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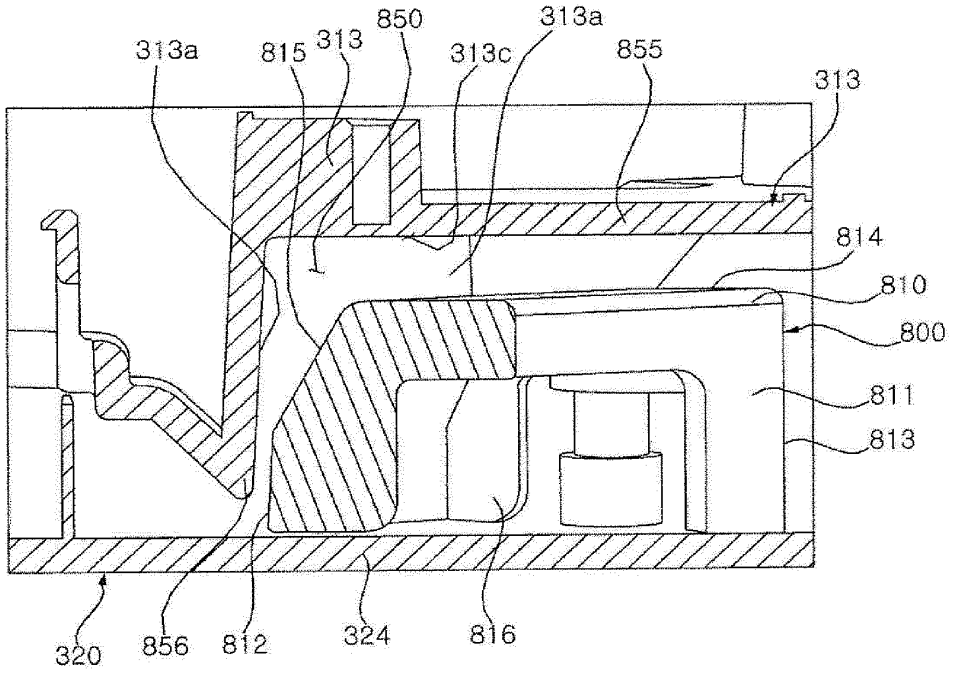
(54) **CEILING-TYPE INDOOR UNIT OF AIR CONDITIONER**

(57) In the present invention, an intake grille may be located in an intake grille placement region through mutual interference between a guide block disposed in the intake grille and a case although shaking occurs in the intake grille when the intake grille is lifted.

Fig. 21



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Description

[Technical Field]

[0001] The present disclosure relates to a ceiling-type indoor unit of an air-conditioner, and more particularly, to a ceiling-type indoor unit in which an intake grille is automatically lowered and lifted.

[Background Art]

[0002] In general, air-conditioners include a compressor, a condenser, an evaporator, and an expander and supply cold air or warm air to a building or a room using an air conditioning cycle.

[0003] Air-conditioners are structurally classified as a separation type in which a compressor is disposed outdoors and an integrated type in which a compressor is integrally manufactured.

[0004] In the separation type air-conditioner, an indoor heat exchanger is installed in an indoor unit and an outdoor heat exchanger and a compressor are installed in an outdoor unit and the two devices separated from each other are connected with a refrigerant pipe.

[0005] In the integrated type air-conditioner, an indoor heat exchanger, an outdoor heat exchanger, and a compressor installed in one case. Integrated type air-conditioners include a window type air-conditioner installed directly by hanging a device on a window and a duct type air-conditioner installed outside a room by connecting an intake duct and a discharge duct.

[0006] The separation type air-conditioners are generally classified depending on an installation form of the indoor unit.

[0007] An air-conditioner whose indoor unit is installed vertically in an indoor space is called a stand-type air-conditioner, an air-conditioner whose indoor unit is installed on a wall in a room is called a wall-mounted air-conditioner, and an air-conditioner whose indoor unit installed on a ceiling in a room is called a ceiling-type indoor unit.

[0008] In the case of the ceiling-type indoor unit, the intake grille is arranged to face a floor. A filter for filtering foreign matter in the indoor air may be disposed on the intake grille and may be separated for cleaning. A user needs to periodically remove the intake grille from the case to clean the filter.

[0009] However, in the case of the ceiling-type indoor unit, since the intake grille is disposed on the ceiling of the room, the user has to climb on a structure such as a chair to separate the intake grille.

[Related Art document]

[Patent document]

[0010] Korean Patent Registration No. 10-0679838 B1

[Disclosure]

[Technical Problem]

[0011] The present disclosure provides a ceiling-type indoor unit of an air-conditioner in which an intake grille may be located at an intake grille placement region even when shaking occurs in the intake grille when the intake grille is lifted.

[0012] Furthermore, the present disclosure provides a ceiling-type indoor unit of an air-conditioner in which an intake panel is guided to its original position through a guide block when the intake grille is lifted and is in close contact with a front panel.

[0013] Furthermore, the present disclosure provides a ceiling-type indoor unit of an air-conditioner in which an intake grille is prevented from being separated from a front panel when the intake grille is lifted and is in close contact with the front panel.

[0014] Furthermore, the present disclosure provides a ceiling-type indoor unit of an air-conditioner in which a bottom surface of a front panel and a bottom surface of an intake grille form a continuous plane when the intake grille is in close contact with the front panel.

[0015] Furthermore, the present disclosure provides a ceiling-type indoor unit of an air-conditioner in which a guide block guides an intake grille to its original position although the intake grille is lifted with one side or the other side thereof inclined.

[0016] Furthermore, the present disclosure provides a ceiling-type indoor unit of an air-conditioner in which shaking is minimized when an intake grille is lifted or lowered.

[0017] Technical objects to be achieved by the present disclosure are not limited to the aforementioned technical objects, and other technical objects not described above may be evidently understood by a person having ordinary skill

in the art to which the present disclosure pertains from the following description.

[Technical Solution]

[0018] In the present disclosure, an intake grille may be located at an intake grille placement region through mutual interference between a guide block provided in the intake grille and a case although shaking occurs in the intake grille when the intake grille is lifted.

[0019] In the present disclosure, the intake panel is guided to its original position through the guide block when the intake grille is lifted and is in close contact with the front panel.

[0020] In the present disclosure, when the intake grille is lifted, a corner frame forming the intake grille placement region and the guide block of the intake grille interfere with each other, through which the intake grille may be returned to the intake grille placement region.

[0021] Since the present disclosure returns the intake grille to the initial position through mutual interference between the guide block and the case, the intake grille may be prevented from being separated from the front panel when in close contact with the front panel.

[0022] In the present disclosure, when the intake grille is returned to its original position, the bottom surface of the front panel and the bottom surface of the intake grille may form a continuous plane.

[0023] In the present disclosure, the guide block may guide the intake grille to its original position, even if the intake grille is lifted with one side or the other side thereof inclined.

[0024] In an aspect, a ceiling-type indoor unit of an air-conditioner includes: a case installed on an interior ceiling in a suspended manner and having an inlet and an outlet provided downward; an intake grille disposed to be separable from the case and covering the inlet of the case; an intake grille placement region disposed on a bottom surface of the case, having a portion forming the inlet, and allowing the intake grille to be located therein; a first unit disposed in the case, coupled to the intake grille through a 1-1 wire and a 1-2 wire, and lifting or lowering one side of the intake grille by simultaneously winding or unwinding the 1-1 wire and the 1-2 wire; a second unit disposed in the case, coupled to the intake grille through a 2-1 wire and a 2-2 wire, and lifting or lowering the other side of the intake grille by simultaneously winding or unwinding the 2-1 wire and the 2-2 wire; and a guide block disposed at the intake grille, mutually interfering with the case when the intake grille is lifted, and guiding the intake grille to the intake grille placement region.

[0025] The ceiling-type indoor unit may further include: a corner frame forming a part of the intake grille placement region, wherein the guide block includes a guide wall mutually interfering with the corner frame when the intake grille is lifted, and the guide wall may be disposed inclined downward toward an outer side of the intake grille.

[0026] The corner frame may include: a corner frame body; an insertion space formed to be concave from a lower side to an upper side of the corner frame body and allowing the guide block to be inserted therein; and a corner inner side wall configuring the corner frame body and extending from the corner frame body to form a part of the insertion space, wherein the guide wall mutually interferes with a lower end of the corner inner side wall when the intake grille is lifted.

[0027] The guide block may include: a first guide block portion disposed at the intake panel; and a second guide block portion assembled to the intake panel and intersecting the first guide block portion to form an included angle B.

[0028] The first guide block portion and the second guide block portion may be disposed to be perpendicular to each other with the included angle B therebetween in a top view.

[0029] The first guide block portion and the second guide block portion may be integrally formed.

[0030] The ceiling-type indoor unit may further include: a corner frame forming a part of the intake grille placement region, wherein the first guide block portion includes a first guide wall mutually interfering with the corner frame when the intake grille is lifted, and the first guide wall is disposed to be inclined downward toward an outer side of the intake grille.

[0031] The first guide wall may be located on an upper side with respect to an upper surface of the intake grille.

[0032] The first guide block portion may include a first guide wall mutually interfering with a structure adjacent to the case when the intake grille is lifted, the second guide block portion may include a second guide wall mutually interfering with the structure adjacent to the case when the intake grille is lifted, the first guide wall may be disposed to be inclined downward toward an outer side of the intake grille, and the second guide wall may be disposed to be inclined downward toward the outer side of the intake grille.

[0033] The first guide wall and the second guide wall may be located on an upper side with respect to an upper surface of the intake grille.

[0034] The ceiling-type indoor unit may further include: a corner frame forming a part of the intake grille placement region, wherein the corner frame may include: a corner frame body; an insertion space formed to be concave from a lower side to an upper side of the corner frame body and allowing the guide block to be inserted therein; a first corner inner side wall configuring the corner frame body and extending from the corner frame body to form a part of the insertion space; a second corner inner side wall configuring the corner frame body, extending from the corner frame body to form a part of the insertion space, and forming a predetermined included angle with the first corner inner side wall; and a corner upper side wall configuring the corner frame body, connecting the first corner inner side wall and the second

corner inner side wall, and allowing the insertion space to be located on a lower side thereof, wherein the first guide wall mutually interferes with a lower end of the first corner inner side wall or the second guide wall mutually interferes with a lower end of the second corner inner side wall, when the intake grille is lifted.

[0035] The first guide block portion may include: a first side wall formed in an up-down direction and disposed to face an inside of the intake panel; a second side wall formed in the up-down direction, opposing the first side wall, and disposed to face an outside of the intake panel; a third side wall formed in the up-down direction and connecting the first side wall and the second side wall; an upper side wall disposed to face an upper side and connecting the first side wall and the third side wall; and a first guide wall connecting the upper side wall and the second side wall and disposed to be inclined downward from the upper side wall toward the second side wall.

[0036] The ceiling-type indoor unit may further include: an inner wall connecting the first side wall, the second side wall, and the upper side wall and disposed below the upper side wall.

[0037] The first guide block portion may include: a first side wall formed in an up-down direction and disposed to face an inner side of the intake panel; a second side wall formed in the up-down direction, opposing the first side wall, and disposed to face an outer side of the intake panel; a third side wall formed in the up-down direction and connecting the first side wall and the second side wall; an upper side wall disposed to face an upper side and connecting the first side wall and the third side wall; and a first guide wall connecting the upper side wall and the second side wall and disposed to be inclined downward from the upper side wall toward the second side wall, and the second guide block portion may include: a first side wall formed in an up-down direction and disposed to face an inner side of the intake panel; a second side wall formed in the up-down direction, opposing the first side wall, and disposed to face an outer side of the intake panel; a third side wall formed in the up-down direction and connecting the first side wall and the second side wall; an upper side wall disposed to face an upper side and connecting the first side wall and the third side wall; and a second guide wall connecting the upper side wall and the second side wall and disposed to be inclined downward from the upper side wall toward the second side wall.

[0038] The ceiling-type indoor unit may further include: a corner frame forming a part of the intake grille placement region, wherein the corner frame may include: a corner frame body; an insertion space formed concave upward from a lower side of the corner frame body and allowing the guide block to be inserted therein; a first corner inner side wall configuring the corner frame body and extending from the corner frame body to form a part of the insertion space; and a second corner inner side wall configuring the corner frame body, extending from the corner frame body to form a part of the insertion space, and forming a predetermined included angle with the first corner inner side wall, wherein the first guide wall mutually interferes with a lower end of the first corner inner side wall or the second guide wall mutually interferes with a lower end of the second corner inner side wall, when the intake grille is lifted.

[0039] At least two guide blocks may be arranged and may be disposed opposite to each other based on a center O of the intake panel.

[0040] The guide block may be disposed on an upper surface of the intake panel and may protrude upward from the upper surface of the intake panel.

[0041] The case may include: a case housing in which a bottom surface is open; and a front body assembled to a lower side of the case housing, covering the bottom surface of the case housing, having the intake grille placement region provided therein, and having a plurality of outlets provided outside the intake grille placement region, wherein the guide block may include a first guide block, a second guide block, a third guide block, and a fourth guide block, and the first guide block, the second guide block, the third guide block, and the fourth guide block are located at four corners of the front body.

[0042] The first guide block and the third guide block may be arranged to face each other based on a center O of the intake grille and the second guide block and the fourth guide block may be arranged to face each other based on the center O of the intake grille.

[0043] The front body may further include: a first corner frame, a second corner frame, a third corner frame, and a fourth corner frame arranged at the four corners, respectively, and forming a part of the intake grille placement region, the first guide block may mutually interfere with the first corner frame, the second guide block may mutually interfere with the second corner frame, the third guide block may mutually interfere with the third corner frame, and the fourth guide block may mutually interfere with the fourth corner frame.

[0044] The intake grille may include: a grille having a plurality of grille holes; and a grille body portion in which an inner edge is disposed to surround the grille and an outer edge is in contact with a plurality of outlets, wherein the first guide block may be disposed at the grille body portion and located adjacent to the first corner frame, the second guide block may be disposed at the grille body portion and located adjacent to the second corner frame, the third guide block may be disposed at the grille body portion and located adjacent to the third corner frame, and the fourth guide block may be disposed at the grille body portion and located adjacent to the fourth corner frame.

[0045] The intake grille may include: a first grille corner portion extending from the grille body portion toward the first corner frame; a second grille corner portion extending from the grille body portion toward the second corner frame; a third grille corner portion extending from the grille body portion toward the third corner frame; and a fourth grille corner

portion extending from the grille body portion toward the fourth corner frame, wherein the first guide block may be disposed at the first grille corner portion, the first guide block may be disposed at the second grille corner portion, the first guide block may be disposed at the third grille corner portion, and the first guide block may be disposed at the fourth grille corner portion.

[0046] The ceiling-type indoor unit may further include: a permanent magnet disposed on one of the front body or the intake grille; and a magnetic force fixing portion disposed on the other of the front body or the intake grille, wherein the permanent magnet and the magnetic force fixing portion may be disposed on an outer side of the guide block based on a center O of the intake grille.

[0047] The ceiling-type indoor unit may further include: a permanent magnet disposed on one of the front body or the intake grille; and a magnetic force fixing portion disposed on the other of the front body or the intake grille; and a wire fixing portion disposed at the intake grille and allowing one of a 1-1 wire, a 1-2 wire, a 2-1 wire, or a 2-2 wire to be fixed thereto, wherein the permanent magnet and the magnetic force fixing portion may be disposed on an outer side of the guide block and the wire fixing portion may be disposed on an inner side of the guide block, based on the center O of the intake grille.

[Advantageous Effects]

[0048] The ceiling-type indoor unit of an air-conditioner according to the embodiment of the present disclosure has one or more advantages as follows.

[0049] First, in the present disclosure, even if shaking occurs in the intake grille when the intake grille is lifted, the intake grille may be located at the intake grille placement region through mutual interference between the guide block disposed at the intake grille and the case.

[0050] Second, in the present disclosure, the intake panel may be guided to its original position through the guide block when the intake grille is lifted and is in close contact with the front panel.

[0051] Third, in the present disclosure, since the intake grille is returned to its initial position through the guide block, the intake grille is prevented from being separated from the front panel when the intake grille is lifted and is in close contact with the front panel, thereby preventing loss of pressure of intaken air.

[0052] Fourth, in the present disclosure, even if the intake grille is lifted with one side or the other side inclined, the guide block may guide the intake grille to its original position.

[0053] Fifth, in the present disclosure, when the intake grille is returned to its original position, a bottom surface of the front panel and a bottom surface of the intake grille may form a continuous plane.

[0054] Sixth, in the present disclosure, since the guide block is located inside the corner frame, an increase in a vertical height may be minimized in spite of a structure in which the guide block and the corner frame mutually interfere with each other.

[0055] Seventh, in the present disclosure, since the permanent magnet and the magnetic force fixing portion are located on an outer side of the guide block, separation of the grille corner portion of the intake panel from the front body may be minimized.

[0056] Eighth, in the present disclosure, since the at least two guide blocks are arranged on the opposite side of the intake grille placement region and each guide block includes the first guide block portion and the second guide block portion extending in mutually different directions, the intake grille may be guided in four directions in a top view.

[0057] Ninth, in the present disclosure, since four guide blocks are disposed at four corners of the intake grille placement region, the intake grille may be more accurately located in the intake grille placement region.

[0058] Tenth, in the present disclosure, since the permanent magnet and the magnetic force fixing portion are located outside the guide block and the wire fixing portion is disposed inside the guide block, interference with the structure adjacent to the case may be minimized when the intake grille is lifted by each wire.

[Description of Drawings]

[0059]

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

FIG. 2 is an exemplary view of an operation of FIG. 1.

FIG. 3 is a cross-sectional view of FIG. 1.

FIG. 4 is an exploded perspective view of a front panel of FIG. 1.

FIG. 5 is a plan view showing an arrangement of the front panel and an elevator of FIG. 1.

FIG. 6 is a bottom view of the front panel shown in FIG. 1.

FIG. 7 is a bottom perspective view of an elevator of FIG. 2.

FIG. 8 is a bottom view of the front panel and the elevator of FIG. 2.
FIG. 9 is a perspective view showing an internal structure of the elevator of FIG. 2.
FIG. 10 is a plan view of FIG. 9.
FIG. 11 is an exemplary view of an operation of an elevator according to a first embodiment of the present disclosure.
FIG. 12 is an exemplary view showing an installation structure of a wire according to the first embodiment of the present disclosure.
FIG. 13 is a bottom view of the front panel shown in FIG. 1.
FIG. 14 is a plan view of an intake grille shown in FIG. 4.
FIG. 15 is an exploded perspective view of a wire guider shown in FIG. 13.
FIG. 16 is an exploded perspective view of the wire guider illustrated in FIG. 15 in another direction.
FIG. 17 is a plan view of the wire guider shown in FIG. 13.
FIG. 18 is a side cross-sectional view of the wire guider illustrated in FIG. 17.
FIG. 19 is a perspective view illustrating an assembly structure of a guider shaft shown in FIG. 17.
FIG. 20 is a perspective view of a guide block shown in FIG. 14.
FIG. 21 is a cross-sectional perspective view showing an assembly structure of a guide block shown in FIG. 3.
FIG. 22 is a perspective view of a vane module shown in FIG. 2.
FIG. 23 is a perspective view in another direction of FIG. 2.
FIG. 24 is an upper perspective view of a vane module in FIG. 22.
FIG. 25 is a plan view of the vane module shown in FIG. 22.
FIG. 26 is a perspective view showing an operational structure of the vane module shown in FIG. 25.

[Mode for Disclosure]

[0060] Advantages and features of the present disclosure and implementation methods thereof will be clarified through following embodiments described with reference to the accompanying drawings. The present disclosure may, however, be embodied in different forms and should not be construed as limited to the embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the present disclosure to those skilled in the art. Further, the present disclosure is only defined by scopes of claims. Throughout the specification, the same reference numerals will be used to designate the same or like components.

[0061] Hereinafter, the present disclosure will be described in detail with reference to the accompanying drawings.

[0062] FIG. 1 is a perspective view of an indoor unit of an air-conditioner according to an embodiment of the present disclosure. FIG. 2 is an exemplary view of an operation of FIG. 1. FIG. 3 is a cross-sectional view of FIG. 1. FIG. 4 is an exploded perspective view of a front panel of FIG. 1. FIG. 5 is a plan view showing an arrangement of the front panel and an elevator of FIG. 1. FIG. 6 is a bottom view of the front panel shown in FIG. 1. FIG. 7 is a bottom perspective view of an elevator of FIG. 2. FIG. 8 is a bottom view of the front panel and the elevator of FIG. 2. FIG. 9 is a perspective view showing an internal structure of the elevator of FIG. 2. FIG. 10 is a plan view of FIG. 9. FIG. 11 is an exemplary view of an operation of an elevator according to a first embodiment of the present disclosure. FIG. 12 is an exemplary view showing an installation structure of a wire according to the first embodiment of the present disclosure. FIG. 13 is a bottom view of the front panel shown in FIG. 1. FIG. 14 is a plan view of an intake grille shown in FIG. 4. FIG. 15 is an exploded perspective view of a wire guider shown in FIG. 13. FIG. 16 is an exploded perspective view of the wire guider illustrated in FIG. 15 in another direction. FIG. 17 is a plan view of the wire guider shown in FIG. 13. FIG. 18 is a side cross-sectional view of the wire guider illustrated in FIG. 17. FIG. 19 is a perspective view illustrating an assembly structure of a guider shaft shown in FIG. 17.

<Configuration of Indoor Unit>

[0063] An indoor unit of an air-conditioner according to the present embodiment includes a case 100 including an inlet 101 and an outlet 102, an indoor heat exchanger 130 disposed in the case 100, and an indoor blower fan 140 disposed in the case 100 and causing air to flow to the inlet 101 and the outlet 102.

[0064] The case 100 further includes an intake grille 320 disposed to face a floor of a room, and an elevator 500 lifting or lowering the intake grille 320 in a vertical direction is disposed in the case 100.

[0065] When a user's operation signal is received, the elevator 500 may be operated, four wires 511, 512, 521, and 522 may be simultaneously unwound or wound by the operation of the elevator 500, and the intake grille 320 coupled to the wires 511, 512, 521, and 522 may be moved in the vertical direction.

[0066] In the present disclosure, since the intake grille 320 is automatically lifted or lowered by the elevator 500, it is very important to return the intake grille 320 to an intake grille placement region 320a which is an initial position in the process of being lifted.

[0067] In this embodiment, a guide block 800 for guiding the intake grille 320 to the intake grille placement region

320a is provided.

[0068] When the intake grille 320 is lifted, the intake grille 320 may be misplaced outside the intake grille placement region 320a. When the intake grille 320 is disposed outside the intake grille placement region 320a, a gap may occur between the intake grille 320 and the case, which lowers an intake air intaking pressure.

[0069] In the present disclosure, the intake grille 320 may be guided to its original position through the guide block 800 when lifted.

<Configuration of Case>

[0070] In this embodiment, the case 100 includes a case housing 110 and a front panel 300. The case housing 100 is installed to hang on the ceiling of a room through a hanger (not shown) and a lower side thereof is open. The front panel 300 covers the open surface of the case housing 110, is disposed to face a floor of the room, is exposed to the room, and has the inlet 101 and the outlet 102.

[0071] The case 100 may be implemented in various ways depending on a production form, and the configuration of the case 100 does not limit the spirit of the present disclosure.

[0072] The inlet 101 is disposed at the center of the front panel 300, and the outlet 102 is disposed outside the inlet 101. The number of the inlet 101 or the number of the outlet 102 is irrelevant to the spirit of the present disclosure. In this embodiment, one inlet 101 is provided and a plurality of outlets 102 are disposed.

[0073] In the present embodiment, the inlet 101 has a square shape in a bottom view, and four outlets 102 are provided and spaced apart from each edge of the inlet 101 by a predetermined interval.

<Configuration of Indoor Heat Exchanger>

[0074] The indoor heat exchanger 130 is disposed between the inlet 101 and the outlet 102 and partitions the case 100 into an inner side and an outer side. The indoor heat exchanger 130 is disposed vertically in this embodiment.

[0075] An indoor blower fan 140 is located on an inner side of the indoor heat exchanger 130.

[0076] In a top or bottom view, the indoor heat exchanger may have an overall shape of "□", and some sections thereof may be separated.

[0077] The indoor heat exchanger 130 is disposed such that air discharged from the indoor blower fan 140 enters vertically.

[0078] A drain pan 132 is installed in the case 100, and the indoor heat exchanger 130 is mounted on the drain pan 132. Condensate water generated in the indoor heat exchanger 130 may flow to the drain pan 132 and be subsequently stored therein. A drain pump (not shown) for discharging collected condensate water to the outside is disposed in the drain pan 132.

[0079] The drain pan 132 may have an inclined surface having directionality to collect and store condensate water flowing from the indoor heat exchanger 130 to one side.

<Configuration of Indoor Blower Fan>

[0080] The indoor blower fan 140 is located in the case 100 and is disposed above the inlet 101. The indoor blower fan 140 is a centrifugal blower that intakes air to the center and discharges air in a circumferential direction.

[0081] The indoor blower fan 140 includes a bell mouse 142, a fan 144, and a fan motor 146.

[0082] The bell mouse 142 is disposed above the intake grille 320 and located below the fan 144. The bell mouse 142 guides air passing through the intake grille 320 to the fan 144.

[0083] The fan motor 146 rotates the fan 144. The fan motor 146 is fixed to the case housing 110. The fan motor 146 is disposed above the fan 144. At least a portion of the fan motor 146 is located higher than the fan 144.

[0084] A motor shaft of the fan motor 146 is disposed to face a lower side, and the fan 144 is coupled to the motor shaft.

[0085] The indoor heat exchanger 130 is located outside the edge of the fan 144. At least portions of the fan 144 and the indoor heat exchanger 130 are disposed on the same horizontal line. At least a portion of the bell mouse 142 is inserted into the fan 144. At least a portion of the bell mouse 142 overlaps the fan 144 in the up-down direction.

<Configuration of Flow Path>

[0086] The indoor heat exchanger 130 is disposed in the case housing 110 and partitions an inner space of the case housing 110 into an inner side and an outer side.

[0087] An inner space surrounded by the indoor heat exchanger 130 is defined as an intake flow path 103, and an outer space of the indoor heat exchanger 130 is defined as a discharge flow path 104.

[0088] The indoor blower fan 140 is disposed at the intake flow path 103. The discharge flow path 104 is between the

outside of the indoor heat exchanger 130 and a side wall of the case housing 110.

[0089] In a top view or a bottom view, the intake flow path 103 is an inner side surrounded by "□" of the indoor heat exchanger, and the discharge flow path 104 is an outer side surrounded by "□" of the indoor heat exchanger.

[0090] The intake flow path 103 communicates with the inlet 101, and the discharge flow path 104 communicates with the outlet 103.

