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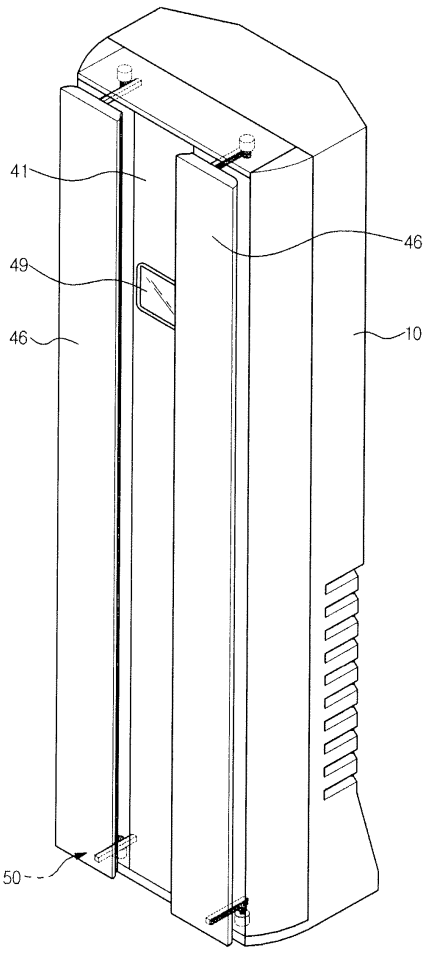
(54) Air conditioner

(57) Disclosed herein is an air conditioner including a front panel (40). The front panel (40) includes a center panel (41) provided with a display (49) and moving panels (46) provided respectively at both sides of the center panel (41). In the air conditioner, as the moving panels (46) are moved forward by drive units (50), discharge holes (42,43,44) are defined at both sides of the moving panels (46), to discharge heat-exchanged air. Accordingly, the air conditioner may discharge the heat-exchanged air forward from both sides of the moving panels (46) without exposing the interior thereof.

FIG. 2



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Description

BACKGROUND

1. Field

[0001] Embodiments of the present invention relate to an air conditioner to discharge heat-exchanged air forward without exposing the interior of a cabinet.

2. Description of the Related Art

[0002] Generally, an air conditioner is an apparatus to cool or warm an indoor space using a refrigerant cycle consisting of a compressor, condenser, expander and heat exchanger, to provide a user with a more pleasant indoor environment.

[0003] A conventional air conditioner includes a cabinet having an open front side, and a front panel coupled to the front side of the cabinet. The front panel includes a lower panel coupled to a front lower part of the cabinet, and an upper panel coupled to a front upper part of the cabinet.

[0004] The upper panel is rotatably provided with a discharge grill, through which air heat-exchanged in the cabinet is discharged forward. However, in the air conditioner having the above-described configuration, the discharge grill exposes the interior of the cabinet to the outside when rotated to discharge the heat-exchanged air.

[0005] To prevent the above exposure, an air conditioner has been proposed, wherein a front panel is moved forward to discharge heat-exchanged air between the front panel and both sides of the cabinet.

[0006] However, discharging the heat-exchanged air between the front panel and both sides of the cabinet of the air conditioner has a limit in discharge of the heat-exchanged air.

SUMMARY

[0007] Therefore, it is an aspect of the present invention to provide an air conditioner to easily discharge heat-exchanged air forward without exposing the interior of a cabinet.

[0008] Additional aspects of the invention will be set forth in part in the description which follows and, in part, will be obvious from the description, or may be learned by practice of the invention.

[0009] In accordance with one aspect of the present invention, an air conditioner includes a cabinet having an open front side, in which a heat exchanger and a blower are provided, a center panel provided at the front side of the cabinet, and moving panels provided at the front side of the cabinet and separated from the center panel, the moving panels being movable forward or rearward.

[0010] The center panel may include a display.

[0011] The moving panels may be arranged respectively at both sides of the center panel.

[0012] Air heat-exchanged by the heat-exchanger within the cabinet may be discharged from both sides of the respective moving panels when the respective moving panels are moved forward.

[0013] A drive unit may be provided at a rear of the moving panels and may serve to move the moving panels forward or rearward.

[0014] The drive unit may move the respective moving panels forward or rearward individually or simultaneously.

[0015] The drive unit may include a rack gear provided at the rear of the moving panels, a pinion gear engaged with the rack gear, and a drive motor axially coupled to the pinion gear.

[0016] The air conditioner may further include rotating units to rotate the moving panels respectively.

[0017] The rotating units may rotate the respective moving panels about ends of the moving panels close to the center panel.

[0018] The air discharged from outer sides of the respective moving panels may be changed in direction as the respective moving panels are rotated by the rotating units.

[0019] Each of the rotating units may include a bracket extending from a rear surface of a corresponding one of the moving panels, and a rotating motor to rotate the bracket.

[0020] Each of the rotating units may further include a guide member having one end fixed to the bracket and the other end fixed to a shaft of the rotating motor.

[0021] The air conditioner may further include an auxiliary blowing unit to change a discharge direction of the air discharged from inner sides of the respective moving panels.

[0022] The auxiliary blowing unit may include a discharge member provided at the center panel and having at least one discharge hole, and a rotating motor to rotate the discharge member so as to change a discharge direction of air through the discharge hole.

[0023] The air, discharged through the discharge hole and changed in direction by rotation of the rotating motor, may change a direction of an air stream discharged from the inner sides of the moving panels.

[0024] The auxiliary blowing unit may include a housing provided at a rear surface of the center panel, an auxiliary fan duct connected to the housing, and an auxiliary fan received in the auxiliary fan duct.

[0025] The housing may be in communication with the discharge member, and the auxiliary fan may blow air upward of the housing, to discharge the air from the discharge hole.

[0026] The discharge member may be provided in a longitudinal direction of the center panel, and the discharge hole may be formed in a longitudinal direction of the discharge member.

[0027] In accordance with another aspect of the present invention, an air conditioner includes a cabinet having an open front side, a center panel provided at the

front side of the cabinet, moving panels provided at the front side of the cabinet and separated from the center panel, a drive unit to move the moving panels forward or rearward, and a rotating unit to rotate the moving panels.

[0028] In accordance with another aspect of the present invention, an air conditioner includes a cabinet having an open front side, a center panel provided at the front side of the cabinet, moving panels provided at the front side of the cabinet and arranged respectively at both sides of the center panel, a drive unit to move the moving panels forward or rearward, so as to define discharge holes, through which air in the cabinet is discharged from both sides of the respective moving panels, and an auxiliary blowing unit provided at the center panel and serving to change a discharge direction of the air from inner sides of the respective moving panels.

[0029] In accordance with a further aspect of the present invention, an air conditioner includes a cabinet having an open front side, and a plurality of panels arranged at the front side of the cabinet on the same plane, and at least one of the plurality of panels is movable forward or rearward.

BRIEF DESCRIPTION OF THE DRAWINGS

[0030] These and/or other aspects of the invention will become apparent and more readily appreciated from the following description of the embodiments, taken in conjunction with the accompanying drawings of which:

FIG. 1 is a perspective view illustrating an air conditioner according to one embodiment of the present invention;

FIG. 2 is a perspective view illustrating a state wherein moving panel of the air conditioner shown in FIG. 1 are moved forward;

FIG. 3 is a partial exploded perspective view of the air conditioner shown in FIG. 1;

FIGS. 4A, 4B and 4C are views illustrating discharge of heat-exchanged air from the air conditioner shown in FIG. 1;

FIG. 5 is a perspective view illustrating a partial configuration of an air conditioner according to another embodiment of the present invention;

FIG. 6 is a perspective view illustrating an alternative configuration of the air conditioner shown in FIG. 5;

FIGS. 7A, 7B, 7C and 7D are views illustrating discharge of heat-exchanged air from the air conditioner shown in FIG. 5;

FIG. 8 is a perspective view illustrating an air conditioner according to a further embodiment of the present invention;

FIG. 9 is a perspective view illustrating a partial configuration of the air conditioner shown in FIG. 8; and

FIGS. 10A and 10B are views illustrating discharge of heat-exchanged air from the air conditioner shown in FIG. 8.

