

an air discharge opening in a top and/or a bottom of the case; and

a driving unit for moving the front panel backward/forward.

2. The air conditioner as claimed in claim 1, wherein the driving unit is provided to every one of the plurality of the front panels separated from each other.

3. The air conditioner as claimed in claim 1, wherein the driving unit includes;
a driving source unit for generating driving force,
a power transmission unit for transmission of driving power from the driving source unit to the front panel, and
the power transmission unit is provided to every one of the plurality of front panels.

4. The air conditioner as claimed in claim 3, wherein the power transmission unit is provided to every one of the plurality of front panels at opposite corners thereof.

5. The air conditioner as claimed in claim 4, wherein the power transmission units are connected with a cooperating unit such that the power transmission units are driven by one driving source unit.

6. The air conditioner as claimed in claim 3, wherein the driving source unit is a driving motor, and the power transmission unit includes;
a pinion gear connected to a rotation shaft of the driving motor, and
a rack rail connected to the front panel, the rack rail for engagement with the pinion gear.

7. The air conditioner as claimed in claim 6, wherein the pinion gears are connected to each other with a connection shaft such that the pinion gears are driven at the same time with one driving motor.

8. The air conditioner as claimed in claim 1, wherein the air suction opening is formed in a front of the case.

9. The air conditioner as claimed in claim 1, wherein the driving unit is provided to every front panel formed as one pair arranged in up/down direction with a space therebetween.

10. The air conditioner as claimed in claim 1, wherein the driving unit transmits driving force so that the front panel moves forward/backward.

11. An air conditioner comprising:

a case having a heat exchanger and a fan mounted thereto;

- a plurality of front panels mounted in front of the case for opening/closing air suction openings as the front panels are moved by the driving unit; discharge units for opening/closing air discharge openings in a top and a bottom of the case, respectively; and
a control unit for controlling the discharge units at the top and the bottom respectively such that extents of opening of the discharge units are different from each other in room cooling.
12. The air conditioner as claimed in claim 11, wherein the control unit opens the air discharge openings at the top and/or the bottom when the front panel moves forward.
 13. The air conditioner as claimed in claim 11, wherein the control unit closes the air discharge openings at the top and/or the bottom when the front panel moves to an original position.
 14. The air conditioner as claimed in claim 11, wherein the control unit puts the fan into operation when the front panel moves forward, and stops the fan when the front panel moves to an original position.
 15. The air conditioner as claimed in claim 11, wherein, of the front panels, the control unit moves forward the front panel at the top in room cooling.
 16. The air conditioner as claimed in claim 11, wherein, of the front panels, the control unit moves the front panel at the bottom forward in room cooling.
 17. The air conditioner as claimed in claim 11, wherein the control unit puts the fan for the front panel that moves forward into operation, and stops other fans in various kinds of operation.
 18. The air conditioner as claimed in claim 11, wherein, of the front panels, the control unit moves the front panel at the top forward and the front panel at the bottom to an original position in room cooling.
 19. The air conditioner as claimed in claim 11, wherein, of the front panels, the control unit moves the front panel at the bottom forward and the front panel at the top to an original position in room heating.
 20. The air conditioner as claimed in claim 11, wherein the control unit closes the air discharge opening at the bottom in sleeping.
 21. The air conditioner as claimed in claim 11, wherein the control unit closes the air discharge opening at the bottom and opens the air discharge opening at the top in sleeping.
 22. The air conditioner as claimed in claim 11, wherein the control unit controls operation of the front panel, the fan, and the driving unit according to user's input through input means.
 23. The air conditioner as claimed in claim 11, wherein the control unit closes the air discharge opening at the bottom in room cooling.
 24. The air conditioner as claimed in claim 11, wherein the control unit closes the air discharge opening at the top in heating.
 25. The air conditioner as claimed in claim 11, wherein the control unit controls the discharge unit such that the air discharge opening at the bottom is opened greater than the air discharge opening at the top in room heating.
 26. The air conditioner as claimed in claim 11, wherein the control unit controls the discharge unit such that the air discharge opening at the top is opened greater than the air discharge opening at the bottom in room cooling.

