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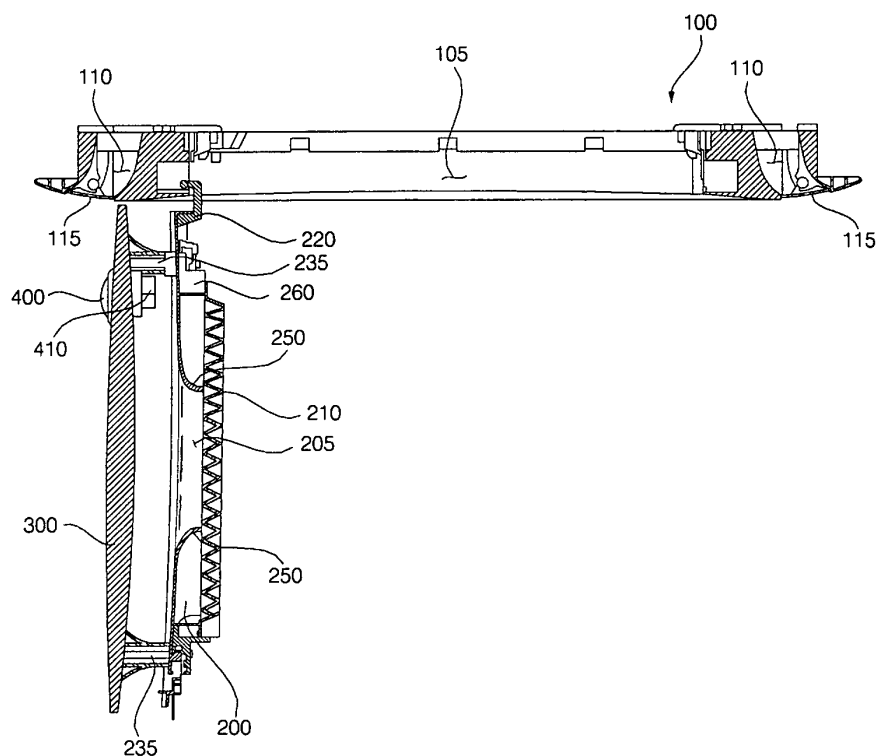
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(54) **Ceiling mounting type air conditioner**

(57) Disclosed is a ceiling mounting type air conditioner including: a body (10) that is fixed on a ceiling (1) and has an opened bottom surface; an outlet panel (100) that is coupled at a lower portion of the body (10) and has an air outlet opening (110); an inlet panel (200) that

is coupled at a lower portion of the outlet panel (100) and has an air inlet opening (205); and a door panel (300) that is arranged to conceal the air inlet opening (205), form an air inlet path between the door panel (300) and the inlet panel (200) when moving down, and shields the inlet panel (200) when moving up.

FIG. 4



## Description

### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention

**[0001]** The present invention is directed to a ceiling mounting type air conditioner, and more specifically to a ceiling mounting type air conditioner that may stably open and close an air inlet opening by a door panel guided by an inlet panel moving up and down, and allows for an easy repair for various heat exchanging parts out of order included in the body by rotating the inlet panel coupled with the door panel.

#### 2. Description of the Related Art

**[0002]** In general, ceiling mounting type air conditioners may include an indoor unit that is provided on the ceiling of a room to cool the room, an outdoor unit that dissipates heat and performs compressing functions, and a coolant pipe that connects the indoor unit with the outdoor unit.

**[0003]** In a conventional ceiling mounting type air conditioner, the air inlet opening sucking air is always opened even when the air conditioner does not operate, thus spoiling the appearance of the ceiling.

**[0004]** In a conventional ceiling mounting type air conditioner, moreover, upper portions of the air conditioner, constituting the appearance of the indoor unit, needs to be disassembled for repairing the mal-functional parts included in the air conditioner, thus causing the fixing work difficult.

### SUMMARY OF THE INVENTION

**[0005]** It would be desirable to provide a ceiling mounting type air conditioner that simplifies a door panel that constitutes the appearance of the bottom surface of the air conditioner.

**[0006]** It would be further desirable to provide a ceiling mounting type air conditioner that has a well-arranged, simple appearance. In the air conditioner, a door panel is movably connected to an inlet panel having an air inlet opening thereunder. The door panel may be guided by the inlet panel upon elevation.

**[0007]** It would be still further desirable to provide a ceiling mounting type air conditioner that permits an easy repair of mal-functional parts included in the body since a repairer may look inside the body only by rotating the inlet panel.

**[0008]** It would be still further desirable to provide a ceiling mounting type air conditioner including: a body that is fixed on a ceiling and has an opened bottom surface; an outlet panel that is coupled at a lower portion of the body and has an air outlet opening; an inlet panel that is coupled at a lower portion of the outlet panel and has an air inlet opening; and a door panel that is arranged

to conceal the air inlet opening, form an air inlet path between the door panel and the inlet panel when moving down, and shields the inlet panel when moving up.

**[0009]** The outlet panel may configure a part of the external appearance of the bottom surface of the air conditioner, and the door panel may configure the other part of the external appearance of the bottom surface of the air conditioner upon elevation.

**[0010]** The outlet panel may include an opening to communicate with the body in addition to the air outlet opening, and wherein the inlet panel rotates with the door panel to open and close the opening.

**[0011]** A purification filter mounting unit may be provided at the top surface of the inlet panel and a purification filter may be mounted in the purification filter mounting unit.

**[0012]** An elevation driving unit may be provided at the top surface of the inlet panel to move up and down the door panel.