DETAILED DESCRIPTION

[0031] Reference will now be made in detail to an air conditioner according to the embodiments of the present invention, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to like elements throughout.

[0032] Referring to FIG. 1, the air conditioner according to one embodiment of the present invention includes a cabinet 10 having an open front side, and a front panel 40 to cover the entire open front side of the cabinet 10.

[0033] The cabinet 10 is configured such that the entire front side is opened as described above. The cabinet 10 has an air suction hole 11 formed in a lower position of a rear surface or side surface thereof, through which indoor air is suctioned into the cabinet 10.

[0034] A heat exchanger 20 is installed in an upper region of the cabinet 10 and serves to heat exchange air blown by a blower 30. The blower 30 is installed in a lower region of the cabinet 10 and serves to blow the air suctioned into the cabinet 10 through the air suction hole 11.

[0035] The heat exchanger 20 takes the form of a flat panel to allow the air blown by the blower 30 to be heat exchanged while passing through the heat exchanger 20. The heat exchanger 20 is obliquely installed to divide an upper interior space of the cabinet 10.

[0036] The blower 30 includes a fan 31, a drive motor (not shown) to apply rotating force to the fan 31, and a fan duct 33 in which the fan 31 is received.

[0037] The fan 31 is a conventional centrifugal fan and as described above, serves to suction indoor air into the cabinet 10 and then, discharge the air having passed through the heat exchanger 20 to the outside. The drive motor is coupled to a rear end of the fan 31 and provides the fan 31 with rotating force. The fan duct 33, as described above, receives the fan 31 therein and serves to guide the air blown by the fan 31 toward the heat exchanger 20.

[0038] The front panel 40, as shown in FIGS. 1 and 2, includes a center panel 41 and moving panels 46 arranged at both sides of the center panel 41.

[0039] The center panel 41 is arranged in the center of the front panel 40 and is provided with a display 49 that displays generation operations of the air conditioner.

[0040] The moving panels 46, as described above, are arranged respectively at both sides of the center panel 41. The moving panels 46 are movable forward or rearward via operation of drive units 50. When the moving

panels 46 are moved forward by the drive units 50, discharge holes 42, 43 and 44 are defined at both sides of the respective moving panels 46 to discharge the heat-exchanged air from the cabinet 10.

[0041] Each of the drive units 50, as shown in FIGS. 2 and 3, includes a rack gear 51 provided at a rear surface of each of the moving panels 46, a pinion gear 53 engaged with the rack gear 51, and a drive motor 55 axially coupled to the pinion gear 53.

[0042] More specifically, each of the moving panels 46 may be moved forward or rearward as the pinion gear 53 is rotated by rotation of the drive motor 55 and in turn, the rack gear 51 engaged with the pinion gear 53 is moved by rotation of the pinion gear 53.

[0043] As shown, a pair of drive units 50 is provided respectively at upper and lower ends of each moving panel 46. The cabinet 10 may contain a rack gear guide member 57 to guide the rack gear 51 of each of the drive units 50.

[0044] The air conditioner having the above-described configuration, as shown in FIG. 4A, defines the discharge holes 42, 43 and 44 to discharge the heat-exchanged air from the cabinet 10 when the respective moving panels 46 are moved forward by the drive units 50.

[0045] The discharge holes 42, 43 and 44 include a first discharge hole 42 defined at an outer side of any one of the moving panels 46 upon forward movement of the corresponding moving panel 46, a second discharge hole 43 defined at an outer side of the other moving panel 46, and a third discharge hole 44 defined between inner sides of the moving panels 46.

[0046] Here, the air discharged through the first discharge hole 42 and second discharge hole 43 is moved in a direction slanted to lateral sides of the air conditioner. The air discharged through the third discharge hole 44 is moved forward as the air having passed through the inner sides of the respective moving panels 46 is mixed.

[0047] As shown in FIGS. 4B and 4C, the discharge holes 42, 43 and 44 of the air conditioner may be selectively defined as only one of the moving panels 46 is moved forward. In this case, the heat-exchanged air is discharged from any one side and center of the air conditioner.

[0048] Referring to FIG. 5 illustrating another embodiment of the present invention, the air conditioner may further include rotating units 60 to rotate the respective moving panels 46 by a predetermined angle after the moving panels 46 are moved forward by the drive units 50.

[0049] The rotating units 60 serve to change a discharge direction of air from the outer sides of the respective moving panels 46, i.e. a discharge direction of air through the first discharge hole 42 and second discharge hole 43.

[0050] For this, each of the rotating units 60 includes a bracket 61 extending from the rear surface of each of the moving panels 46, a rotating motor 65 to rotate the bracket 61, and a guide member 63 having one end fixed to the bracket 61 and the other end fixed to a shaft of the rotating motor 65.

[0051] The bracket 61, as described above, extends from the rear surface of the corresponding moving panel 46, and takes the form of a sector, an end of which close to the center panel 41 is a vertex. The guide member 63, which has one end fixed to the bracket 61 and the other end fixed to the shaft of the rotating motor 65, is entirely curved.

[0052] The rotating motor 65 and guide member 63 are mounted to the rack gear 51. The rotating motor 65 rotates the guide member 63 by a predetermined angle about the end of the guide member 63 close to the center panel 41, i.e. a coupling portion of the guide member 63 and rack gear 51, thereby rotating the bracket 61.

[0053] As shown in FIG. 6, alternatively, the drive unit 50 may include a Y-shaped rack gear 52. In this case, both the moving panels 46 may be moved forward or rearward via rotation of the single drive motor 55. The guide members 63 of the respective rotating units 60 provided at the rear surfaces of the respective moving panels 46 may be fixed respectively to two branches of the Y-shaped rack gear 52.

[0054] In the air conditioner including the above-described rotating units 60, as shown in FIG. 7A, the heat-exchanged air is discharged from the cabinet 10 as the respective moving panels 46 are moved forward by the drive units 50.

[0055] In this case, the air discharged through the first discharge hole 42 and second discharge hole 43 is moved in a direction slanted to lateral sides of the air conditioner. The air discharged through the third discharge hole 44 is moved forward as the air having passed through the inner sides of the respective moving panels 46 is mixed.

[0056] As shown in FIG. 7B, in a state wherein the respective moving panels 46 are moved forward by the drive units 50, the rotating units 60 may rotate the moving panels 46 about ends of the moving panels 46 close to the center panel 41. In this case, the air discharged through the first discharge hole 42 and second discharge hole 43 may be moved in a slightly forwardly slanted direction.

[0057] As shown in FIGS. 7C and 7D, in a state wherein the respective moving panels 46 are moved forward by the drive units 50, only one of the moving panels 46 may be rotated. In this case, an air stream discharged from the outer side of only one of the moving panels 46 is moved in a slightly forwardly slanted direction without a change in a discharge direction of an air stream from the outer side of the other moving panel 46.

[0058] Referring to FIGS. 8 and 9 illustrating a further embodiment of the present invention, the air conditioner may further include an auxiliary blowing unit 70 to control air streams discharged from the inner sides of the respective moving panels 46, i.e. discharged through the third discharge hole 44.

[0059] The auxiliary blowing unit 70 includes a dis-

charge member 71 provided in the center panel 41 and having a fourth discharge hole 72, and a rotating motor 77 to rotate the discharge member 71 so as to change a discharge direction of air through the fourth discharge hole 72.

[0060] The discharge member 71 is longitudinally provided in the center of the center panel 41 and has a semi-circular cross section. The center panel 41 is provided with an installation opening 45 for the discharge member 71, and both sides of the installation opening 45 are rounded to assure smooth rotation of the semi-circular discharge member 71.