FIG. 1

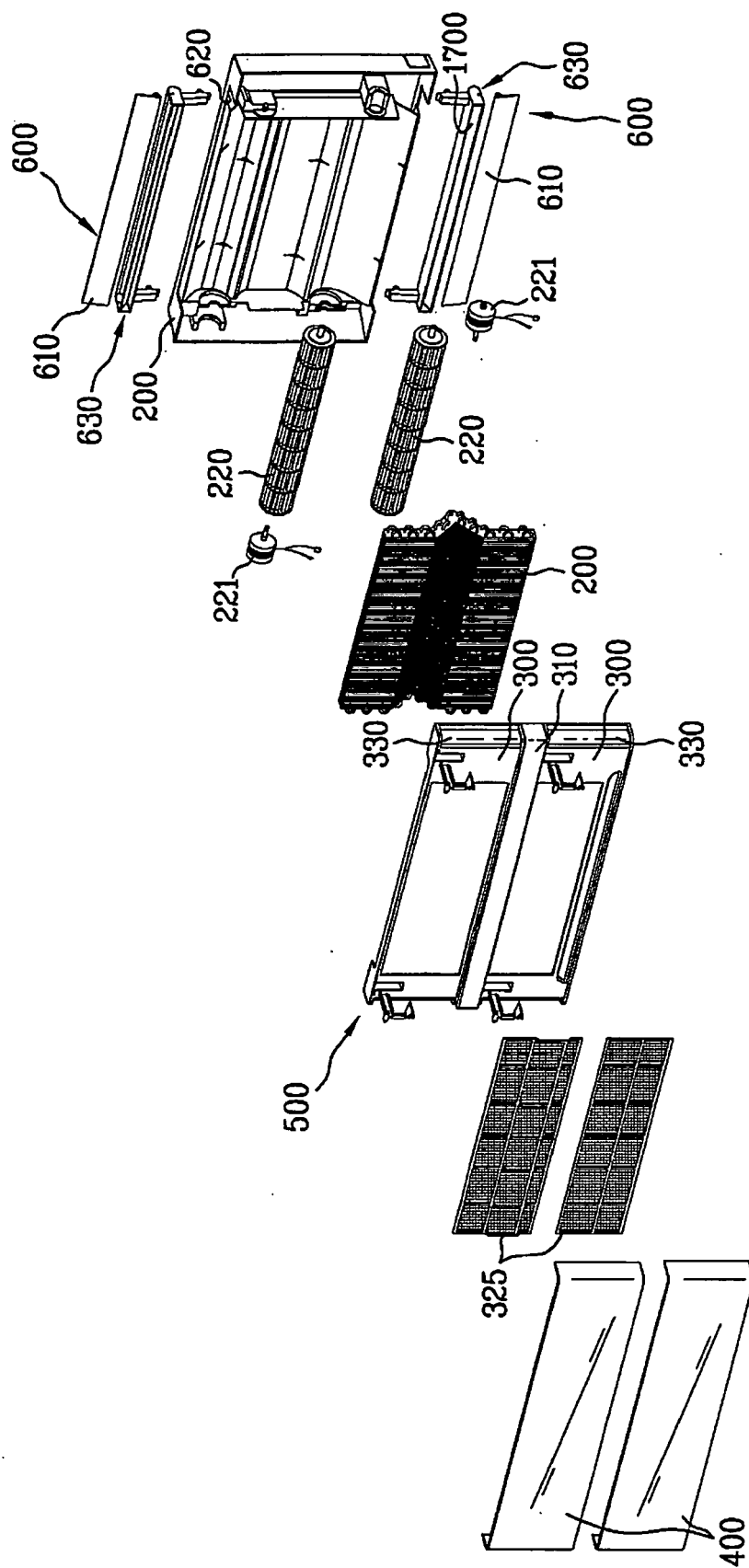


FIG. 2

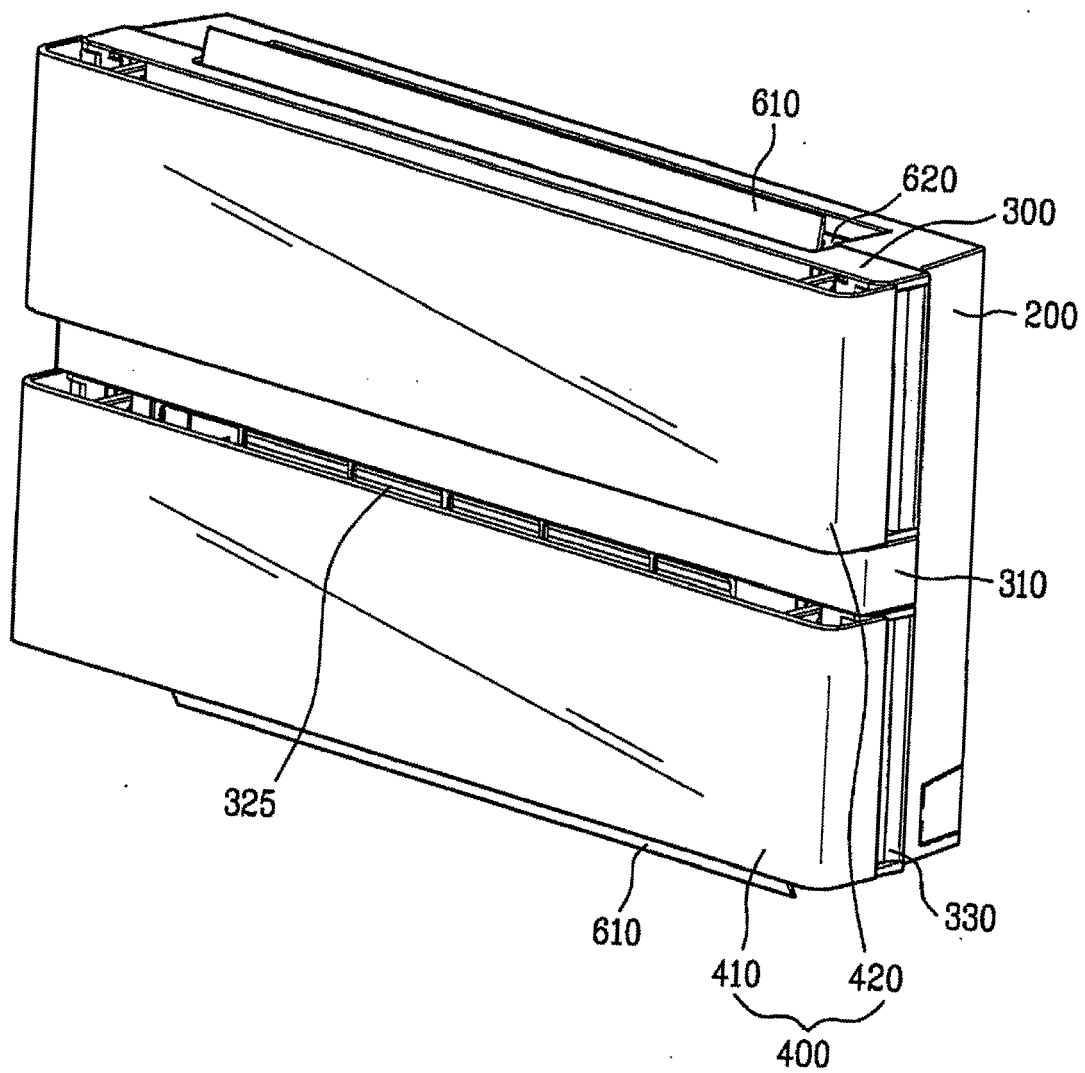


FIG. 3

