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(71) Applicant: **LG Electronics Inc.
Seoul 150-875 (KR)**

(72) Inventor: **Yang, Seung Hoon
Changwon City,
Gyongsangnam-do, 641-711 (KR)**

(74) Representative: **Palmer, Jonathan R.
Boult Wade Tennant
Verulam Gardens
70 Gray's Inn Road
London WC1X 8BT (GB)**

(54) **Indoor unit of air conditioner**

(57) Provided is an indoor unit of an air conditioner. The indoor unit includes a chassis defining a back surface of the indoor unit and a main body provided with a front frame coupled to a front portion of the chassis. The indoor unit further includes a front panel movable coupled to a front surface of the main body, the front panel sucking air through the front surface of the main body in a state where the front panel is spaced from the main body, an inner panel provided between the front frame and the

front panel, a link member connecting the front panel to the inner panel, and a drive unit for driving the link member. When the drive unit operates, the front panel is rotated with respect to the main body such that a distance between one end portion of the front panel and the main body is different from that between the other end portion of the front panel and the main body.

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Description

BACKGROUND

[0001] Embodiments relate to an indoor unit of an air conditioner.

[0002] Generally, an air conditioner is a cooling/heating apparatus that cools or heats air within an inner space of a building, etc.

[0003] The air conditioner includes an outdoor unit receiving a compressor and an indoor unit installed at an indoor space to perform heat-exchange between air and refrigerant. According to the types of air conditioners, the indoor unit and the outdoor unit may be integrated in one body.

[0004] An indoor heat exchanger, a fan assembly, and a filter for filtering sucked air are installed in the indoor unit. The indoor unit is classified into a wall-mounted type, a floor-mounted type, and a window type according to an installation position thereof.

[0005] In case of the wall-mounted type, an indoor air intake port is generally disposed on a top surface of the indoor unit in a structure in which a front portion is shielded by a panel member. In a structure in which the indoor air intake port is disposed on a front surface of the indoor unit, an intake grill is disposed on the front surface of the indoor unit. In case of such a product, components within the indoor unit are exposed through the front portion of the indoor unit to spoil the beauty.

SUMMARY

[0006] Embodiments provide an indoor unit of an air conditioner.

[0007] In one embodiment, an indoor unit of an air conditioner including a chassis defining a back surface of the indoor unit and a main body provided with a front frame coupled to a front portion of the chassis includes: a front panel movable coupled to a front surface of the main body, the front panel sucking air through the front surface of the main body in a state where the front panel is spaced from the main body; an inner panel provided between the front frame and the front panel; a link member connecting the front panel to the inner panel; and a drive unit for driving the link member, wherein, when the drive unit operates, the front panel is rotated with respect to the main body such that a distance between one end portion of the front panel and the main body is different from that between the other end portion of the front panel and the main body.

[0008] The details of one or more embodiments are set forth in the accompanying drawings and the description below. Other features will be apparent from the description and drawings, and from the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009]

FIG. 1 is a cross-sectional view illustrating an indoor unit of an air conditioner according to an embodiment.

FIG. 2 is a perspective view illustrating an operation state of an indoor unit of an air conditioner according to an embodiment.

FIGS. 3 and 4 are perspective views of an indoor unit in which a front panel is opened for separating a filter.

FIG. 5 is a side view illustrating an ascent of a front panel of an indoor unit according to an embodiment.

FIG. 6 is a perspective view of a front panel drive unit according to an embodiment.

FIG. 7 is an exploded perspective view of the drive unit.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0010] Reference will now be made in detail to the embodiments of the present disclosure, examples of which are illustrated in the accompanying drawings.

[0011] In the following detailed description of the preferred embodiments, reference is made to the accompanying drawings that form a part hereof, and in which is shown by way of illustration specific preferred embodiments in which the invention may be practiced. These embodiments are described in sufficient detail to enable those skilled in the art to practice the invention, and it is understood that other embodiments may be utilized and that logical structural, mechanical, electrical, and chemical changes may be made without departing from the spirit or scope of the invention. To avoid detail not necessary to enable those skilled in the art to practice the invention, the description may omit certain information known to those skilled in the art. The following detailed description is, therefore, not to be taken in a limiting sense, and the scope of the present invention is defined only by the appended claims.

[0012] FIG. 1 is a cross-sectional view illustrating an indoor unit of an air conditioner according to an embodiment.