**[0013]** A concealment rib may be provided at the top surface of the inlet panel so that the elevation driving unit is not viewed from under the air inlet opening through the air inlet opening and the concealment rib protrudes upward by a predetermined length.

**[0014]** The ceiling mounting type air conditioner may further include a pyroelectric infrared ray sensor module (Here-after, "pyroelectric infrared ray sensor module" may be referred as "PIR sensor module") that is provided in the door panel to sense a motion of a user in a room, wherein an upper portion of the PIR sensor module is arranged in the door panel to be protruded upward by a predetermined length, and wherein a motion recognition sensor covering unit is provided in the inlet panel to fit in shape with an upper portion of the PIR sensor module when the door panel moves up.

**[0015]** The motion recognition sensor covering unit may be integrally formed with the inlet panel and protruded upward so that the top surface of the door panel is brought in contact with the bottom surface of the inlet panel when the upper portion of the PIR sensor module is elevated to fit with the motion recognition sensor covering unit.

**[0016]** An elevation guide hole may be provided at each corner of the inlet panel to pass through the inlet panel in up and down directions, and wherein a moving member is arranged at the top surface of the door panel, connected with the elevation driving unit, and passes through the elevation guide hole upon elevation, and wherein when moving up from under the inlet panel, the door panel is guided by the elevation guide hole upon elevation of the moving member to open and close the air inlet opening.

**[0017]** The ceiling mounting type air conditioner may further include a plurality of elevation driving units that are arranged on the top surface of the inlet panel to move up and down the door panel, wherein each elevation driving unit includes, a rotation member that is arranged on the top surface of the inlet panel to be coupled with the

moving member and rotates to move up and down the moving member, a shaft to both ends of which the rotation member and another rotation member of another elevation driving unit are coupled, and a shaft driving unit that is arranged between both ends of the shaft and connected to one of the rotation members.

**[0018]** In the elevation driving unit, the shaft driving unit may be operative so that the moving member moves down and thus the door panel moves down to form an air inlet path when the air inlet opening is open and the moving member moves up and thus the door panel moves up to bring the top surface of the door panel in contact with the bottom surface of the inlet panel when the air inlet opening is closed.

**[0019]** The shaft driving unit may include a motor whose rotational shaft is parallel with a part of the shaft, and a cooperating member that is coupled to the rotational shaft to cooperate with the shaft.

**[0020]** The ceiling mounting type air conditioner according to the present invention may stably open and close the air inlet opening by the door panel elevated by guide of the inlet panel, thus preventing the appearance of the air conditioner from being spoiled.

**[0021]** The ceiling mounting type air conditioner according to the present invention allows for an easy repair of various parts included in the body only by rotating the inlet panel to open the body upon repair of the mal-functional parts of the body.

#### BRIEF DESCRIPTION OF THE DRAWINGS

**[0022]** The above features of the present invention will become apparent from the following description of an embodiment given in conjunction with the accompanying drawing, in which:

Fig. 1 is a perspective view illustrating a ceiling mounting type air conditioner according to an embodiment of the present invention;

Fig. 2 is an exploded perspective view illustrating an outlet panel, an inlet panel, and a door panel included in the air conditioner shown in Fig. 1;

Fig. 3 is an exploded perspective view illustrating an inlet panel and a door panel included in the air conditioner shown in Fig. 1;

Fig. 4 is a cross section view illustrating the inlet panel shown in Fig. 3, which opens and closes an opening;

Fig. 5 is a cross section view taken along line A-A shown in Fig. 1;

Fig. 6 is a cross section view taken along line B-B shown in Fig. 1; and

Fig. 7 is an expanded cross section view illustrating portion "C" shown in Fig. 6.

#### DETAILED DESCRIPTION OF THE INVENTION

**[0023]** Hereinafter, embodiments of the present inven-

tion will be described in greater detail with reference to accompanying drawings.

**[0024]** Fig. 1 is a perspective view illustrating a ceiling mounting type air conditioner according to an embodiment of the present invention, Fig. 2 is an exploded perspective view illustrating an outlet panel, an inlet panel, and a door panel included in the air conditioner shown in Fig. 1, and Fig. 3 is an exploded perspective view illustrating an inlet panel and a door panel included in the air conditioner shown in Fig. 1.

**[0025]** Referring to Figs. 1 to 3, the ceiling mounting type air conditioner according to an embodiment of the present invention includes a body 10 between a ceiling 1 and a ceiling finishing member 2 located under the ceiling 1. The body 10 is configured so that its bottom surface is open, and includes therein various heat exchanging parts (not shown), for example, a blast fan (not shown) that sucks and discharge air from/to a room and a heat exchanger that heat exchanges the sucked air.

**[0026]** More specifically, the body 10 is shaped as a rectangular parallelepiped or a cube type box, whose bottom surface is opened, and includes the heat exchanging parts therein.

**[0027]** There is provided an outlet panel 100 that is arranged substantially parallel with the ceiling finishing member 2 under the body 10.

**[0028]** The outlet panel 100 is provided under the body 10 to conceal the lower portion of the body 10, and includes an opening 105 at its central portion for mounting an inlet panel 200 that will be described later.

**[0029]** Along the periphery of the outlet panel 100 are provided a plurality of air outlet openings 110 through which air heat-exchanged inside the body 10 is discharged.

**[0030]** The outlet panel 100 is also provided under the body 10 to conceal the lower portion of the body 10 and configured to have a similar shape as the bottom portion of the body 10, i.e., rectangular parallelepiped or square shaped plate.

**[0031]** A wind direction control vane 115 may be provided near each air outlet opening 110 to open/close the air outlet opening 110 by rotating at a predetermined angle to control the direction of air discharged.