[0061] The discharge member 71 has the fourth discharge hole 72 as described above. The fourth discharge hole 72 is longitudinally perforated in the discharge member 71 and takes the form of a single lengthwise discharge hole or a plurality of discharge holes. That is, the fourth discharge hole 72 includes at least one discharge hole.

[0062] The auxiliary blowing unit 70 further includes a housing 75 provided at a rear surface of the center panel 41, and an auxiliary blower connected to the housing 75. The auxiliary blower includes an auxiliary fan 73, a drive motor (not shown) to apply rotating force to the auxiliary fan 73, and an auxiliary fan duct 74 in which the auxiliary fan 73 is received.

[0063] The housing 75 is provided at the rear surface of the center panel 41 as described above and the auxiliary fan duct 74 is connected to the bottom of the housing 75. The interior of the housing 75 is isolated from the interior space of the cabinet 10 to define a flow passage of the air blown by the auxiliary fan 73.

[0064] The housing 75 is in communication with the fourth discharge hole 72 of the discharge member 71. Thereby, the air blown by the auxiliary fan 73 is moved upward through an interior space of the housing 75 to thereby be discharged from the fourth discharge hole 72 of the discharge member 71.

[0065] The rotating motor 77 is provided at the top of the discharge member 71, to rotate the discharge member 71 in the installation opening 45 of the center panel 41.

[0066] The air conditioner including the above-described auxiliary blowing unit 70 discharges the heat-exchanged air from the cabinet 10 as the respective moving panels 46 are moved forward by the drive units 50. In this case, the air discharged through the first discharge hole 42 and second discharge hole 43 is moved in a direction slanted to lateral sides of the air conditioner. The air discharged through the third discharge hole 44 is moved forward as the air having passed through the inner sides of the respective moving panels 46 is mixed.

[0067] In the above-described operation, as shown in FIGS. 10A and 10B, the auxiliary blowing unit 70 may selectively change a discharge direction of air streams through the third discharge hole 44 toward any one of the moving panels 46.

[0068] More specifically, if the auxiliary fan 73 is operated, the air blown by the auxiliary fan 73 is moved upward through the interior space of the housing 75. Then, the air having passed through the interior space of the housing 75 is discharged through the fourth discharge hole 72 of the discharge member 71. In this case, the fourth discharge hole 72 may be changed in direction as the discharge member 71 is rotated by the rotating motor 77.

[0069] If a discharge direction of air, blown by the auxiliary fan 73 and discharged through the fourth discharge hole 72, is changed, a direction of the air discharged through the third discharge hole 44 is also changed from a forward direction to a direction slanted to any one of the moving panels 46.

[0070] Accordingly, in the embodiments of the present invention, the front panel 40 is divided into the center panel 41 and the moving panels 46 arranged at both sides of the center panel 41 and the heat-exchanged air is discharged from both sides of the respective moving panels 46, whereby the heat-exchanged air may be easily discharged forward of the air conditioner without exposing the interior of the cabinet 10.

[0071] Further, in the embodiments of the present invention, the moving panels 46 may be moved forward individually or simultaneously, to control a discharge direction of the heat-exchanged air. Furthermore, a discharge direction of the air discharged from the outer sides of the respective moving panels 46 may be controlled by operation of the rotating units 60, and a discharge direction of the air discharged from the inner sides of the respective moving panels 46 may be controlled by operation of the auxiliary blowing unit 70.

[0072] As is apparent from the above description, an air conditioner according to the embodiments of the present invention includes a front panel consisting of a center panel and moving panels arranged at both sides of the center panel, to discharge heat-exchanged air from both sides of the moving panels. This may assure easy forward discharge of the heat-exchanged air without exposing the interior of a cabinet.

[0073] Although a few embodiments of the present invention have been shown and described, it would be appreciated by those skilled in the art that changes may be made in these embodiments without departing from the principles and spirit of the invention, the scope of which is defined in the claims and their equivalents.

Claims

1. An air conditioner comprising:

a cabinet having an open front side, in which a heat exchanger and a blower are provided;

a center panel provided at the front side of the cabinet; and

moving panels provided at the front side of the cabinet and separated from the center panel,

the moving panels being movable forward or rearward.

2. The air conditioner according to claim 1, wherein:

the center panel includes a display; and
the moving panels are arranged respectively at both sides of the center panel.

3. The air conditioner according to claim 1, wherein air heat-exchanged by the heat-exchanger within the cabinet is discharged from both sides of the respective moving panels when the respective moving panels are moved forward.

4. The air conditioner according to claim 3, wherein:

a drive unit is provided at a rear of the moving panels and serves to move the moving panels forward or rearward; and
the drive unit moves the respective moving panels forward or rearward individually or simultaneously.

5. The air conditioner according to claim 4, wherein the drive unit includes a rack gear provided at the rear of the moving panels, a pinion gear engaged with the rack gear, and a drive motor axially coupled to the pinion gear.

6. The air conditioner according to claim 5, further comprising rotating units to rotate the moving panels respectively; and
the rotating units rotate the respective moving panels about ends of the moving panels close to the center panel.

7. The air conditioner according to claim 6, wherein the air discharged from outer sides of the respective moving panels is changed in direction as the respective moving panels are rotated by the rotating units.

8. The air conditioner according to claim 7, wherein each of the rotating units includes a bracket extending from a rear surface of a corresponding one of the moving panels, and a rotating motor to rotate the bracket.

9. The air conditioner according to claim 8, wherein each of the rotating units further includes a guide member having one end fixed to the bracket and the other end fixed to a shaft of the rotating motor.

10. The air conditioner according to claim 3, further comprising an auxiliary blowing unit to change a discharge direction of the air discharged from inner sides of the respective moving panels.

11. The air conditioner according to claim 10, wherein the auxiliary blowing unit includes a discharge member provided at the center panel and having at least one discharge hole, and a rotating motor to rotate the discharge member so as to change a discharge direction of air through the discharge hole.

12. The air conditioner according to claim 11, wherein the air, discharged through the discharge hole and changed in direction by rotation of the rotating motor, changes a direction of an air stream discharged from the inner sides of the moving panels.

13. The air conditioner according to claim 10, wherein the auxiliary blowing unit includes a housing provided at a rear surface of the center panel, an auxiliary fan duct connected to the housing, and an auxiliary fan received in the auxiliary fan duct.

14. The air conditioner according to claim 13, wherein:

the housing is in communication with the discharge member; and
the auxiliary fan blows air upward of the housing, to discharge the air from the discharge hole.

15. The air conditioner according to claim 11, wherein:

the discharge member is provided in a longitudinal direction of the center panel; and
the discharge hole is formed in a longitudinal direction of the discharge member.