[0013] Referring to FIG. 1, the indoor unit 10 of the air conditioner includes a chassis 11, a base 12, a front frame 13, and a front panel 14. A flow guide 111 for generating airflow is provided on a front surface of the chassis 11. The base 12 is provided on a back surface of the chassis 11 and fixed to an installation wall surface. The front frame 13 is coupled to a front portion of the chassis 11. An intake grill 131 is provided on an upper surface of the front frame 13. The front panel 14 is movably coupled to a front surface of the front frame 13.

[0014] The indoor unit 10 further includes an inner panel 15, a heat exchanger 19, a fan 20, and a discharge grill 16. The inner panel 15 is link-coupled to a back surface of the front panel 14 and rotatably provided to the front frame 13. The heat exchanger 19 is disposed between the front frame 13 and the chassis 11. The fan 20 is provided at a lower side of the heat exchanger 19 to

suck and discharge indoor air. The discharge grill 16 supports a lower end of the heat exchanger 19 and includes a discharge hole.

[0015] The indoor unit 10 further includes a discharge vane 21, a discharge louver 22, a bottom plate 23, and a tubing holder 24. The discharge vane 21 selectively shields the discharge hole. The discharge louver 22 is provided in the discharge hole to adjust a discharge direction of air together with the discharge vane 21. The bottom plate 23 shields a piping passing through a lower end of the indoor unit 10. The tubing holder 24 is rotatably coupled to the chassis 11 and supports the piping.

[0016] The indoor unit 10 further includes a pre-filter 17 and a dust-collecting filter 18. The pre-filter 17 filters air sucked through a front surface of the front frame 13 and the intake grill 131. The dust-collecting filter 18 is provided between the pre-filter 17 and the heat exchanger 19.

[0017] FIG. 2 is a perspective view illustrating an operation state of an indoor unit of an air conditioner according to an embodiment.

[0018] Referring to FIG. 2, in the indoor unit 10 of the air conditioner, the discharge grill 16 including the discharge hole is disposed at a lower side of the indoor unit 10. That is, the discharge hole is disposed in a bottom surface of the indoor unit 10, and the discharge vane 21 and the discharge louver 22 are disposed in the discharge hole. Thus, sucked indoor air passes through the heat exchanger 19, and then, is discharged through the bottom surface of the indoor unit 10.

[0019] A top surface of the front panel 13 defines a top surface of the indoor unit 10. As illustrated in FIG. 2, the intake grill 131 is provided in the top surface of the front panel 13. A side panel 25 is provided on a side surface of the front panel 13 to define a side portion of the indoor unit 10.

[0020] In order to suck the indoor air, the front panel 14 ascends while the front panel 14 is rotated by a link member 26. In detail, the front panel 14 ascends in a state in which an upper end of the front panel 14 is inclined forwardly due to a rotation of the link member 26. Thus, the indoor air is sucked through the intake grill 131, and also, the indoor air is sucked through a space between the front frame 13 and the front panel 14. At this time, the inner panel 15 disposed on the back surface of the front panel 14 is fixedly maintained on a front surface of the front frame 13. An air intake hole is defined in the inner panel 15.

[0021] A moving sensor assembly 27 for detecting a movement of a human body is disposed on an edge portion of a bottom surface of the indoor unit 10.

[0022] In detail, the moving sensor assembly 27 is inserted inside the indoor unit 10 in a state where the indoor unit 10 does not operate. When the indoor unit 10 operates, the moving sensor assembly 27 descends to protrude from a bottom surface of the indoor unit 10. The moving sensor assembly 27 is rotatably disposed at a predetermined angle with respect to a vertical axis.

[0023] The moving sensor assembly 27 protrudes from the bottom surface of the indoor unit 10 by a predetermined length and is disposed rotatably in left and right directions (horizontal direction). Thus, a range capable of detecting the movement of the human body increases.

[0024] FIGS. 3 and 4 are perspective views of an indoor unit in which a front panel is opened for separating a filter.

[0025] Referring to FIGS. 3 and 4, in case of the indoor unit 10 according to an embodiment, a lower portion of the front panel 14 ascends for replacing the filter.

[0026] In detail, the pre-filter 17 is disposed on the front surface of the front frame 13, and the inner panel 15 is disposed on a front surface of the pre-filter 17. The inner panel 15 is closely attached to the front surface of the front frame 13 during the operation of the indoor unit 10. Only the front panel 14 ascends as illustrated in FIG. 2.