**[0032]** The ceiling mounting type air conditioner according to the embodiment of the present invention may further an inlet panel 200 that is mounted at the outlet panel 100 to shield the opening 105.

**[0033]** The inlet panel 200 includes an air inlet opening 205 at its central portion that allows air to be sucked from the room into the body 10. A purification filter 210 may be positioned over the air inlet opening 205 to filter unwanted materials contained in the sucked air. At the upper portion of the inlet panel 200 is provided a purification filter mounting unit 215 that mounts the purification filter 210 as described above.

**[0034]** The air inlet opening 205 provided at the central portion of the inlet panel 200 may be circular so that air may be concentratively sucked through the central por-

tion of the inlet panel 200 from the room.

**[0035]** The inlet panel 200 serves as an orifice that provides for mounting the purification filter 210 and controls the flow rate or flow speed of the sucked air.

**[0036]** However, the air inlet opening 205 is not necessarily circular but rather may have various forms, for example, such as square, to suck more amount of air at once.

**[0037]** Fig. 4 is a cross section view illustrating the inlet panel shown in Fig. 3, which opens and closes an opening. Referring to Fig. 4, the inlet panel 200 may pivot with respect to the outlet panel 100 to open and close the opening 105.

**[0038]** More specifically, one end of the inlet panel 200 is connected to a side of the opening 105 by a hinge 220, and the other end thereof is detachably connected to the other side of the opening 105.

**[0039]** The other end of the inlet panel 200 is pivoted with respect to the one end of the inlet panel 200, which is connected to the hinge 220 to open and close the opening 105.

**[0040]** The inlet panel 200 coupled with the outlet panel 100 may be rotated with the door panel 300 provided under the inlet panel 200 to open the opening 105. Accordingly, in cases where the parts inside the body 10, such as the heat exchanger, need to be checked or repaired by a user due to faults or malfunctions, checking or repairing work may be easily done by opening the opening 105 without disassembling the outlet panel 100.

**[0041]** Fig. 5 is a cross section view taken along line A-A shown in Fig. 1.

**[0042]** Referring to Figs. 3 and 5, the ceiling mounting type air conditioner according to the embodiment of the present invention may further include the door panel 300 that is provided under the inlet panel 200 to be elevated. The air inlet opening 205 may be opened and closed by elevation of the door panel 300.

**[0043]** The door panel 300 may be configured substantially in such a size as to correspond to the size of the inlet panel 200.

**[0044]** More specifically, the door panel 300 may be formed to be larger than the inlet panel 200 so that the inlet panel 200 is not viewed by a user from the room side, that is, its bottom portion when the air inlet opening 205 is closed by elevation of the door panel 300.

**[0045]** Further, the opening 105 may be substantially shaped as a rectangle or square, and the inlet panel 200 may be also formed in the shape of shielding the opening 105, that is, rectangle or square.

**[0046]** The ceiling mounting type air conditioner according to the embodiment of the present invention may further include a plurality of elevation mechanisms 230A that elevates the door panel 300 at the lower portion of the inlet panel 200.

**[0047]** Referring to Fig. 3, each elevation mechanism 230A includes a motor 231 provided at the inlet panel 200, a shaft 232 arranged in parallel with the rotational shaft of the motor 231, a cooperating member 233 co-

operatively rotating the shaft 232 as the motor rotates, a pair of rotation members 234 provided at both ends of the shaft 232, and a moving member 235 that is provided at the door panel 300 and moves up and down as the rotation members 234 rotate.

**[0048]** Each of the plurality of elevation mechanisms 230A includes the rotation member 234. The rotation member 234 included in any one of the plurality of elevation mechanisms 230A is connected to one end of the shaft 232 and the rotation member 234 included in another elevation mechanism 230A are connected to the other end of the shaft 232. That is, two elevation mechanisms 230A are connected to each other via one shaft 232.

**[0049]** A driving mechanism that includes the motor 231, the shaft 232, the cooperating member 233, and the rotation member 234, other than the moving member 235 provided at the door panel 300 and generates a direct driving force for elevation of the door panel 300 and transfers the driving force to the moving member 235, will now be called an "elevation driving unit 230" for the convenience of description.

**[0050]** Further, a combination of the motor 232 generating a driving force and transferring the generated driving force directly to the shaft 232 and the cooperating member 233 may be referred to as a "shaft driving unit 230". The shaft driving unit 230 is arranged between both ends of the shaft 232 and connected to any one of the rotation members 234.

**[0051]** In the elevation driving unit 230, the shaft driving unit 230 is operative so that the moving member 235 moves down and thus the door panel 300 moves down to form an air inlet path when the air inlet opening 205 is open and the moving member 235 moves up and thus the door panel 300 moves up to bring the top surface of the door panel 300 in contact with the bottom surface of the inlet panel 200 when the air inlet opening 205 is closed.

**[0052]** Two elevation driving units 230 may be provided, one of which is positioned at a peripheral portion of top surface of the inlet panel 200 and the other at its opposite peripheral portion of top surface of the inlet panel 200.

**[0053]** More specifically, two elevation driving units 230 may be respectively provided at front and rear ends of top surface of the inlet panel 200, or at left and right ends of top surface of the inlet panel 200, while spaced from each other.

**[0054]** When the rotation member 234 rotates cooperatively with the shaft 232, the moving member 235, and resultantly, the door panel 300 moves up and down.

**[0055]** More specifically, the moving members 235 are arranged around corners of the top surface of the door panel 300, which is substantially rectangular or square shaped plate.