FIG. 1

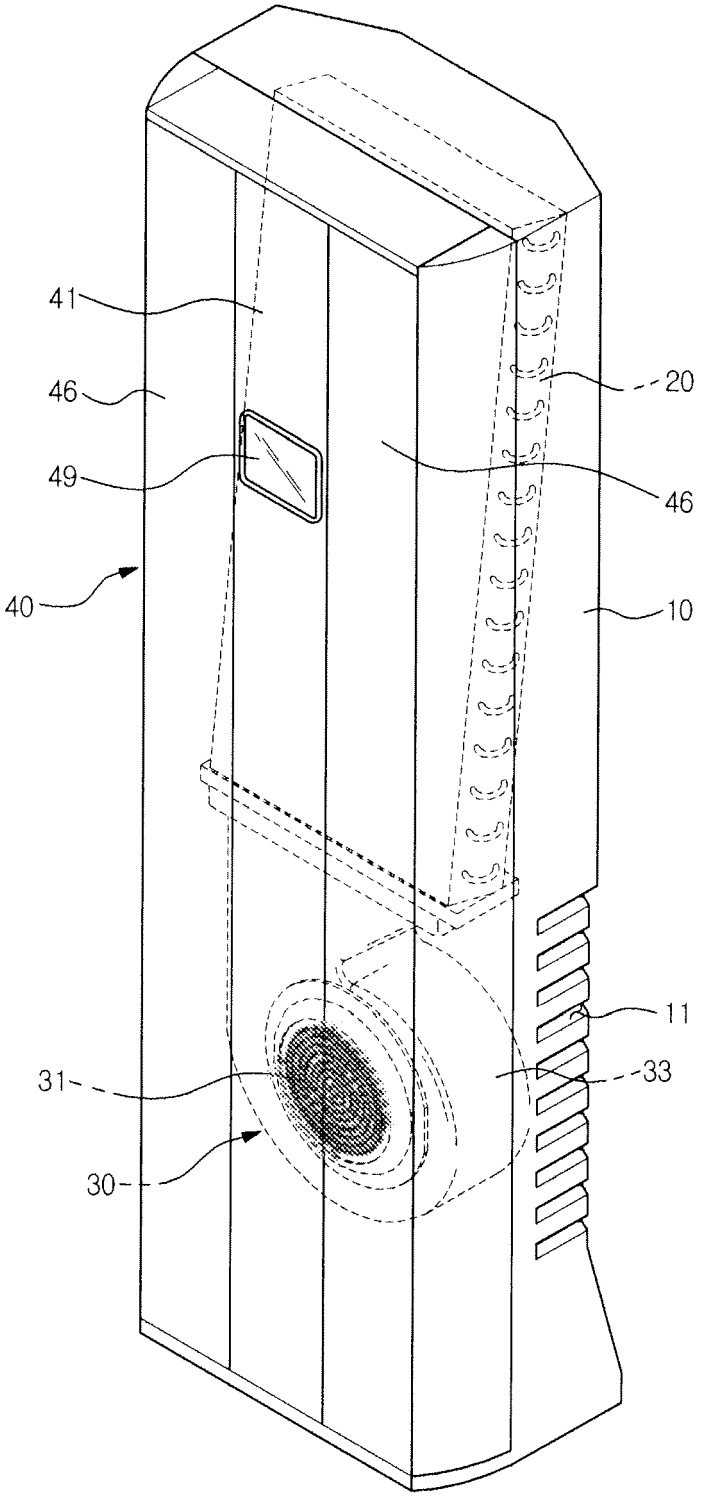

FIG. 2

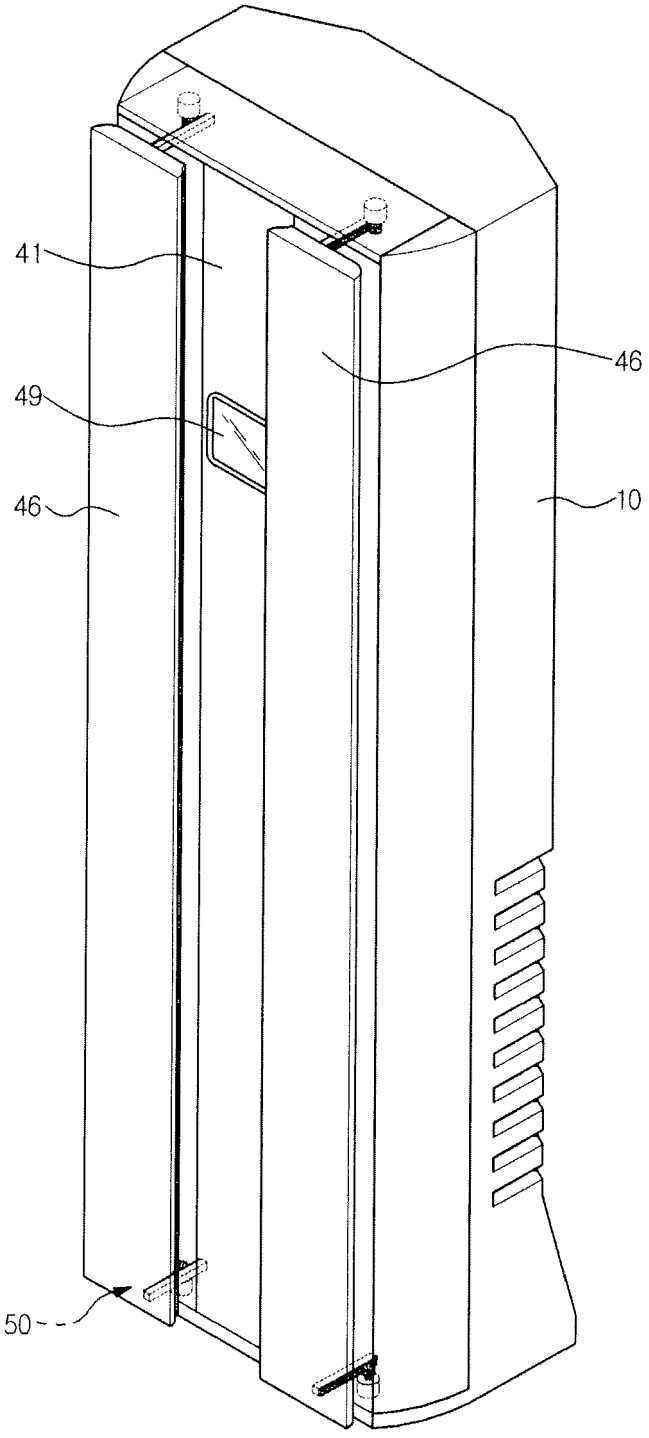

FIG. 3

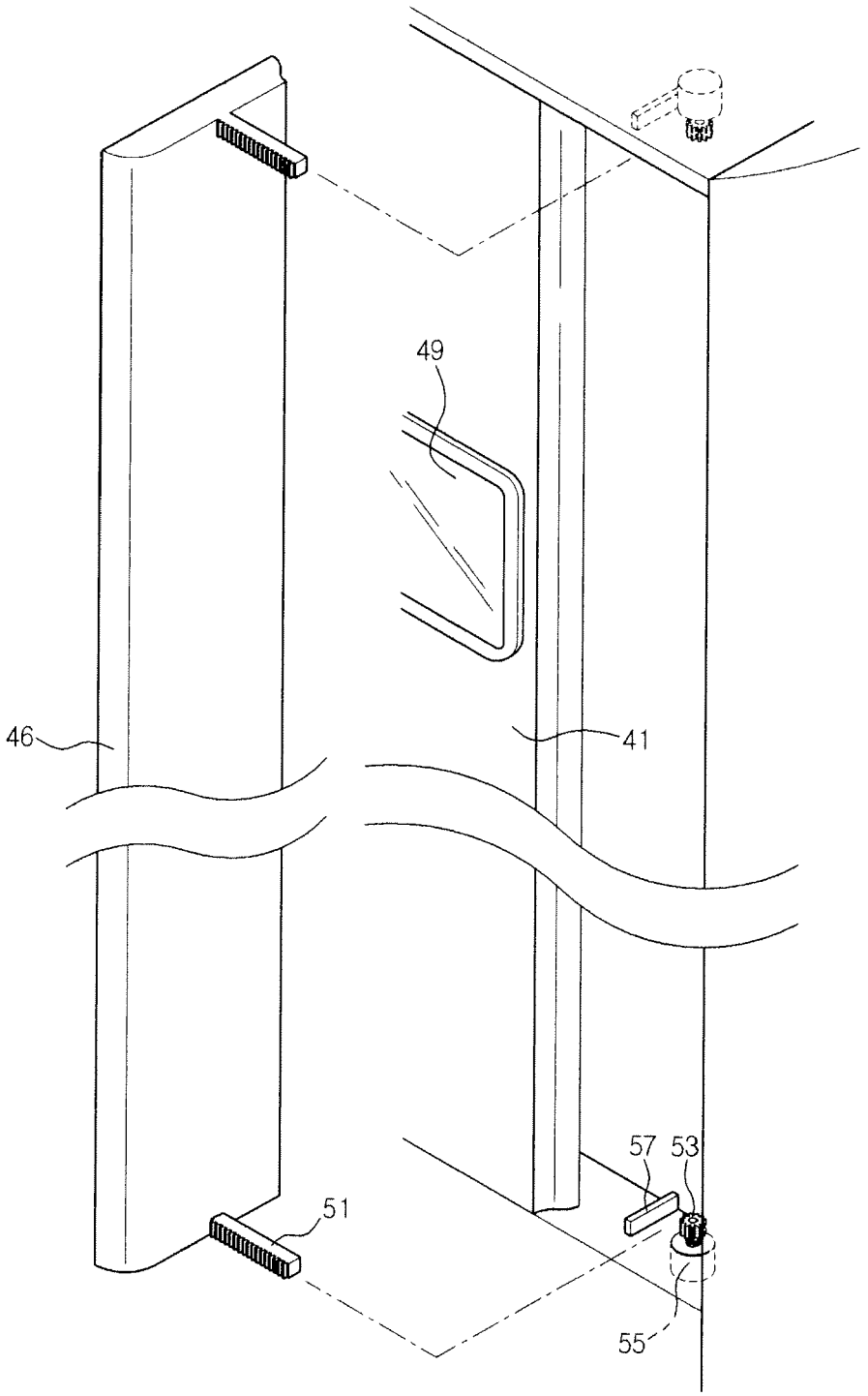