[0027] When the front panel 14 ascends for replacing the filter, the inner panel 15 ascends together in a state where the inner panel 15 is closely attached to the back surface of the front panel 14. This is done because the front panel 14 and the inner panel 15 are connected to each other by the link member 26.

[0028] A support 28 is rotatably connected to a back surface of the inner panel 15. In detail, the support 28 has one end rotatably connected to the back surface of the inner panel 15 and the other end vertically and slidably coupled to the front surface of the front frame 13.

[0029] A guide recess or a guide rail for guiding movement of the support 28 may be provided in/on the front surface of the front frame 13. Thus, when the front panel 14 ascends, an end portion of the support 28 connected to the front panel 28 descends. When the ascent of the front panel 14 is stopped in a state where the support 28 descends up to a distance at least perpendicular to the front frame 13, a lower end of the front panel 14 is supported in an opened state. In the opened state, the filter 17 is pulled to separate the filter 17 from the indoor unit 10.

[0030] The link member 26 includes a lower link 261 and an upper link 262 disposed over the lower link 261. Lower ends of the lower link 261 and the upper link 262 are rotatably connected to the back surface of the front panel 14. Upper ends of the lower link 261 and the upper link 162 are rotatably connected to the inner panel 15. A hole through which the link member 26 passes is defined in the inner panel 15.

[0031] Thus, when a user lifts the front panel 14, the inner panel 15 is lifted together. When lower ends of the front panel 14 and the inner panel 15 are rotated with respect to upper ends of the front panel 14 and the inner panel 15, the end portion of the support 28 descends along the front surface of the front frame 13 to support the inner panel 15.

[0032] FIG. 5 is a side view illustrating an ascent of a front panel of an indoor unit according to an embodiment.

[0033] Referring to FIG. 5, when a drive command is inputted in the indoor unit 10, the front panel ascends.

[0034] In detail, an automatic ascending/descending structure of the front panel 14 includes the link member 26 and a drive unit 30. Both end portions of the link member 26 are connected to the front panel 14 and the inner panel 15, respectively. The drive unit 30 provides a rotation force to the link member 26.

[0035] In further detail, an end portion of the upper link 262 of the link member 26 is connected to the drive unit 30, and the link member 26 is rotated by the rotation force generated in the drive unit 30. A receiver 263 having a gear shape protrudes from the end portion of the upper link 262, i.e., an end portion rotatably connected to the inner panel 15. The receiver 263 is engaged with a second gear 352 (see FIG. 7) of the drive unit 30.

[0036] The lower link 261 is shorter than the upper link 262. Thus, the front panel 14 ascends in a state where the front panel 14 is slightly inclined in a front direction. That is to say, the upper end of the front panel 14 is inclined a direction away from the front surface of the indoor unit 10, and the lower end of the front panel 14 ascends in a state where the lower end of the front panel 14 is adjacent to the front frame 13. That is, a horizontal distance between an upper portion of the front panel 14 and the front frame 13 is greater than that between a lower portion of the front panel 14 and the front frame 13.

[0037] Thus, the indoor air is sucked from the upper portion and both sides of the front panel 14. A portion of the discharge hole defined in the lower end of the indoor unit 10 is opened while the front panel 14 ascends. The discharge vane 21 is rotated to open a remaining portion of the discharge hole. Here, since the front panel 14 ascends in a state where the upper end of the front panel 14 is inclined and the most of indoor air is sucked from an upper side of the indoor unit 10, it prevents the air discharged through the discharge hole from being sucked again into the indoor unit 10.

[0038] FIG. 6 is a perspective view of a front panel drive unit according to an embodiment, and FIG. 7 is an exploded perspective view of the drive unit.

[0039] Referring to FIGS. 6 and 7, the drive unit 30 according to this embodiment includes a drive motor 31, a bracket 32, and a power transmission unit. The bracket 32 is coupled to the drive motor 31. The power transmission unit is disposed on a side opposite to the drive motor 31 with respect to the bracket 32. The bracket 32 is fixed to the back surface of the front frame.

[0040] In detail, the power transmission unit includes a drive gear 33, a transmission gear 34, and a driven gear 35. The drive gear 33 is connected to a rotation shaft of the drive motor 31. The transmission gear 34 is engaged with the drive gear 33. The driven gear 35 is engaged with the transmission gear 34. The driven gear 35 includes a first gear 351 and the second gear 352.