**[0056]** Around corners of the inlet panel 200 are provided elevation guide holes 240 through which the moving members 235 pass to be protruded beyond the inlet

panel 200 when the door panel 300 is elevated.

**[0057]** The inlet panel 200 thus configured guides elevation of the moving member 235 and resultantly the door panel 300 to open and close the air inlet opening 205 provided at the inlet panel 200.

**[0058]** Further, as shown in Fig. 3, a concealment rib 250 is provided at a side of the air inlet opening 205. The concealment rib 250 protrudes upward so that the top surface of the inlet panel 200 is not viewed from under the air inlet opening 205.

**[0059]** The concealment rib 250 may be configured to have such a height that when the door panel 300 moves down to open the air inlet opening 205, the elevation driving unit 230 located over the inlet panel 200 is not viewed by a user located under the ceiling in the room.

**[0060]** The concealment rib 250 prevents the user from viewing the elevation driving unit 230 when the air inlet opening 205 is opened, thus allowing for arranged and neat appearance of the body 10 upon operation.

**[0061]** When the air inlet opening 205 is opened, the elevation driving unit 230 may operate to move down the moving member 235 and resultantly the door panel 300 to form an air inlet path. Further, when the air inlet opening 205 is closed, the elevation driving unit 230 may operate to move up the moving member 235 and thus the door panel 300 to bring the top surface of the door panel 300 in contact with the bottom surface of the inlet panel 200.

**[0062]** Fig. 6 is a cross section view taken along line B-B shown in Fig. 1, and Fig. 7 is an expanded cross section view illustrating portion "C" shown in Fig. 6.

**[0063]** Referring to Figs. 6 and 7, the ceiling mounting type air conditioner according to the embodiment of the present invention may further include a PIR sensor module 400 that is provided in the door panel 300 to sense a motion of a user in the room.

**[0064]** The PIR sensor module 400 includes a motion recognition sensor (not shown) that may rotate to detect a specific wavelength of infrared light or temperature radiated from the user over the entire areas in the room. Thus, the PIR sensor module 400 may identify where the user is located in the room.

**[0065]** A result as detected by the PIR sensor module 400 may be transmitted to a controller (not shown), and the controller (not shown) may precisely determine the user's motion together with the temperature in the room to appropriately control the operation rate of the heat exchanger or the wind direction control vane 115. By doing so, it is possible to achieve the temperature in the room as that desired by the user and guide air flow intensively toward the user.

**[0066]** The PIR sensor module 400 is mounted in a sensor mounting hole 310 that is formed to pass through the door panel 300 in up and down directions.

**[0067]** More specifically, the sensor mounting hole 310 is provided in the door panel 300 to pass through the door panel 300 in up and down directions, so that the sensor mounting hole 310 may be mounted in the sensor mounting hole 310 in up and down directions. The PIR

sensor module 400 is mounted in the sensor mounting hole 310 to protrude beyond the top or bottom surface of the door panel 300 by a predetermined height with respect to the sensor mounting hole 310.

**[0068]** For example, the PIR sensor module 400 may be mounted to be protruded beyond the bottom surface of the door panel 300, that is, toward the room, to be capable of detecting user's motion over a broader range (angle) in the room.

**[0069]** Further, the PIR sensor module 400 may be provided to protrude beyond the top surface of the door panel 300 toward the inlet panel 200 by a predetermined height.

**[0070]** For example, the PIR sensor module 400 may protrude beyond the top surface of the door panel 300 because a sensor driving motor 410 rotating the motion recognition sensor may be separately provided at the top surface of the door panel 300; the door panel 300 is made relatively thin in thickness to reduce its weight that could be a burden to elevation.

**[0071]** The inlet panel 200 may further include a motion recognition sensor covering unit covering unit 260 that fits in shape with the upper portion of the PIR sensor module 400 to prevent any distortion that may occur when the PIR sensor module 400 elevates to bring the bottom surface of the inlet panel 200 in contact with the upper surface of the door panel 300.

**[0072]** The motion recognition sensor covering unit covering unit 260 is not necessarily in shape to fit with the upper portion of the PIR sensor module 400, but it is sufficient that the motion recognition sensor covering unit covering unit 260 has a shape of receiving the upper portion of the PIR sensor module 400. The motion recognition sensor covering unit covering unit 260 is formed to be protruded upward from the bottom surface of the inlet panel 200 by a predetermined depth. Further, the motion recognition sensor covering unit covering unit 260 may be integrally formed with the inlet panel 200.

**[0073]** For example, the motion recognition sensor covering unit covering unit 260 may be protruded upward more than the PIR sensor module 400 is protruded.

**[0074]** A process of installing the ceiling mounting type air conditioner according to the present invention will now be described.

**[0075]** First, the body 10 is fixed between the ceiling 1 and the ceiling finishing member 2.

**[0076]** Next, the moving members 235 are fixed at corners of the top surface of the door panel 300.

**[0077]** Then, the door panel 300 is shifted toward the inlet panel 200 to pass the moving member 235 through the elevation guide hole 240 so that the moving member 235 is protruded beyond the top surface of the inlet panel 200.

**[0078]** As shown in Fig. 3, a stopper (not shown) is coupled with the upper end of the moving member 235 to limit rising and falling distances of the door panel 300 and connects the elevation driving unit 230 with the moving member 235.

**[0079]** The purification filter 210 is seated on the purification filter mounting unit 215 that is provided over the inlet panel 200.

**[0080]** The inlet panel 200 coupled with the door panel 300 is located near the outlet panel 100. Under this situation, an end of the outlet panel 100 is pivotably coupled to a side of the air inlet opening 205 and the other end is coupled to the other side of the air inlet opening 205, thus completing the process of installing the ceiling mounting type air conditioner according to the embodiment of the present invention.