FIG. 4A

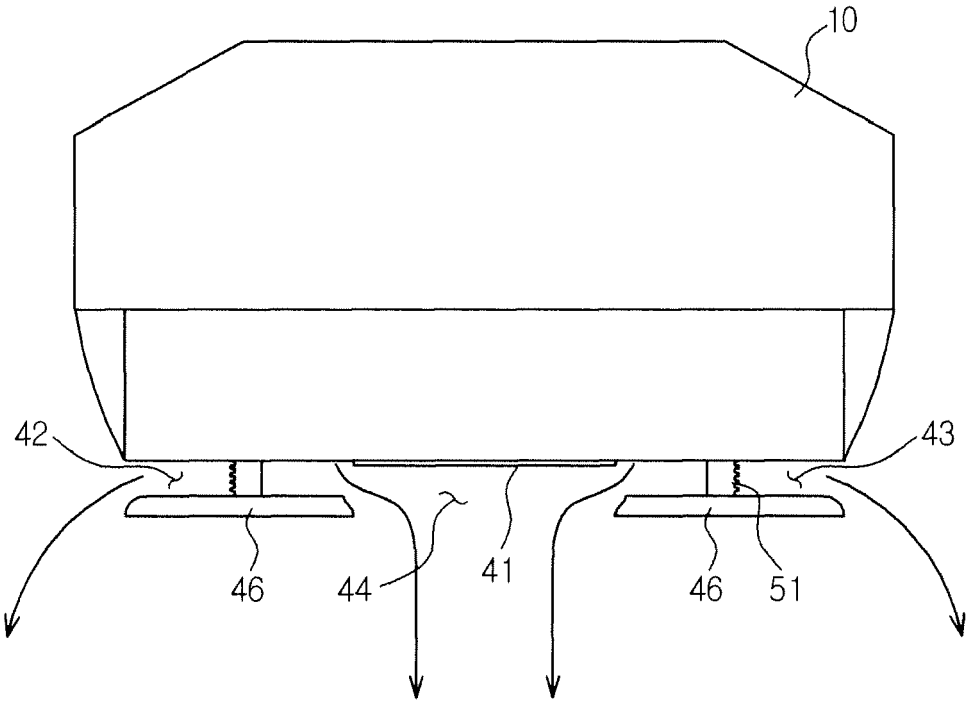

FIG. 4B

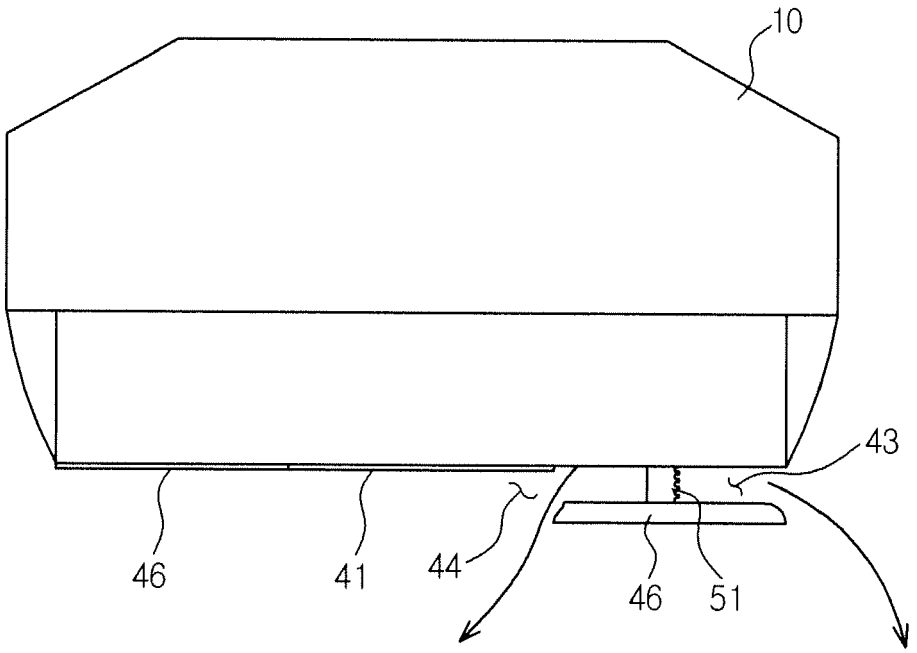

FIG. 4C

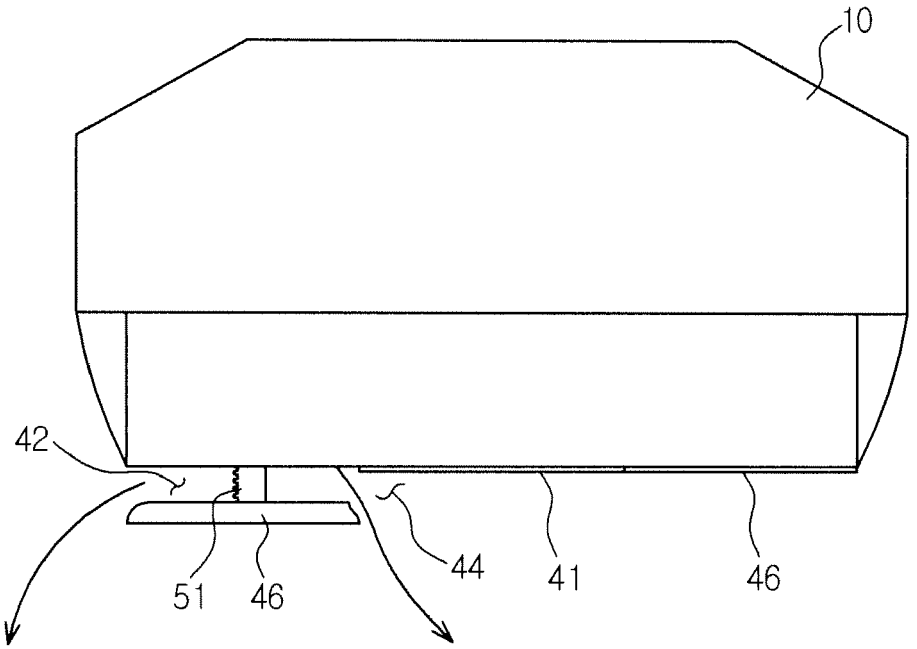