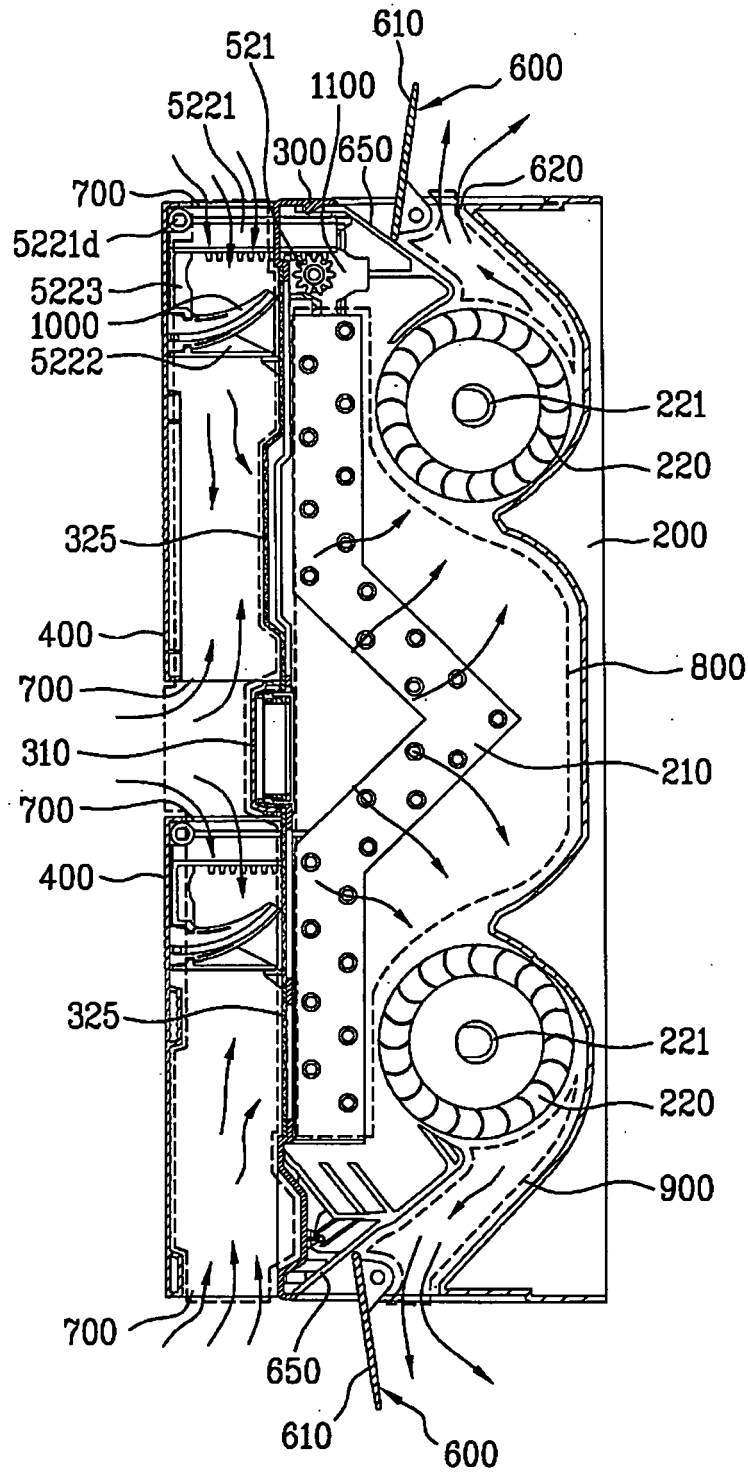


FIG. 4

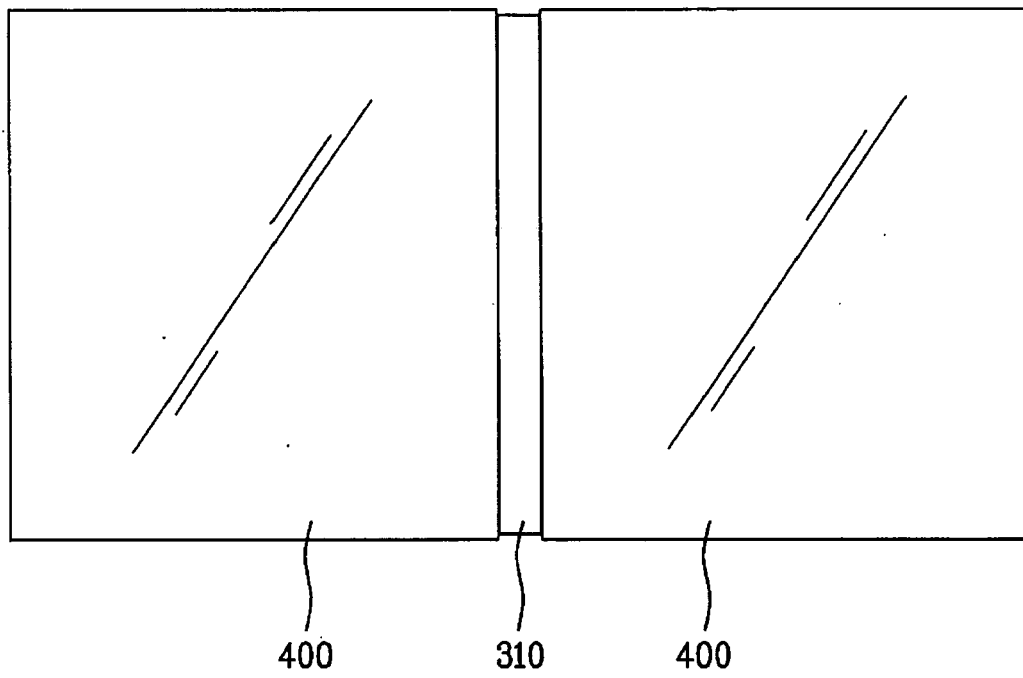


FIG. 5

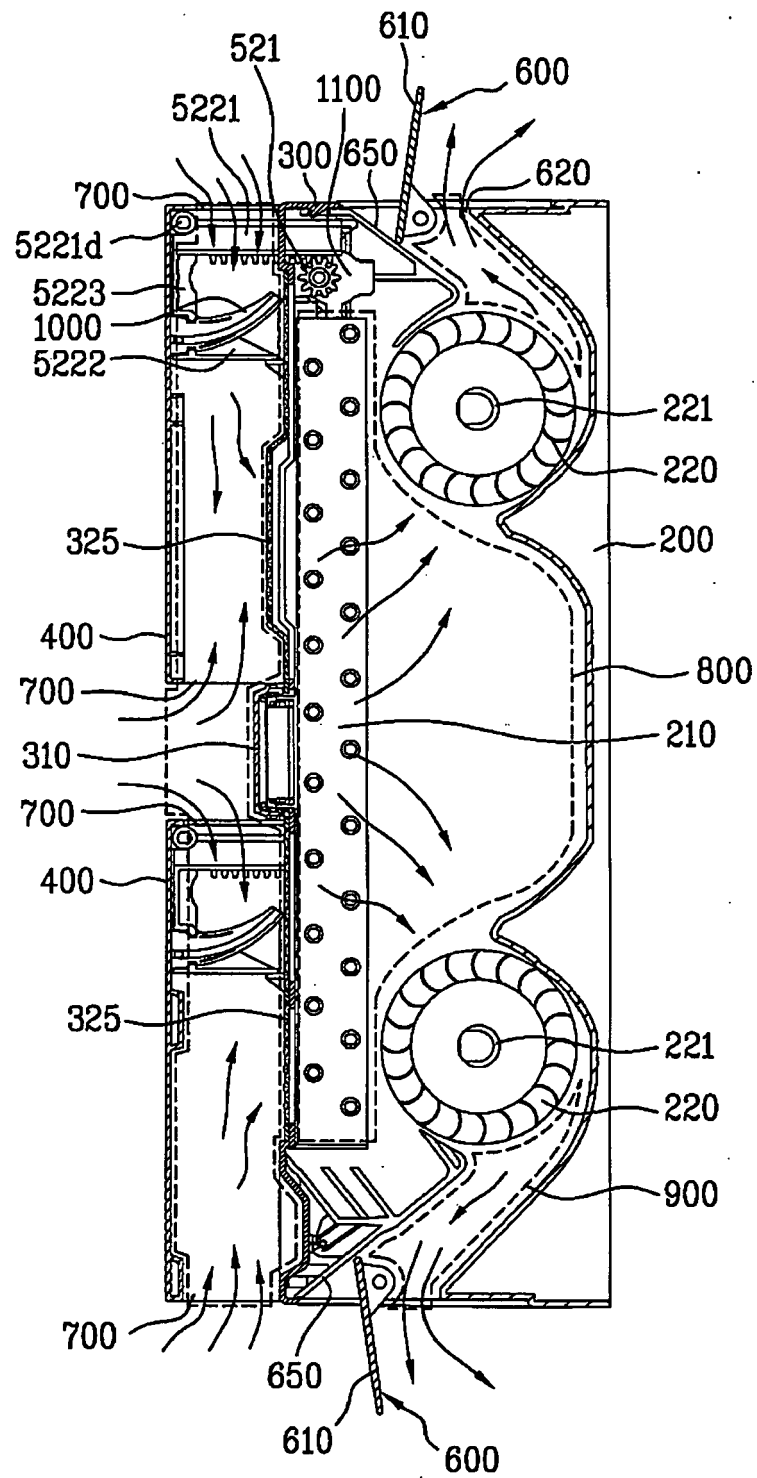