[0091] Air flows from a lower side to an upper side of the intake flow path 103 and flows from an upper side to a lower side of the discharge flow path 104. A flow direction of air is switched 180 degrees based on the indoor heat exchanger 130.

[0092] The inlet 101 and the outlet 102 are provided on the same plane of the front panel 300.

[0093] The inlet 101 and the outlet 102 are arranged to face in the same direction. In this embodiment, the inlet 101 and the outlet 102 are arranged to face the floor of the room.

[0094] When the front panel 300 is curved, the outlet 102 may be formed to have a slight side slope, but the outlet 102 connected to the discharge flow path 104 is provided to face downward.

[0095] A vane module 200 is disposed to control a direction of air discharged through the outlet 102.

<Configuration of Front Panel>

[0096] The front panel 300 includes a front body 310 coupled to the case housing 110, having the inlet 101 and the outlet 102, the intake grille 320 having a plurality of grille holes 321 and covering the inlet 101, a pre-filter 330 detachably assembled to the intake grille 320, and a vane module 200 installed at the front body 310 and controlling an air flow direction of the outlet 102.

[0097] The intake grille 320 is disposed separately from the front body 310. The intake grille 320 is in close contact with the front body 310, but a component for assembling or coupling the front body 310 and the intake grille 320 is not disposed.

[0098] The intake grille 320 is pulled by a wire to maintain a close contact with the front body 310 and may be lowered or lifted according to an operation of the elevator 500.

[0099] The intake grille 320 may be lifted or lowered in the up-down direction from the front body 310 by the elevator 500. The intake grille 320 covers the entire inlet 101.

[0100] The elevator 500 and the intake grille 320 are connected through four wires and the elevator 500 moves the intake grille 320 in the up-down direction by winding or unwinding the wires.

[0101] In this embodiment, the intake grille 320 has a plurality of grille holes 321 through a grid shape. The grille hole 321 and the inlet 101 are in communication.

[0102] The pre-filter 330 is disposed above the intake grille 320. The pre-filter 330 filters air intaken into the case 100. The pre-filter 330 is located above the grille hole 321 and filters air passing through the intake grille 320.

[0103] The outlet 102 is provided in the form of a long slit along the edge of the inlet 101. The vane module 200 is located on the outlet 102 and coupled to the front body 310.

[0104] In this embodiment, the vane module 200 may be separated to a lower side of the front body 310. That is, the vane module 200 is disposed irrespective of a coupling structure of the front body 310 and may be independently separated from the front body 310. A structure thereof will be described later in more detail.

<Configuration of Front Body>

[0105] The front body 310 is coupled to the lower side of the case housing 110 and is arranged toward a direction of the room. The front body 310 is installed on the ceiling of the room and exposed to the room.

[0106] The front body 310 is coupled to the case housing 110, and the case housing 110 supports a load of the front body 310. The front body 310 supports loads of the intake grille 320 and the pre-filter 330.

[0107] The front body 310 has a square shape in a top view. The front body 310 may have various forms.

[0108] An upper surface of the front body 310 is formed horizontally to be in close contact with the ceiling, and a lower surface thereof may have a slightly curved edge.

[0109] The inlet 101 is disposed at the center of the front body 310, and a plurality of outlets 102 are arranged outside the edge of the inlet 101.

[0110] In a top view, the inlet 101 may have a square shape, and the outlet 102 may have a rectangular shape. The outlet 102 may be formed in a slit shape in which a length is greater than a width.

[0111] The front body 310 includes a front frame 312, a side cover 314, and a corner cover 316.

[0112] The front frame 312 provides a load and rigidity of the front panel 300 and is fastened to the case housing 110. The inlet 101 and four outlets 102 are provided in the front frame 312.

[0113] In this embodiment, the front frame 312 includes a side frame 311 and a corner frame 313.

[0114] The corner frame 313 is disposed at each corner of the front panel 300. The side frame 311 is coupled with two corner frames 313. The side frame 311 includes an inner side frame 311a and an outer side frame 311b.

[0115] The inner side frame 311a is disposed between the inlet 101 and the outlet 102 and couples the two corner frames 313. The outer side frame 311b is disposed outside the outlet 102.

[0116] In this embodiment, four inner side frames 311a and four outer side frames 311b are provided.

[0117] The inlet 101 is located on an inner side of the four inner side frames 311a. The outlet 102 is surrounded by two corner frames 313, the inner side frames 311a, and the outer side frames 311b.

[0118] The side cover 314 and the corner cover 316 are coupled to a bottom surface of the front frame 312. The side cover 314 and the corner cover 316 are exposed to the user, and the front frame 312 is not visible to the user.

[0119] In this embodiment, four corner frames 313 are arranged.

[0120] The corner frame 313 provides an insertion space 850 for accommodating the guide block 800, which will be described later. The insertion space 850 is open downward.

[0121] The corner frame 313 includes a corner frame body 855 coupled with each front frame 312 on one side and the other side, an insertion space 850 formed concave upward from a lower side of the corner frame body 855, a first corner inner side wall 313a configuring the corner frame body 855 and extending from the corner frame body to form the insertion space 850, a second corner inner side wall 313b configuring the corner frame body 855, extending from the corner frame body 855 to form the insertion space 850, and forming a predetermined included angle with the first corner inner side wall 313a, and a corner upper side wall 313c configuring the corner frame body 855, connecting the first corner inner side wall 313a and the second corner inner side wall 313b, and having the insertion space 850 located on a lower side thereof.

[0122] In this embodiment, the insertion space 850 is open toward the inlet 101 side. Unlike the present embodiment, the insertion space 850 may be provided in the form of a hole penetrated in the up-down direction or may be provided in the form of a recess which is concave upward from a lower side.

[0123] In this embodiment, the insertion space 850 is formed through the first corner inner side wall 313a, the second corner inner side wall 313b, and the corner upper side wall 313c. In the insertion space 850, the center O and a lower surface of the intake panel are open.

[0124] In this embodiment, the first corner inner side wall 313a and the second corner inner side wall 313b are perpendicular to each other, and the guide block 800 is located on an inner side of the first corner inner side wall 313a and the second corner inner side wall 313b.

[0125] A lower end 856 of the first corner inner side wall 313a and a lower end (not shown) of the second corner inner side wall 313b configuring the corner frame body 855 may protrude downward and may mutually interfere with the guide block 800.

[0126] When the intake panel 300 is lifted and the guide block 800 is in contact with the lower end 856 of the corner frame 313, the guide block 800 may be pushed by the lower end 856 and moved toward the inlet.

[0127] The side cover 314 is disposed at the edge of the front frame 312, and the corner cover 316 is disposed at the corner of the front frame 312.

[0128] The side cover 314 is formed of a synthetic resin material and is fastened and fixed to the front frame 312. Specifically, the side cover 314 is coupled to the side frame 311 and the corner cover 316 is coupled to the corner frame 313.

[0129] In this embodiment, four side covers 314 and four corner covers 316 are provided. The side covers 314 and the corner covers 316 are coupled to the front frame 312 and connected to one structure. In the front panel 300, four side covers 314 and four corner covers 316 form one edge.

[0130] The side cover 314 is disposed below the side frame 311, and the corner cover 316 is disposed below the corner frame 313.

[0131] The four side covers 314 and the four corner covers 316 are assembled to form a quadrangular rim. The four connected side covers 314 and the four connected corner covers 316 are defined as a front deco 350.

[0132] The front deco 350 forms a deco outer border 351 and a deco inner border 352.

[0133] In a top view or a bottom view, the deco outer border 351 has a square shape, and the deco inner border 352 is also formed in a square shape overall. However, the corner of the deco inner border has a predetermined curvature.

[0134] The intake grille 320 and four vane modules 200 are arranged on an inner side of the deco inner border 352. The intake grille 320 and four vane modules 200 are in contact with the deco inner border 352.

[0135] In this embodiment, four side covers 314 are arranged, and each side cover 314 is coupled to the front frame 312. An outer edge of the side cover 314 forms part of the deco outer border 351, and an inner edge thereof forms part of the deco inner border 352.

[0136] In particular, the inner edge of the side cover 314 forms an outer boundary of the outlet 102. The inner edge of the side cover 314 is defined as a side deco inner border 315.

[0137] In this embodiment, four corner covers 316 are arranged, and each corner cover 316 is coupled to the front frame 312. The outer edge of the corner cover 316 forms part of the deco outer border 351, and the inner edge thereof forms part of the deco inner border 352.

[0138] The inner edge of the corner cover 316 is defined as a corner deco inner border 317.

[0139] The corner deco inner border 317 may be disposed in contact with the intake grille 320. In this embodiment, the inner edge of the corner cover 316 is disposed to face the intake grille 320 and is spaced apart therefrom by a predetermined interval to form a gap 317a.

[0140] The side deco inner border 315 is also spaced apart from the vane module 200 by a predetermined interval to form a gap 315a and is disposed to face the outer edge of the vane module 200.

[0141] Therefore, the deco inner border 352 is spaced apart from the outer edge of the intake grille 320 and four vane modules 200 by a predetermined interval and form a continuous gap.

[0142] A continuous gap formed by four side deco inner border gaps 315a and four corner deco inner border gaps 317a is defined as a front deco gap 350a.

[0143] The front deco gap 350a is formed on an inner edge of the front deco 350. Specifically, the front deco gap 350a is formed by separating the outer edge of the intake grille 320 and the vane module 200 and the inner edge of the front deco 350.

[0144] When the vane module 200 is not operated (when the indoor unit is stopped), the front deco gap 350a makes the intake grille 320 and the vane module 200 appear as one structure.

<Configuration of Intake Grille>

[0145] The intake grille 320 is located below the front body 310. The intake grille 320 may be lowered downward while in close contact with the bottom surface of the front body 310.

[0146] The intake grille 320 includes a grille body 322, a plurality of grille holes 321 formed to penetrate the grille body 322 in the up-down direction, a wire fixing portion 329 provided at the grille body 322 and allowing the other end of the wire to be fixed thereto, and a filter coupling portion 331 to which the pre-filter 330 is detachably assembled.

[0147] The intake grille 320 includes a grille body 322 disposed below the inlet 101, communicating with the inlet 101 by a plurality of grille holes 321, having a square shape and a grille corner portion 327 extending diagonally from a corner of the grille body 322.

[0148] A bottom surface of the grille body 322 and a bottom surface of the vane 210 may form a continuous plane. In addition, the bottom surface of the grille body 322 and a bottom surface of the corner cover 316 may form a continuous plane.

[0149] A plurality of grills 323 are arranged in a grid shape inside the grille body 322. The grid-shaped grille 323 forms a rectangular grille hole 321. A portion where the grille 323 and the grille hole 321 are formed is defined as an inlet portion.

[0150] The grille body 322 includes a grille 323 in which a plurality of grille holes 321 are formed and a grille body portion 324 disposed along the edge of the grille 323 and surrounding the grille 323. In the top view or the bottom view, the inlet portion is formed in a rectangular shape overall.

[0151] The pre-filter 330 is located above the inlet portion and covers the inlet portion.

[0152] Each corner of the inlet portion is disposed to face each corner of the front panel 300, and more specifically, to face the corner cover 316.

[0153] In the bottom view, the grille body 322 is formed in a rectangular shape.

[0154] An outer edge of the grille body portion 324 is disposed to face the outlet 102 or the front deco 350.

[0155] The outer edge of the grille body portion 324 includes a grille corner border 326 disposed to face the corner cover 316 and a grille side border 325 forming the outlet 102 and disposed to face the side cover 314.

[0156] The grille corner border 326 may have a curvature centering on the inside of the intake grille 320, and the grille side border 325 may have a curvature centering on the outside of the intake grille 320.

[0157] The grille body portion 324 further includes a grille corner portion 327 surrounded by the grille corner border 326 and two grille side borders 325. The grille corner portion 327 protrudes toward the corner cover 316 from the grille body portion 324.

[0158] The grille corner portion 327 is disposed at each corner of the grille body 322. The grille corner portion 327 extends toward each corner of the front panel 300.

[0159] In this embodiment, four grille corner portions 327 are disposed. For convenience of explanation, the four grille corner portions 327 are defined as a first grille corner portion 327-1, a second grille corner portion 327-2, a third grille corner portion 327-3, and a fourth grille corner portion 327-4.

[0160] The grille side border 325 is formed to be concave inward from the outside.

[0161] The outlet 102 is provided between the side cover 314 and the intake grille 320. More specifically, one outlet 102 is provided between the side deco inner border 315 of the side cover 314 and the grille side border 325 of the grille body 322. Each outlet 102 is provided between the side deco inner border 315 and the grille side border 325 disposed in four directions of the intake grille 320.

[0162] In this embodiment, the grille corner border 326 and the corner deco inner border 317 are arranged to face each other. A length of the grille corner border 326 and a length of the corner deco inner border 317 are equal. That is, a width of the corner cover 316 and a width of the grille corner portion 327 are equal. In addition, an inner width of the

side cover 314 and a width of the grille side border 325 are equal.

[0163] The grille side border 325 is described in more detail as follows.

[0164] The grille side border 325 forms an inner boundary of the outlet 102. The side deco inner border 315 and the corner deco inner border 317 form an outer boundary of the outlet 102.

[0165] The grille side border 325 incudes a long linear section 325a extending in a longitudinal direction of the outlet 102 and formed as a straight line, a first curved section 325b connected to one side of the long linear section 325a and having a center of curvature formed on an outer side of the intake grille 320, a second curved section 325c connected to the other side of the long linear section 325a and having a center of curvature formed on an outer side of the intake grille 320, a first short linear section 325d connected to the first curved section 325b, and a second short linear section 325e connected to the second curved section 325c.

[0166] The outlet 102 is provided between the grille side border 325 and the side deco inner border 315, and the vane module 200 is disposed at each outlet 102.

[0167] An inner edge 210a of the vane 210 of the vane module 200 is disposed to face the grille side border 325, and an outer edge 210b of the vane 210 is disposed to face the side deco inner border 315.

[0168] In this embodiment, an inner space formed by the inner edge 210a of the vane 210 and the four corner deco inner borders 317 is defined as an intake grille placement region 320a.

[0169] When the intake grille 320 is properly disposed at the intake grille placement region 320a, the intake grille 320 forms a continuous plane with the vane 210 and the corner cover 316.

[0170] When the intake grille 320 is misplaced outside the intake grille placement region 320a, the intake grille 320 may protrude downward with respect to the vane 210 or the corner cover 316.

[0171] When the intake grille 320 is disposed outside the intake grille placement region 320a, the intake grille 320 may form a gap with the vane 210 or the corner cover 316. This gap lowers an air intake pressure inside the bell mouse 142.

[0172] The intake grille placement region 320a may be formed in the same shape as the intake grille 320 and may be formed to be larger than the intake grille 320 by the gaps 315a and 317a. The gaps 315a and 317a provide a margin for the intake grille 320 to be installed when the intake grille 320 is in close contact with the front body 310.

[0173] The intake grille placement region 320a is formed to be larger than the entire area of the intake grille 320, and the inlet 101 is located in the intake grille placement region 320a.

[0174] In this embodiment, the front frame 312 may form part of the intake grille placement region 320a. In particular, the corner frame 313 may form part of the intake grille placement region 320a and may cause mutual interference with a guide wall described later.

[0175] In this embodiment, the inlet 101 corresponds to an area of the grille 323.

[0176] Meanwhile, the wire fixing portion 329 to which the other end of the wire is fixed protrudes upward from the grille body portion 324. Four wire fixing portions 329 are arranged and correspond to the wires 511, 512, 521, and 522, respectively.

[0177] A wire fixing portion to which the other end of a 1-1 wire 511 is fixed is defined as a first wire fixing portion 329-1, a wire fixing portion to which the other end of the 1-2 wire 512 is fixed is defined as a second wire fixing portion 329-2, a wire fixing portion to which the other end of the 2-1 wire 521 is fixed is defined as a third wire fixing portion 329-3, and a wire fixing portion to which the other end of the wire 2-2 wire 522 is fixed is defined as a fourth wire fixing portion 329-4.

[0178] In the top view or the bottom view, the first wire fixing portion and the second wire fixing portion are symmetrical with reference to a direction of a motor shaft 541 of a first unit. In the top view or the bottom view, the third wire fixing portion and the fourth wire fixing portion are symmetrical with reference to a direction of the motor shaft 541 of a second unit.

[0179] An arrangement direction of the first wire fixing portion and the second wire fixing portion is parallel to that of the third wire fixing portion and the fourth wire fixing portion.

[0180] In this embodiment, the first wire fixing portion is located adjacent to the first grille corner portion 327-1, the second wire fixing portion is located adjacent to the second grille corner portion 327-2, and the third wire fixing portion is located adjacent to the third grille corner portion 327-3, and the fourth wire fixing portion is located adjacent to the fourth grille corner portion 327-4.

[0181] The wire fixing portion 329 is disposed outside the pre-filter 330 and disposed at the grille body 322. Each wire fixing portion protrudes upward from an upper surface of the grille body 322.

[0182] The filter coupling portion 331 is configured to fix the pre-filter 330. Since the pre-filter 330 needs to be periodically cleaned, the pre-filter 330 is detachably assembled to the filter coupling portion 331.

[0183] In this embodiment, the filter coupling portion 331 is a structure surrounding the edge of the pre-filter 330. The filter coupling portion 331 may be disposed outside the grille 323 and may be disposed along the inlet 101 or the edge of the inlet portion.

[0184] The filter coupling portion 331 protrudes upward from the upper surface of the grille body portion 324, and an interval in which the pre-filter 330 may be accommodated is formed between the filter coupling portion 331 and the upper surface of the grille body portion 324.

<Configuration of Guide Block>

[0185] In the present disclosure, since the intake grille 320 is automatically lifted or lowered by the elevator 500, it is very important to return the intake grille 320 to the intake grille placement region 320a when the intake grille 320 is lifted.

[0186] In this embodiment, a guide block 800 for guiding the intake grille 320 to the intake grille placement region 320a is disposed.

[0187] The guide block 800 is disposed at the intake grille 320 and protrudes upwards from the intake grille 320. The guide block 800 is disposed on an upper surface of the intake grille 320.

[0188] The guide block 800 is assembled to the intake grille 320. The guide block 800 protrudes upward with respect to the intake grille 320. When the intake grille 320 is lifted, the guide block 800 may first come into contact with a structure adjacent to the case than with the intake grille 320.

[0189] In this embodiment, the guide block 800 may mutually interfere with the corner frame 313.

[0190] In this embodiment, the guide block 800 is disposed at the grille body portion 324 of the intake grille 320. The guide block 800 may be disposed at the grille 323. If the guide block is disposed at the grille 323, there is a problem of reducing an area of the inlet 101.

[0191] The guide block 800 may be located adjacent to the side frame 311 or side cover 314, which is a linear edge of the front body 310.

[0192] However, in this embodiment, the guide block 800 is disposed adjacent to the corner of the front body 310 and may provide correction in two directions through the guide block 800 disposed adjacent to the corner.

[0193] The guide block 800 may be disposed to face the grille corner portion 327 from the grille body portion 324 of the intake grille 320.

[0194] In this embodiment, four guide blocks 800 are disposed and are disposed at each corner side of the intake grille 320.

[0195] The guide block 800 may be disposed on virtual diagonal lines P1 and P2 passing through the center of the front panel 300. In this embodiment, two guide blocks 800 are arranged on the line P1 and two guide blocks 800 are arranged on the line P2. An intersection of P1 and P2 is defined as the center of the front panel or the center O of the intake panel.

[0196] Each guide block 800 is disposed to be symmetrical with respect to the center O of the intake panel 320.

[0197] For convenience of explanation, a guide block disposed adjacent to the first corner cover 316-1, which will be described later, is defined as a first guide block 801, a guide block disposed adjacent to the second corner cover 316-2 is defined as a second guide block 802, a guide block disposed adjacent to the third corner cover 316-3 is defined as a third guide block 803, and a guide block disposed adjacent to the fourth corner cover 316-4 is defined as a fourth guide block 804.

[0198] For convenience of explanation, the first guide block 801 is disposed at the first grille corner portion 327-1, the second guide block 802 is disposed at the second grille corner portion 327-2, the third guide block 803 is disposed at the third grille corner portion 327-3, and the fourth guide block 804 is disposed at the fourth grille corner portion 327-4.

[0199] Also, a corner frame that interferes with the first guide block 801 is defined as a first corner frame 313-1, a corner frame that interferes with the second guide block 802 is defined as a second corner frame 313-2, a corner frame that interferes with the third guide block 803 is defined as a third corner frame 313-3, and a corner frame that interferes with the fourth guide block 804 is defined as a fourth corner frame 313-4.

[0200] In this embodiment, the first guide block 801, the second guide block 802, the third guide block 803, and the fourth guide block 804 are arranged in a clockwise direction based on the center O.

[0201] The first guide block 801 and the third guide block 803 are disposed on the line P1, and the second guide block 802 and the fourth guide block 804 are disposed on the line P2.

[0202] The first guide block 801 and the third guide block 803 are disposed to face each other based on the center O, and the second guide block 802 and the fourth guide block 804 are also disposed to face each other based on the center O.

[0203] The guide block 800 includes a first guide block portion 810 assembled to the intake panel 320 and extending in one direction and a second guide block portion 820 assembled to the intake panel 320 and intersecting the first guide block portion 810 to form an included angle B in the top view or the bottom view.

[0204] Referring to FIG. 14, for convenience of description, the guide block portion disposed in a left-right direction is referred to as a first guide block portion 810 and a guide block portion disposed in a front-rear direction is referred to as a second guide block portion 820.

[0205] In this embodiment, the first guide block portion 810 and the second guide block portion 820 are distinguished from each other to describe the guide block 800, but the first guide block portion 810 and the second guide block may be interchanged in arrangement direction.

[0206] In the top view, the first guide block portion 810 of the first guide block 801 and the second guide block portion 820 of the second guide block 802 are arranged in a line. In the top view, the first guide block portion 810 of the second

guide block 802 and the second guide block portion 820 of the third guide block 803 are arranged in a line. In the top view, the first guide block portion 810 of the third guide block 803 and the second guide block portion 820 of the fourth guide block 804 are arranged in a line. In the top view, the first guide block portion 810 of the fourth guide block 804 and the second guide block portion 820 of the first guide block 801 are arranged in a line.

[0207] The first guide block portion 810 and the second guide block portion 820 may be separately manufactured and then assembled to the intake panel 320. In this embodiment, the first guide block portion 810 and the second guide block portion 820 are integrally manufactured and assembled to the intake panel 320.

[0208] In the top view, the first guide block portion 810 and the second guide block portion 820 may form an included angle of 180 degrees or less, and in this embodiment, the first guide block portion 810 and the second guide block portion 820 are perpendicular to each other.

[0209] The first guide block portion 810 and the second guide block portion 820 protrude upward and form a predetermined height. The reason why the first guide block portion 810 and the second guide block portion 820 protrude upward with respect to the other portions of the intake panel 320 is for the intake grille 320 to first come into contact with the front body 310 before any other component of the intake grille 320 when lifted.

[0210] The first guide block portion 810 and the second guide block portion 820 are formed in an "¬" shape in the top view.

[0211] In this embodiment, the first guide block portion 810 and the second guide block portion 820 form an included angle of 90 degrees and are inserted into the corner of the front body 310. In this embodiment, the first guide block portion 810 and the second guide block portion 820 may interfere with the corner frame 313 configuring the front body 310.

[0212] The guide block 800 may interfere with the lower end 856 of the corner frame 313 or the inner side walls 313a and 313b. The corner frame 313 is formed in a "¬" shape in the top view or the bottom view to connect the side frame 311. The outer surfaces of the first guide block portion 810 and the second guide block portion 820 may be in contact with an inner surface of the corner frame 313.

[0213] When the guide block 800 is lifted in a normal path, the guide block 800 is not in contact with the corner frame 313. When the guide block 800 deviates from the normal path, at least one of the first guide block portion 810 and the second guide block portion 820 interferes with the lower end 856 of the corner frame 313 and is pushed toward the inlet 101.

[0214] In this process, outer surfaces of the first guide block portion 810 and the second guide block portion 820 may be in contact with the inner side walls 313a and 313b of the corner frame 313.

[0215] This is because, when the intake griller 320 is lifted, it may come into contact with the guide block 800 and the corner upper side wall 313c, and in this case, operation noise may occur due to the contact. When the intake grille 320 is returned to the initial position, the corner upper side wall 313c and the upper surface of the guide block 800 are spaced apart from each other.

[0216] In this embodiment, the insertion space 850 is open toward the inlet 101 side. The insertion space 850 corresponds to each guide block 801, 802, 803, and 804.

[0217] An insertion space corresponding to the first guide block 801 is defined as a first insertion space 851, an insertion space corresponding to the second guide block 802 is defined as a second insertion space 852, an insertion space corresponding to the third guide block 803 is defined as a third insertion space 853, and an insertion space corresponding to the fourth guide block 804 is defined as a fourth insertion space 854.

[0218] The first insertion space 851 is disposed above the first guide block 801, the second insertion space 852 is disposed above the second guide block 802, the third guide block 803 is disposed above the third guide block 803, and the fourth insertion space 851 is disposed above the fourth guide block 804.

[0219] In this embodiment, the first guide block portion 810 and the second guide block portion 820 are symmetrical with respect to a connecting block portion 830. In this embodiment, the connecting block portion 830 of each guide block is disposed on the line P1 or P2.

[0220] In the top view, in the present embodiment, the first guide block 801 is disposed in a "¬" shape, the second guide block 802 is provided in a "⌟" shape, the third guide block 803 is provided in a "⌞" shape, and the fourth guide block 804 is provided in a "⌐" shape.

[0221] A portion of the outer surface of the guide block 800 may mutually interfere with the front body 310. A surface of the outer surface of the guide block 800 which mutually interferes with the front body 310 when the intake grille 320 is lifted is defined as a guide wall 860.

[0222] The first guide block portion 810 and the second guide block portion 820 are formed to have an upper surface narrower than a bottom surface.

[0223] The first guide block portion 810 includes a first side wall 811 provided in the up-down direction and disposed to face an inner side of the case 100, a second side wall 812 provided in the up-down direction, facing the first side wall 811, and disposed to face an outer side of the case 100, a third side wall provided in the up-down direction and connecting the first side wall 811 and the second side wall 812, an upper side wall 814 disposed to face an upper side and connecting the first side wall 811 and the third side wall 813, a first guide wall 815 connecting the upper side wall 814 and the second side wall 812 and disposed to be inclined downward toward the second side wall 812 from the upper side wall 814, and

an inner wall 816 connecting the first side wall 811, the second side wall 812, and the upper side wall 814 and disposed below the upper side wall 814.

[0224] The first guide block portion 810 may be manufactured in a shape in which an inside is solid. In this embodiment, the first guide block portion 810 has a hollow inside and a lower side thereof is also open. In the present embodiment, the first side wall 811 is formed only at a portion in contact with the second side wall 812 and the upper side wall 814. Unlike the present embodiment, the first side wall 811 may be formed to extend from the upper side wall 814 to the upper surface of the intake panel 320.