[0041] The first gear 351 has an approximately semi-circular shape. The second gear 352 is integrated or coupled with/to the first gear 351. The first gear 351 is rotatably engaged with the transmission gear 34, and the second gear 352 is rotatably engaged with the receiver 263

of the upper link 262.

[0042] An operation of the drive unit 30 will now be described. When a power is applied to the drive motor 31, the drive gear 33, the transmission gear 34, and driven gear 35 are rotated in a state of being engaged with each other. When the second gear 352 is rotated, the receiver 263 is rotated to rotate the upper link 262. As a result, the front panel 14 is rotated and ascends. Since the lower link 261 is shorter than the upper link 262, the front panel 14 ascends in a state where the front panel 14 is inclined forwardly. The front panel 14 is moved to open the indoor air intake hole.

[0043] In order to clean or replace the filter, when the lower end of the front panel 14 is lifted, the receiver 263 is released from the engagement coupling with the second gear 352. The lower ends of front panel 14 and the inner panel 15 are rotated forwardly together with respect to the upper ends of the front panel 14 and the inner panel 15.

[0044] Although the receiver 263 is provided on the lower link 262 in this embodiment, the present disclosure is not limited thereto. For example, the receiver 263 may be provided on the upper link 261. Also, although the plurality of gears is engaged with the drive unit 30 in this embodiment, the present disclosure is not limited thereto. For example, a member having the same function as the driven gear 35 may be directly connected to the rotation shaft of the drive motor 31. In addition, a power transmission unit having a shape different from a combination of the gears provided in this embodiment may be applicable.

[0045] According the proposed embodiment, the front panel constituting the front portion of the indoor unit ascends and is rotated to suck the indoor air from the upper portion and both sides of the front surface of the indoor unit. Thus, an intake area of the indoor air increases.

[0046] Also, even if an air intake hole 151 defined in the front surface of the indoor unit is opened, since the air intake hole 151 is covered by the front panel, the air intake hole 151 is not exposed to the user. Therefore, the outer appearance of the indoor unit can be neatly finished.

[0047] In addition, when the front panel is lifted upwardly in order to clean or replace the filter, the inner panel is lifted together with the front panel. Therefore, the user can easily clean or replace the filter.

[0048] While the present disclose 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 disclose as defined by the following claims.

Claims

1. An indoor unit of an air conditioner including a main

body provided with a chassis defining a back surface of the indoor unit and a front frame coupled to a front portion of the chassis, the indoor unit comprising:

a front panel movably coupled to a front surface of the main body, the front panel sucking air through the front surface of the main body in a state where the front panel is spaced from the main body;
 an inner panel provided between the front frame and the front panel;
 a link member connecting the front panel to the inner panel; and
 a drive unit for driving the link member,

wherein, when the drive unit operates, the front panel is rotated with respect to the main body such that a distance between one end portion of the front panel and the main body is different from that between the other end portion of the front panel and the main body.

2. The indoor unit according to claim 1, wherein, when the drive unit operates, the front panel ascends, and simultaneously, is rotated with respect to the main body. 25
3. The indoor unit according to claim 2, wherein the one end portion of the front panel is an upper end portion of the front panel and the other end portion of the front panel is a lower end portion of the front panel. 30
4. The indoor unit according to claim 3, wherein the inner panel is maintained in a state where the inner panel is fixed to the main body when the front panel ascends due to the drive unit. 35
5. The indoor unit according to claim 3, wherein the link member comprises: 40
 - an upper link; and
 - a lower link disposed under the upper link, the lower link being shorter than the upper link.
6. The indoor unit according to claim 5, wherein the drive unit transmits a driving force to one of the upper link and the lower link. 45
7. The indoor unit according to claim 6, wherein the drive unit comprises a drive motor and a power transmission unit for transmitting a driving force generated from the drive motor, and the one of the upper link and the lower link comprises a receiver for receiving the driving force from the power transmission unit. 50
8. The indoor unit according to claim 7, wherein the power transmission unit comprises one or more gear. 55

9. The indoor unit according to claim 7, wherein, when a lower end of the inner panel is rotated with respect to an upper end thereof, a connection between the receiver and the power transmission unit is released.