FIG. 5

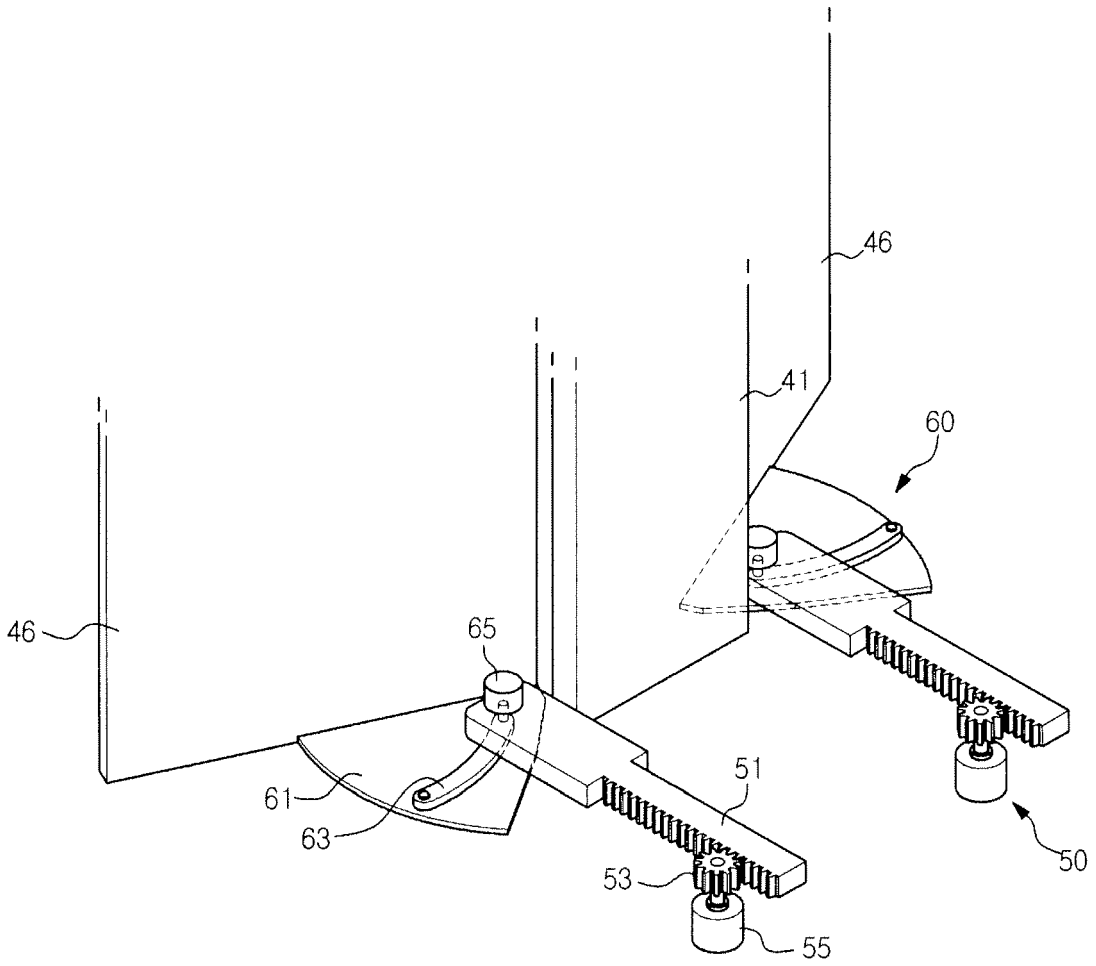

FIG. 6

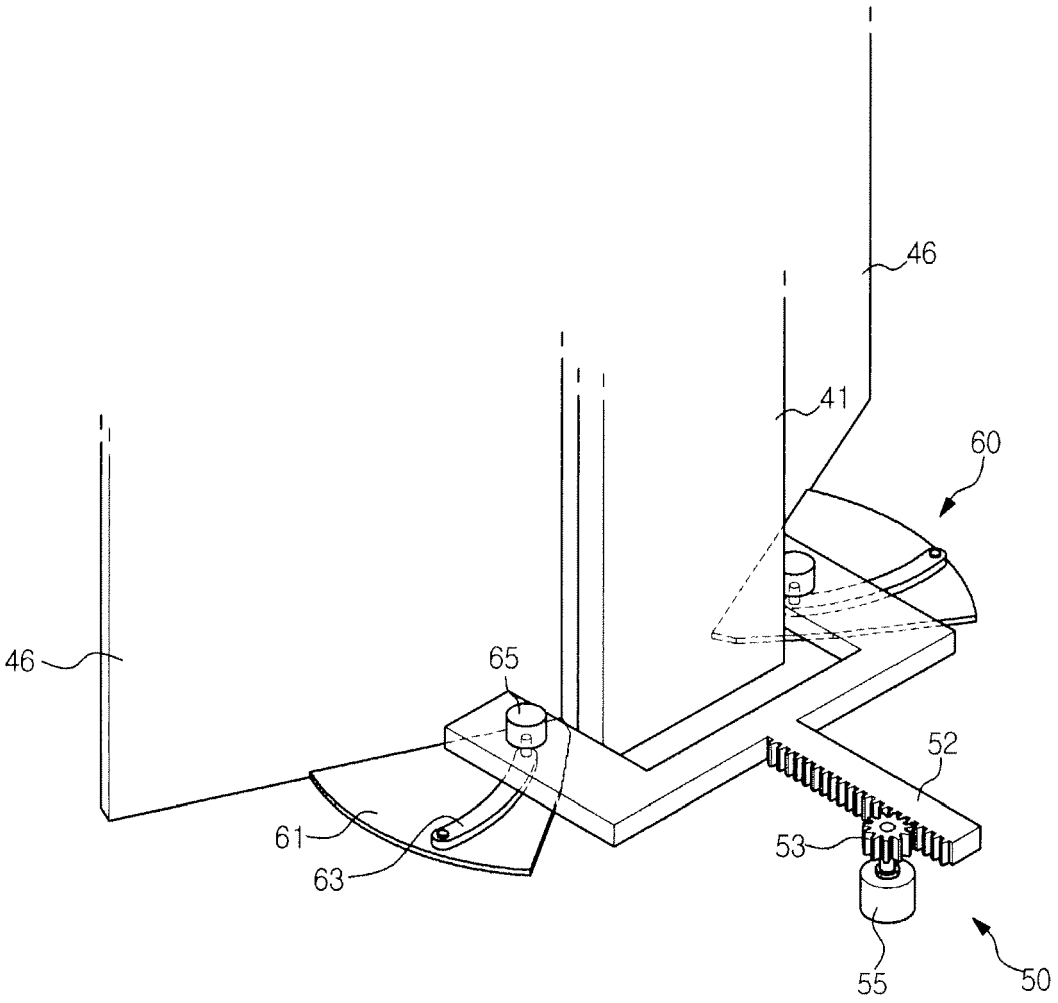

FIG. 7A

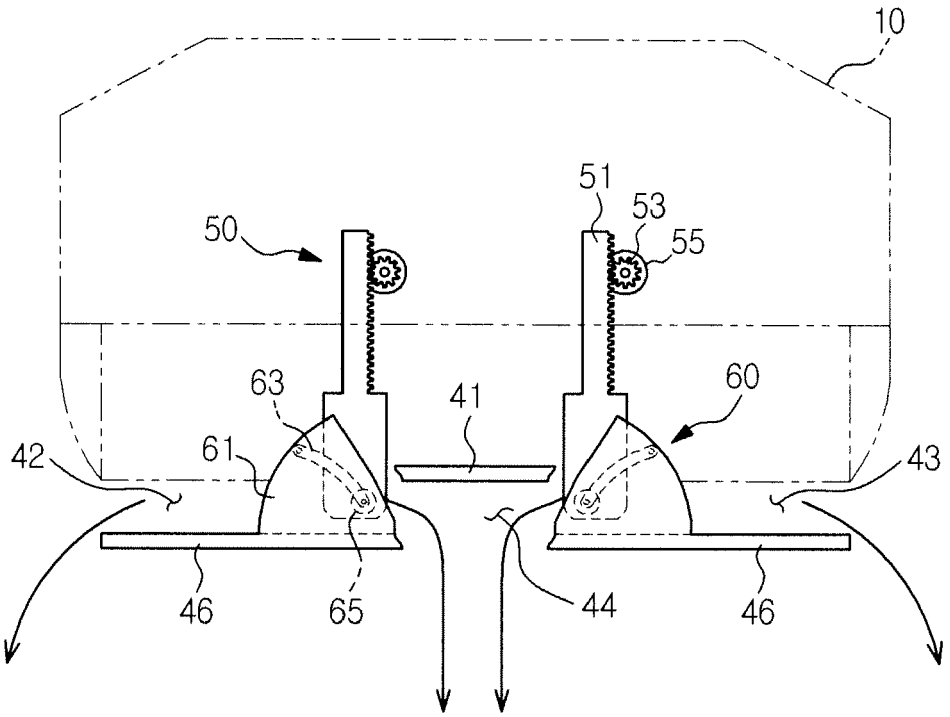

FIG. 7B