[0225] In the present embodiment, since the first guide block portion 810 is formed with the hollow inside, deformation after injection molding may be prevented. In addition, since the first guide block portion 810 is formed with the hollow inside, a load of the guide block 800 may be reduced to reduce an operation load by the elevator 500.

[0226] The inner wall 816 is disposed in the up-down direction and connects the first side wall 811, the second side surface, and the upper side wall 814. The inner wall 816 increases strength of the first guide block portion 810.

[0227] The first guide block portion 810 includes a fastening hole 817 penetrating the upper side wall 814 in the up-down direction and further includes a fastening recess 818 formed to be concave around the fastening hole 717 on a lower side of the upper side wall. The fastening recess 818 may accommodate a head of a fastening member (not shown, bolt or screw). The fastening recess 818 prevents the head of the fastening member from protruding upward and prevents the intake grille 320 from coming into contact with the corner upper side wall 313c of the corner frame 313 when lifted to the original position.

[0228] The fastening recess 818 is open upward and is open from the first side wall 811 toward the second side wall 812.

[0229] A fastening boss 819 for coupling with a fastening member is provided below the fastening hole 817. The fastening boss 819 is integrally manufactured with the intake panel 320 and protrudes upward from the upper surface of the intake panel 320.

[0230] The first guide wall 815 is formed to be inclined from an inner side to an outer side and from top to bottom. An upper edge of the first guide wall 815 is connected to the upper side wall 814, a lower edge thereof is connected to the second side wall 812, and an outer edge thereof is connected to the third side wall 813. The first guide wall 815 is disposed above the second side wall 812.

[0231] When the intake grille 320 is lifted, the first guide wall 815 may be in contact with a lower end of the first corner inner side wall 313a.

[0232] When the intake grille 320 is lifted, if the first guide wall 815 comes in contact with the first corner inner side wall 313a, the guide block 800 is pushed to move to the intake grille placement region 320a.

[0233] The second guide block portion 820 includes a first side wall 821 provided in the up-down direction and disposed to face the inner side of the case 100, a second side wall 822 provided in the up-down direction, facing the first side wall 821, and disposed to face an outer side of the case 100, a third side wall 823 provided in the up-down direction and connecting the first side wall 821 and the second side wall 822, an upper side wall 824 disposed to face an upper side and connecting the first side wall 821 and the third side wall 823, a second guide wall 825 connecting the upper side wall 824 and the second side wall and disposed to be inclined downward toward the second side wall 822 from the upper side wall 824, an inner wall 826 connecting the first side wall 821, the second side wall 822, and the upper side wall 824 and disposed below the upper side wall, a fastening hole 827 penetrating the upper side wall 824 in the up-down direction, and a fastening recess 828 formed around the fastening hole 827 and formed to be concave and lower than the upper side wall 824.

[0234] The second guide wall 825 is formed to be inclined from inside to outside and from top to bottom. An upper edge of the second guide wall 825 is connected to the upper side wall 824, a lower edge thereof is connected to the second side wall 822, and an outer edge thereof is connected to the third side wall 823. The second guide wall 825 is disposed above the second side wall 822.

[0235] When the intake grille 320 is lifted, the second guide wall 825 may come into contact with the lower end of the second corner inner side wall 313b.

[0236] When the intake grille 320 is lifted and the second guide wall 825 comes into contact with the lower end 856 of the corner frame 313, the guide block 800 is pushed to move to the intake grille placement region 320a.

[0237] Since the other components of the second guide block portion 820 are symmetric to the components of the first guide block portion 810, a detailed description thereof is omitted.

[0238] In the top view, the upper side wall 814 of the first guide block portion 810 and the upper side wall 824 of the second guide block portion 820 form an included angle and are perpendicular to each other in this embodiment. The upper side wall 814 of the first guide block portion 810 and the upper side wall 824 of the second guide block portion 820 form a continuous plane.

[0239] In the top view, the first side wall 811 of the first guide block portion 810 and the first side wall 821 of the second guide block portion 820 form an included angle and perpendicular to each other in this embodiment. The first side wall 811 of the first guide block portion 810 and the first side wall 821 of the second guide block portion 820 are connected to each other.

[0240] In the top view, the second side wall 812 of the first guide block portion 810 and the second side wall 822 of the second guide block portion 820 form an included angle and are perpendicular to each other in this embodiment. The second side wall 812 of the first guide block portion 810 and the second side wall 822 of the second guide block portion 820 are connected to each other.

[0241] The first guide wall 815 of the first guide block portion 810 and the second guide wall 825 of the second guide block portion 820 are connected to each other. In this embodiment, the first guide wall 815 and the second guide wall 825 are connected in a curved surface.

[0242] When the intake grille 320 is lifted, either the lower end 856 of the first corner inner side wall 313a or the lower end of the second corner inner side wall 313b is generally in contact with the first guide wall 815 or the second guide wall 825. In some cases, when the intake grille 320 is inclined to one corner, the lower end 856 of the first corner inner side wall 313a and the lower end of the second inner corner wall 313b may come into contact with the first guide wall 815 and the second guide wall 825, respectively, and even in this case, the guide block 800 is pushed to move to the intake grille placement region 320a.

[0243] When the intake grille 320 has finished rising to the initial position, the second side walls 812 and 822 of the guide block 800 may come into contact with the first corner inner side wall 313a and the second corner inner side wall 313b.

[0244] When the intake grille 320 has finished rising to the initial position, the second side wall 812 of the first guide block portion 810 is located on an inner side of the first corner inner side wall 313a, and the second side wall 822 of the second guide block portion 820 is located on an inner side of the second corner inner side wall 313b.

[0245] Since the guide block 800 is located in the insertion space 850, a stacking thickness of the intake grille 320 and the front body (specifically, the corner frame) may be minimized.

<Configuration of Pre-filter>

[0246] The pre-filter 330 is disposed above the intake grille 320. The pre-filter 330 filters foreign matter having a large volume from air intaken through the inlet 101.

[0247] The pre-filter 330 is disposed above the grille 323 and covers the entire inlet portion.

[0248] The pre-filter 330 is detachably assembled to the intake grille 320 and lowered together when the intake grille 320 is lowered.

<Configuration of Elevator>

[0249] The elevator 500 may lift or lower the intake grille 320 by winding or unwinding four wires 511, 512, 521, and 522 at the same time. The user may operate the elevator 500 by inputting an operation signal to a controller.

[0250] The elevator 500 is controlled by the controller. The elevator 500 supports the intake grille 320 at four points. The elevator 500 supports the intake grille 320 through four wires 511, 512, 521, and 522 and lifts or lowers the intake grille 320 by winding or unwinding the wires.

[0251] The elevator 500 is operated to wind or unwind four wires 511, 512, 521, and 522 simultaneously, through which the intake grille 320 may be lifted or lowered in a horizontal state.

[0252] The elevator 500 includes a first unit 510 and a second unit 520.

[0253] The first unit 510 may wind or unwind a pair of wires simultaneously, and the second unit 520 may also wind or unwind a pair of wires.

[0254] A pair of wires connected to the first unit 510 is defined as a 1-1 wire 511 and a 1-2 wire 512, and a pair of wires connected to the second unit 520 is defined as a 2-1 wire 521 and a 2-2 wire 522.

[0255] The first unit 510 may simultaneously wind or unwind the 1-1 wire 511 and the 1-2 wire 512. The second unit 520 may simultaneously wind or unwind the 2-1 wire 521 and the 2-2 wire 522.

[0256] One end of the 1-1 wire 511 and one end of the 1-2 wire 512 are coupled to the first unit 510, the other end of the 1-1 wire 511 and the other end of the 1-2 wire 512 are coupled to one side of the intake grille 320.

[0257] One end of the 2-1 wire 521 and one end of the 2-2 wire 522 are coupled to the second unit 520, and the other end of the 2-1 wire 521 and the other end of the 2-2 wire 522 are coupled to the other side of the intake grille.

[0258] When the 1-1 wire 511 and the 1-2 wire 512 are arranged on the left, the 2-1 wire 521 and the 2-2 wire 522 are arranged on the right. Alternatively, when the 1-1 wire 511 and the 1-2 wire 512 are arranged on a front side, the 2-1 wire 521 and the 2-2 wire 522 are arranged on a rear side.

[0259] Referring to FIG. 5, the 1-1 wire 511 and the 1-2 wire 512 are located on the left and are arranged in the front-rear direction, and the 2-1 wire 521 and the 2-2 wire 522 are located on the right and are arranged in the front-rear direction.

[0260] In the bottom view or the top view, the 1-1 wire 511 and the 1-2 wire 512 are arranged in a line, and the 2-1 wire 521 and the 2-2 wire 522 are also arranged in a line.

[0261] The 1-1 wire 511 and the 2-1 wire 521 are arranged in parallel, and the 1-2 wires 512 and the 2-2 wires 522 are arranged in parallel.

[0262] The first unit 510 and the second unit 520 are arranged symmetrically to each other. When the first unit 510 is disposed on the left of the case 100, the second unit 520 is disposed on the right of the case 100. Similarly, when the first unit 510 is disposed on the front side of the case 100, the second unit 520 is disposed on the rear side of the case 100.

[0263] In this embodiment, the first unit 510 is disposed on the left of the case 100, and the second unit 520 is disposed on the right of the case 100.

[0264] The elevator 500 provides a structure that allows the intake grille 320 to be lifted or lowered in a horizontal state by simultaneously winding or unwinding four wires.

[0265] Since the configurations of the first unit 510 and the second unit 520 are the same, the structure of the first unit 510 will be described as an example.

<Configuration of First Unit>

[0266] The first unit 510 includes a drum 530 to which one end of the 1-1 wire 511 and one end of the 1-2 wire 512 are fixed, a drum motor that rotates the drum 530, a first roller box 550 disposed to be penetrated by the 1-1 wire 511 and aligning a position of the 1-1 wire 511 when the 1-1 wire 511 is wound or unwound, a second roller box 560 disposed to be penetrated by the 1-2 wire 512 and aligning a position of the 1-2 wire 512 when the 1-2 wire 512 is wound or unwound, and a rotation amount detecting device 600 detecting the amount of rotation of the drum 530.

[0267] The first unit 510 may be disposed at any one of the front body 310, the cabinet housing 110, and the bell mouse 142.

[0268] The drum 530, a drum motor 540, the first roller box 550, and the second roller box 560 configuring the first unit 510 may be disposed at any one of the front body 310, the cabinet housing 110, and the bell mouse 142.

[0269] In this embodiment, a unit case 590 forming an appearance of the first unit 510 is provided to facilitate replacement and repair. The drum 530, the drum motor 540, the first roller box 550, the second roller box 560, and the rotation amount detecting device 600 are disposed in the unit case 590.

[0270] The unit case 590 may be disposed at any one of the front body 310, the cabinet housing 110, and the bell mouse 142. In this embodiment, the unit case 590 is installed at the bell mouse 142. The unit case 590 is disposed above the intake grille 320.

[0271] When it is necessary to distinguish the unit case, the unit case disposed at the first unit is defined as a first unit case and the unit case disposed at the second unit is defined as a second unit case.

<Configuration of Drum>

[0272] The drum 530 includes a drum body 535 formed in a cylindrical shape and allowing one end of the 1-1 wire 511 and the 1-2 wire 512 to be fixed thereto, a partition 533 disposed to protrude outward in a radial direction of the drum body 535 and partitioning a first zone 531 around which the 1-1 wire 511 is wound and a second zone 532 around which the 1-2 wire 512 is wound, a 1-1 barrier 534 disposed at the drum body 535 and preventing the 1-1 wire 511 wound in the first zone 531 from escaping to outside of the drum body 535, and a 1-2 barrier 536 disposed at the drum body 535 and preventing the 1-2 wire 512 wound in the second zone 532 from escaping to outside of the drum body 535.

[0273] The drum body 535 is formed in a cylindrical shape. Unlike the present embodiment, the drum body 535 may be formed in various shapes. A recess may be provided on an outer circumferential surface of the drum body 535 to facilitate alignment when the wire is wound. The recess may be provided in a spiral shape along the outer circumferential surface of the drum body 535.

[0274] The partition 533 is disposed in the middle of the drum body 535 with reference to the longitudinal direction. The partition 533 is formed to protrude radially outward of the drum body 535. In this embodiment, the partition 533 is formed in a ring shape, and the center of the partition 533 is disposed on the same axis as an axial center C of the drum body 535. The ring shape is disposed to protrude radially along an outer circumferential surface of the drum body 535.

[0275] The axial center C of the drum body 535 and the 1-1 wire 511 or the 1-2 wire 512 intersect each other.

[0276] The partition 533 divides the outer circumferential surface of the drum body 535 into the first zone 531 and the second zone 532.

[0277] The 1-1 wire 511 is located at the first zone 531 and is wound or unwound at the first zone 531. The 1-2 wire 512 is located at the second zone 532 and is wound or unwound at the second zone 532.

[0278] The partition 533 prevents the wire from being unwound outside the corresponding zone.

[0279] The 1-1 barrier 534 prevents the 1-1 wire 511 wound at the first zone 531 from escaping to outside of the drum body 535. The 1-2 barrier 536 prevents the 1-2 wire 512 wound at the second zone 532 from escaping to outside of the drum body 535.

[0280] The 1-1 barrier 534 is disposed to protrude radially outward of the drum body 535. The 1-2 barrier 536 is disposed to protrude radially outward of the drum body 535.

[0281] In this embodiment, the 1-1 barrier 534 and the 1-2 barrier 536 are formed in a ring shape along the outer

circumferential surface of the drum body 535. The ring shapes of the 1-1 barrier 534 and the 1-2 barrier 536 are disposed to protrude radially along the outer circumferential surface of the drum body 535.

[0282] One end of the 1-1 wire 511 is fixed to the first zone 531, and one end of the 1-2 wire 512 is fixed to the second zone 532.

[0283] One end of the 1-1 wire 511 may be fixed to any one of the drum body 535, the partition 533, or the 1-1 barrier 534 forming the first zone 531.

[0284] In this embodiment, one end of the 1-1 wire 511 is fixed to the outer circumferential surface of the drum body 535 at the first zone 531. Also, in this embodiment, one end of the 1-2 wire 512 is fixed to the outer circumferential surface of the drum body 535 at the second zone 532.

[0285] In order to detect the amount of rotation of the drum 530, some components of the rotation amount detecting device 600 may be disposed at the drum 530. In order to detect the amount of rotation of the drum 530, a rotation detecting factor 601 is disposed. In this embodiment, the rotation detecting factor 601 is disposed at equal intervals with reference to a circumferential direction based on the axial center C of the drum 530. The rotation detecting factor 601 may be disposed on at least one of the 1-1 barrier 534 or the 1-2 barrier 536.

<Configuration of Drum Motor>

[0286] In the drum motor 540, a motor shaft 541 is assembled to the drum 530. The motor shaft 541 and the axial center C of the drum 530 match. In this embodiment, the drum motor 540 is a step motor.

[0287] Unlike the present embodiment, gears may be arranged to provide the drum 530 with a rotational force of the drum motor 540. Through the combination of the gears, the amount of rotation and a rotation speed of the drum 530 may be more precisely controlled.

[0288] The axial center C and an arrangement direction of the 1-1 wire 511 and the 1-2 wire 512 intersect. In this embodiment, the axial center C and the arrangement direction of the 1-1 wire 511 and the 1-2 wire 512 are perpendicular to each other.

[0289] In addition, one end of the 1-1 wire 511 and one end of the 1-2 wire 512 are symmetrical with respect to the axial center C.

[0290] To simultaneously wind or unwind the 1-1 wire 511 and the 1-2 wire 512, the 1-1 wire 511 is wound to an upper surface of the drum body 535 and the 1 -2 wire 512 is wound to a lower surface of the drum body 535.

<Configuration of Roller Box>

[0291] The first roller box 550 and the second roller box 560 are disposed in the unit case 590 of the first unit 510. The first roller box 550 and the second roller box 560 are also disposed in the unit case 590 of the second unit 520.

[0292] The first roller box 550 aligns the 1-1 wire 511 in order at the drum body 535 when the 1-1 wire 511 is wound or unwound at the first zone 531 of the drum 530.

[0293] When the 1-1 wire 511 is not wound while forming a uniform layer on the outer circumferential surface of the drum 530, a length difference may be formed from the 1-2 wire 512 by a thickness of the wire.

[0294] When the 1-1 wire 511 wound at the first zone 531 and the 1-2 wire 512 wound at the second zone 532 form a non-uniform layer, the intake grille 320 is inclined relative to a horizontal direction.

[0295] The second roller box 560 aligns the 1-2 wire 512 in order at the drum body 535 when the 1-2 wire 512 is wound or unwound at the second zone 532 of the drum 530.

[0296] In the top view, the first roller box 550 and the second roller box 560 are symmetrically arranged based on an intersection of the partition 533 and the axial center C.

[0297] Since the first roller box 550 and the second roller box 560 have the same configuration, the first roller box 550 will be described as an example.

[0298] The first roller box 550 includes a box 555 fixed to the unit case 590, a first roller 551 disposed in the box 555, coming into contact with the 1-1 wire 511, rotated by frictional contact when the 1-1 wire 511 moves, and disposed farthest from the drum 530, a fourth roller 554 disposed in the box 555, coming into contact with the 1-1 wire 511, rotated by frictional contact when the 1-1 wire 511 moves, and disposed closest to the drum 530, a second roller 552 disposed in the box 555, coming into contact with the 1-1 wire 511, rotated by frictional contact when the 1-1 wire 511 moves, disposed between the first roller 551 and the fourth roller 554, and disposed to be movable in a horizontal direction by tension of the 1-1 wire 511, and a third roller 553 disposed in the box 555, coming into contact with the 1-1 wire 511, rotated by frictional contact when the 1-1 wire 511 moves, disposed between the second roller 552 and the fourth roller 554, and disposed to be movable in a horizontal direction by tension of the 1-1 wire 511.

[0299] With respect to the drum 530, the first roller 551 is disposed at the farthest position, the second roller 552 is disposed at the second farthest position, the third roller 553 is disposed at the third farthest position, and the fourth roller 554 is located to be closest to the drum 530.

[0300] The first roller 551, the second roller 552, the third roller 553, and the fourth roller 554 are assembled to the roller shafts 551a, 552a, 553a, and 554a, respectively, and may be rotated about the roller shaft 551a, 552a, 553a, and 554a, respectively. Each of the roller shafts 551a, 552a, 553a, and 554a is disposed in a horizontal direction.

[0301] At least one of the first roller 551, the second roller 552, the third roller 553, and the fourth roller 554 is rotated in a fixed state, and the other rollers may be rotated, while moving along a roller shaft.

[0302] In the present embodiment, the first roller 551 is a fixed roller not moved along the roller shaft. In the present embodiment, the first roller 551, in a state of being assembled to the roller shaft 551a, is rotated in place around a roller shaft 551a.

[0303] The second roller 552, the third roller 553, and the fourth roller 554 are movable rollers movable in the horizontal direction along each roller shaft. In this embodiment, the second roller 552, the third roller 553, and the fourth roller 554 are rotatable in a state of being assembled to each roller shaft 552a, 553a, and 554a. When a force (e.g., tension of wire) is applied to the second roller 552, the third roller 553, and the fourth roller 554, the second roller 552, the third roller 553, and the fourth roller 554 may be moved along the roller shafts 552a, 553a, and 554a, respectively. Each roller 552, 553, 554 may be moved relative to each other.

[0304] The 1-1 wire 511 is aligned in line with the drum 530 by a relative movement of the second roller 552, the third roller 553, and the fourth roller 554.

[0305] A wire guard 551b is disposed to be spaced apart from the first roller 551 by a predetermined distance. The 1-1 wire 511 is disposed between the wire guard 551b and the first roller 551. The wire guard 551b prevents the wire wound around the roller from being separated from the roller.

[0306] Wire guards 552b, 553b, and 554b are also disposed on the second roller 552, the third roller 553, and the fourth roller 554, respectively.

[0307] The first roller 551 located on the outermost side excludes movement in an axial direction, thereby preventing an axial movement of the wire. When the first roller 551 located outside is moved along the roller shaft 551a, a deviation may occur in the height of the intake grille 320 and the intake grille 320 may be shaken.

[0308] When the wire is wound or unwound, the first roller 551 is rotated in place in the box 555 and the second roller 552, the third roller 553, and the fourth roller 554 may be moved along the respective roller shafts.

[0309] The first roller 551, the second roller 552, the third roller 553, and the fourth roller 554 are arranged in a zigzag form in the up-down direction.

[0310] Based on the first roller 551, the second roller 552 is disposed above the first roller 551 and the third roller 553 is disposed below the first roller 551. The fourth roller 554 is disposed above the first roller 551 and the second roller 552, and is located below the third roller 553.

[0311] In particular, the second roller shaft 552a is located highest, the third roller shaft 553a is located lowest, and the first roller shaft 551a is located higher than the third roller shaft 553a and the fourth roller shaft 554a is located higher than the first roller shaft 551.

[0312] The fourth roller shaft 554a is located above the central axis C, and a wire connecting the drum body 535 is disposed to be inclined upward. Tension may be formed at the wire through a relative arrangement of the fourth roller shaft 554a and the central shaft C.

[0313] To reduce a horizontal width of the roller box 550, the first roller 551, the second roller 552, the third roller 553, and the fourth roller 554 are located to overlap each other in the up-down direction.

[0314] That is, an interval between the first roller 551 and the third roller 553 is formed smaller than a diameter of the second roller 552. In addition, an interval between the second roller 552 and the fourth roller 554 is smaller than a diameter of the third roller 553.

[0315] In this embodiment, the 1-1 wire 511 surrounds a lower outer circumferential surface of the first roller 551 and surrounds an upper outer circumferential surface of the fourth roller 554.

[0316] Meanwhile, the second roller box 560 includes a box 565 fixed to the unit case 590, a first roller 561 and a fourth roller 564 disposed in the box 565, coming into contact with the 1-2 wire 512, and rotated by frictional contact when the 1-2 wire 512 moves, and a second roller 562 and a third roller 563 disposed in the box 565, coming into contact with the 1-2 wire 512, rotated by frictional contact when the 1-2 wire 512 moves, and disposed to be relatively movable in an axial direction by tension of the 1-2 wire 512.

[0317] The first roller 561, the second roller 562, the third roller 563, and the fourth roller 564 are assembled to the roller shafts 561a, 562a, 563a, and 564a and may be rotated around the roller shafts 561a, 562a, 563a, and 564a, respectively.

[0318] The wire guards 561b, 562b, 563b, and 564b are disposed in the second roller box 560 and spaced apart by a predetermined interval from the first roller 561, the second roller 562, the third roller 563, and the fourth roller 564.

[0319] The first roller box 550 and the second roller box 560 are symmetrically disposed with respect to the drum 530. In particular, the first roller box 550 and the second roller box 560 are disposed to be bilaterally symmetrical based on the axial center C.

[0320] With respect to the axial center C, the first rollers 551 and 561 are disposed on the farthest side and the fourth

rollers 554 and 564 are disposed on the closest side.

[0321] In this embodiment, one end of the 1-1 wire 511 and one end of the 1-2 wire 512 are located on opposite sides based on the axial center of the drum 530. The 1-1 wire 511 and the 1-2 wire 512 are wound around or unwound from the drum body 535 in the same direction according to rotation of the drum 530.

[0322] The unit case 590 is formed in a box shape and includes a first hole 591 and a second hole 592 provided on the side thereof.

[0323] The first hole 591 is disposed on one side of the unit case 590, and the second hole 592 is disposed on the other side of the unit case 590. For example, when the first hole 591 is formed on the left side of the unit case 590, the second hole 592 is formed on the right side of the unit case 590.

[0324] The 1-1 wire 511 and the 1-2 wire 512 penetrate the unit case 590 in the horizontal direction.

<Configuration of Wire Guider>

[0325] A wire guider 700 is provided at the front body 310 to support the wire when the wire is wound or unwound by the elevator 500. Four wire guiders 700 are provided and correspond to the wires 511, 512, 521, and 522.

[0326] A wire guider corresponding to the first wire 511 is defined as a first wire guider 701, a wire guider corresponding to the second wire 512 is defined as a second wire guider 702, a wire guider corresponding to the third wire 513 is defined as a third wire guider 703, and a wire guider corresponding to the fourth wire 514 is defined as a fourth wire guider 704.

[0327] The first wire guider 701 and the second wire guider 702 are disposed to face each other. The third wire guider 703 and the fourth wire guider 704 are disposed to face each other.

[0328] The first wire guider 701, the second wire guider 702, the third wire guider 703, and the fourth wire guider 704 are all located at the same height.

[0329] In the top view or the bottom view, the first wire guider 701 and the second wire guider 702 are symmetrical based on a direction of the motor shaft 541 of the first unit. In the top view or the bottom view, the third wire guider 703 and the fourth wire guider 704 are symmetrical based on the direction of the motor shaft 541 of the second unit.

[0330] An arrangement direction of the first wire guider 701 and the second wire guider 702 and an arrangement direction of the third wire guider 703 and the fourth wire guider 704 are parallel.

[0331] In this embodiment, the first wire guider 701 is located adjacent to the first corner cover 316-1, the second wire guider 702 is located adjacent to the second corner cover 316-2 , the third wire guider 703 is located adjacent to the third corner cover 316-3, and the fourth wire guider 704 is located adjacent to the fourth corner cover 316-4.

[0332] In this embodiment, the wire guider 700 is disposed at the front body 310. The wire guider 700 protrudes from the front body 310 toward the elevator 500. Each wire guider 700 is disposed on an inner edge 310a of the front body 310. The wire guider 700 is located between the roller box 550 and the front body 310. The wire guider 700 protrudes horizontally from the front body 310 toward the roller box 550.

[0333] The wire guider 700 is located above the intake grille 320 and below the bell mouse 142.

[0334] The wire guider 700 includes a fixed block 710 disposed on the inner edge 310a of the front body 310 and protruding toward the roller box 550, an assembled block 720 assembled with the fixed block 710, and a guider 750 disposed at the assembled block 720, disposed to be rotatable in the assembled block 720, and supporting a wire.

<Configuration of Guider>

[0335] The guider 750 supports the wire. The guider 750 may be rotated together with the wire when the wire is wound or unwound.

[0336] The guider 750 accommodates the wire and provides a structure to help the wire move. The guider 750 may be provided in various forms, but in this embodiment, the guider 750 is formed in a disk shape.

[0337] The guider 750 includes a guider body 752 having a rotation center in a horizontal direction, a guider recess 754 disposed on an outer surface of the guider body 752 and provided to be concave toward the rotation center, and allowing the wire to be inserted and supported therein, and a guide shaft 755 penetrating the rotation center of the guider body 752 and rotatably assembled to the assembled block 720.