FIG. 6

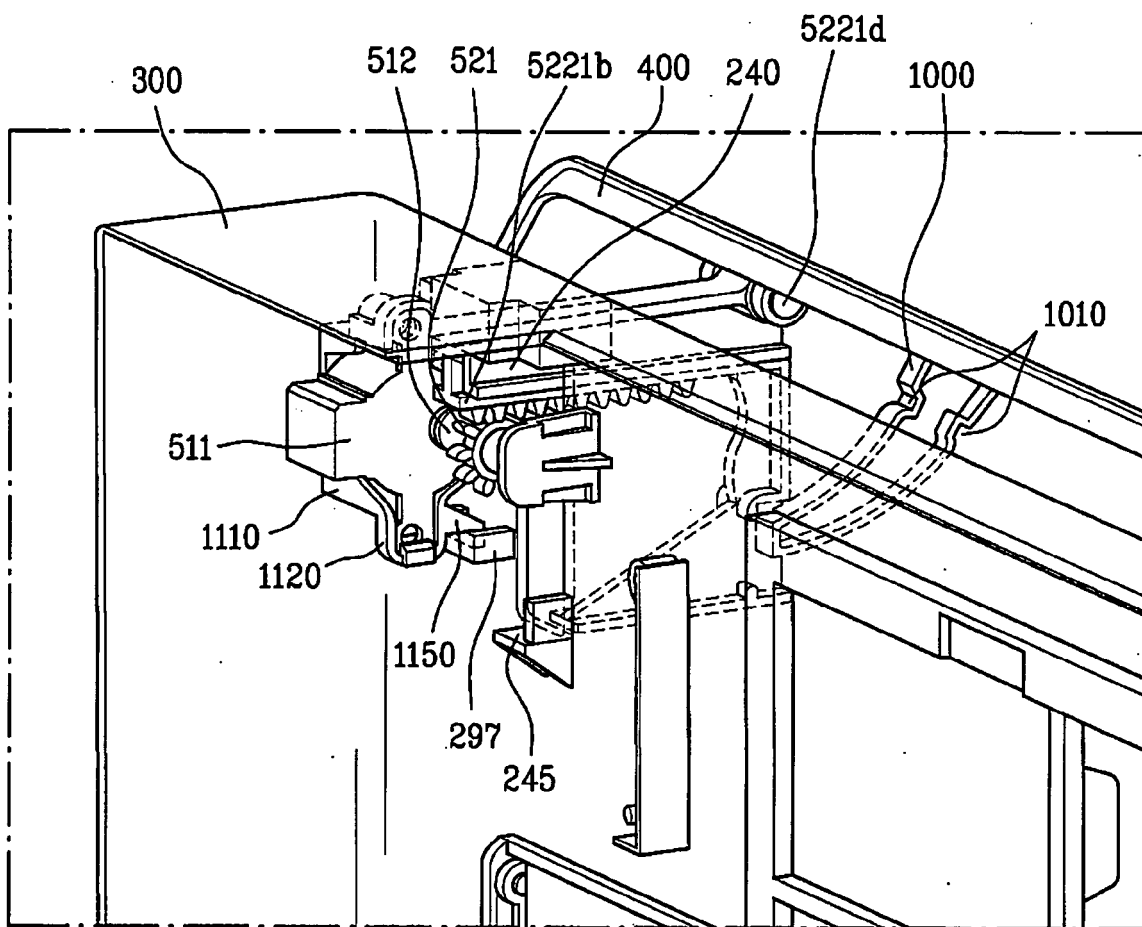


FIG. 7

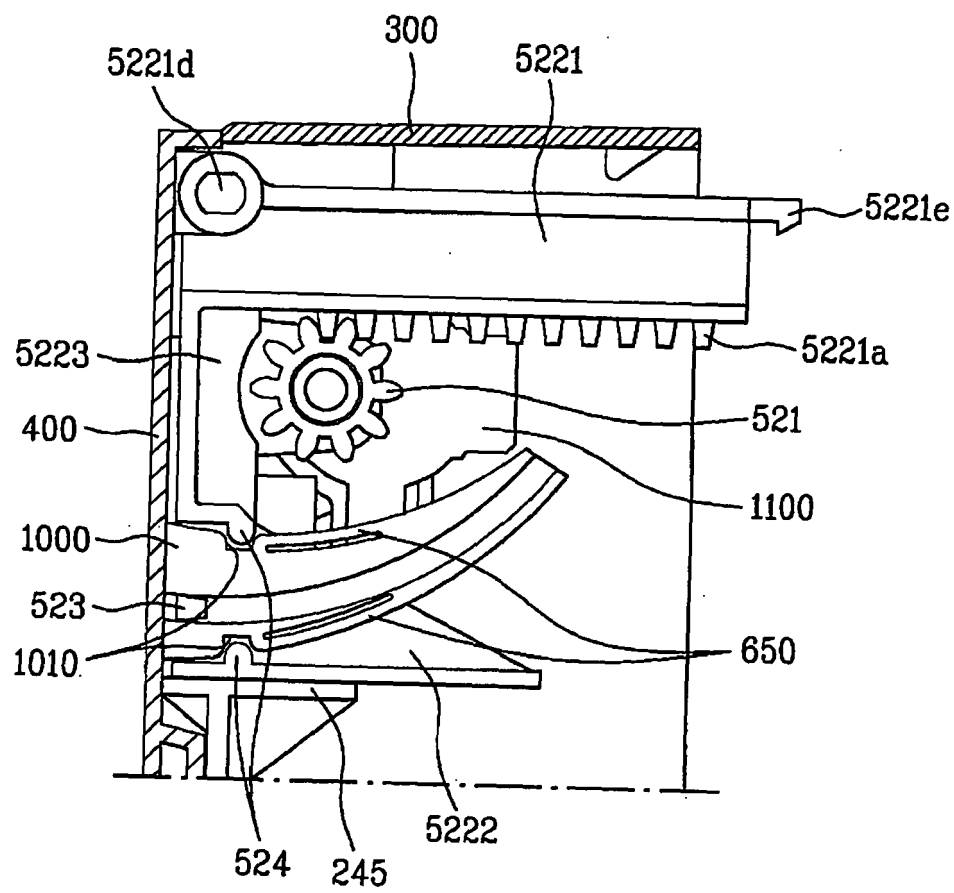