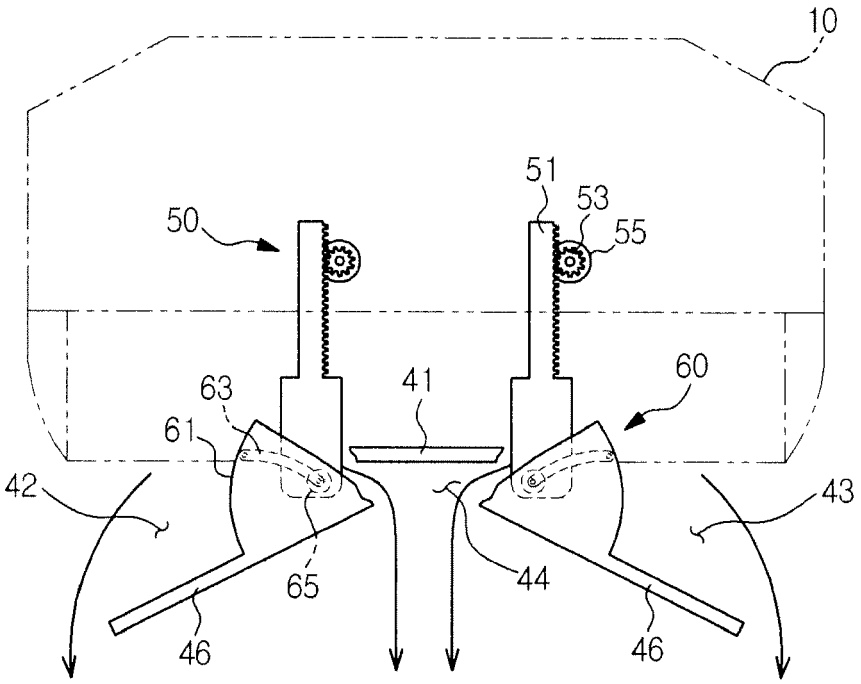

FIG. 7C

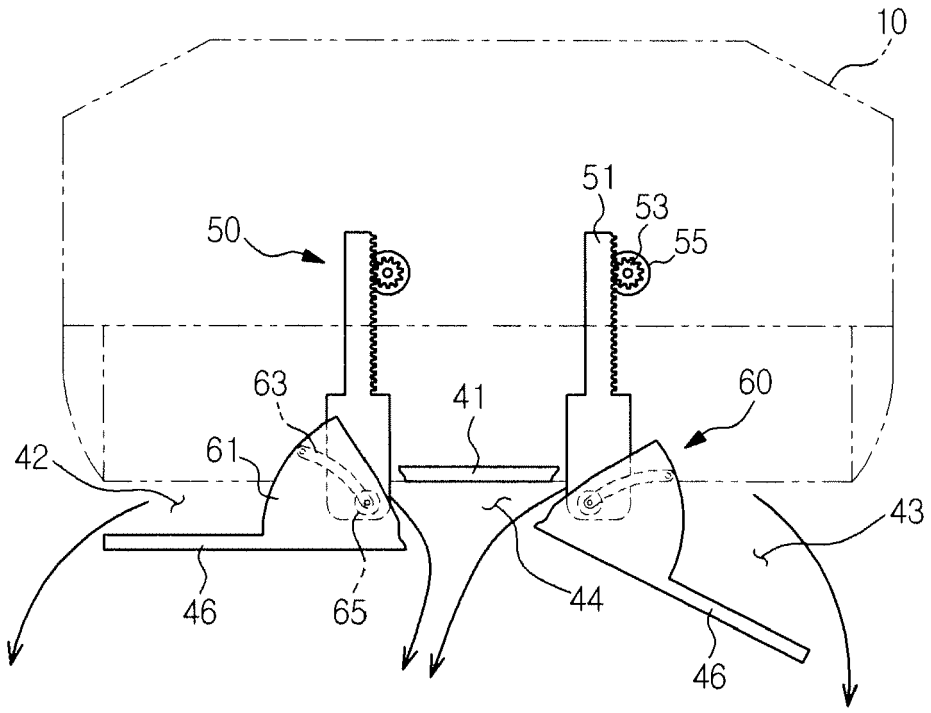

FIG. 7D

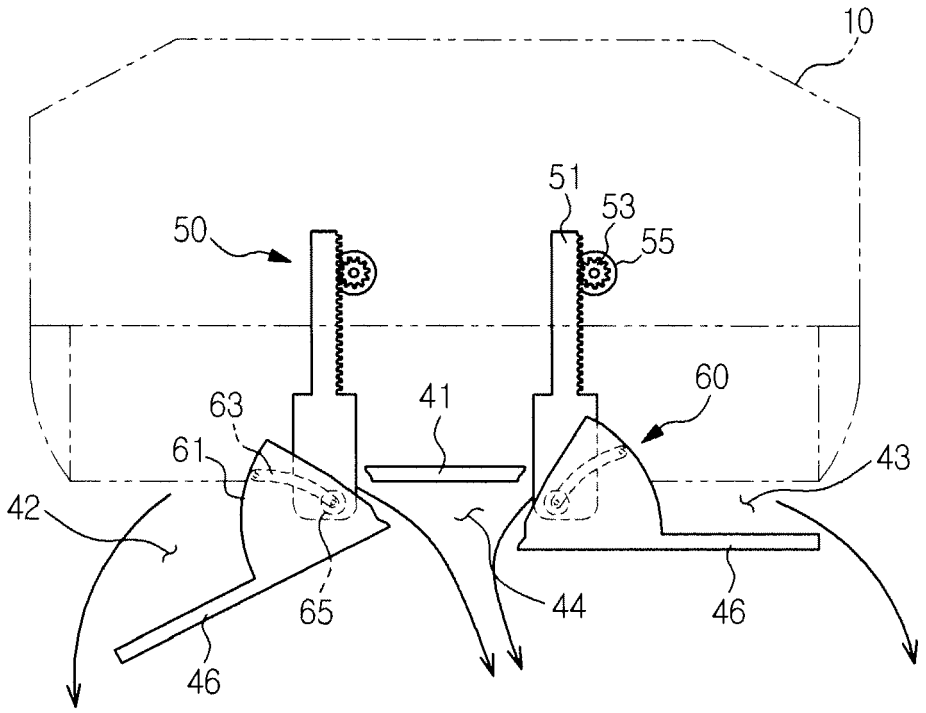

FIG. 8