[0338] In this embodiment, the guider body 752 is formed in a disk shape and is disposed to be erected in the up-down direction. The guider body 752 is rotated in a vertical direction, and the rotation center is formed in a horizontal direction. In a side view, an outer surface 752a of the guider body 752 is formed in a circular shape.

[0339] The guider recess 754 is formed concave toward the center of rotation from the outer surface of the guider body 752. The guider recess 754 is formed in a ring shape along the outer surface of the guider body 752.

[0340] The wire is inserted into the guider recess 754 and may form a friction force with the guider body 752 by frictional contact. The guider body 752 may be rotated by frictional contact between the wire and the guider body 752.

[0341] A guider shaft hole 753 penetrated by the guider shaft 755 is formed at the rotation center of the guider body

752. A formation direction of the guider shaft hole 753 and a formation direction of the guider recess 754 intersect.

[0342] In this embodiment, the guider shaft 755 and the guider body 752 are separately manufactured and then assembled. Unlike the present embodiment, the guider shaft 755 and the guider body 752 may be integrally manufactured.

<Configuration of Fixed Block>

[0343] In this embodiment, two fixed blocks 710 are provided. Unlike the present embodiment, one fixed block 710 may be manufactured. In this embodiment, the fixed block 710 is manufactured integrally with the front body 310. Unlike the present embodiment, the fixed block 710 may be separately manufactured and then assembled to the front body 310.

[0344] The fixed block 710 includes a first fixed block 711 and a second fixed block 712.

[0345] The first fixed block 711 and the second fixed block 712 are disposed in a horizontal direction and are laterally symmetrical. The first fixed block 711 and the second fixed block 712 are spaced apart from each other to form an insertion interval 713, and a guider 750 is located at the insertion interval 713.

[0346] A load applied to the guider 750 is supported through the first fixed block 711 and the second fixed block 712. Since the first fixed block 711 and the second fixed block 712 have the same shape, the first fixed block 711 will be described as an example.

[0347] The first fixed block 711 comprises a fixed block body 730, a fastening hole 735 penetrating the fixed block body 730 in the up-down direction, a first insertion portion 732 configuring the fixed block body 730, protruding toward the elevator 500, assembled to the assembled block 720, and mutually engaged with the assembled block 720 in the up-down direction, and a second insertion portion 732 configuring the fixed block body 730, protruding toward the elevator 500, assembled to the assembled block 720, and mutually engaged with the assembled block 720 in the up-down direction.

[0348] The first insertion portion 731 and the second insertion portion 732 are integrally formed. Upper surfaces of the first insertion portion 731 and the second insertion portion 732 form a continuous plane. Lower surfaces of the first insertion portion 731 and the second insertion portion 732 also form a continuous plane. That is, an upper surface 711a and a lower surface 711b of the first fixed block 711 are formed as a plane, are parallel to each other, and are disposed in the horizontal direction.

[0349] The first insertion portion 731 is disposed close to the insertion interval 713, and the second insertion portion 732 is disposed close to the insertion interval 713.

[0350] The first insertion portion 731 and the second insertion portion 732 protrude in the horizontal direction and form different protruding lengths. The first insertion portion 731 protrudes further toward the elevator 500 than the second insertion portion 732. That is, a protruding length of the first inserting portion 731 is formed to be longer than a protruding length of the second inserting portion 732.

[0351] In this embodiment, since the volume of the first insertion portion 731 is larger than the second insertion portion 732, the fastening hole 735 is formed at the first insertion portion 731.

[0352] The surface protruding from the first insertion portion 731 toward the assembled block 720 is formed as a curved surface 731a. The curved surface 731a is formed in an arrangement direction of the first insertion portion 731 and the second insertion portion 732.

[0353] In the first fixed block 711, an inner surface 711c forming the insertion interval 713 and an outer surface 711d away from the insertion interval 713 are formed parallel to each other. The inner surface 711c and the outer surface 711d are perpendicular to the upper surface 711a.

[0354] Upper surfaces 711a and 712a of the first fixed block 711 and the second fixed block 712 are disposed on the same plane, and lower surfaces 711b and 712b are also disposed on the same plane.

[0355] The insertion interval 713 is formed between the inner surfaces 711c and 712c of the first fixed block 711 and the second fixed block 712. The inner surfaces 711c and 712c of the first fixed block 711 and the second fixed block 712 are disposed parallel to each other with reference to the up-down direction. The outer surfaces 711d and 712d of the first fixed block 711 and the second fixed block 712 are disposed parallel to each other with reference to the up-down direction.

[0356] Fastening holes 735 of the first fixed block 711 and the second fixed block 712 are parallel to each other with reference to the up-down direction.

[0357] A space 739 is formed between the first fixed block 711 and the inner surface 310a of the front body 310. A space 739 is also formed between the second fixed block 712 and the inner surface 310a of the front body 310. Each space 739 is formed in the up-down direction and penetrates the first fixed block 711 and the second fixed block 712. Strength of the fixed block may be improved through the space. Through the space 739, deformation that may occur in the process of generating a fixed block may be suppressed.

[0358] Due to the space 739, a first insertion portion leg 736 connecting the first insertion portion 731 and the inner surface 310a is formed. Due to the space 739, a second insertion portion leg 737 connecting the second insertion portion 732 and the inner surface 310a is formed.

<Configuration of Assembled Block>

[0359] The assembled block 720 is a structure surrounding an outer surface of the fixed block 710. The fixed block 710 is inserted into the assembled block 720. The fixed block 710 and the assembled block 720 are assembled in a horizontal direction, and the fixed block 710 and the assembled block 720 form mutual engagement in the up-down direction.

[0360] The assembled block 720 includes an assembled block body 740 allowing the guider 750 to be rotatably assembled thereto and having a first block opening 721a and a second block opening 722a provided on one surface thereof, a first insertion space 721 provided in the assembled block body 740, provided to be concave to an inner side of the first block opening 721a, and allowing the first fixed block 711 to be inserted therein, a second insertion space 722 provided in the assembled block body 740, provided to be concave to an inner side of the second block opening 722a, and allowing the second fixed block 712 to be inserted therein, a guider installation space 742 provided outside the assembled block body 740, located between the first insertion space 721 and the second insertion space 722, and allowing the guider 750 to be inserted therein, guider axial recesses 744 and 746 provided outside the assembled block body 740 and supporting a rotational shaft of the guider 750, and a fastening hole 745 penetrating an inner side and an outer side of the assembled block body 740 and allowing a fastening member to be inserted therein.

[0361] In this embodiment, the first fixed block 711 is inserted into the first insertion space 721a, and the second fixed block 712 is inserted into the second insertion space 722a. The first insertion space 721a and the second insertion space 722a are open toward the inner surface 310a of the front body 310 and protrude toward the elevator 500.

[0362] Unlike the present embodiment, one insertion space instead of the first insertion space 721a and the second insertion space 722a may be formed. If one insertion space is formed, the first fixed block and the second fixed block may be inserted into one insertion space, and thus a gap may occur.

[0363] Since the wire guider 700 is a structure for supporting the wire, it is necessary to minimize a gap or shaking. If the guider 750 is shaken when supporting the wire, operation noise may not only occur and but also stronger shaking may occur in the intake grille 320 supported by the wire.

[0364] The first insertion space 721a and the second insertion space 722a are formed in the horizontal direction. The assembled block body 740 is open at only one side and is closed at the other side.

[0365] A guider installation space 742 and guide shaft recesses 744 and 746 are formed on an outer surface of the assembled block body 740.

[0366] The guider installation space 742 is formed in a horizontal direction and a front-rear width thereof is narrower than a vertical thickness thereof. The guider installation space 742 is formed by a first guider installation wall 742a, a second guider installation wall 742b, and a third guider installation wall 742c.

[0367] The first guider installation wall 742a and the third guider installation wall 742c are disposed to face each other, and the second guider installation wall 742b connects the first guider installation wall 742a and the third guider installation wall 742c. The second guider installation wall 742b intersects the first guider installation wall 742a and the third guider installation wall 742c and is perpendicular in this embodiment.

[0368] The first guider installation wall 742a and the third guider installation wall 742c are formed in parallel with each other, and the guider 750 is inserted between the first guider installation wall 742a and the third guider installation wall 742c. An interval between the first guider installation wall 742a and the third guider installation wall 742c is formed to be longer than a thickness of the guider 750.

[0369] An interval between the first guider installation wall 742a and the third guider installation wall 742c is formed to be narrower than the insertion interval 713 between the first fixed block 711 and the second fixed block 712.

[0370] A vertical length of the guider installation space 742 is formed to be smaller than a diameter of the guider 750, and the guider 750 protrudes upward and downward from the guider installation space 742.

[0371] The first guider installation wall 742a and the third guider installation wall 742c are formed flat in the up-down direction, but the second guider installation wall 742b is not.

[0372] An upper side of the second guider installation wall 742b may protrude toward the guider 750. In this embodiment, the upper side of the second guider installation wall 742b includes a separation preventing protrusion 743 that protrudes gently toward the guider 750.

[0373] The separation preventing protrusion 743 is configured to prevent the guider body 752 from being unintentionally separated from the assembled block 720. The separation preventing protrusion 743 is defined as a first separation preventing protrusion when to be designated distinguishably.

[0374] The first separation preventing protrusion 743 protrudes from the second guider installation wall 742b toward the guider 750. The first separation preventing protrusion 743 forms a predetermined curvature and is spaced apart from the outer surface 752a of the guider 750 by a predetermined interval.

[0375] An interval between the first separation preventing protrusion 743 and the outer surface 752a of the guider 750 is formed to be smaller than a diameter of the wire, through which the wire is prevented from escaping from the wire recess 754 and separated to the outside of the guider 750. The wire installed at the guider recess 754 is located between

the second guider installation wall 742b and the wire recess 754.

[0376] At least a portion of the first separation preventing protrusion 743 may have a center of curvature disposed at a rotation center of the guider shaft 755. The first separation preventing protrusion 743 is located above the center of rotation of the guider shaft 755.

[0377] When the guider shaft 755 is inserted into the guide shaft recess 744 and 746, the outer surface 752a of the guider body 752 may interfere with the first separation preventing protrusion 743. When the guider shaft 755 is inserted into the guide shaft recesses 744 and 746, the guider body 752 is assembled with the separation preventing protrusion 743 in an interference fitting manner. After the guider shaft 755 is assembled, the outer surface 752a of the guider body 752 and the separation preventing protrusion 743 maintain in a state of being spaced apart from each other by a predetermined interval.

[0378] When an operator does not intentionally separate the guider 750 through such a structure, the guider shaft 755 is caught in the separation preventing protrusion 743 and is not separated.

[0379] Meanwhile, the guide shaft recesses 744 and 746 are disposed on both sides of the guider installation space 742, respectively. The first guide shaft recess 744 is disposed adjacent to the first guider installation wall 742a side and the second guide shaft recess 746 is disposed adjacent to the third guider installation wall 742c.

[0380] Formation directions of the first guide shaft recess 744 and the second guide shaft recess 746 are perpendicular to a formation direction of the guider installation space 742. The first guide shaft recess 744 and the second guide shaft recess 746 are symmetrical to the guider installation space 742.

[0381] The first guide shaft recess 744 and the second guide shaft recess 746 are concave downward on an upper surface of the assembled block body 740.

[0382] Since a shape of the second guide shaft recess 746 is symmetric to the first guide shaft recess 744, the first guide shaft recess 744 will be described as an example.

[0383] The guide shaft recesses 744 and 746 include a first axial wall 744a, a second axial wall 744b, and a third axial wall 744c.

[0384] The first axial wall 744a and the third axial wall 744c are formed parallel to each other. The guider shaft 755 of the guider 750 is inserted between the first axial wall 744a and the third axial wall 744c. An interval between the first axial wall 744a and the third axial wall 744c is formed to be wider than a diameter of the guider shaft 755. The guider shaft 755 may be rotated between the first axial wall 744a and the third axial wall 744c.

[0385] A separation preventing protrusion 747 for preventing separation of the guide shaft 755 is disposed. A configuration for preventing the guide shaft 755 from being separated from the guide shaft recesses 744 and 746 is defined as a second separation preventing protrusion.

[0386] In this embodiment, the second separation preventing protrusion 747 is disposed at two places. The second separation preventing protrusion 747 includes a 2-1 separation preventing protrusion 747a protruding from the first axial wall 744a toward the third axial wall 744c and a 2-2 separation preventing protrusions 747c protruding from the third axial wall 744c toward the first axial wall 744a.

[0387] Unlike the present embodiment, only one of the 2-1 separation preventing protrusion 747a and the 2-2 separation preventing protrusions 747c may be disposed.

[0388] An interval between the 2-1 separation preventing protrusion 747a and the 2-2 separation preventing protrusion 747c is formed smaller than a diameter of the guider shaft 755. The 2-1 separation preventing protrusion 747a and the 2-2 separation preventing protrusion 747c are located above the center of rotation of the guider shaft 755.

[0389] The 2-1 separation preventing protrusion 747a and the 2-2 separation preventing protrusion 747c surround an outer portion of the guider shaft 755. An arrangement direction of the 2-1 separation preventing protrusion 747a and the 2-2 separation preventing protrusion 747c intersects a longitudinal direction of the guider shaft 755.

[0390] The first separation preventing protrusion 743 and the second separation preventing protrusion 747 not only prevent the guider from being separated from the assembled block 720 but also suppress a vertical movement of the guider 750.

[0391] During the operation of the elevator 500, the first separation preventing protrusion 743 and the second separation preventing protrusion 747 limit shaking and movement of the guider 750, thereby minimizing operation noise that occurs during a rotation process of the guider 750.

[0392] Since the first separation preventing protrusion 743 and the second separation preventing protrusion 747 limit shaking and movement of the guider 750, shaking of the intake grille 320 in the operation process of the elevator 500 may also be minimized.

[0393] In this embodiment, the wire surrounds an upper side of the guider 750 and is turned to a lower side. Thus, since a load of the intake grille 320 is applied to the wire, the guider 750 is pressed downward. That is, since the guider 750 is pressed downward in an installation state or during operation, the guider does not escape from the guider installation space 742 and the guider axial recesses 744 and 746 if there is no intentional operation by the operator.

[0394] In this embodiment, in order to easily install the guider, the fixed block and the assembled block are manufactured distinguishably. Unlike the present embodiment, the installation structure of the guider may be provided on the fixed

block and the guider may be installed. For example, a guider installation space and a guider axial recess may be formed in the fixed block.

[0395] However, the formation of the guider installation space and the guider axial recess in the fixed block makes a structure of an injection mold complicated and is difficult to manufacture.

<Arrangement of Wire Fixing Portion>

[0396] The wire is turned to a lower side, while surrounding the guider 750, and fixed to the intake grille 320.

[0397] One end of the wire is fixed to the drum body 535 of the elevator 500 and the other end thereof is fixed to an upper surface of the intake grille 320.

[0398] The intake grille 320 includes a wire fixing portion 329 to which the other end of the wire is fixed. The wire fixing portion 329 is disposed at the grille body 322 of the intake grille 320. In particular, the wire fixing portion 329 is disposed in the grille body portion 324 in which the grille hole 321 is not formed in the grille body 322 and protrudes upward.

[0399] The wire fixing portion disposed below the first wire guider 701 is defined as a first wire fixing portion, the wire fixing portion disposed below the second wire guider 702 is defined as a second wire fixing portion, the wire fixing portion disposed below the third wire guider 703 is defined as a third wire fixing portion, and the wire fixing portion disposed below the fourth wire guider 701 is defined as a fourth wire fixing portion.

[0400] The wire extends vertically downward through the guider 750 and is fixed to the wire fixing portion 329. The guider 750 is located above the grille body portion 324.

[0401] The wire guider 700 according to the present embodiment is located above the intake grille 320 and is covered by the intake grille 320. In particular, since the wire guider 700 is located above the grille body portion 324, it is not exposed to the user.

[0402] The wire guider 700 is located closer to the inlet 101 than the vane module 200. The vane module 200 has a structure detachable from the front body 310 and prevents interference with the wire during a separation process of the vane module 200.

[0403] That is, the vane module 200 is located outside the four wires 511, 512, 521, and 522, and the operator may separate the vane module 200 in a state where the four wires 511, 512, 521, and 522 are installed.

[0404] In addition, in the case of repairing or replacing the elevator 500, the operator may separate four wires 511, 512, 521, and 522, regardless of the vane module 200, in a state where the intake grille 320 is lowered.

<Configuration of Rotation Amount Detecting Device>

[0405] The rotation amount detecting device 600 is for detecting the amount of rotation of the drum 530. The rotation amount detecting device 600 should detect a rotation amount to be more precise than a revolution per minute (RPM) of the drum 530.

[0406] In the present embodiment, the amount of rotation of the drum 530 must be precisely detected because the 1-1 wire 511 and the 1-2 wire 512 of the first unit 510 and the 2-1 wire 521 and the 2-2 wire 522 are to be simultaneously wound or unwound.

[0407] Since the rotation amount detecting devices 600 of the first unit 510 and the second unit 520 have the same configuration, the rotation amount detecting device 600 disposed in the first unit 510 will be described as an example.

[0408] The rotation amount detecting device 600 includes a rotation detecting factor 601 disposed at the drum 530 and rotated together when the drum 530 rotates, a sensor 602 disposed to be spaced apart from the rotation detecting factor 601 and detecting the amount of rotation of the rotation detecting factor 601, and a printed circuit board (PCB) where the sensor 602 is disposed.

[0409] The rotation detecting factor 601 is disposed at a position where the rotation detecting factor 601 is rotated together when the drum 530 is rotated. The rotation detecting factor 601 may be disposed on at least one of the 1-1 barrier 534 and the 1-2 barrier 536.

[0410] In the present embodiment, a plurality of the rotation detecting factors 601 are disposed, and the plurality of rotation detecting factors 601 are equally spaced with reference to a circumferential direction based on the axial center C of the drum 530.

[0411] In this embodiment, the rotation detecting factor 601 is disposed on the 1-1 barrier 534.

[0412] In the present embodiment, the rotation detecting factor 601 has a sawtooth shape. The rotation detecting factor 601 is disposed to protrude radially outward based on the axial center C of the drum 530.

[0413] The sensor 602 detects the rotation detecting factor 601. In this embodiment, the sensor 602 may be an infrared sensor or a photo sensor. The sensor 602 detects a signal generated by the rotation detecting factor 601 when the drum 530 rotates. For example, the sensor 602 generates infrared light and receives the generated infrared light. The controller may determine a rotation angle, the number of rotations, and a rotation speed of the drum 530 through a change in infrared rays blocked by the rotation detecting factor 601.

[0414] In order to effectively detect the rotation detecting factor 601, a sensor installation portion 604 is disposed to protrude from the PCB 603.

[0415] The PCB 603 is disposed parallel to the axial center C. The PCB 603 is installed on any one of the drum motor 540, the unit case 590, or a roller box.

[0416] In this embodiment, the PCB 603 is installed on the drum motor 540 and disposed parallel to the motor shaft of the drum motor 540.

[0417] The sensor installation portion 604 is disposed to protrude toward the drum 530 from the PCB 603. In this embodiment, the sensor installation portion 604 is disposed to be perpendicular to the PCB 603.

[0418] The sensor 602 is installed at the sensor installation portion 604. The sensor 602 includes a light emitting unit that generates an infrared signal and a light receiving unit that receives the infrared signal generated by the light emitting unit. Since an operation mechanism of the sensor 602 is a general technique to those skilled in the art, detailed description is omitted.

[0419] However, structures of the sensor installation portion 604 and the PCB 603 for effectively recognizing the rotation detecting factor 601 are characterized.

[0420] The sensor installation portion 604 is formed in a "⊏" shape in the top view.

[0421] The sensor installation portion 604 has a slot 605 allowing the rotation detecting factor 601 to pass therethrough. When the drum 530 rotates, the rotation detecting factor 601 passes through the slot 605, and the sensor 602 detects the rotation detecting factor 601 passing through the slot 605.

[0422] The slot 605 is perpendicular to the axial center of the drum 530. The slot 605 is located on a rotation plane of the rotation detecting factor 601.

[0423] In this embodiment, since the rotation detecting factor 601 is disposed on the 1-1 barrier 534, the slot 605 and at least a portion of the 1-1 barrier 534 are located on the same plane.

[0424] The slot 605 is disposed in parallel with the 1-2 barrier 536 and the partition 533.

[0425] The sensor installation portion 604 may be a structure in which only the sensor 602 is installed. Alternatively, the sensor installation portion 604 may be configured as a PCB capable of providing power to the sensor 602. Thus, the PCB 603 and the sensor installation portion 604 may be electrically connected.

[0426] Unlike the present embodiment, a permanent magnet is used as the rotation detecting factor and a Hall sensor for detecting the permanent magnet may be used as the sensor. When a permanent magnet is used as a rotation detecting factor, a plurality of permanent magnets may be arranged along the edge of the 1-1 barrier 534 in the circumferential direction.

[0427] Unlike the present embodiment, the rotation detecting factor 601 may be disposed at the 1-2 barrier 536 or the partition 533.

[0428] Since the second unit 520 is configured to be the same as the first unit 510, a detailed description is omitted.

<Arrangement of Vane Module and Intake Grille>

[0429] When the intake grille 320 is lowered, four vane modules 200 and the elevator 500 are exposed. Since each wire is maintained in an upwardly pulled state, the intake grille 320 is maintained in close contact with the front body 310.

[0430] When the intake grille 320 is moved downward, four vane modules 200 and the elevator 500 covered by the intake grille 320 are exposed.

[0431] In a state where the intake grille 320 is in close contact with the front body 310, only the vane 210 of the vane module 200 is exposed.

[0432] Then, each wire guider is located above the grille corner portion 327 configuring the intake grille 320.

[0433] The intake grille 320 includes a grille body 322 communicating with the inlet 101 by a plurality of grille holes 321 and having a quadrangular shape and a first grille corner portion 327-1, a second grille corner portion 327-2, a third grille corner portion 327-3, and a fourth grille corner portion 327-4 extending in a diagonal direction from each corner of the grille body 322.

[0434] The vane module 200 includes a first vane module 201 disposed outside each edge of the intake grille 320 and disposed between the first grille corner portion 327-1 and the second grille corner portion 327-2, a second vane module 202 disposed outside each edge of the intake grille 320 and disposed between the second grille corner portion 327-2 and the third grille corner portion 327-3, a third vane module 203 disposed outside each edge of the intake grille 320 and disposed between the third grille corner portion 327-3 and the fourth grille corner portion 327-4, and a fourth vane module 204 disposed outside each edge of the intake grille 320 and disposed between the fourth grille corner portion 327-4 and the first grille corner portion 327-1.

[0435] The vane module 200 disposed in a 12 o'clock direction is defined as the first vane module 201, the vane module 200 disposed in a 3 o'clock direction is defined as the second vane module 202, the vane module 200 disposed in a 6 o'clock direction is defined as the third vane module 203, and the vane module 200 disposed in a 9 o'clock direction is defined as the fourth vane module 204.

[0436] The first vane module 201, the second vane module 202, the third vane module 203, and the fourth vane module 204 are arranged at 90° intervals based on the center C of the front panel 300.

[0437] The first vane module 201 and the third vane module 203 are arranged in parallel, and the second vane module 202 and the fourth vane module 204 are arranged in parallel.

[0438] Four side covers 314 are disposed on the front body 310. For convenience of description, the side cover 314 disposed outside the first vane module 201 is defined as a first side cover 314-1, the side cover 314 disposed outside the second vane module 202 is defined as a second side cover 314-2, the side cover 314 disposed outside the third vane module 203 is defined as a third side cover 314-3, and the side cover 314 disposed outside the fourth vane module 204 is defined as a fourth side cover 314-4.

[0439] Each side cover 314 is assembled to the edge of the front frame 312, located below the front frame 312, exposed to the outside, is disposed outside each vane module 202.

[0440] In addition, the corner cover 316 disposed between the first vane module 201 and the second vane module 202 is defined as a first corner cover 316-1. The corner cover 316 disposed between the second vane module 202 and the third vane module 203 is defined as a second corner cover 316-2. The corner cover 316 disposed between the third vane module 203 and the fourth vane module 204 is defined as a third corner cover 316-3. The corner cover 316 disposed between the fourth vane module 204 and the first vane module 201 is defined as a fourth corner cover 316-4.

[0441] The first corner cover 316-1 is assembled to the corner of the front frame 312, located below the front frame 312, located between the first side cover 314-1 and the second side covers 314-2, and exposed to the outside.

[0442] The second corner cover 316-2 is assembled to the corner of the front frame 312, located below the front frame 312, located between the second side cover 314-2 and the third side cover 314-3, and exposed to the outside.

[0443] The third corner cover 316-3 is assembled to the corner of the front frame 312, located below the front frame 312, located between the third side cover 314-1 and the fourth side cover 314-4, and exposed to the outside.

[0444] The fourth corner cover 316-4 is assembled to the corner of the front frame 312, located below the front frame 312, located between the fourth side cover 314-4 and the first side cover 314-1, and exposed to the outside.

[0445] The first corner cover 316-1 and the third corner cover 316-3 are arranged diagonally with respect to the center O of the front panel 300 and face each other. The second corner cover 316-2 and the fourth corner cover 316-4 are arranged diagonally with respect to the center O of the front panel 300 and face each other.

[0446] Virtual diagonal lines passing through the center of the front panel 300 are defined as P1 and P2. P1 is an virtual line connecting the first corner cover 316-1 and the third corner cover 316-3, and P2 is a virtual line connecting the second corner cover 316-2 and the fourth corner cover 316-4.

[0447] The intake panel 320 includes a first grille corner portion 327-1, a second grille corner portion 327-2, a third grille corner portion 327-3, and a fourth grille corner portion 327-4 extending toward the corner sides.

[0448] With respect to the grille corner portions, the first vane module 201 is disposed outside each edge of the intake grille 320 and disposed between the first grille corner portion 327-1 and the second grille corner portion 327-2.

[0449] The second vane module 202 is disposed outside each edge of the intake grille and disposed between the second grille corner portion 327-2 and the third grille corner portion 327-3.

[0450] The third vane module 203 is disposed outside each edge of the intake grille and disposed between the third grille corner portion 327-3 and the fourth grille corner portion 327-4.

[0451] The fourth vane module 204 is disposed outside each edge of the intake grille and disposed between the fourth grille corner portion 327-4 and the first grille corner portion 327-1.

[0452] The first grille corner portion 327-1 extends toward the first corner cover 316-1 and forms a continuous plane with an outer surface of the first corner cover 316-1.

[0453] The grille corner border 326 of the first grille corner portion 327-1 faces the corner deco inner border 317 of the first corner cover 316-1 and forms a corner deco inner border gap 317a.

[0454] The corner grille corner 326 of the remaining grille corner portion 327 and the corner deco inner border 317 of the corner cover 316 are also opposed to each other and form a corner deco inner border gap 317a.

[0455] The intake grille 320 includes four grille corner portions 327 that face the corner covers 316, respectively. The grille corner portions 327 are disposed to face the corner covers 316, respectively.