**[0081]** The ceiling mounting type air conditioner according to the embodiment of the present invention allows a user (or repairer) to easily and simply repair malfunctioning heat exchanging parts that are included in the body 10, such as the blast fan 5 or the heat exchanger 7, without disassembling the body 10, since the opening 105 may be opened by rotating the inlet panel 200 coupled with the door panel 300 with respect to a side of the opening 105.

**[0082]** Further, since elevation of the door panel 300 is guided by the door panel 300, the air inlet opening 205 may be opened and closed, with the door panel 300 elevated more stably.

**[0083]** In the ceiling mounting type air conditioner according to the present invention, as described above, one motor 231 is arranged at each elevation driving unit 230, and two driving members 235 are involved with each motor 231 in elevating the door panel 300.

**[0084]** Each motor needs to be precisely controlled by a controller (not shown) to have the same rotation speed during the same set time so that the door panel 300 can be brought in contact with the bottom surface of the inlet panel 200 without being inclined when the air inlet opening 205 is closed.

**[0085]** In a case where the motor 231 stops the operation with the door panel 300 inclined when the air inlet opening 205 is closed by the door panel 300, the appearance of the ceiling may be greatly spoiled.

**[0086]** To solve the above problems, the ceiling mounting type air conditioner according to an embodiment of the present invention may further include a controller (not shown) that controls the operation of the motor 231.

**[0087]** When receiving an operation OFF signal, the controller controls the operation of the motor 231 during a first set time that the door panel 300 is brought in contact with the bottom surface of the inlet panel 200 and then further controls the operation of the motor during a second set time.

**[0088]** Assuming each motor 231 has a same rotation speed, the first set time is a time from the moment that power is applied to the motor 231 to the moment that the door panel 300 is brought in contact with the bottom surface of the inlet panel 200. The first set time may be calculated from variables such as rotation speed of the motor 231 and current value as applied.

**[0089]** Further, the second set time may be shorter than the first set time.

**[0090]** The door panel 300 is elevated to be brought in contact with the bottom surface of the inlet panel 200 during the first set time. The elevation may be ended with the door panel 300 inclined after the first set time. To prevent the door panel 300 from being inclined even after the first set time, the second set time may be provided in addition to the first set time. During the second set time, the motor 231 may be further operated.

**[0091]** That is, the second set time is provided to give parallelism to the door panel 300, which is likely to be inclined after the first set time. The second set time may be set to be shorter than the first set time. And, the second set time may be set not to exceed approximately 3 seconds.

**[0092]** While the invention has been shown and described with respect to the embodiments, it will be understood by those skilled in the art that various changes and modifications may be made without departing from the scope of the invention as defined in the following claims.

## Claims

1. A ceiling mounting type air conditioner comprising:
  - a body that is fixed on a ceiling and has an opened bottom surface;
  - an outlet panel that is coupled at a lower portion of the body and has an air outlet opening;
  - an inlet panel that is coupled at a lower portion of the outlet panel and has an air inlet opening; and
  - a door panel that is arranged to conceal the air inlet opening, form an air inlet path between the door panel and the inlet panel when moving down, and shields the inlet panel when moving up.
2. The ceiling mounting type air conditioner of claim 1, wherein the outlet panel configures a part of the external appearance of the bottom surface of the air conditioner, and the door panel configures the other part of the external appearance of the bottom surface of the air conditioner upon elevation.
3. The ceiling mounting type air conditioner of any of claims 1 and 2, wherein the outlet panel includes an opening to communicate with the body in addition to the air outlet opening, and wherein the inlet panel rotates with the door panel to open and close the opening.
4. The ceiling mounting type air conditioner of any of claims 1 to 3, wherein a purification filter mounting unit is provided at the top surface of the inlet panel and a purification filter is mounted in the purification filter mounting unit.

5. The ceiling mounting type air conditioner of any of claims 1 to 4, wherein an elevation driving unit is provided at the top surface of the inlet panel to move up and down the door panel.
6. The ceiling mounting type air conditioner of claim 5, wherein a concealment rib is provided at the top surface of the inlet panel so that the elevation driving unit is not viewed from under the air inlet opening through the air inlet opening and the concealment rib protrudes upward by a predetermined length.
7. The ceiling mounting type air conditioner of any of claims 1 to 6, further comprising:
  - a PIR sensor module that is provided in the door panel to sense a motion of a user in a room, wherein
  - an upper portion of the PIR sensor module is arranged in the door panel to be protruded upward by a predetermined length, and wherein a motion recognition sensor covering unit is provided in the inlet panel to fit in shape with an upper portion of the PIR sensor module when the door panel moves up.
8. The ceiling mounting type air conditioner of claim 7, wherein the motion recognition sensor covering unit is integrally formed with the inlet panel and protruded upward so that the top surface of the door panel is brought in contact with the bottom surface of the inlet panel when the upper portion of the PIR sensor module is elevated to fit with the motion recognition sensor covering unit.
9. The ceiling mounting type air conditioner of claim 4, wherein an elevation guide hole is provided at each corner of the inlet panel to pass through the inlet panel in up and down directions, and wherein a moving member is arranged at the top surface of the door panel, connected with the elevation driving unit, and passes through the elevation guide hole upon elevation, and wherein when moving up from under the inlet panel, the door panel is guided by the elevation guide hole upon elevation of the moving member to open and close the air inlet opening.
10. The ceiling mounting type air conditioner of claim 9, further comprising:
  - a plurality of elevation driving units that are arranged on the top surface of the inlet panel to move up and down the door panel, wherein each elevation driving unit includes,
  - a rotation member that is arranged on the top surface of the inlet panel to be coupled with the moving member and rotates to move up and
- down the moving member,
- a shaft to both ends of which the rotation member and another rotation member of another elevation driving unit are coupled, and
- a shaft driving unit that is arranged between both ends of the shaft and connected to one of the rotation members.
11. The ceiling mounting type air conditioner of claim 10, wherein in the elevation driving unit, the shaft driving unit is operative so that the moving member moves down and thus the door panel moves down to form an air inlet path when the air inlet opening is open and the moving member moves up and thus the door panel moves up to bring the top surface of the door panel in contact with the bottom surface of the inlet panel when the air inlet opening is closed.
12. The ceiling mounting type air conditioner of any of claims 10 and 11, wherein the shaft driving unit includes,
  - a motor whose rotational shaft is parallel with a part of the shaft, and
  - a cooperating member that is coupled to the rotational shaft to cooperate with the shaft.
13. The ceiling mounting type air conditioner of claim 12, further comprising:
  - a controller that controls the operation of the motor included in each elevation driving unit, wherein when receiving an operation OFF signal, the controller controls the operation of the motor during a first set time that the door panel is brought in contact with the bottom surface of the inlet panel and then further controls the operation of the motor during a second set time.
14. The ceiling mounting type air conditioner of claim 13, wherein assuming each motor has a same rotation speed, the first set time is a time from the moment that power is applied to the motor to the moment that the door panel is brought in contact with the bottom surface of the inlet panel, and the second set time is shorter than the first set time.