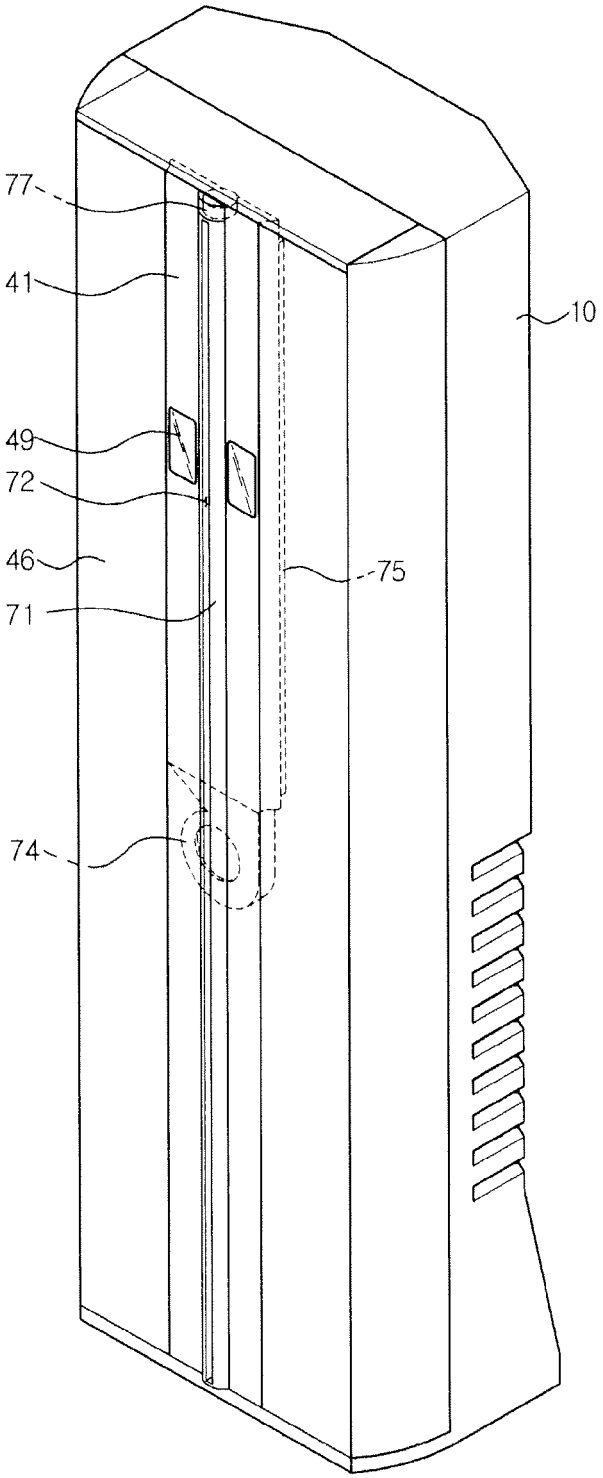

FIG. 9

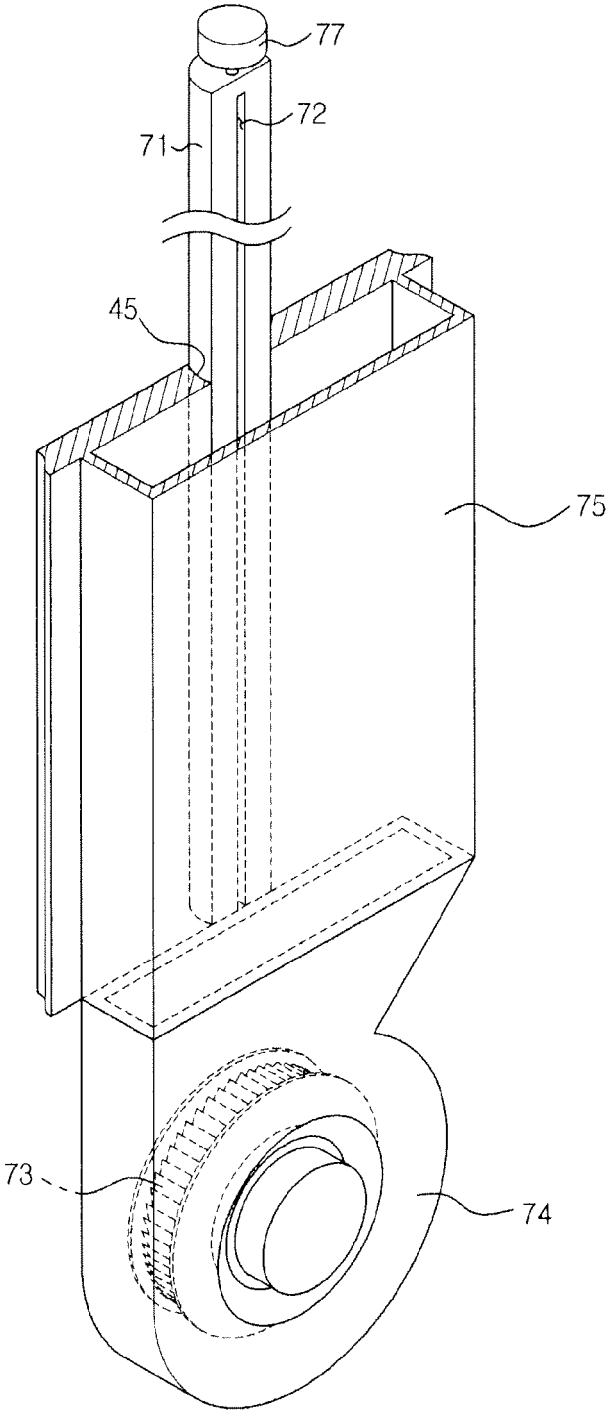

FIG. 10A

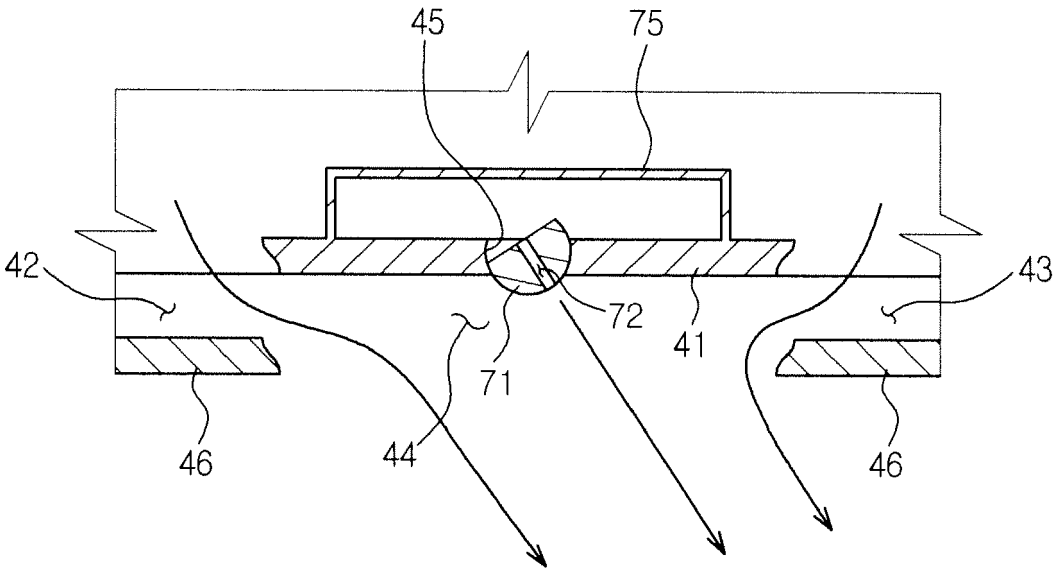

FIG. 10B