[0456] The grille corner portion 327 disposed to face the first corner cover 316-1 is defined as a first grille corner portion 327-1, the grille corner portion 327 disposed to face the second corner cover 316-2 is defined as a second grille corner portion 327-2, the grille corner portion 327 disposed to face the third corner cover 316-3 is defined as a third grille corner portion 327-3, and the grille corner portion 327 disposed to face the fourth corner cover 316-4 is defined as a fourth grille corner portion 327-4.

[0457] The grille side border 325 forming the edge of the grille corner portion 327 is disposed to face the corner deco inner border 317 forming an inner edge of the corner cover 316 and shapes of curves thereof correspond to each other.

[0458] Similarly, the grille corner border 326 forming the edge of the grille corner portion 327 is disposed to face the inner edge of the vane 210, and the shapes of the curves thereof correspond to each other.

[0459] Meanwhile, in this embodiment, in order to maintain a state in which the intake grille 320 is in close contact

with the front body 310, a permanent magnet 318 and a magnetic force fixing portion 328 are provided.

[0460] Either the permanent magnet 318 or the magnetic force fixing portion 328 may be disposed on the front body 310, and the other of the magnetic force fixing portion 328 or the permanent magnet 318 may be disposed on an upper surface of each grille corner portion 327.

[0461] The permanent magnet 318 and the magnetic force fixing portion 328 are located above each grille corner portion 327 and are hidden by each grille corner portion 327. Since the permanent magnet 318 and the magnetic force fixing portion 328 are located outside each corner of the intake grille 320, a gap between the intake grille 320 and the front body 310 may be minimized.

[0462] If the intake grille 320 and the front body 310 are spaced apart from each other, a problem that an internal pressure of the intake flow path 103 is lowered arises.

[0463] In this embodiment, the permanent magnet 318 is disposed at the front body 310. Specifically, the permanent magnet is disposed at the corner frame 313.

[0464] The magnetic force fixing portion 328 is formed of a metal that interacts with the permanent magnet 318 to form an attractive force. The magnetic force fixing portion 328 is disposed on an upper surface of the intake grille 320. Specifically, the magnetic force fixing portion 328 is disposed on an upper surface of the grille corner portion 327. An installation portion 328a disposed at the intake grille 320 and protruding upward from the intake grille 320 is further provided. The installation portion 328a is integrally injection-molded with the intake grille 320.

[0465] The installation portion 328a is provided between the guide block 800 and the grille corner border 326.

[0466] When the guide block 800 is located outside the permanent magnet 318 and the magnetic force fixing portion 328, the grille corner portion 327 may sag, and in this case, the grille corner portion 327 may be separated from the front body 310.

[0467] In this embodiment, since the permanent magnet 318 and the magnetic force fixing portion 328 are located outside the guide block 800, the guide block 800 may become close contact with the insertion space 850 adjacent to the front body 310 when the permanent magnet 318 and the magnetic force fixing portion 328 are coupled.

[0468] When the intake grille 320 is moved upward and close to the permanent magnet 318, the permanent magnet 318 pulls the magnetic force fixing portion 328 to fix the intake grille 320. The magnetic force of the permanent magnet 318 is formed smaller than a self-load of the intake grille 320. Therefore, if the intake grille 320 is not pulled by the elevator 500, the combination of the permanent magnet 318 and the magnetic force fixing portion 328 is released.

[0469] In the top view or the bottom view, the permanent magnet 318 is disposed on the virtual diagonal lines P1 and P2. The permanent magnet 318 is located inside the corner cover 316.

[0470] In the top view or the bottom view, one of four permanent magnets 318 is disposed between a first module body 410 of the first vane module 201 and a second module body 420 of the fourth vane module 204. The other three permanent magnets are also disposed between the first module body 410 and the second module body 420 of each vane module.

[0471] The permanent magnet 318 and the magnetic force fixing portion 328 are located above each grille corner portion 327 and are hidden by the each grille corner portions 327.

<Configuration of Vane Module>

[0472] The vane module 200 is installed in the discharge flow path 104 and controls a flow direction of air discharged through the outlet 102.

[0473] The vane module 200 includes a module body 400, a first vane 210, a second vane 220, a vane motor 230, a drive link 240, a first vane link 250, and a second vane link 260.

[0474] The first vane 210, the second vane 220, the vane motor 230, the drive link 240, the first vane link 250, and the second vane link 260 are all installed at the module body 400. The module body 400 is integrally installed on the front panel 300. That is, the entire components of the vane module 200 are modularized and installed on the front panel 300 at once.

[0475] Since the vane module 200 is modularized, an assembly time may be shortened and the vane module 200 may be easily replaced when broken down.

[0476] In this embodiment, the vane motor 230 is a step motor.

<Configuration of Module Body>

[0477] The module body 400 may be configured as one body. In this embodiment, the module body 400 is divided into two components and the two components are separately manufactured to minimize an installation space and minimize a production cost.

[0478] In this embodiment, the module body 400 includes a first module body 410 and a second module body 420.

[0479] The first module body 410 and the second module body 420 are formed to be laterally symmetrical. In this

embodiment, for the common components, the first module body 410 is described as an example.

[0480] The first module body 410 and the second module body 420 are fastened to the front body 310, separately. Specifically, the first module body 410 and the second module body 420 are each installed at the corner frame 313.

[0481] With reference to the horizontal direction, the first module body 410 is installed at the corner frame 313 disposed on one side of the outlet 102, and the second module body 420 is installed at the corner frame 313 disposed on the other side of the outlet 102.

[0482] With reference to the up-down direction, the first module body 410 and the second module body 420 are in close contact with the bottom surface of each corner frame 313 and are fastened through a fastening member 401.

[0483] Thus, the first module body 410 and the second module body 420 are disposed below the front body 310. When viewed in a state where the indoor unit is installed, the first module body 410 and the corner frame 313 are arranged and fastened in an upward direction, and the second module body 420 and the corner frame 313 are also arranged and fastened in the upward direction.

[0484] Due to such a structure, the entire vane module 200 may be easily separated from the front body 310 in a service process.

[0485] The vane module 200 includes a first module body 410 disposed on one side of the outlet 102, located below the front body 310, and assembled to the front body 310 so as to be detachable downward, a second module body 420 disposed on the other side of the outlet 102, located below the front body 310, and assembled to the front body 310 so as to be detachable downward, one or more vanes 210 and 220 having one side and the other side coupled to the first module body 410 and the second module body 420, respectively, relatively rotating with respect to the first module body 410 and the second module body 420, a vane motor 230 installed on at least one of the first module body 410 and the second module body 420 and providing a driving force to the vane, a first fastening hole 403-1 disposed on the first module body 410, disposed downward, and penetrating the first module body 410, a first fastening member 401-1 fastened to the front body 310 through the first fastening hole 403-1, a second fastening hole 403-2 disposed on the second module body 420, disposed downward, and penetrating the second module body 420, and a second fastening member 401-2 fastened to the front body through the second fastening hole 403-2.

[0486] In particular, since the first module body 410 and the second module body 420 are located below the front body 310, only the vane module 200 may be separated from the front body 310 in a state where the front body 310 is installed in the case housing 110. This is commonly applied to all four vane modules 200.

[0487] When the module body 400 is separated from the front body 310, the entire vane module 200 is separated downward from the front body 310.

[0488] The first module body 410 includes a module body portion 402 coupled to the front body 310 and a link installation portion 404 protruding upward from the module body portion 402.

[0489] The module body portion 402 is fastened to the front body 310 by a fastening member 401 (not shown). Unlike the present embodiment, the module body portion 402 may be coupled to the front body 310 through hook coupling or interference fitting.

[0490] In this embodiment, in order to minimize the occurrence of vibration of noise due to the first vane 210, the second vane 220, the vane motor 230, the drive link 240, the first vane link 250, the second vane link 260, and the like, the module body portion 402 is firmly fastened to the front body 310.

[0491] The fastening member 401 for fixing the module body portion 402 is fastened in an upward direction from a lower side and may be separated downward from an upper side.

[0492] The module body portion 402 may have a fastening hole 403 penetrated by the fastening member 401.

[0493] For convenience of explanation, when it is necessary to distinguish between a fastening hole formed at the first module body 410 from a fastening hole formed at the second module body 420, the fastening hole disposed at the first module body 410 is referred to as a first fastening hole 403-1 and the fastening hole disposed at the second module body 420 is referred to as a second fastening hole 403-1.

[0494] When it is necessary to distinguish between the fastening members 401, the fastening member 401 installed at the first fastening hole 403-1 is defined as a first fastening member 401-1 and the fastening member 401 installed at the fastening hole 403-1 is defined as a second fastening member 401-2.

[0495] The first fastening member 401-1 penetrates the first fastening hole and is fastened to the front body 310. The second fastening member 401-2 penetrates the second fastening hole and is fastened to the front body 310.

[0496] Before fastening and fixing the module body 400, a module hook 405 for temporarily fixing a position of the module body 400 is disposed.

[0497] The module hook 405 is coupled with the front panel 300 (specifically, the front body 310). Specifically, the module hook 405 and the front body 310 form mutual engagement.

[0498] A plurality of module hooks 405 may be disposed at one module body. In this embodiment, the plurality of module hooks 405 are arranged at an outer edge of the module body portion 402 and at an edge of a front side, respectively. That is, the module hooks 405 are arranged outside the first module body 410 and the second module body 420, respectively, and are symmetrical with reference to a left-right direction.

[0499] The vane module 200 may be temporarily fixed to the frame body 310 by the module hook 405 of the first module body 410 and the module hook 405 of the second module body 420. In this embodiment, the module hook 405 forms a mutual engagement with the corner frame 313.

[0500] Fixing by the module hooks 405 may cause a slight gap in terms of the coupling structure. The fastening member 401 firmly fixes the temporarily fixed module body 400 to the front body 310.

[0501] The fastening hole 403 in which the fastening member 401 is installed may be located between the module hooks 405. The fastening hole 403 of the first module body 410 and the fastening hole 403 of the second module body 420 are arranged between the module hooks 405 on one side and the other side.

[0502] In this embodiment, the module hooks 405 and the fastening holes 403 are arranged in a line.

[0503] Even when the fastening members 401 are disassembled, the vane module 200 may be maintained in a state of being coupled to the frame body 310 by the module hooks 405.

[0504] In case of repairing or malfunctioning, when the vane module 200 needs to be separated, the vane module 200 remains coupled to the front panel 300 even when the fastening member 401 is removed. Therefore, the operator does not need to separately support the vane module 200 when disassembling the fastening member 401.

[0505] Since the vane module 200 is first fixed by the module hook 405 and secondly fixed by the fastening member 401, work convenience may be significantly improved in service.

[0506] The module body portion 402 is horizontally arranged, and the link installation portion 404 is vertically arranged. In particular, when viewed in an installed state, the link installation portion 404 protrudes upward from the module body unit 402.

[0507] The link installation portion 404 of the first module body 410 and the link installation portion 404 of the second module body 420 are disposed to face each other. The first vane 210, the second vane 220, the drive link 240, the first vane link 250, and the second vane link 260 are arranged between the link installation portion 404 of the first module body 410 and the link installation portion 404 of the second module body 420. The vane motor 230 is disposed outside the link installation portion 404 of the first module body 410 or outside the link installation portion 404 of the second module body 420.

[0508] The vane motor 230 may be installed at only one of the first module body 410 or the second module body 420. In this embodiment, the vane motor 230 is disposed at each of the first module body 410 or the second module body 420.

[0509] The first vane 210, the second vane 220, the drive link 240, the first vane link 250, and the second vane link 260 are coupled between the first module body 410 and the second module body 420, so that the vane module 200 is integrated.

[0510] In order to install the vane motor 230, a vane motor installation portion 406 protruding outward from the link installation portion 404 is disposed. The vane motor 230 is fastened and fixed to the vane motor installation portion 406. The vane motor installation portion 406 is formed in a boss shape, and the vane motor 230 is fixed to the vane motor installation portion 406. Due to the vane motor installation portion 406, the link installation portion 404 and the vane motor 230 are spaced apart from each other at a predetermined interval.

[0511] To the link installation portion 404, the drive link 240 is assembled, and a drive link coupling portion 407 providing a rotation center to the drive link 240 and the first vane link 250 are assembled. A first vane link coupling portion 408 providing a rotation center to the first vane link 250 and a second vane coupling portion 409 coupled to the second vane 220 and providing a rotation center to the second vane 220 are arranged on the link installation portion 404.

[0512] In this embodiment, the drive link coupling portion 407, the first vane link coupling portion 408, and the second vane coupling portion 409 are formed in a hole shape. Unlike this embodiment, the drive link coupling portion 407, the first vane link coupling portion 408, and the second vane coupling portion 409 may be formed in a boss shape or may be implemented in various shapes that provide a rotating shaft.

[0513] Meanwhile, a stopper 270 limiting a rotation angle of the drive link 240 is disposed at the link installation portion 404. The stopper 270 is disposed to protrude toward the opposite link mounting portion 404.

[0514] In this embodiment, the stopper 270 causes interference at a specific position when the drive link 240 rotates, and limits rotation of the drive link 240. The stopper 270 is located within a rotation radius of the drive link 240.

[0515] In this embodiment, the stopper 270 is manufactured integrally with the link installation portion 404. In this embodiment, the stopper 270 provides an installation position of the drive link 240, maintains a contact state when the drive link 240 is rotated, and prevents vibration or a gap of the drive link 240.

[0516] In this embodiment, the stopper 270 is formed in an arc shape.

[0517] Hereinafter, an operation process when the intake grille is lifted or lowered according to an embodiment of the present disclosure will be described in detail.

[0518] First, an installation state of the intake grille 320 will be described in detail.

[0519] The intake grille 320 may be lowered for filter cleaning or repairing the indoor unit. The intake grille 320 is supported by four wires 511, 512, 521, and 522, and a load of the intake grille 320 is applied by all four wires 511, 512, 521, and 522.

[0520] The intake grille 320 is maintained in close contact with the front body 310 by four wires 511, 512, 521, and

522. That is, a separate coupling structure for supporting the intake grille 320 and the front body 310 is not provided.

[0521] Therefore, the user does not need to stand on a structure such as a chair to disassemble the intake grille 320 and the front body 310 to separate the intake grille 320. That is, the intake panel 320 is lowered downward as soon as the four wires 511, 512, 521, and 522 are released by the operation of the elevator 500.

[0522] In addition, since the intake grille 320 is supported only by the wires 511, 512, 521, and 522, the wires 511, 512, 521, and 522 always form a tension. If the intake grille 320 is supported by another structure, some of the wires 511, 512, 521, and 522 may loosen and the elevator 500 may not precisely control the wires 511, 512, 521, and 522.

[0523] Since the wires 511, 512, 521, and 522 according to the present embodiment always supports the load of the intake grille 320, the entire length of the wires 511, 512, 521, and 522 loosened outside of the elevator 500 is always in a tight state.

[0524] The first wire fixing portion 329-1, the second wire fixing portion 329-2, the third wire fixing portion 329-3, and the fourth wire fixing portion 329-4 are located at the corners of the intake panels 320, respectively.

[0525] Since each of the four wire fixing portions is pulled upward by each wire so as to be in close contact with the front body 310, the edge of the intake grille 320 may be brought into close contact with the front body 310 and sagging of the intake grille 320 may be minimized.

[0526] Since wire guiders 701, 702, 703, and 704 are disposed for four wires 511, 512, 521, and 522, the wires 511, 512, 521, and 522 may be prevented from sagging.

[0527] A load applied to each of the wire 511, 512, 521, and 522 may be partially distributed to each of the wire guiders 701, 702, 703, and 704. In addition, since the wires 511, 512, 521, and 522 are moved only along the wire recess 754 disposed in the up-down direction, a horizontal movement of each of the wires 511, 512, 521, and 522 may be suppressed, whereby shaking of the intake grille 320 may be minimized.

[0528] Next, a lowering process of the intake grille 320 will be described.

[0529] When the user inputs an operation signal through a wireless remote controller or a wired remote controller with the intake grille 320 mounted on the cover panel 300, the controller determines the input operation signal and lowers the intake grille 320.

[0530] When the intake grille 320 is lowered, the user may adjust a descending length of the intake grille 320. In this embodiment, the intake grille 320 may be differentially lowered to 1 m, 2 m, 3 m, and 4.5 m.

[0531] The controller determines the input operation signal to operate the first unit 510 and the second unit 520 at the same time and determines rotation amounts of the drum motors 540 respectively disposed in the first unit 510 and the second unit 520.

[0532] When operating the drum motors 540 of the first unit 510 and the second unit 520 at the same time, revolutions per minute (RPMs) and rotation speeds of the drum motors 540 must be matched to prevent inclination of the intake grille 320. To this end, the drum motors 540 of the first unit 510 and the second unit 520 may be synchronized.

[0533] In this embodiment, when each drum motor 540 rotates each drum 530 in a first direction (e.g., counterclockwise direction), the intake grille 320 is lowered. Conversely, when each drum motor 540 rotates each drum 530 in a second direction (e.g., a clockwise direction) opposite to the first direction, the intake grille 320 is lifted.

[0534] Also, when each drum motor 540 rotates each drum 530, the rotation amount detecting device 600 disposed at the first unit 510 and the second unit 520 detects at least one of the RPM or rotation speed of the drum 530.

[0535] The controller monitors data sensed by the rotation amount sensing device 600 and determines whether each drum 530 is rotated at the same speed.

[0536] If steps on both sides by the first unit 510 and the second unit 520 are not equal, correction may be performed on the number of counting of the rotation detecting factor 601 in a stop state to correct the step. In this embodiment, the counted number of the rotation detecting factor 601 is corrected up to three times and the elevator 500 is driven.

[0537] Also, the controller monitors the descending or elevating process of the intake grille 320 by the elevator 500 through the rotation amount detecting device 600.

[0538] When the rotation of any one of the drums 530 is stopped in the process of ascending or descending, each drum motor 540 is immediately stopped to prevent a possibility of tilting or falling of the intake grille 320.

[0539] By the operation of each drum motor 540, four wires 511, 512, 521, and 522 are simultaneously unwound from each drum 530. Each wire 511, 512, 521, and 522 passes through the fourth roller 554, the third roller 553, the second roller 552, and the first roller 551. Each wire 511, 512, 521, and 522 extending in the horizontal direction from each unit case 590 is changed in direction toward the ground from the guider 750 located in the horizontal direction of each unit case 590.

[0540] Each wire 511, 512, 521, and 522 may be moved downward in the up-down direction of the guider 750 while being supported on the upper surface of each guider 750. Through this process, the other ends of the wires 511, 512, 521, and 522 fixed to the wire fixing portion 329 of the intake grille 320 are simultaneously lowered downward.

[0541] Each wire fixing portion 329 is located below each guider 750, and each wire 511, 512, 521, and 522 extends in the up-down direction.

[0542] That is, since the wire fixing portion 329 is disposed below the guider 750 supporting the wire, shaking is

minimized in the process of moving each wire 511, 512, 521, and 522 up and down. In addition, since the wires 511, 512, 521, and 522 are supported by four guiders 750, a load may be evenly distributed and the load applied to the rollers of the roller boxes may be minimized.

[0543] In addition, since the guider 750 and the roller box 550 are fixed structures, the wires are not shaken in a state of being supported by the guider 750 and the first roller 551.

[0544] Since the wire fixing portion 329 is a structure which may be shaken during the ascending or descending process of the intake grille 320 and the wire fixing portion 329 is disposed below the guider 750, a wire length between the guider 750 and the wire fixing portion 329 is minimized.

[0545] That is, since the guider 750 and the wire fixing portion 329 are arranged in the up-down direction, a length of the wire unwound in the descending process of the intake grille 320 is minimized. If the wires are arranged diagonally, it is necessary to unwind the wires longer than those in the up-down direction when the intake grille is lowered.

[0546] Next, a lifting process of the elevator 500 will be described in detail.

[0547] In a state where the intake grille 320 is lowered, the controller may lift the intake grille 320 to its original position upon receiving the user's operation signal.

[0548] The controller rotates the drums 530 of the first unit 510 and the second unit 520 in a clockwise direction to return the intake grille 320 to the initial position.

[0549] The controller maintains the rotation amount and rotation speed of each drum 530 to be the same, thereby lifting the intake grille 320 in a horizontal state.

[0550] When the intake grille 320 is lifted, the wire fixing portion 329 is moved upward in a vertical direction and the ends of the wires are also moved upward from the lower side.

[0551] According to the rotation of the drums 530, the 1-1 wire 511 and the 1-2 wire 512 of the first unit and the 2-1 wire 521 and the 2-2 wire 522 of the second unit 520 are simultaneously wound around the drums 520, respectively.

[0552] When the drum 530 of the first unit 510 rotates, the 1-1 wire 511 and the 1-2 wire 512 are aligned and wound around a first zone 531 and a second zone 532 of the drum 530 in a horizontal direction.

[0553] The 1-1 wire 511 passes through the guider 750 in the vertical direction, turns in the horizontal direction, passes through the first roller 551, the second roller 552, the third roller 553, and the fourth roller 554, and is then wound on the outer circumferential surface of the drum body 535 of the first zone 531. After the 1-1 wire 511 is wound in a row on the outer circumferential surface of the drum body 535, the 1-1 wire is wound again on the 1-1 wire 511 wound in a row, while forming a layer.

[0554] The 1-2 wire 512 passes through the guider 750 in the vertical direction, turns in the horizontal direction, passes through the first roller 561, the second roller 562, the third roller 563, and the fourth roller 564, and is then wound on the outer circumferential surface of the drum body 535 of the second zone 532.

[0555] Meanwhile, the 2-1 wire 521 and the 2-2 wire 522 are wound on the second unit 520 which rotates simultaneously with the first unit 510 at the same rate as that of the first unit 510.

[0556] Like the first unit 510, when the drum 530 of the second unit 520 rotates, one end of the 2-1 wire 521 and one end of the 2-2 wire 522 are wound, while being aligned in the first zone 531 and the second zone 532 of the drum 530.

[0557] As in the present embodiment, the intake grille 320 includes the 1-1 wire 511, the 1-2 wire 512, the 2-1 wire 521, and the 2-2 wire 522.

[0558] In a state where the intake grille 320 is supported at four points, both sides of the intake grille 320 may be simultaneously lifted or lowered by synchronizing the rotation amount and the rotation speed of the drums 530 disposed at the first unit 510 and the second unit 520.

[0559] In the indoor unit according to the present embodiment, although the drum motor 540 disposed on the first unit 510 and the second unit 520, the controller may uniformly control the four wires through the rotation amount detecting device 600.

[0560] In addition, since the indoor unit according to the present embodiment provides the structure in which the 1-1 wire 511 and the 1-2 wire 512 are simultaneously wound or unwound by driving one drum 530, tilting of the intake grille 320 may be prevented.

[0561] Although the shaking or tilting of the intake grille 320 may be prevented through the wire guider, a possibility in which the intake grille 320 shakes due to an external force applied to the intake grille 320 cannot be excluded.

[0562] For example, when the user re-installs the pre-filter 330 and subsequently lifts the intake grille 320, the user's external force is applied to the intake grille 320, and as a result, vibration may occur in the front-rear or left-right direction.

[0563] When the elevator 500 is operated with the vibration in the front-rear or left-right direction, an amplitude of the vibration decreases as each wire is wound.

[0564] Even if the vibration of the intake grille decreases, it is not 100% certain that the intake grille 320 is located below the intake grille placement region 320a. In this situation, the first guide wall 815 and the second guide wall 825 of the guide block 800 guide the intake grille 320 to the intake grille placement region 320a.

[0565] When the intake panel 300 is lifted, if the intake grille 320 is out of the intake grille placement region 320a, the guide block 800 comes into contact with the lower end 856 of the corner frame 313 and the guide block 800 is pushed

by the lower end 856 to move to the intake grille placement region 320a.

[0566] When the guide block 800 is elevated in a normal path, the intake grille 320 is moved upward from a lower side of the intake grille placement region 320a and is not in contact with the corner frame 313.

[0567] If the guide block 800 deviates from the normal path due to vibration or the like, the outer edge of the intake grille 320 may deviate from the intake grille placement region 320a.

[0568] If the intake grille 320 is lifted, while deviating from the intake grille placement region 320a, at least one of the first guide block portion 810 or the second guide block portion 820 interferes with the lower end 856 of the corner frame 313 and moves the entire intake grille 320 to the intake grille placement region 320a.

[0569] For example, if the first guide block 801 is out of the intake grille placement region 320a, the first guide block 801 may interfere with the first corner frame 313-1 and the intake grille 320 may be pushed to move toward the third guide block 803.

[0570] As another example, if the first guide block 801 and the second guide block 802 is out of the intake grille placement region 320a, the first guide block 801 may interfere with the first corner frame 313-1, the second guide block 802 may interfere with the second corner frame 313-2, and the intake grille 320 may be pushed to move toward the third guide block 803 and the fourth guide block 804.

[0571] The embodiments have been described with reference to the accompanying drawings but various modifications may be made without being limited thereto and it will be understood by those of skill in the art that various changes in form and details may be made without departing from the spirit and scope of the present invention as set forth in the following claims. Therefore, the embodiments described above are merely illustrative and should not be understood as a limitation of the present disclosure.

[Description of reference numeral]

100:	case	101:	inlet
102:	outlet	103:	intake flow path
104:	discharge flow path	110:	case housing
120:	front panel	130:	indoor heat exchanger
140:	indoor blower fan	200:	vane module
300:	front module	310:	front body
320:	intake grille	321:	grille hole
322:	grille body	323:	grille
324:	grille body portion	329:	wire fixing portion
330:	pre-filter	500:	elevator
600:	rotation amount detecting device	700:	wire guider
701:	first wire guider	702:	second wire guider
703:	third wire guider	704:	fourth wire guider
710:	fixed block	720:	assembled block
730:	fixed block body	740:	assembled block body
750:	guider	800:	guide block
810:	first guide block portion	820:	second guide block portion

Claims

1. A ceiling-type indoor unit of an air-conditioner, the ceiling-type indoor unit comprising:

a case installed on an interior ceiling in a suspended manner and having an inlet and an outlet provided downward;
an intake grille disposed to be separable from the case and covering the inlet of the case;
an intake grille placement region disposed on a bottom surface of the case, having a portion forming the inlet, and allowing the intake grille to be located therein;
a first unit disposed in the case, coupled to the intake grille through a 1-1 wire and a 1-2 wire, and lifting or lowering one side of the intake grille by simultaneously winding or unwinding the 1-1 wire and the 1-2 wire;
a second unit disposed in the case, coupled to the intake grille through a 2-1 wire and a 2-2 wire, and lifting or lowering the other side of the intake grille by simultaneously winding or unwinding the 2-1 wire and the 2-2 wire; and
a guide block disposed at the intake grille, mutually interfering with the case when the intake grille is lifted, and guiding the intake grille to the intake grille placement region.