FIG. 1

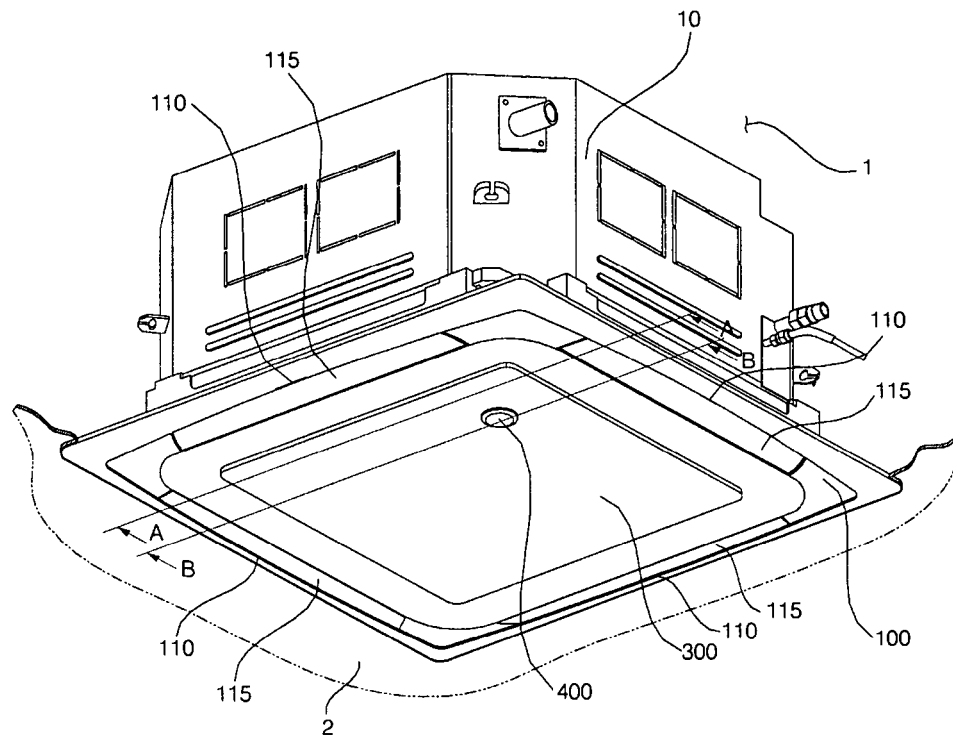


FIG. 2

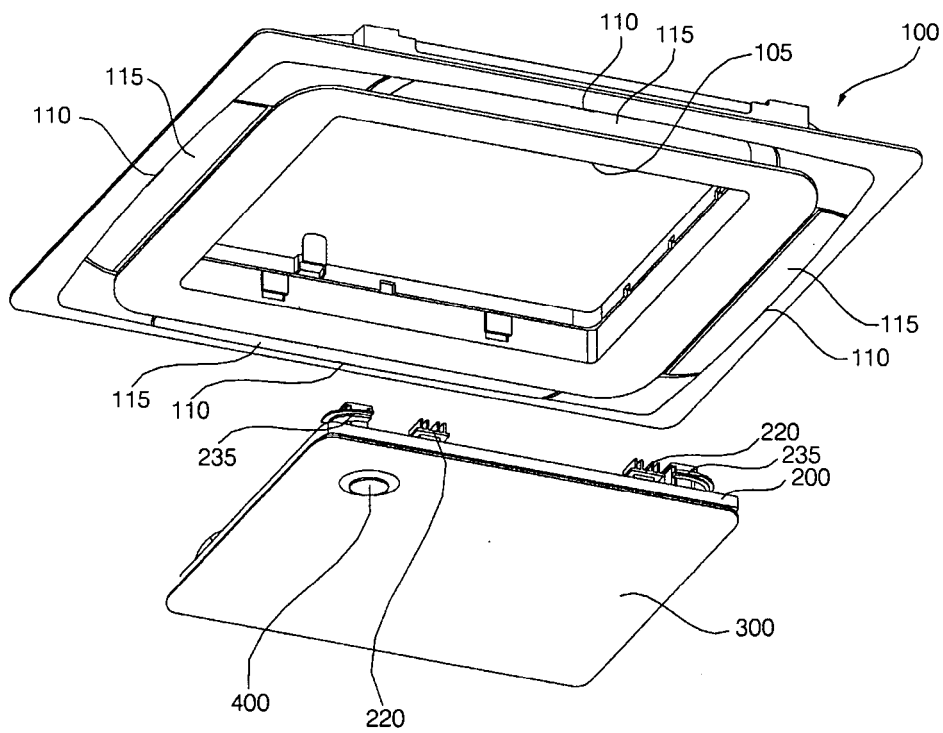