FIG. 8

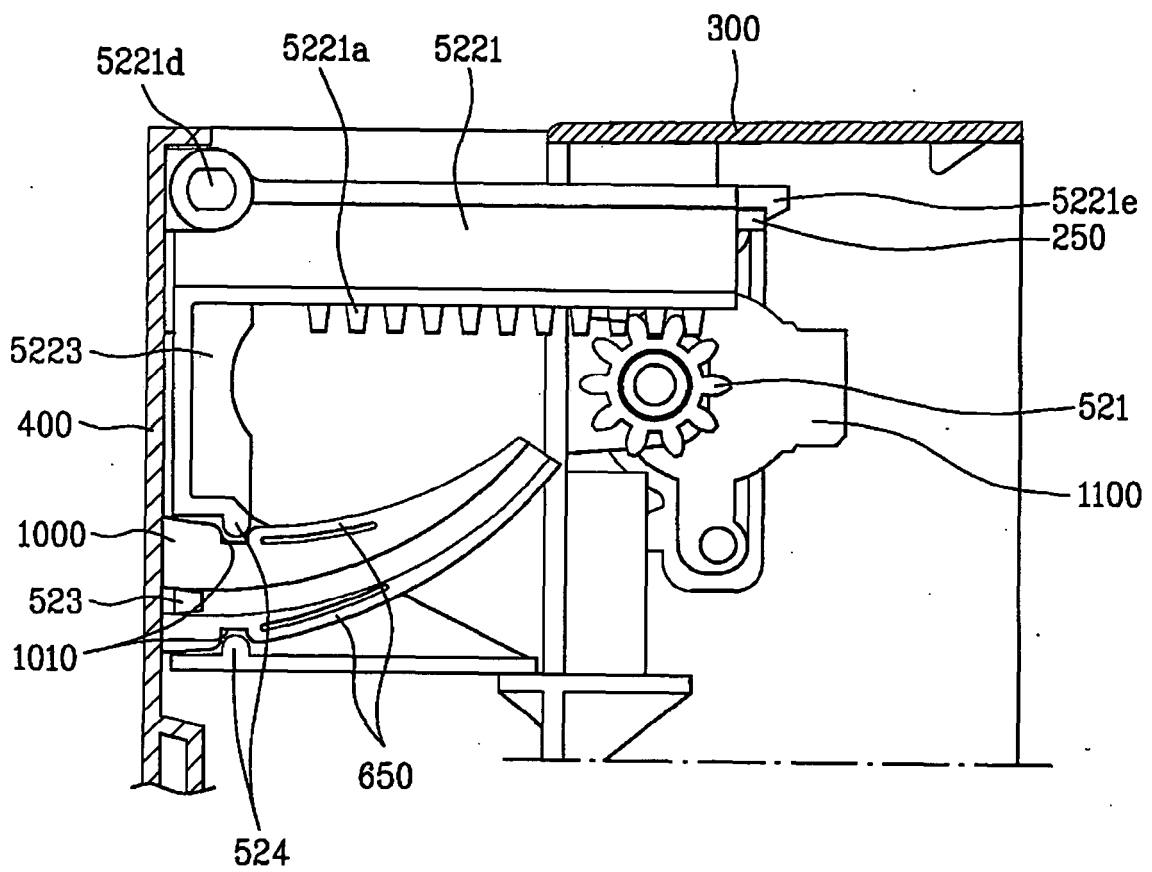


FIG. 9

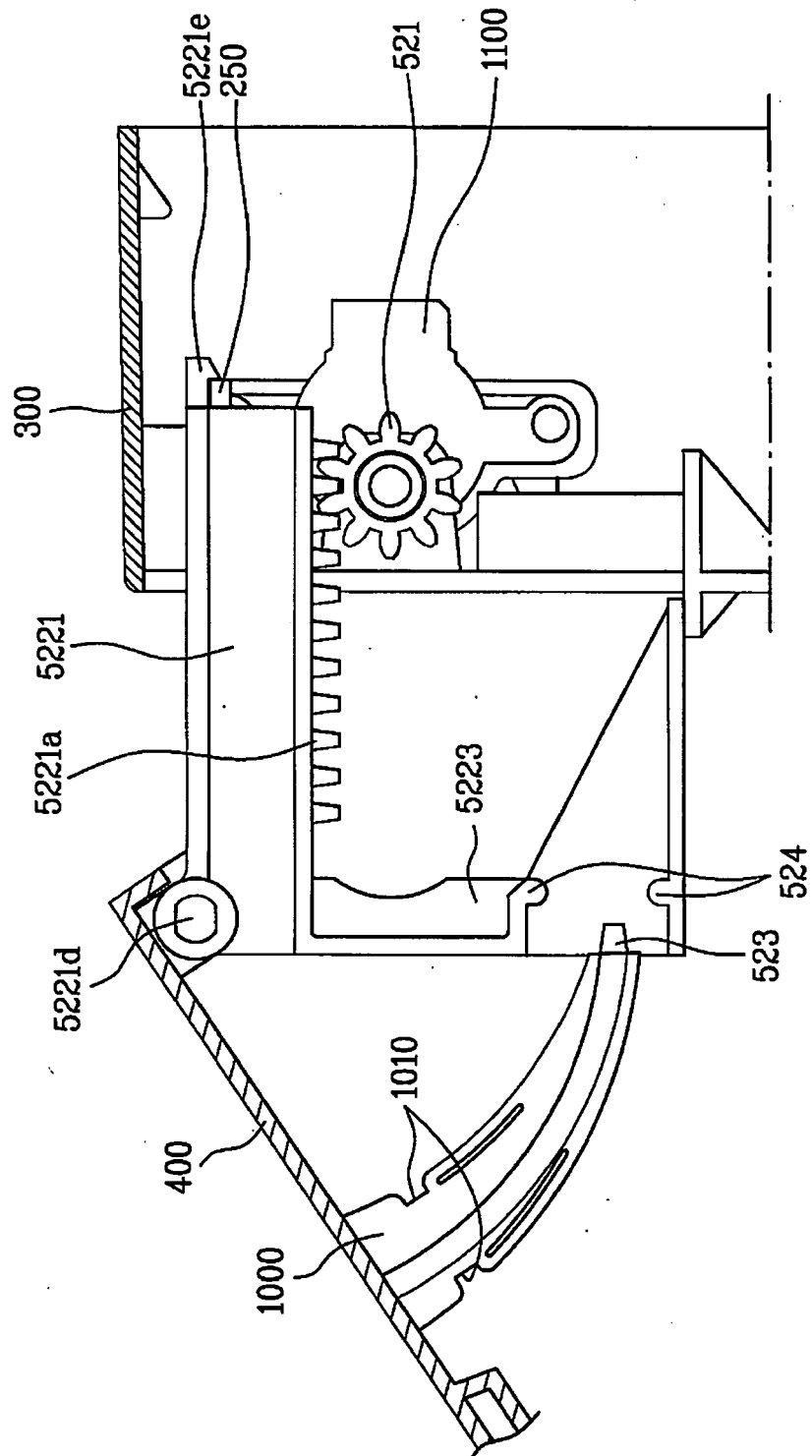


FIG. 10