10. The indoor unit according to claim 5, wherein the upper link and the lower link have one ends respectively connected to the inner panel and the other ends respectively connected to the front panel.

11. The indoor unit according to claim 1, further comprising a support having one end rotatably provided on a back surface of the inner panel to support the inner panel such that a lower end of the inner panel is maintained in a state lifted with respect to an upper end of the inner panel.

12. The indoor unit according to claim 11, wherein the inner panel is rotated together with the front panel.

13. The indoor unit according to claim 11, wherein the support has the other end slidably connected to a front surface of the front frame.

Fig.1

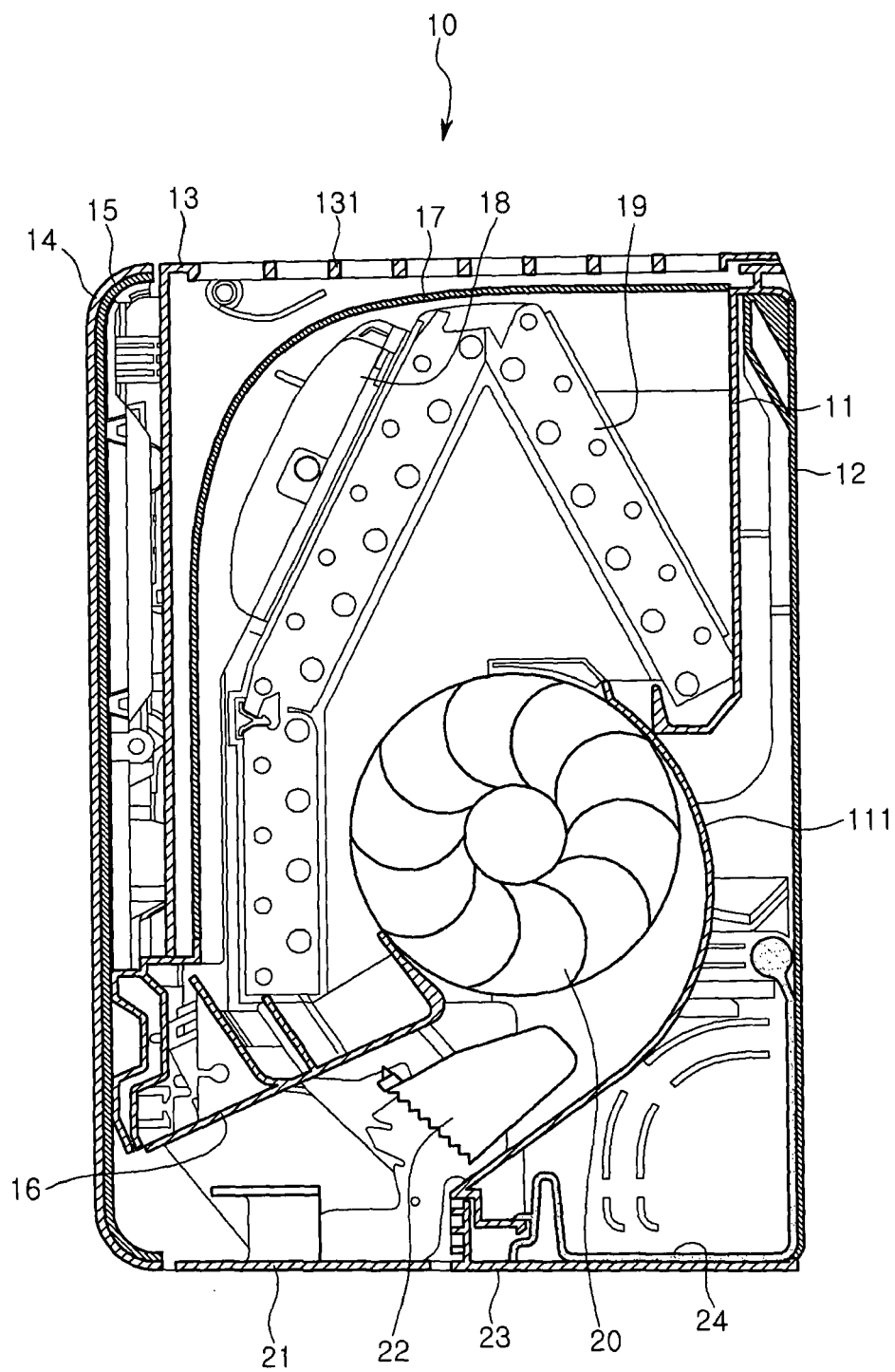