FIG. 3

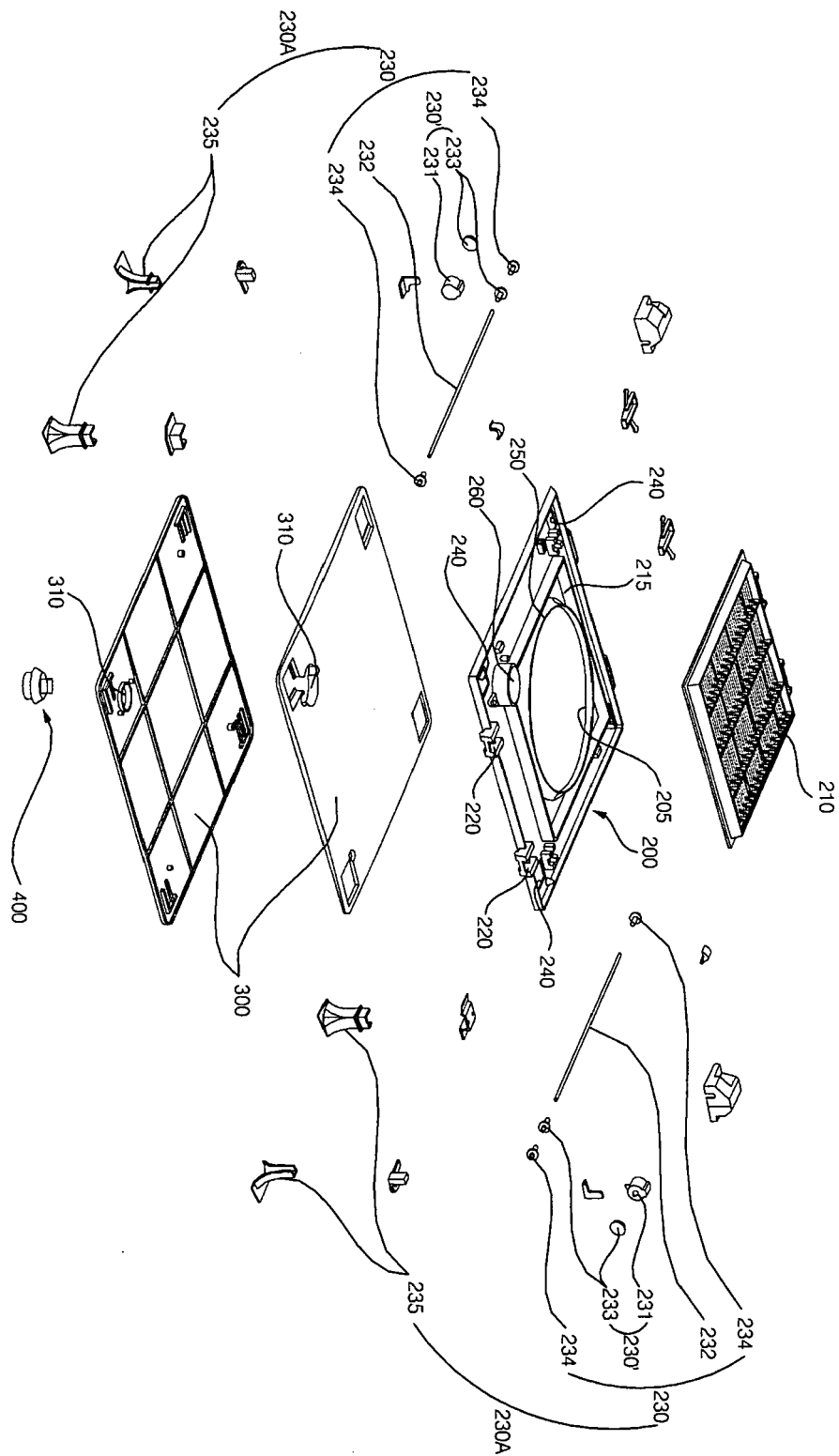


FIG. 4

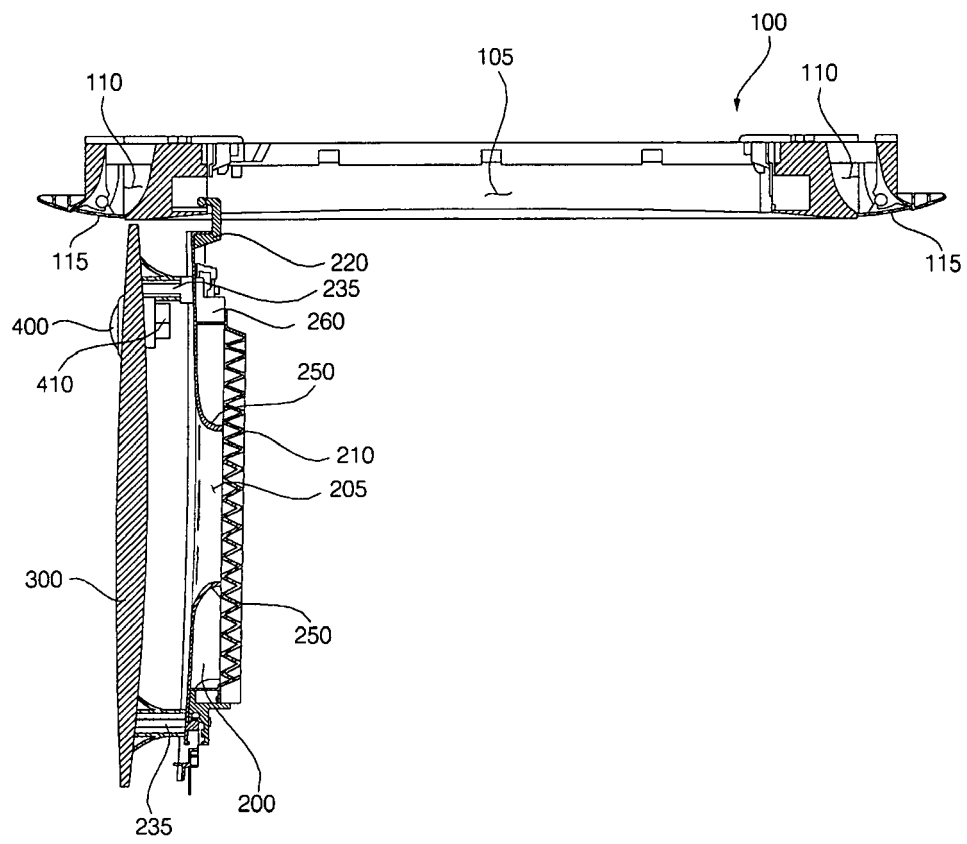