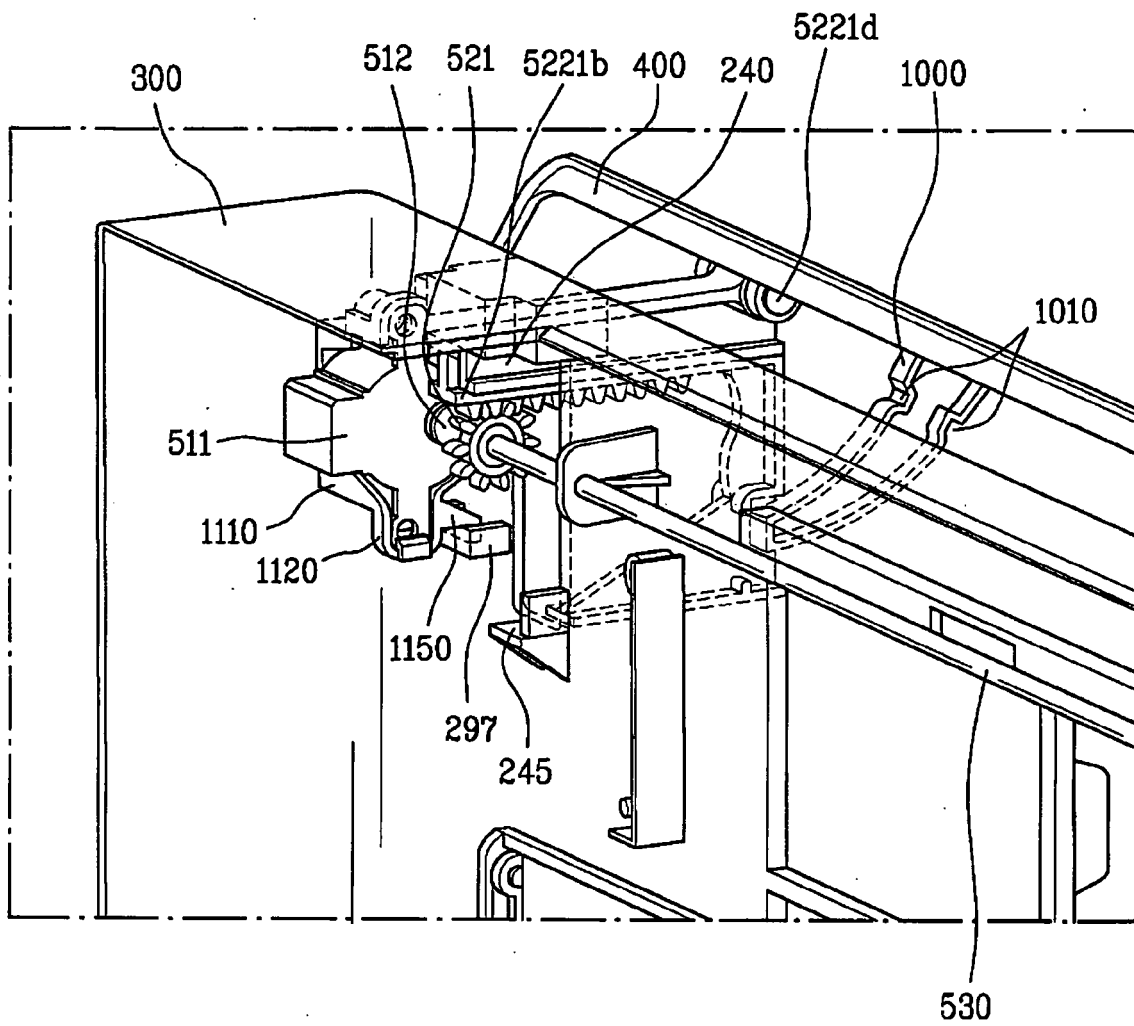


FIG. 11

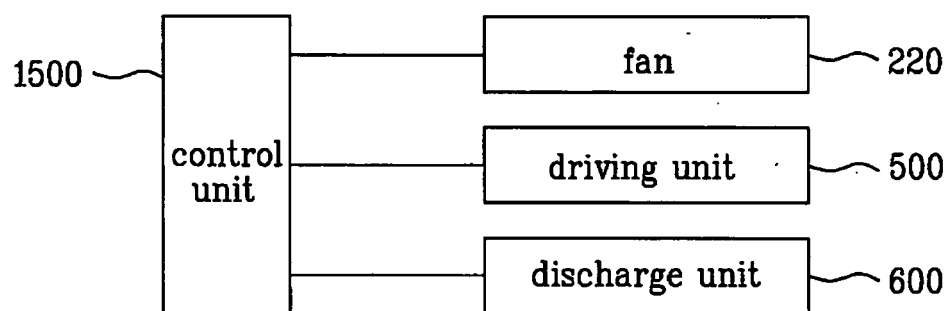


FIG. 12

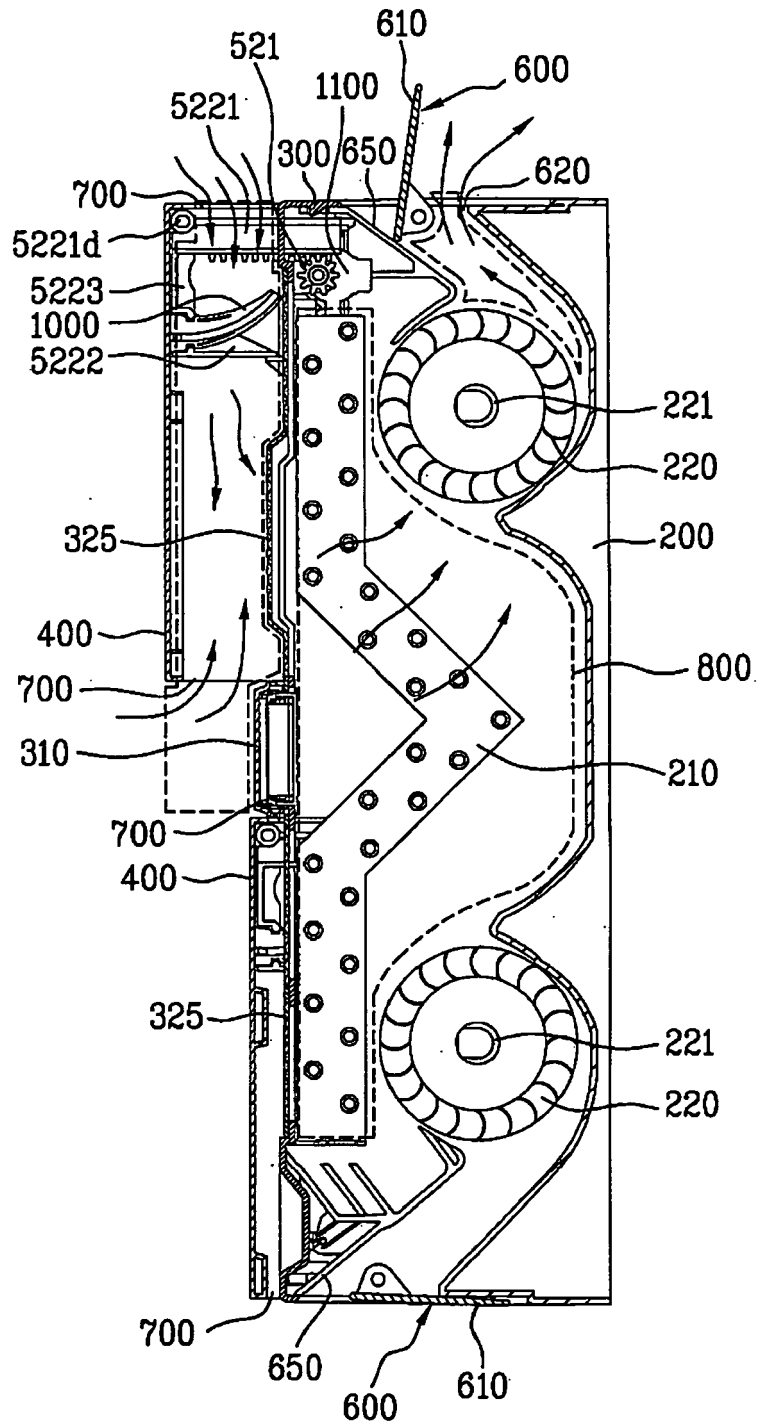