2. The ceiling-type indoor unit of claim 1, further comprising:

a corner frame forming a part of the intake grille placement region,
wherein the guide block comprises a guide wall mutually interfering with the corner frame when the intake grille is lifted, and the guide wall is disposed inclined downward toward an outer side of the intake grille.

3. The ceiling-type indoor unit of claim 2, wherein
the corner frame comprises:

a corner frame body;
an insertion space formed to be concave from a lower side to an upper side of the corner frame body and allowing the guide block to be inserted therein; and
a corner inner side wall configuring the corner frame body and extending from the corner frame body to form a part of the insertion space,
wherein the guide wall mutually interferes with a lower end of the corner inner side wall when the intake grille is lifted.

4. The ceiling-type indoor unit of claim 1, wherein
the guide block comprises:

a first guide block portion disposed at the intake panel; and
a second guide block portion assembled to the intake panel and intersecting the first guide block portion to form an included angle B.

5. The ceiling-type indoor unit of claim 4, wherein
the first guide block portion and the second guide block portion are disposed to be perpendicular to each other with the included angle B therebetween in a top view.

6. The ceiling-type indoor unit of claim 4, wherein
the first guide block portion and the second guide block portion are integrally formed.

7. The ceiling-type indoor unit of claim 4, further comprising:

a corner frame forming a part of the intake grille placement region,
wherein the first guide block portion comprises a first guide wall mutually interfering with the corner frame when the intake grille is lifted, and
the first guide wall is disposed to be inclined downward toward an outer side of the intake grille.

8. The ceiling-type indoor unit of claim 7, wherein
the first guide wall is located on an upper side with respect to an upper surface of the intake grille.

9. The ceiling-type indoor unit of claim 4, wherein
the first guide block portion comprises a first guide wall mutually interfering with a structure adjacent to the case when the intake grille is lifted,
the second guide block portion comprises a second guide wall mutually interfering with the structure adjacent to the case when the intake grille is lifted,
the first guide wall is disposed to be inclined downward toward an outer side of the intake grille, and the second guide wall is disposed to be inclined downward toward the outer side of the intake grille.

10. The ceiling-type indoor unit of claim 9, wherein
the first guide wall and the second guide wall are located on an upper side with respect to an upper surface of the intake grille.

11. The ceiling-type indoor unit of claim 9, further comprising:

a corner frame forming a part of the intake grille placement region,
wherein the corner frame comprises:

a corner frame body;
an insertion space formed to be concave from a lower side to an upper side of the corner frame body and allowing the guide block to be inserted therein;
a first corner inner side wall configuring the corner frame body and extending from the corner frame body to form a part of the insertion space;
a second corner inner side wall configuring the corner frame body, extending from the corner frame body to form a part of the insertion space, and forming a predetermined included angle with the first corner inner side wall; and
a corner upper side wall configuring the corner frame body, connecting the first corner inner side wall and the second corner inner side wall, and allowing the insertion space to be located on a lower side thereof,
wherein the first guide wall mutually interferes with a lower end of the first corner inner side wall or the second guide wall mutually interferes with a lower end of the second corner inner side wall, when the intake grille is lifted.

12. The ceiling-type indoor unit of claim 4, wherein
the first guide block portion comprises:

a first side wall formed in an up-down direction and disposed to face an inside of the intake panel;
a second side wall formed in the up-down direction, opposing the first side wall, and disposed to face an outside of the intake panel;
a third side wall formed in the up-down direction and connecting the first side wall and the second side wall;
an upper side wall disposed to face an upper side and connecting the first side wall and the third side wall; and
a first guide wall connecting the upper side wall and the second side wall and disposed to be inclined downward from the upper side wall toward the second side wall.

13. The ceiling-type indoor unit of claim 12, further comprising:
an inner wall connecting the first side wall, the second side wall, and the upper side wall and disposed below the upper side wall.

14. The ceiling-type indoor unit of claim 4, wherein
the first guide block portion comprises:

a first side wall formed in an up-down direction and disposed to face an inner side of the intake panel;
a second side wall formed in the up-down direction, opposing the first side wall, and disposed to face an outer side of the intake panel;
a third side wall formed in the up-down direction and connecting the first side wall and the second side wall;
an upper side wall disposed to face an upper side and connecting the first side wall and the third side wall; and
a first guide wall connecting the upper side wall and the second side wall and disposed to be inclined downward from the upper side wall toward the second side wall, and
the second guide block portion comprises:

a first side wall formed in the up-down direction and disposed to face an inner side of the intake panel;
a second side wall formed in the up-down direction, opposing the first side wall, and disposed to face an outer side of the intake panel;
a third side wall formed in the up-down direction and connecting the first side wall and the second side wall;
an upper side wall disposed to face an upper side and connecting the first side wall and the third side wall; and
a second guide wall connecting the upper side wall and the second side wall and disposed to be inclined downward from the upper side wall toward the second side wall.

15. The ceiling-type indoor unit of claim 14, further comprising:

a corner frame forming a part of the intake grille placement region,
wherein the corner frame comprises:

a corner frame body;
an insertion space formed to be concave from a lower side to an upper side of the corner frame body and allowing the guide block to be inserted therein;
a first corner inner side wall configuring the corner frame body and extending from the corner frame body

to form a part of the insertion space; and
a second corner inner side wall configuring the corner frame body, extending from the corner frame body to form a part of the insertion space, and forming a predetermined included angle with the first corner inner side wall,
wherein the first guide wall mutually interferes with a lower end of the first corner inner side wall or the second guide wall mutually interferes with a lower end of the second corner inner side wall, when the intake grille is lifted.

16. The ceiling-type indoor unit of claim 1, wherein
at least two guide blocks are arranged and disposed opposite to each other based on a center O of the intake panel.

17. The ceiling-type indoor unit of claim 1, wherein
the guide block is disposed on an upper surface of the intake panel and protrudes upward from the upper surface of the intake panel.

18. The ceiling-type indoor unit of claim 1, wherein
the case comprises:

a case housing in which a bottom surface is open; and
a front body assembled to a lower side of the case housing, covering the bottom surface of the case housing, having the intake grille placement region provided therein, and having a plurality of outlets provided outside the intake grille placement region,
wherein the guide block comprises a first guide block, a second guide block, a third guide block, and a fourth guide block, and the first guide block, the second guide block, the third guide block, and the fourth guide block are located at four corners of the front body.

19. The ceiling-type indoor unit of claim 18, wherein
the first guide block and the third guide block are arranged to face each other based on a center O of the intake grille and the second guide block and the fourth guide block are arranged to face each other based on the center O of the intake grille.

20. The ceiling-type indoor unit of claim 18, wherein
the front body further comprises a first corner frame, a second corner frame, a third corner frame, and a fourth corner frame arranged at the four corners, respectively, and forming a part of the intake grille placement region, and
the first guide block mutually interferes with the first corner frame, the second guide block mutually interferes with the second corner frame, the third guide block mutually interferes with the third corner frame, and the fourth guide block mutually interferes with the fourth corner frame.

21. The ceiling-type indoor unit of claim 20, wherein
the intake grille comprises:

a grille having a plurality of grille holes; and
a grille body portion in which an inner edge is disposed to surround the grille and an outer edge is in contact with a plurality of outlets,
wherein the first guide block is disposed at the grille body portion and located adjacent to the first corner frame, the second guide block is disposed at the grille body portion and located adjacent to the second corner frame, the third guide block is disposed at the grille body portion and located adjacent to the third corner frame, and the fourth guide block is disposed at the grille body portion and located adjacent to the fourth corner frame.

22. The ceiling-type indoor unit of claim 21, wherein
the intake grille comprises:

a first grille corner portion extending from the grille body portion toward the first corner frame;
a second grille corner portion extending from the grille body portion toward the second corner frame;
a third grille corner portion extending from the grille body portion toward the third corner frame; and
a fourth grille corner portion extending from the grille body portion toward the fourth corner frame,
wherein the first guide block is disposed at the first grille corner portion, the first guide block is disposed at the second grille corner portion, the first guide block is disposed at the third grille corner portion, and the first guide

block is disposed at the fourth grille corner portion.

23. The ceiling-type indoor unit of claim 20, further comprising:

a permanent magnet disposed on one of the front body or the intake grille; and
a magnetic force fixing portion disposed on the other of the front body or the intake grille,
wherein the permanent magnet and the magnetic force fixing portion are disposed on an outer side of the guide block based on a center O of the intake grille.

24. The ceiling-type indoor unit of claim 20, further comprising:

a permanent magnet disposed on one of the front body or the intake grille;
a magnetic force fixing portion disposed on the other of the front body or the intake grille; and
a wire fixing portion disposed at the intake grille and allowing one of a 1-1 wire, a 1-2 wire, a 2-1 wire, or a 2-2 wire to be fixed thereto,
wherein the permanent magnet and the magnetic force fixing portion are disposed on an outer side of the guide block and the wire fixing portion is disposed on an inner side of the guide block, based on a center O of the intake grille.

Fig. 1

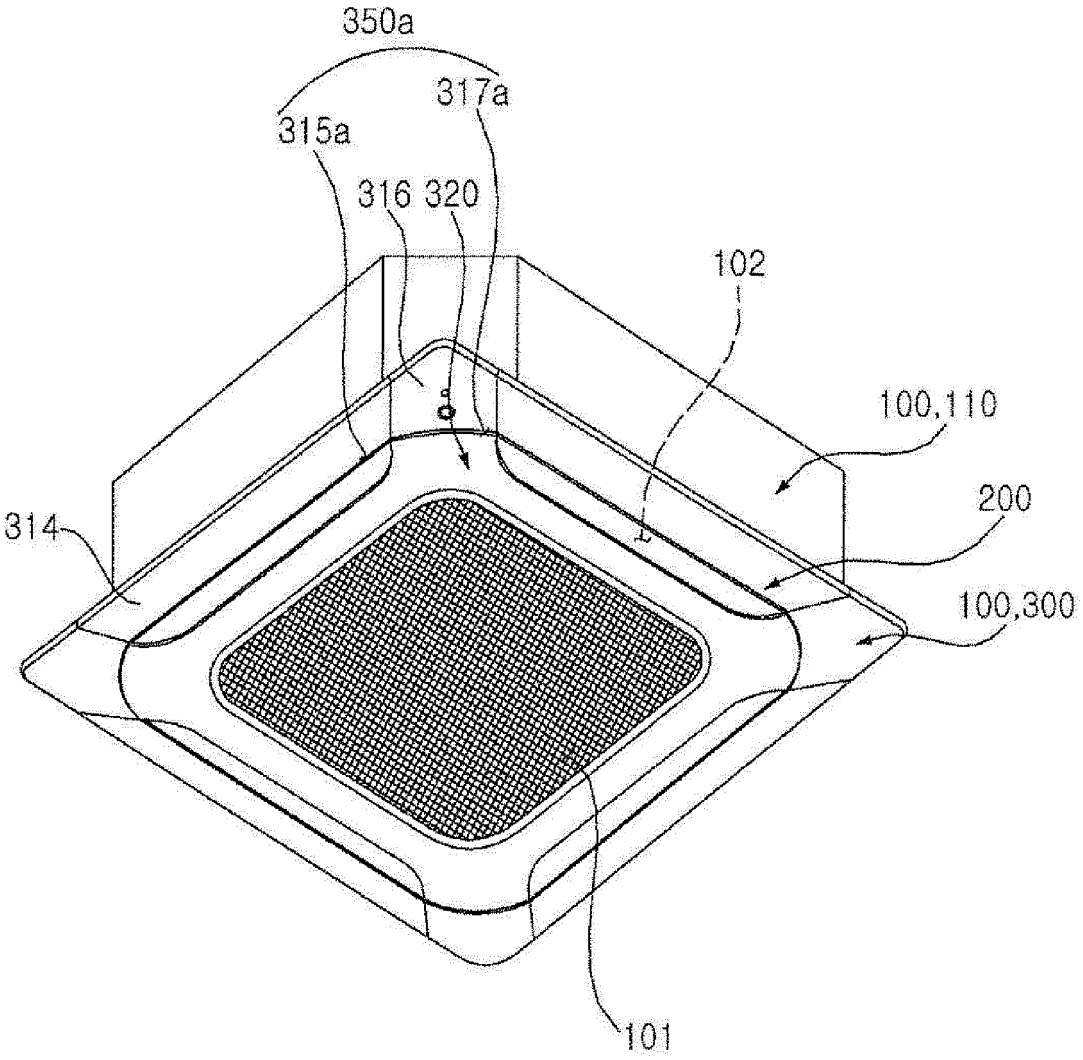

Fig. 2

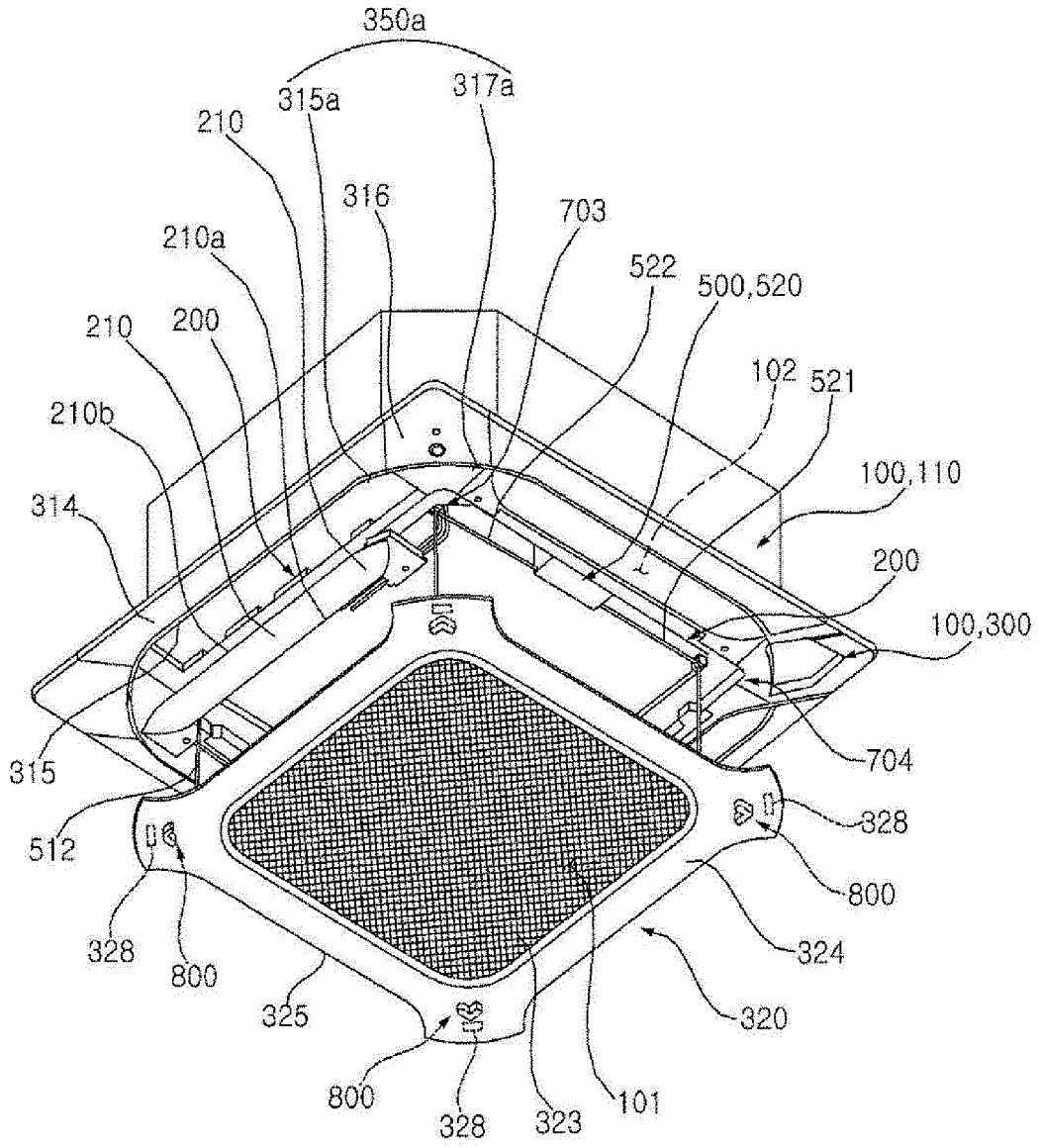
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Fig. 3

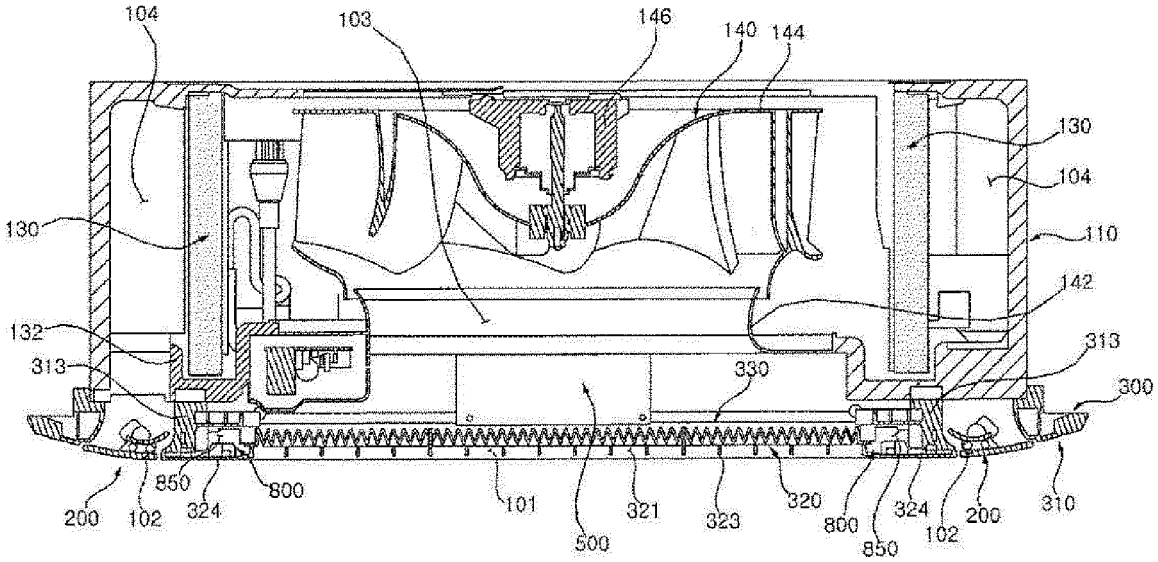
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Fig. 4

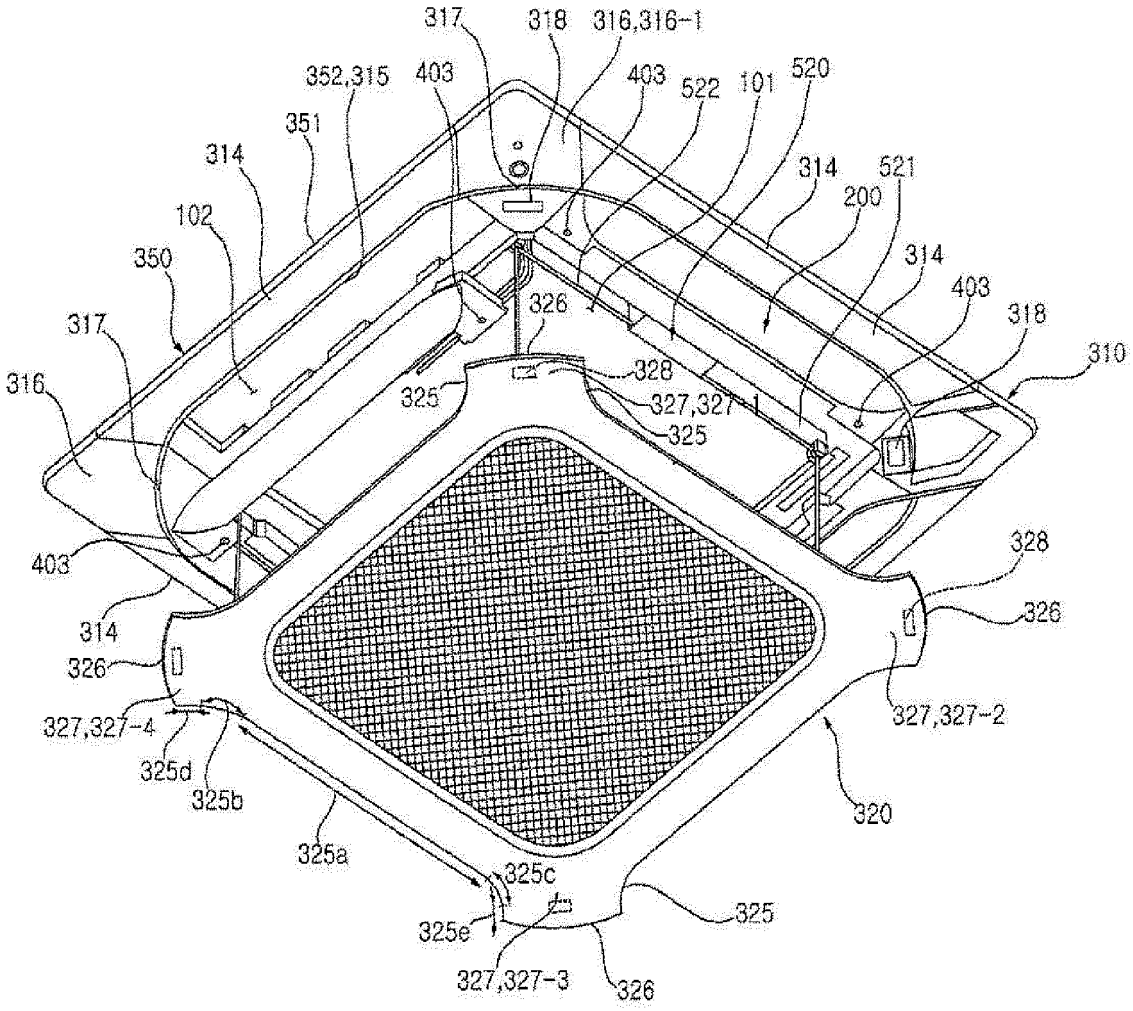
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Fig. 5

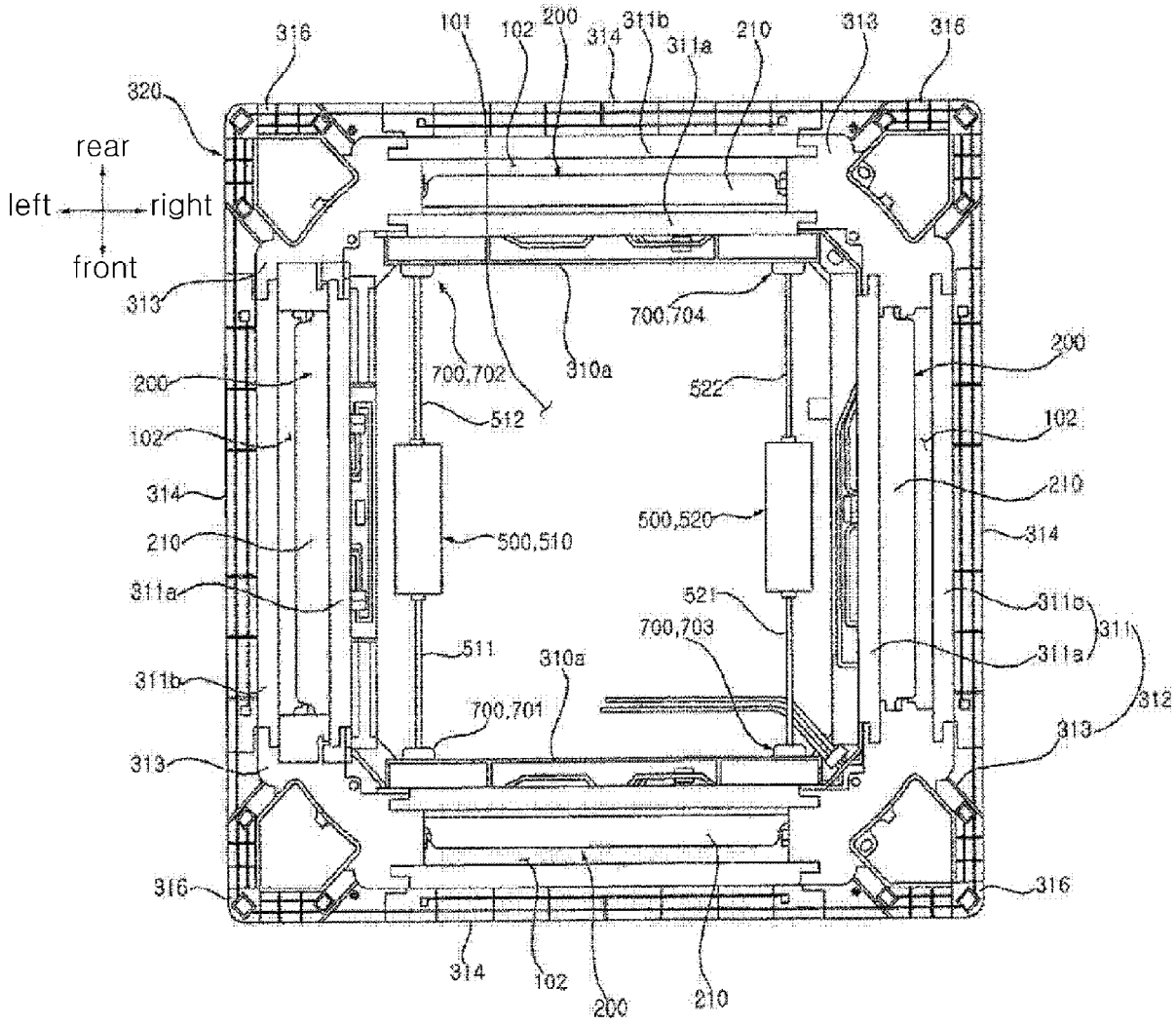
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Fig. 6