Fig.2

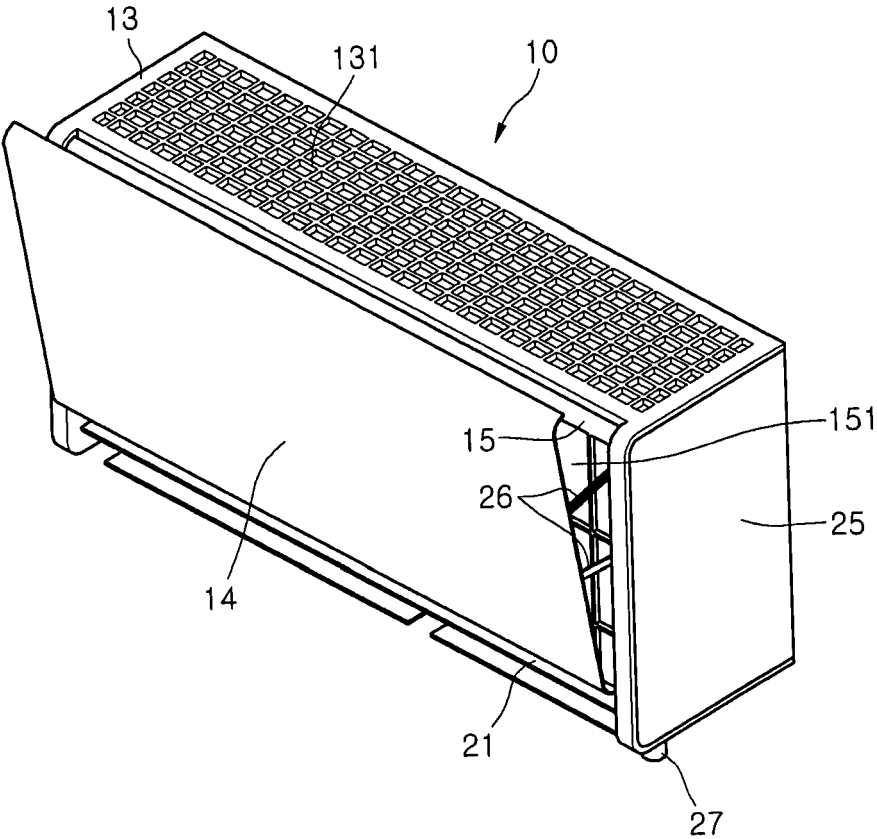


Fig.3

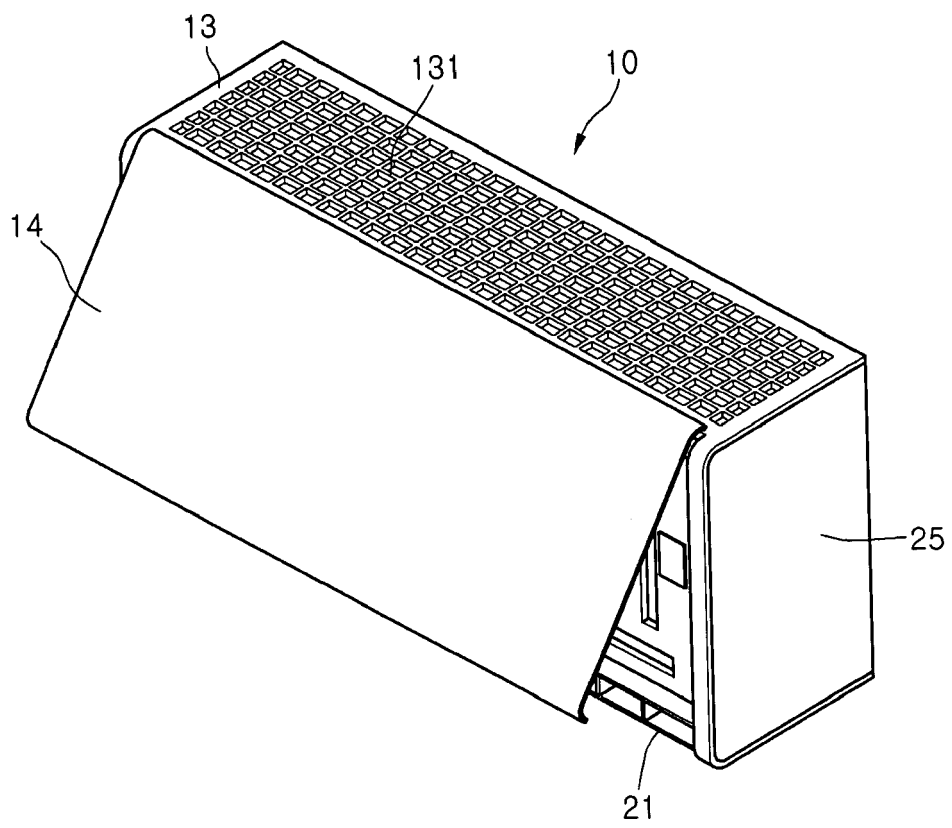


Fig.4

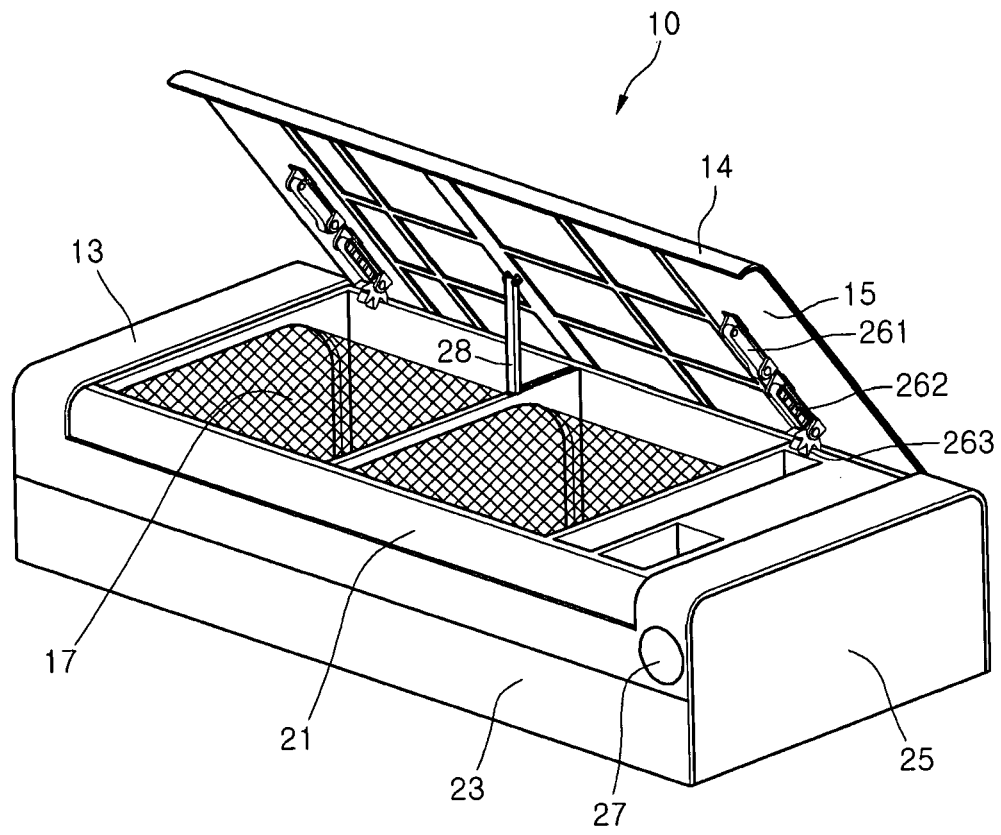


Fig. 5

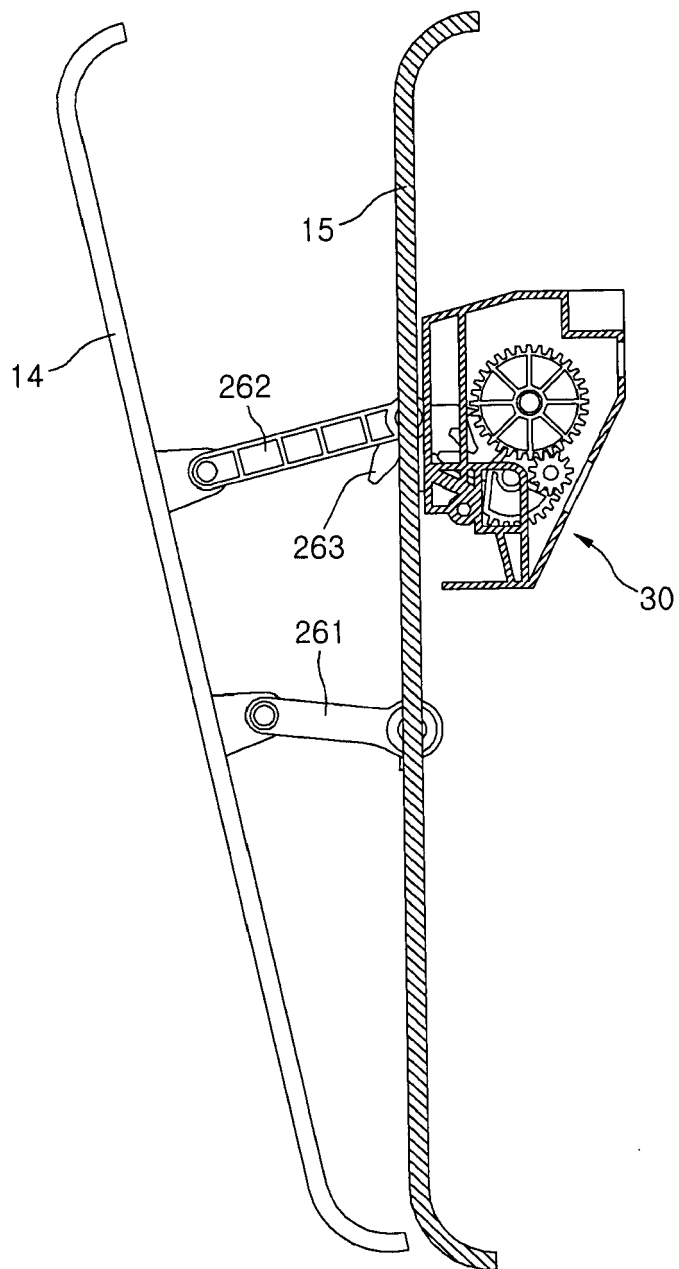


Fig.6

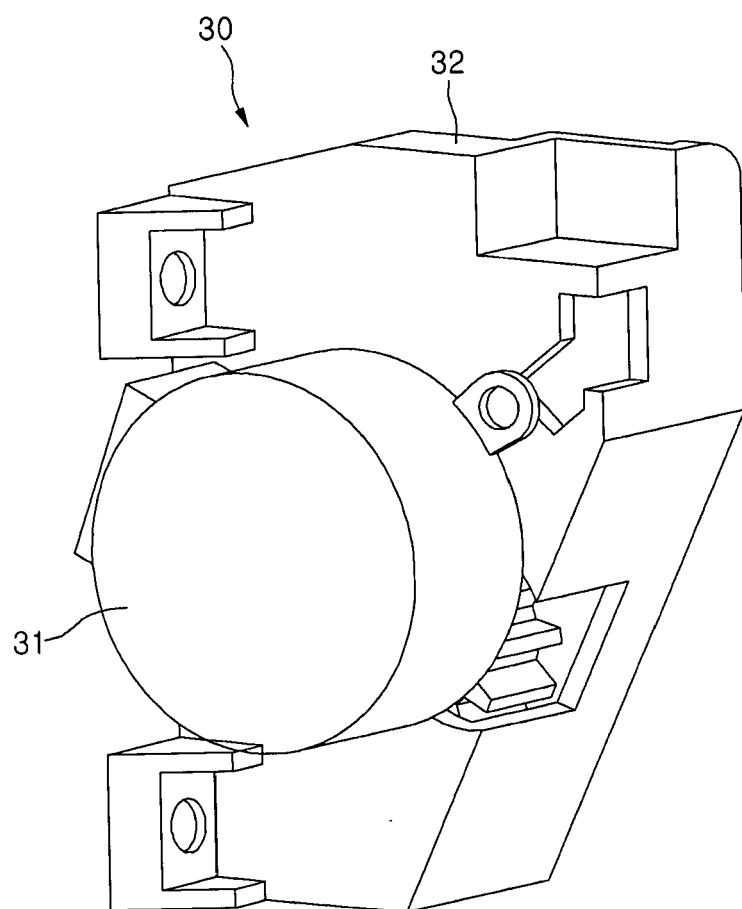


Fig. 7