FIG. 13

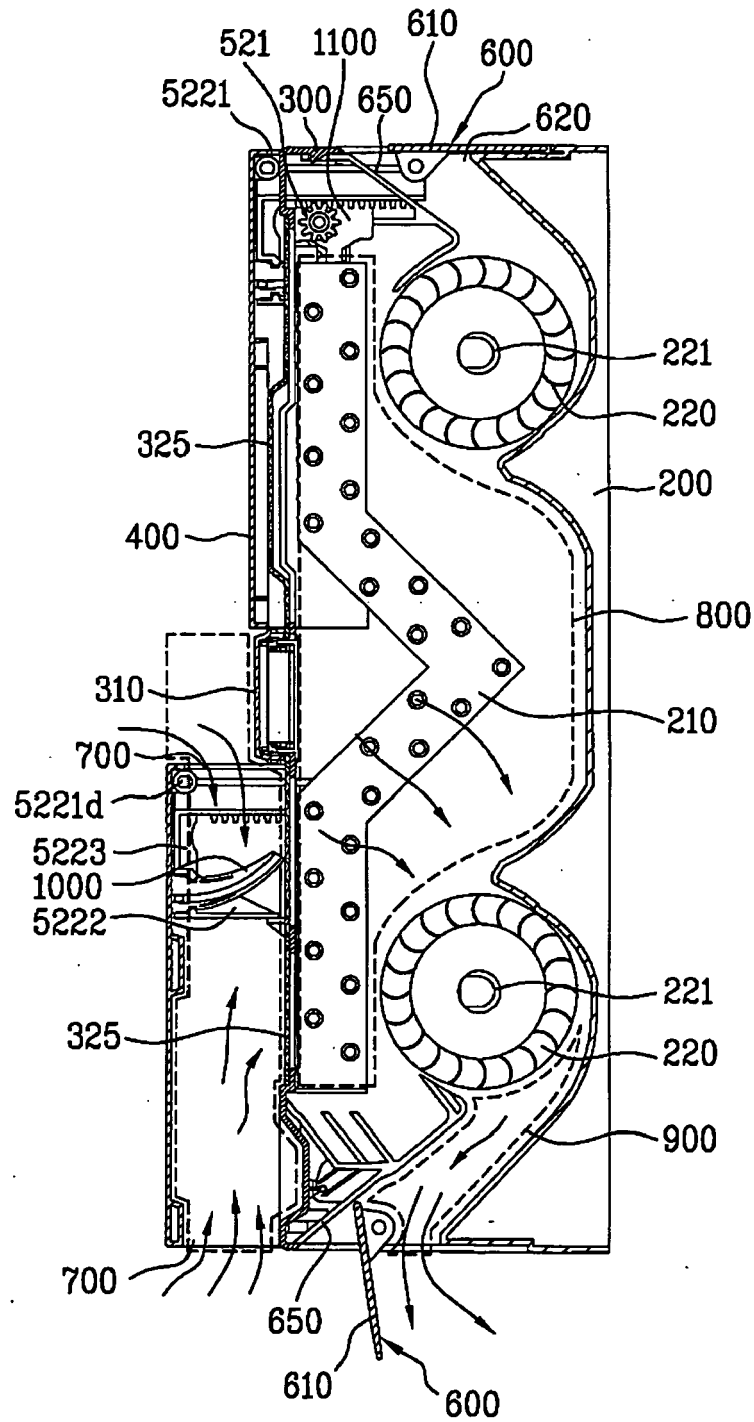


FIG. 14

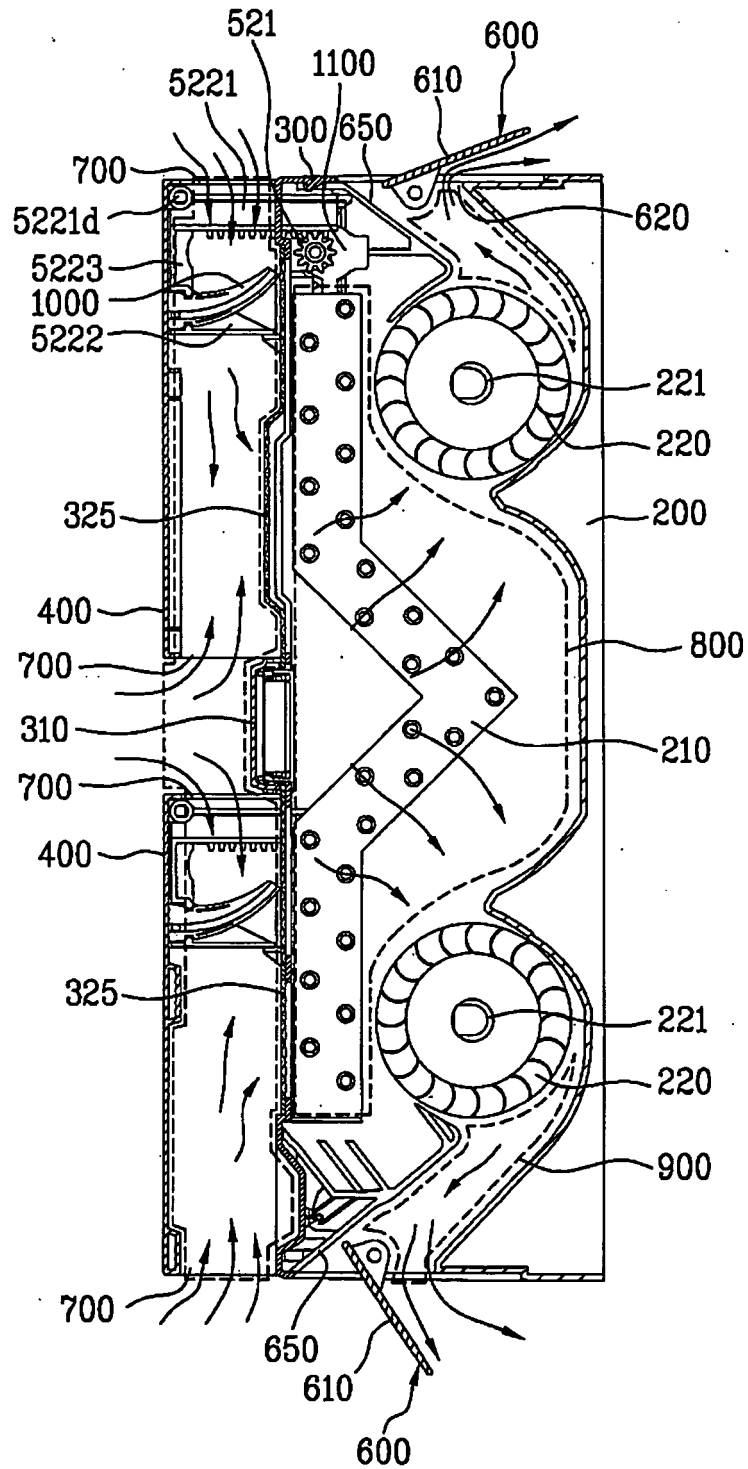