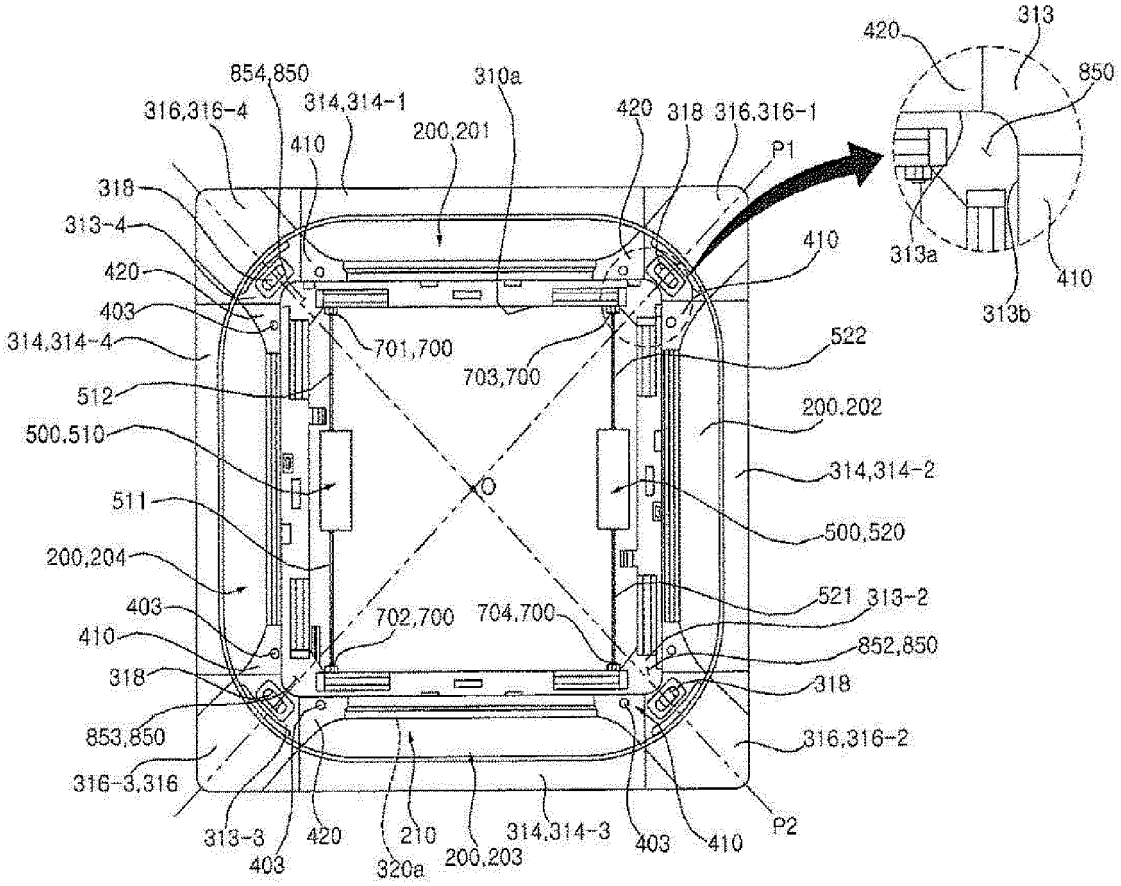
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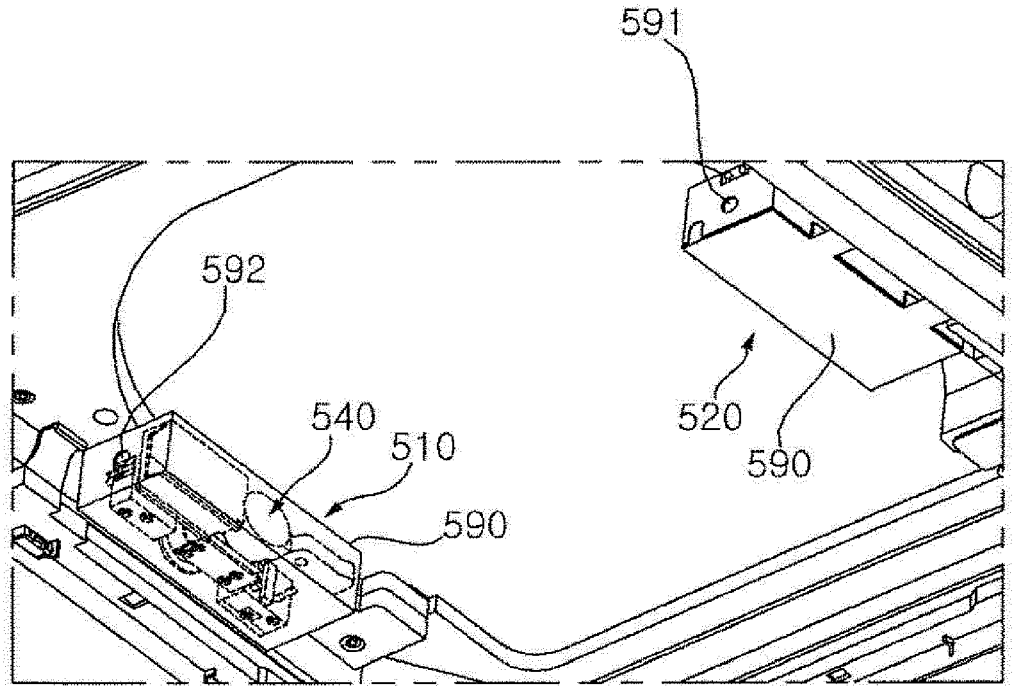
Fig. 7



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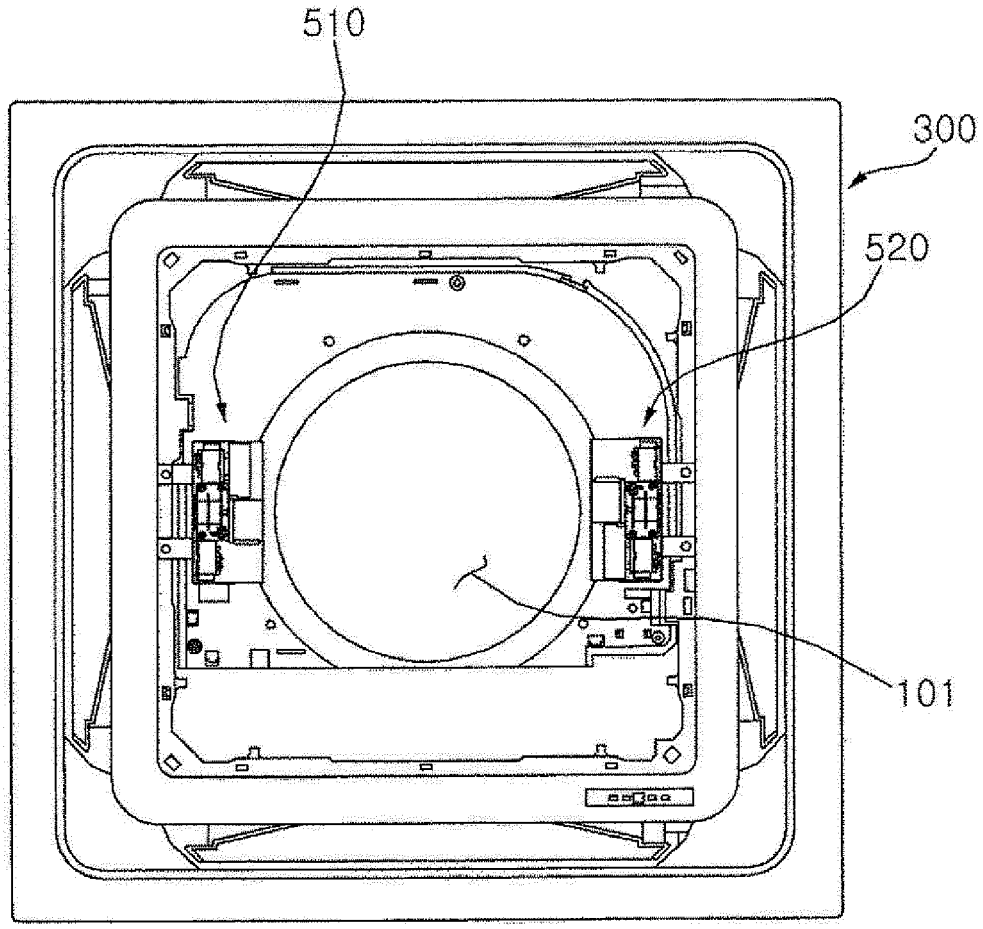

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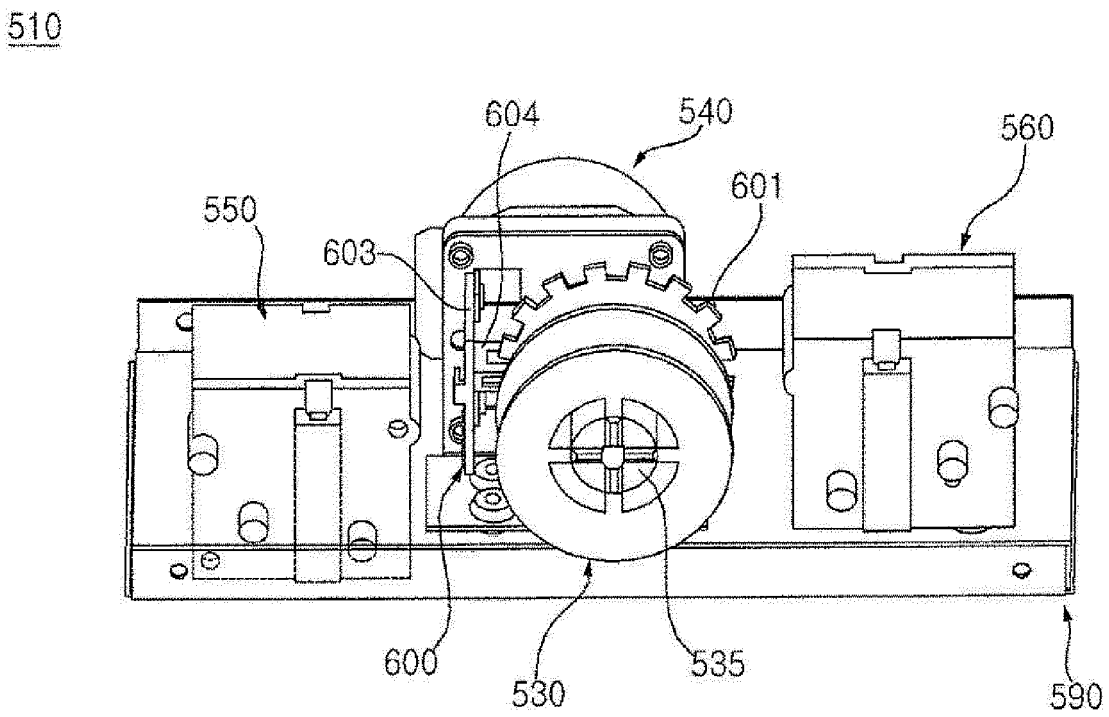

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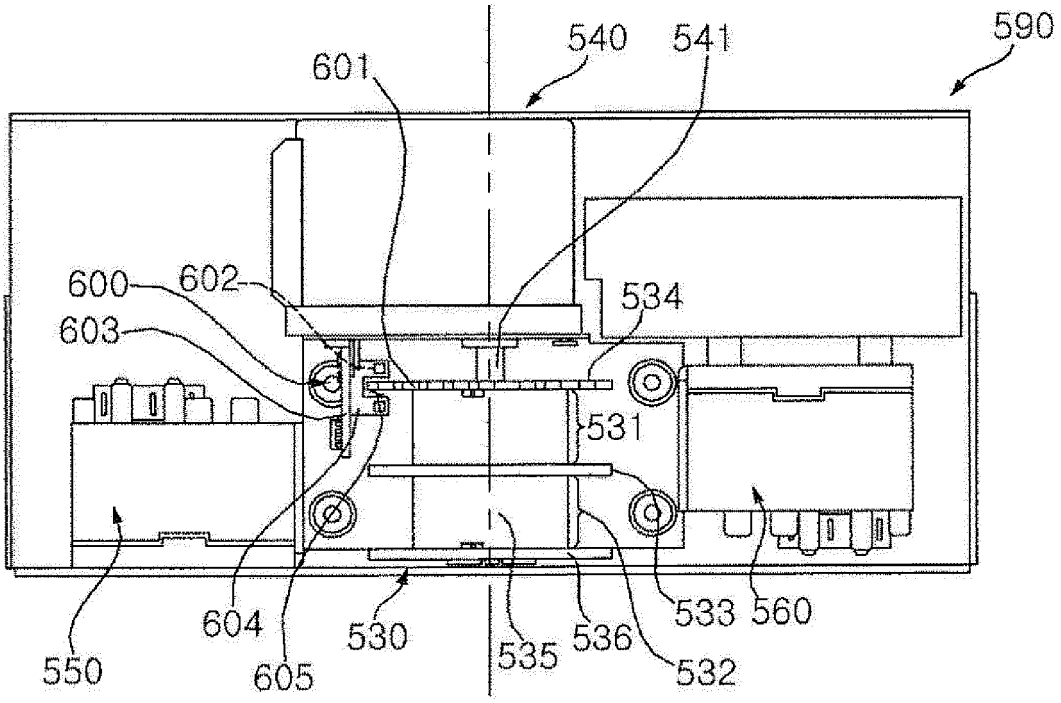
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Fig. 11

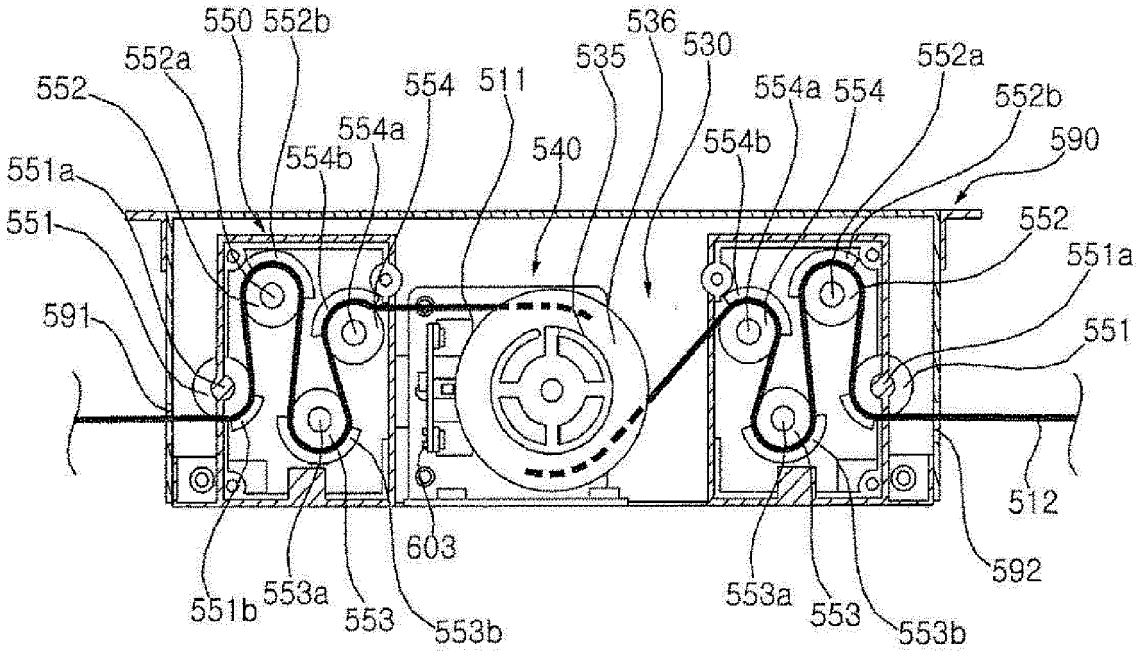
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Fig. 12

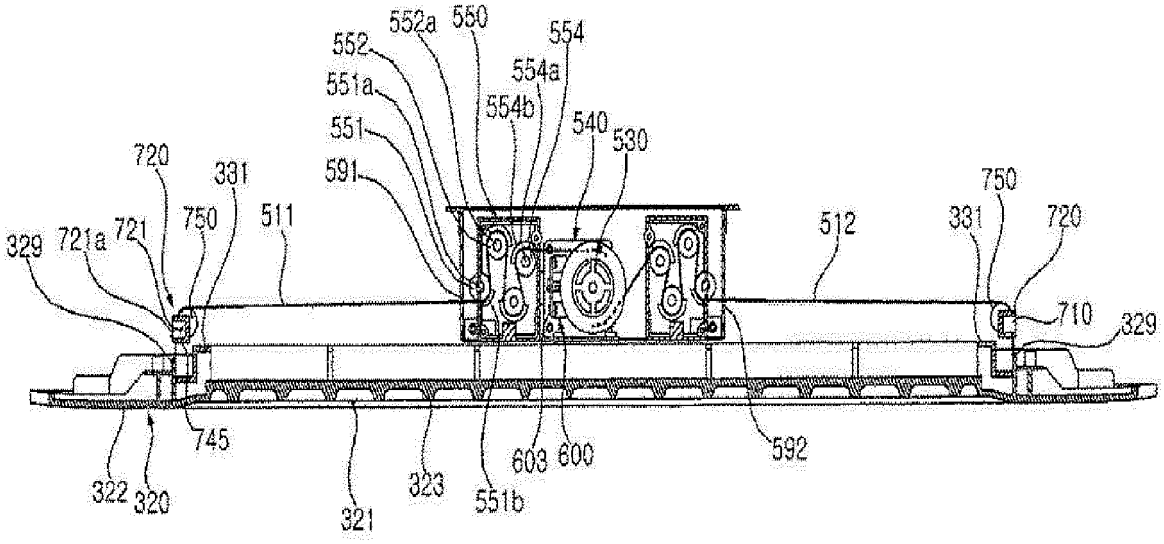
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Fig. 13

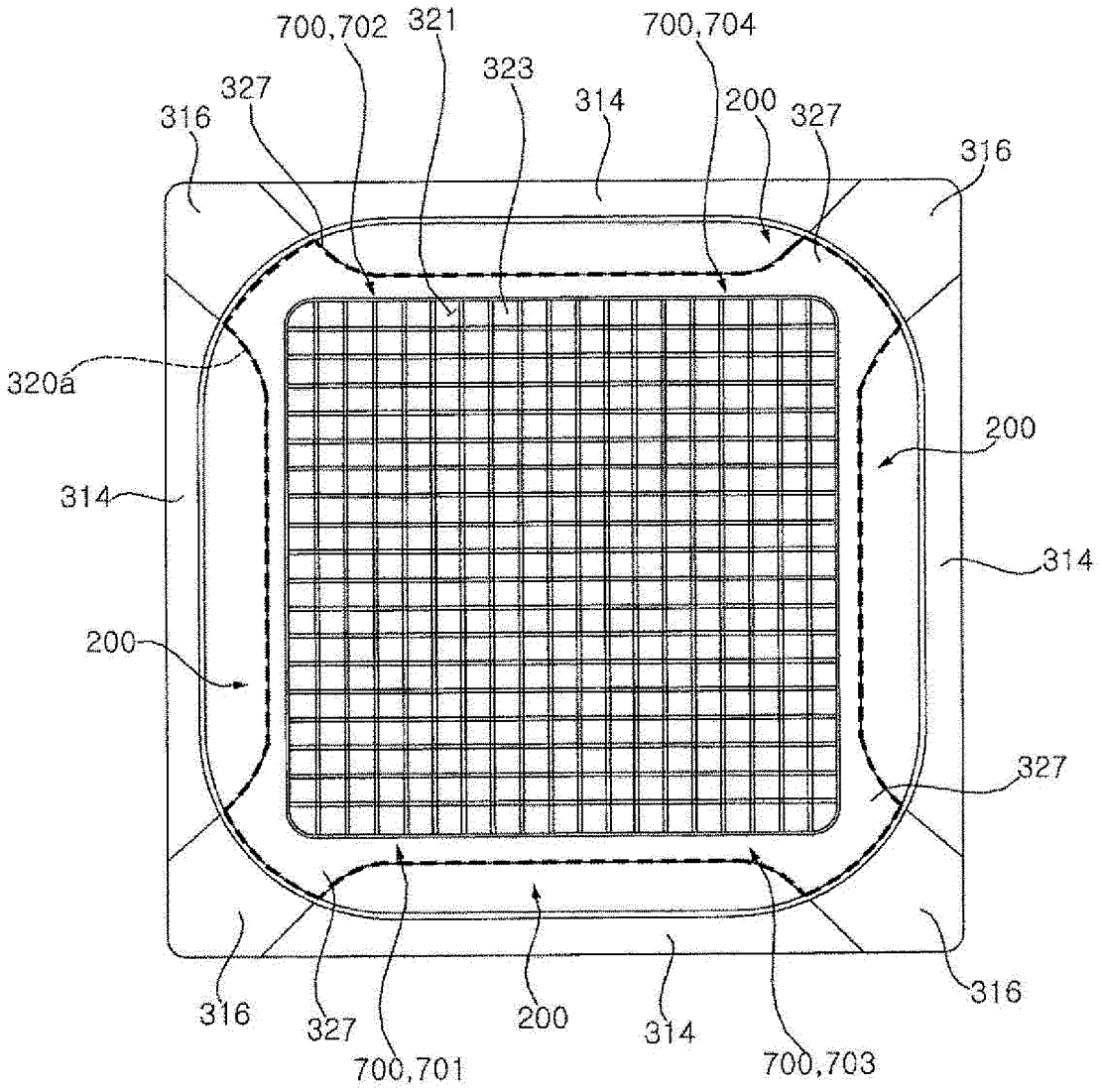
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Fig. 14

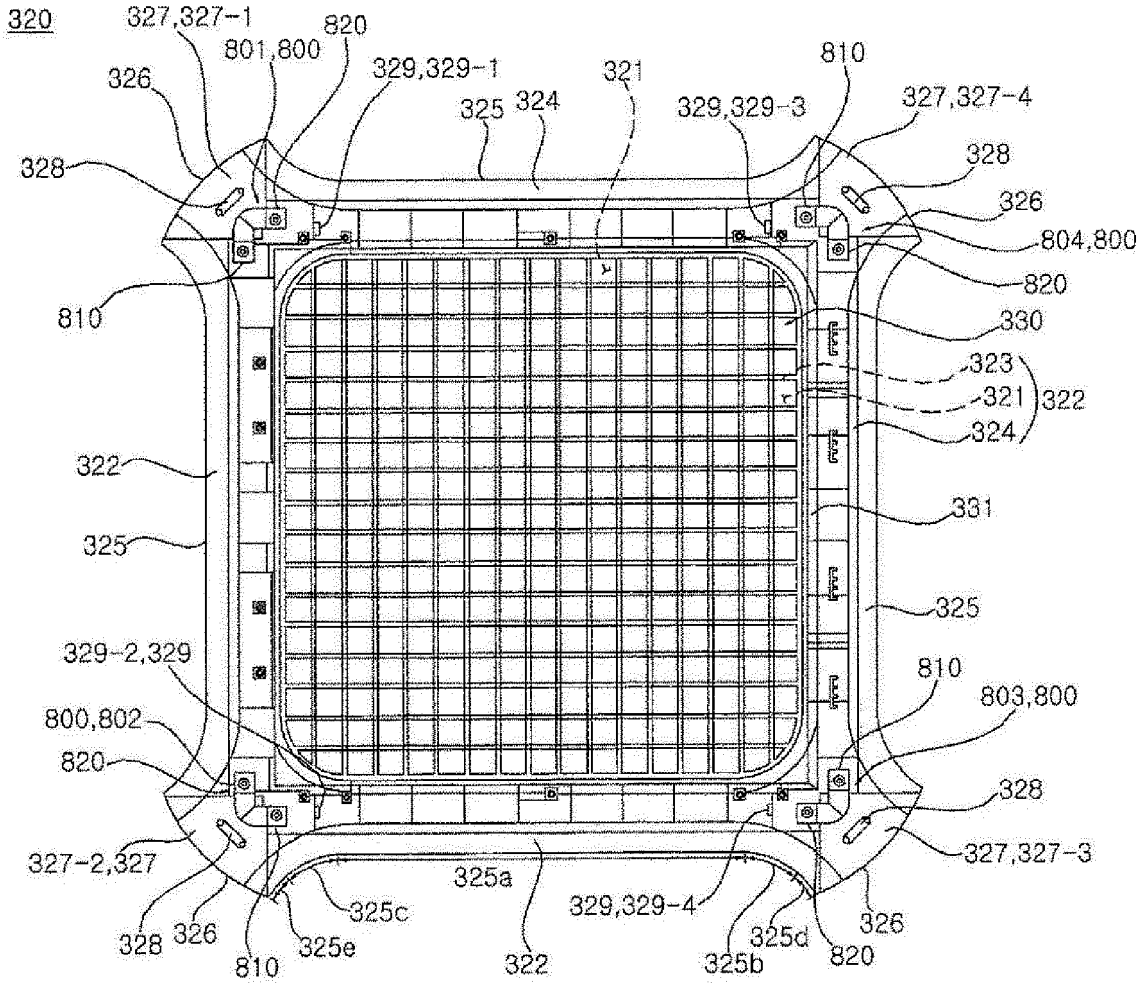
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Fig. 15

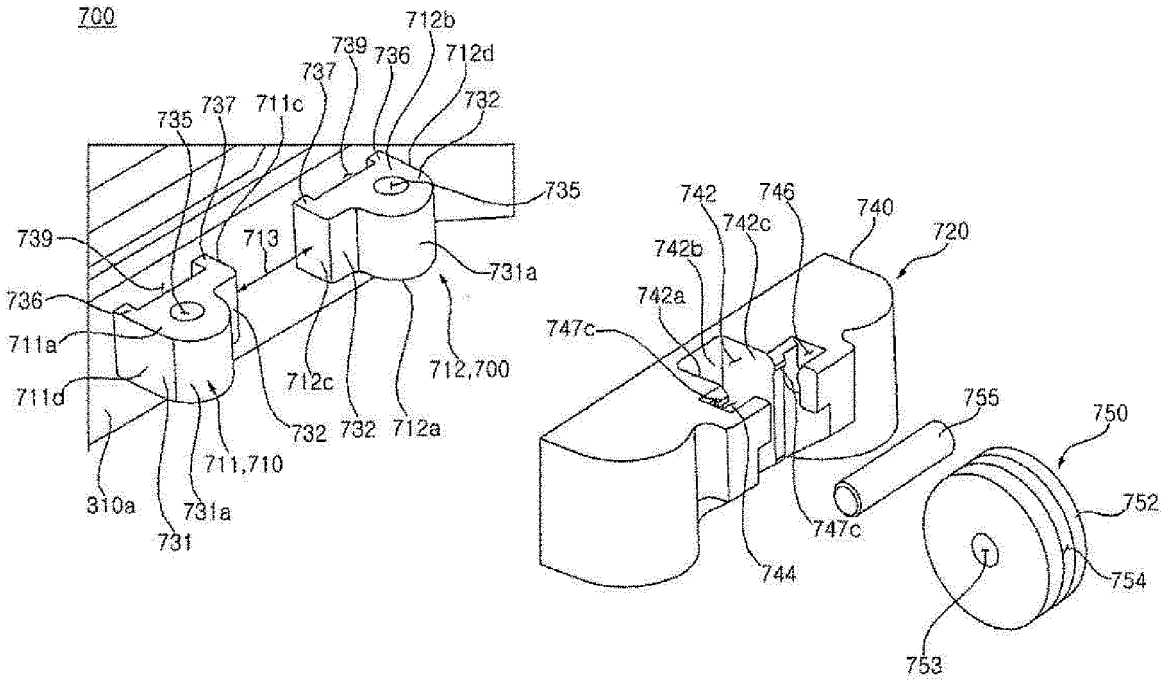
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Fig. 16

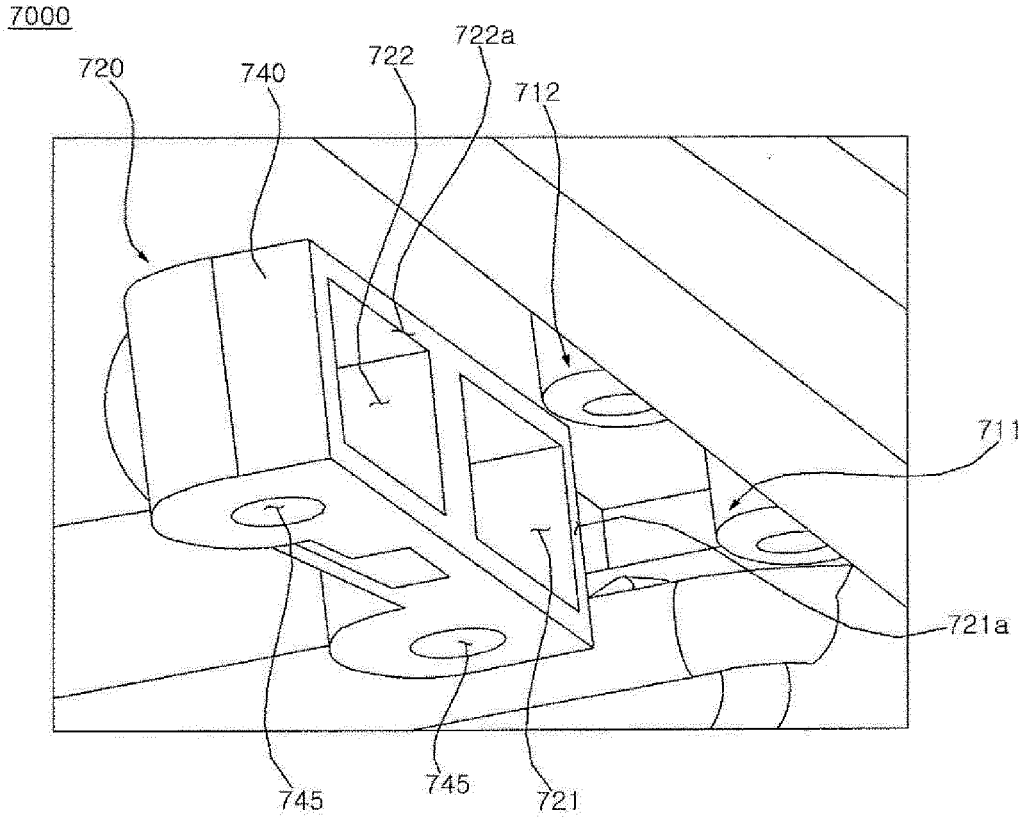

Fig. 17

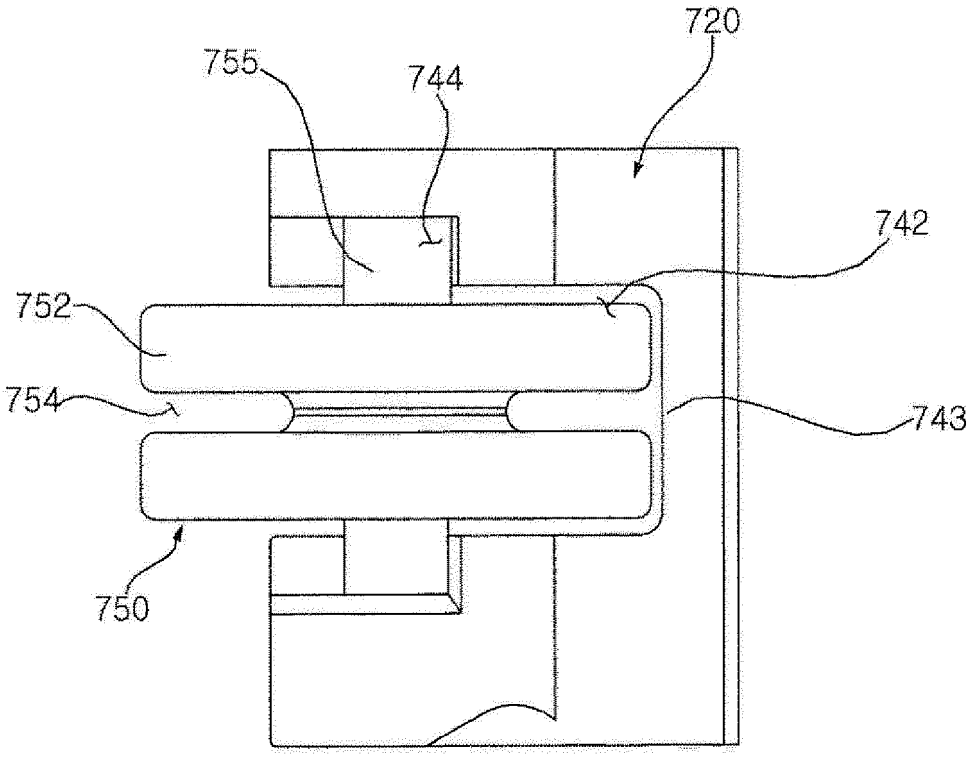

Fig. 18

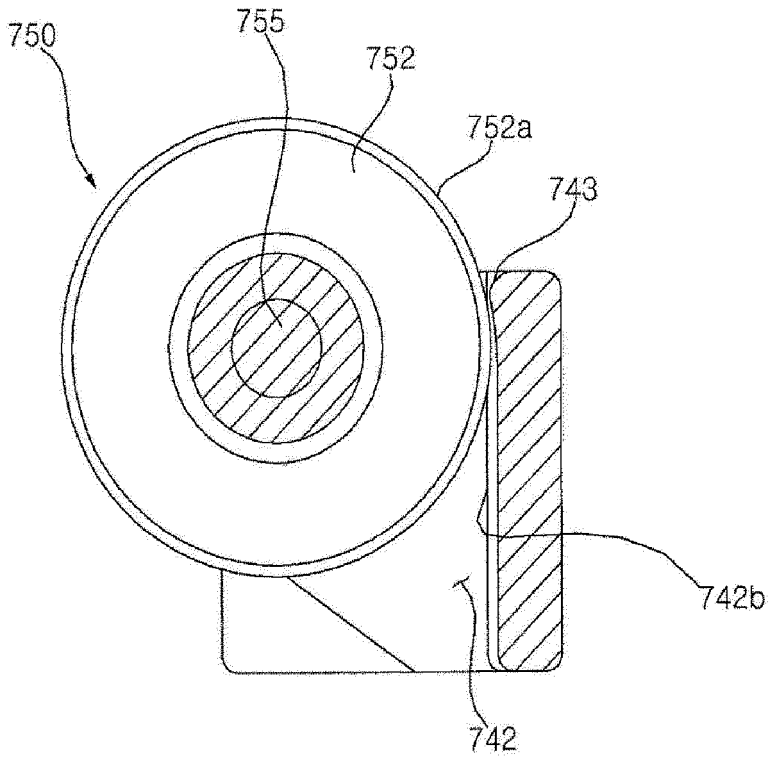

Fig. 19

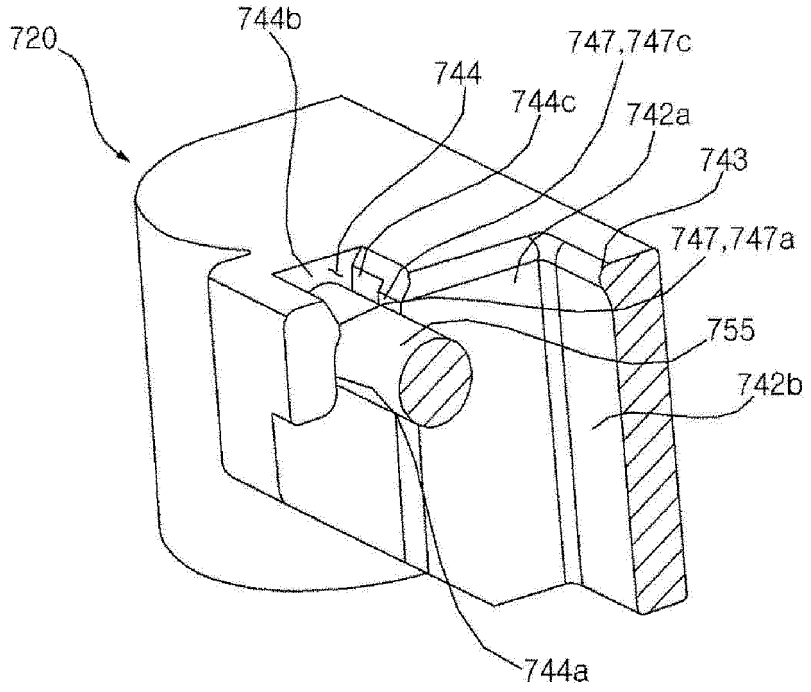

Fig. 20

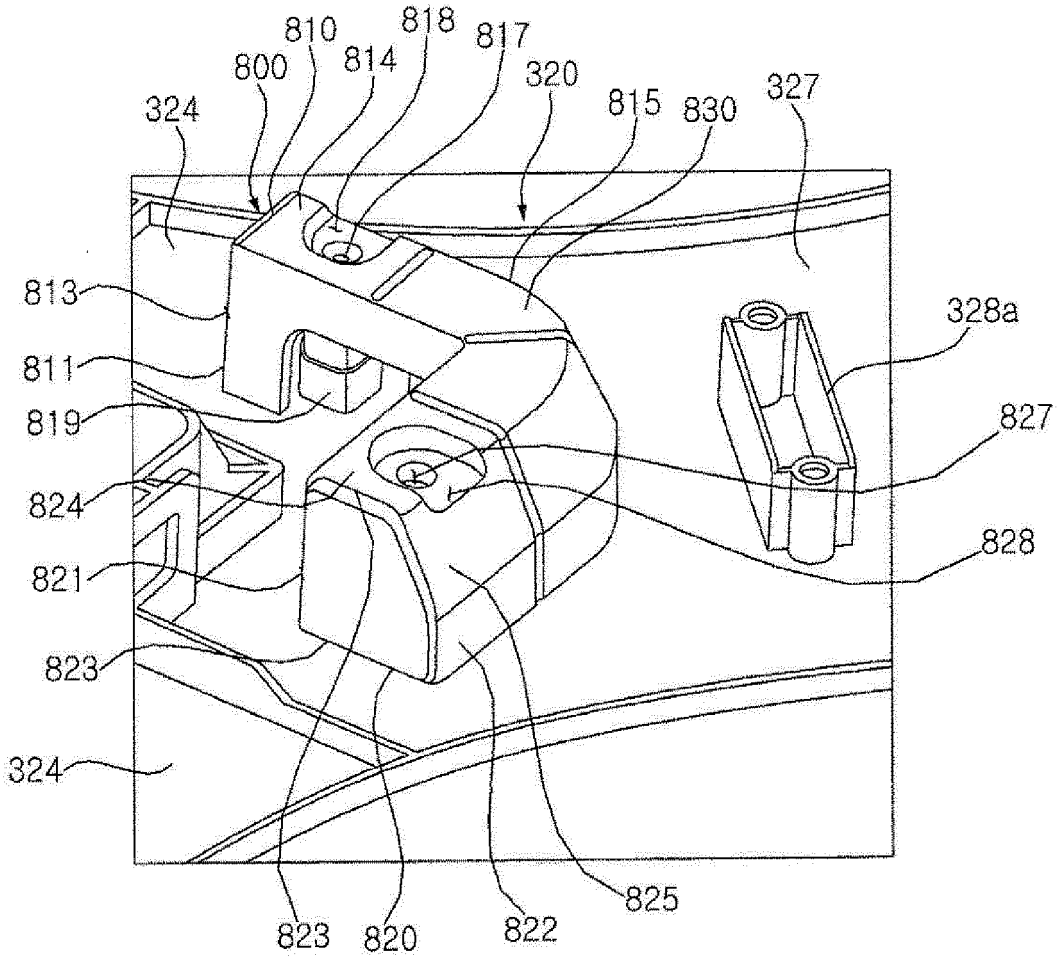
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Fig. 21

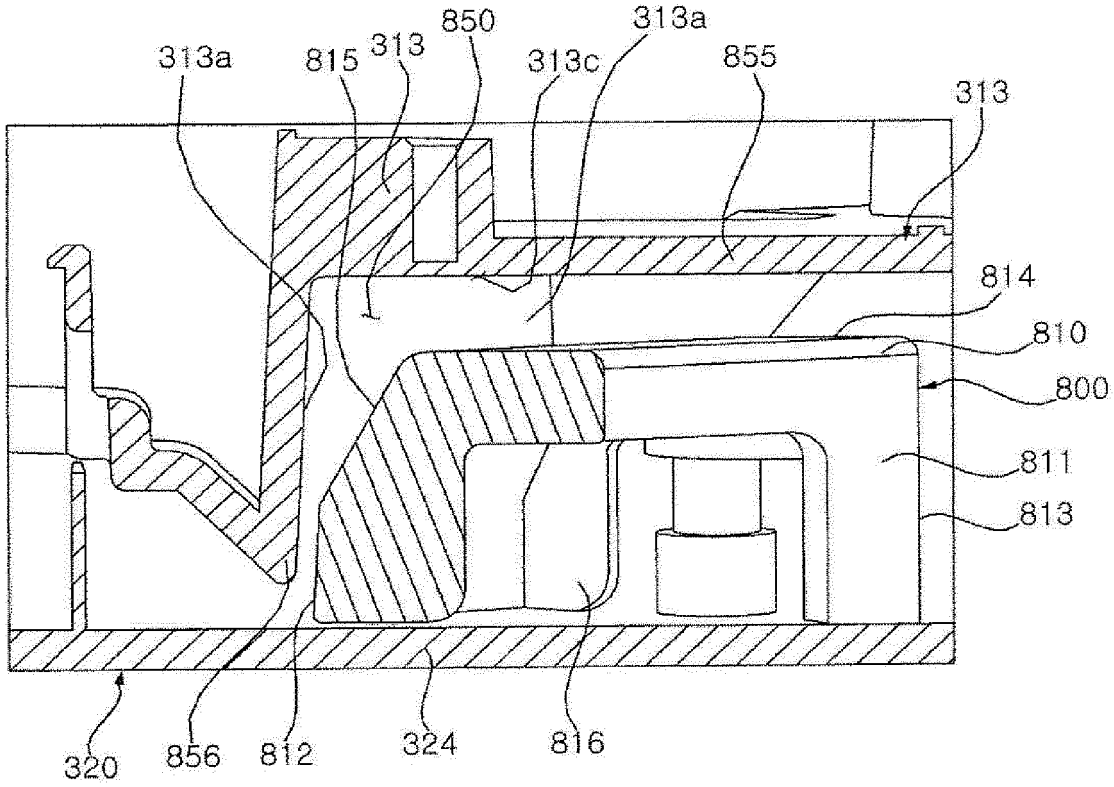
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Fig. 22

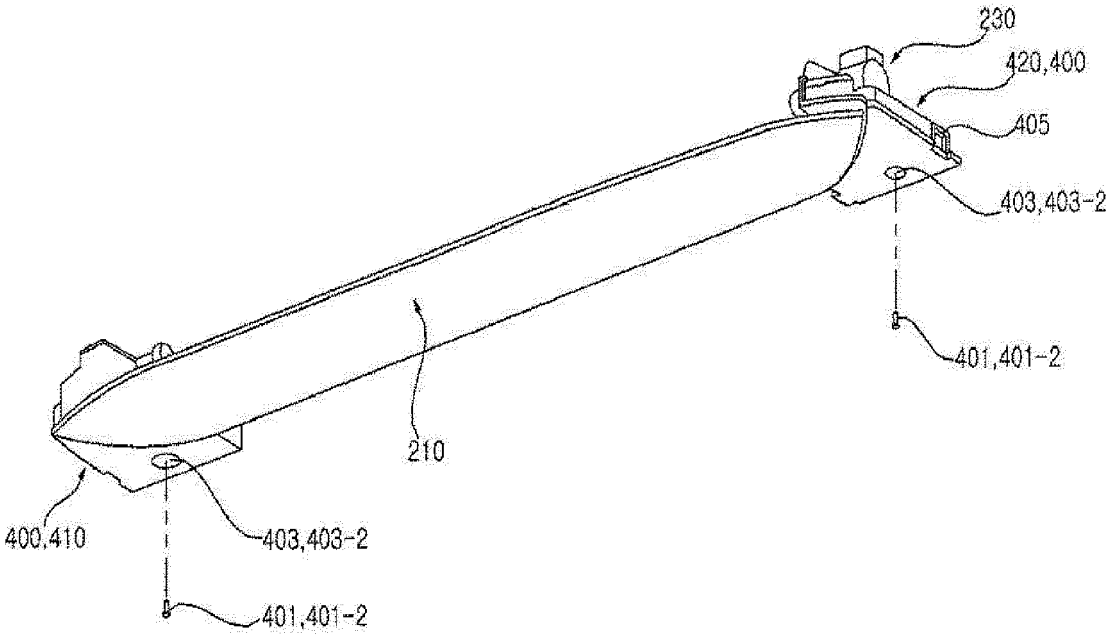

Fig. 23

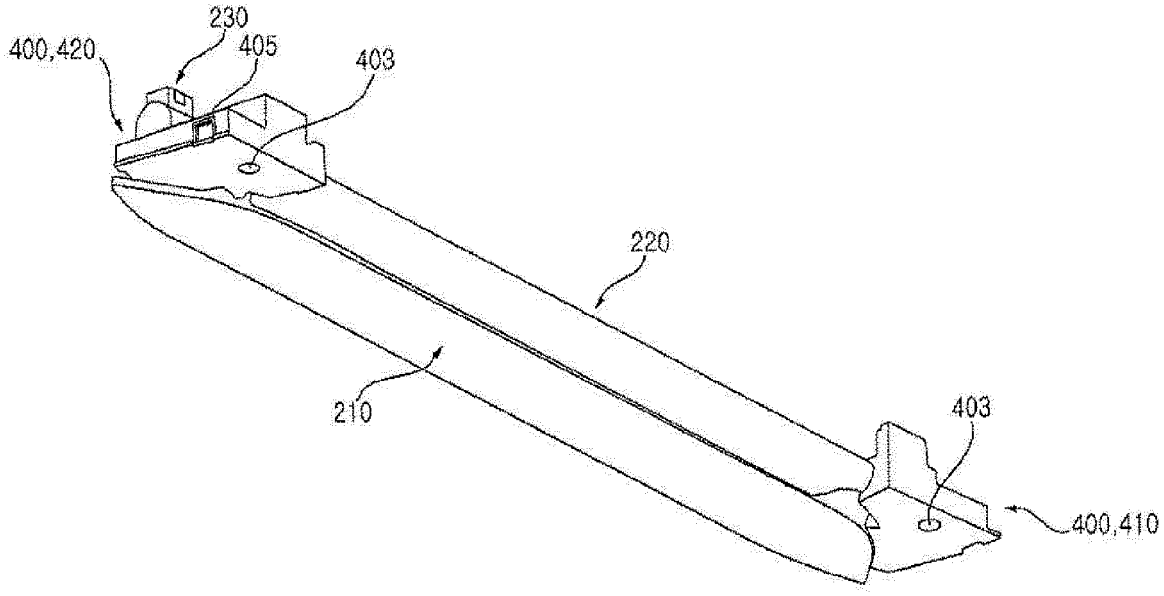
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Fig. 24

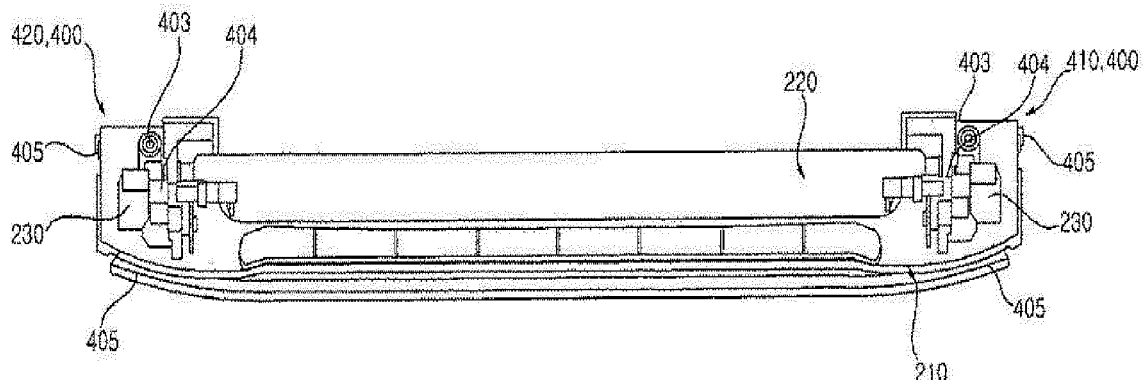
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Fig. 25

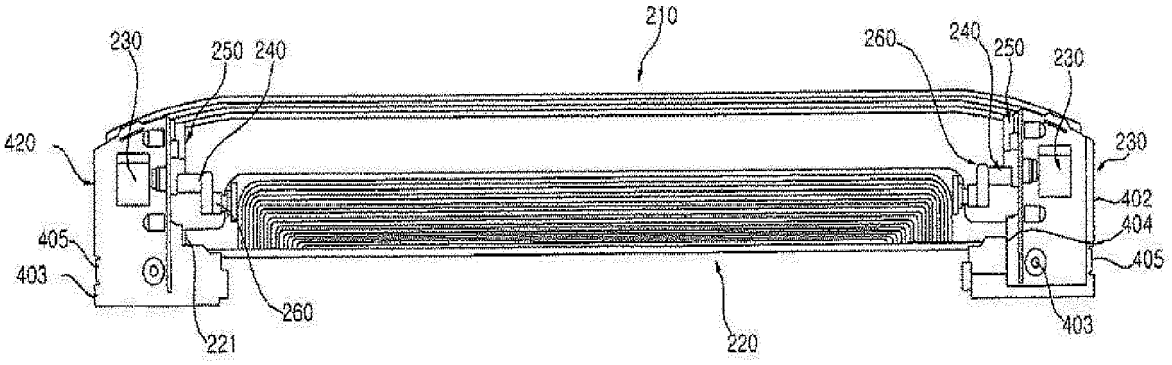
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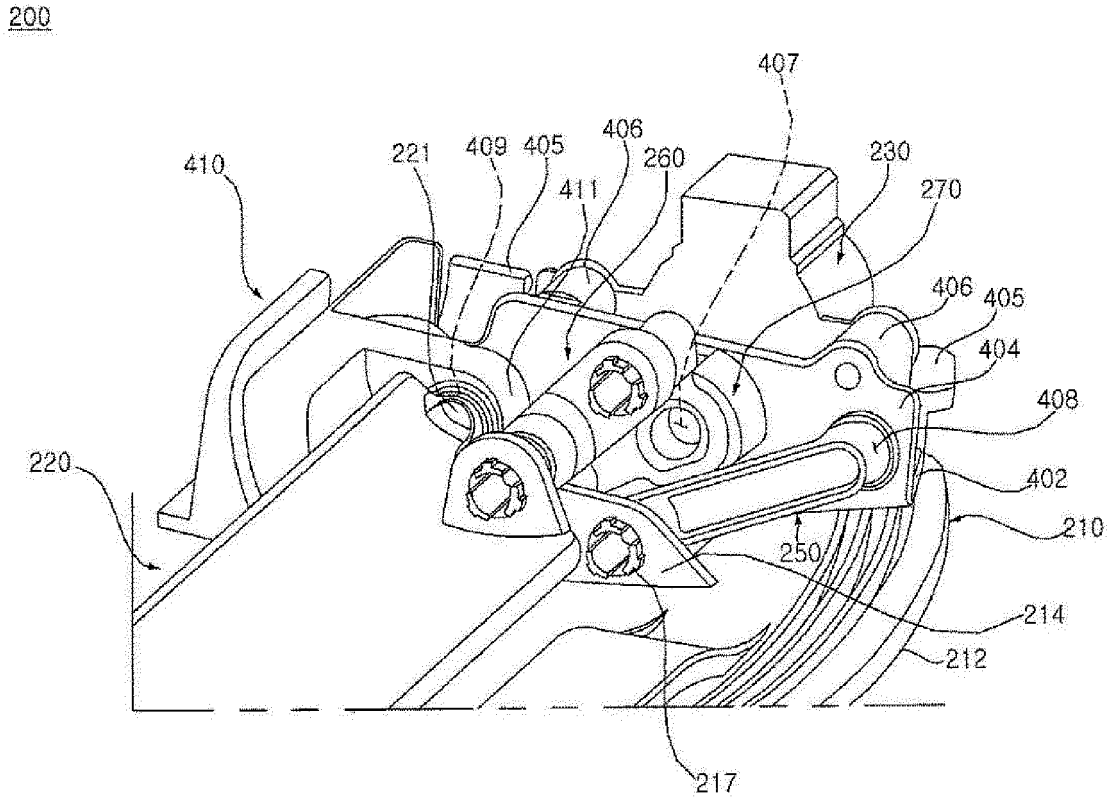
Fig. 26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INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2018/016455

A. CLASSIFICATION OF SUBJECT MATTER

F24F 1/00(2011.01)i, F24F 13/10(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

F24F 1/00; F24F 1/02; F24F 11/02; F24F 13/08; F24F 13/20; F24F 13/28; F24F 13/10

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean Utility models and applications for Utility models: IPC as above
Japanese Utility models and applications for Utility models: IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS (KIPO internal) & Keywords: ceiling, air conditioning, grill, wire, guide, guidance

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	KR 10-2010-0013472 A (SHIN, Jeong Hoon) 10 February 2010 See paragraphs [0021]-[0026]; and figure 1.	1-24
Y	KR 10-2017-0048123 A (SAMSUNG ELECTRONICS CO., LTD.) 08 May 2017 See paragraphs [0110]-[0117]; and figures 6-11.	1-24
Y	KR 20-2011-0005818 U (SAM-IL ENG CO., LTD.) 10 June 2011 See paragraph [0023]; and figure 3.	23-24
A	JP 2010-112643 A (PANASONIC CORP.) 20 May 2010 See paragraphs [0012]-[0026]; and figures 1-4.	1-24
A	JP 11-002423 A (DAIKIN IND., LTD.) 06 January 1999 See paragraphs [0017]-[0051]; and figures 1-5.	1-24

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
11 APRIL 2019 (11.04.2019)	**11 APRIL 2019 (11.04.2019)**

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/KR2018/016455

Patent document cited in search report	Publication date	Patent family member	Publication date
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Patent documents cited in the description

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