FIG. 15

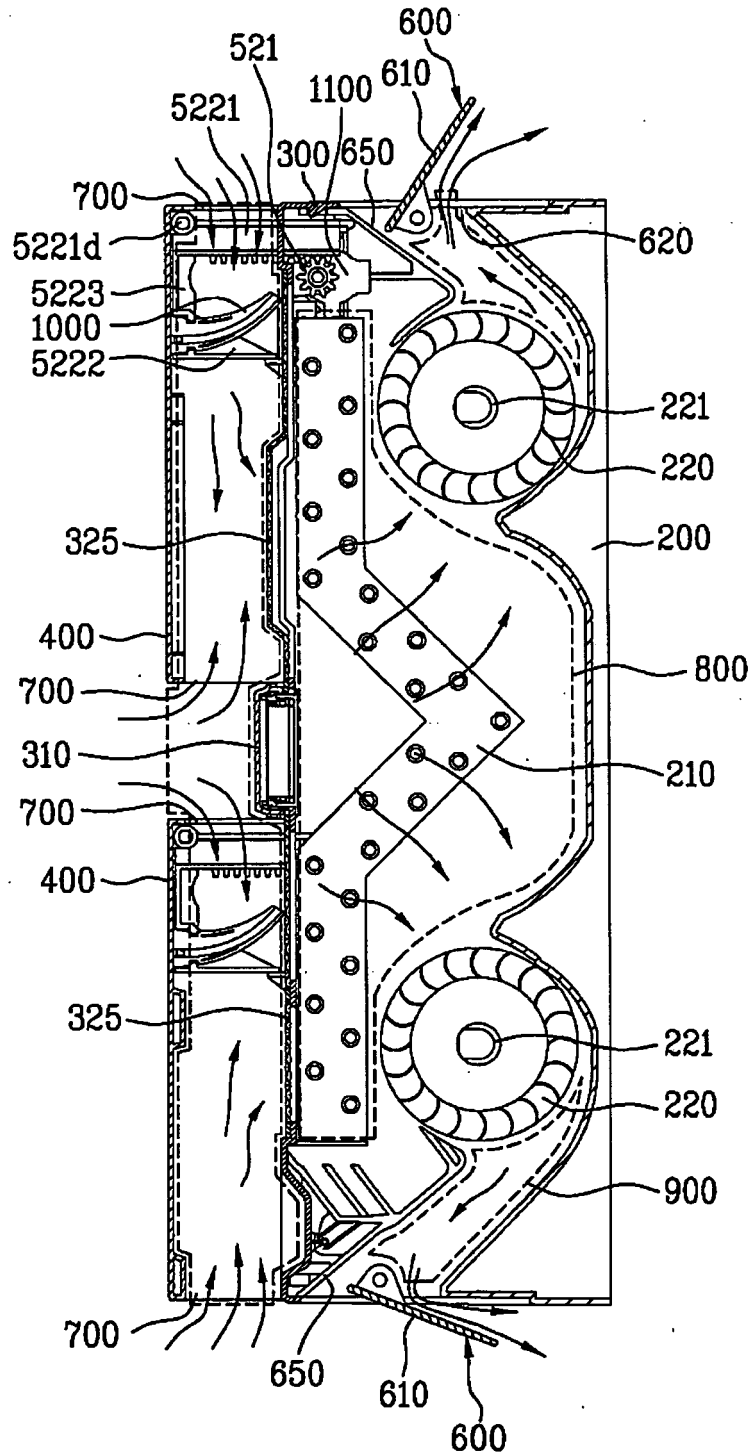


FIG. 16

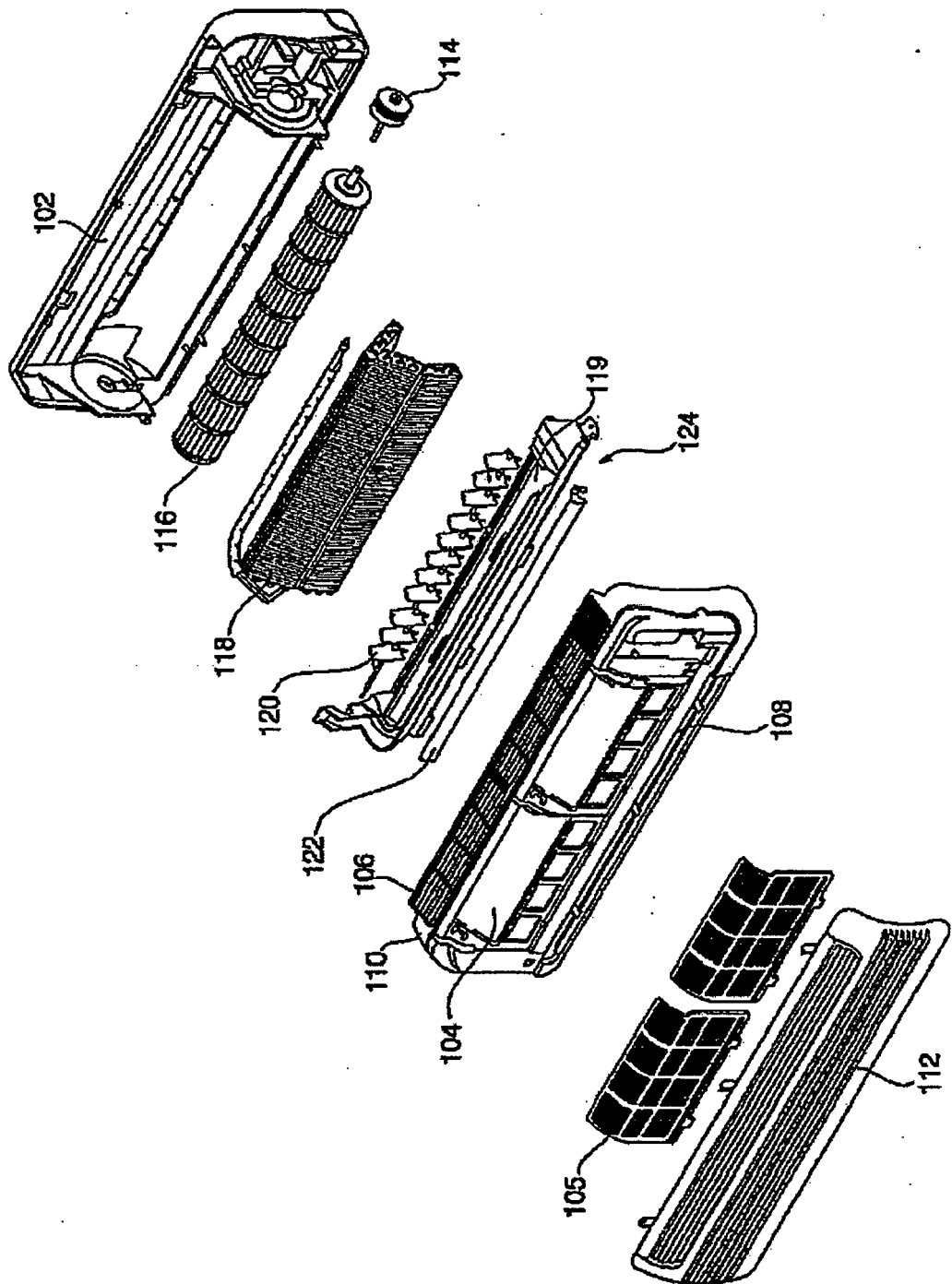


FIG. 17