FIG. 5

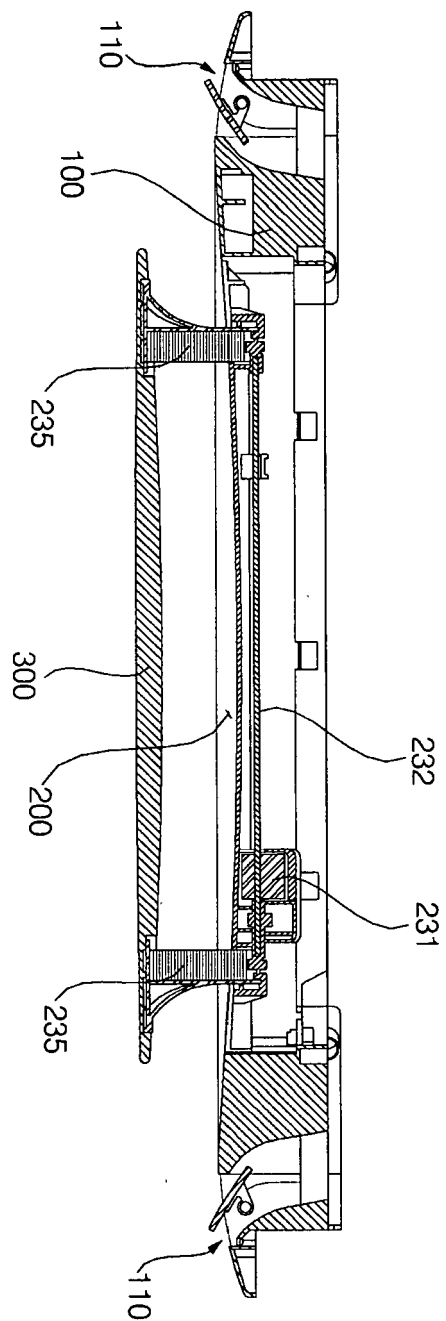


FIG. 6

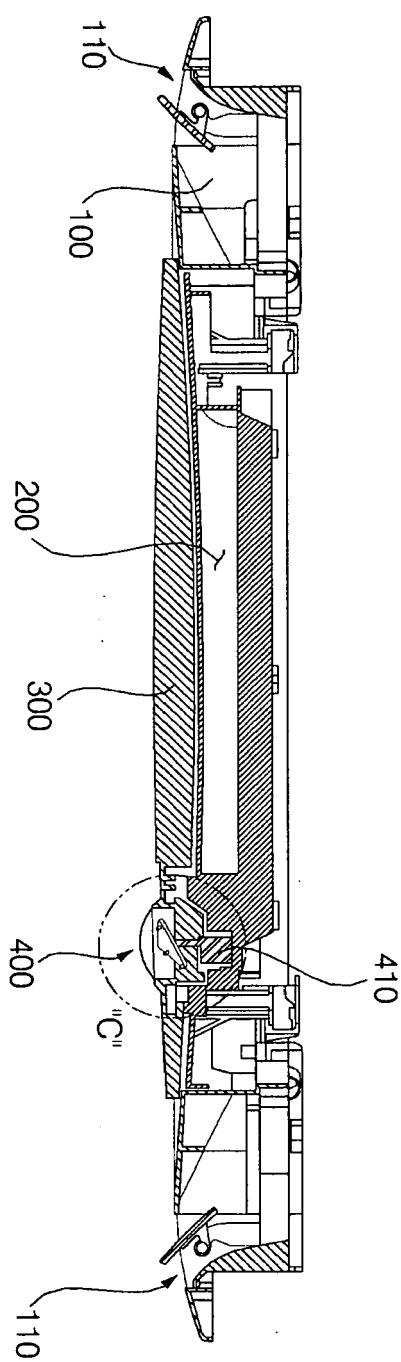
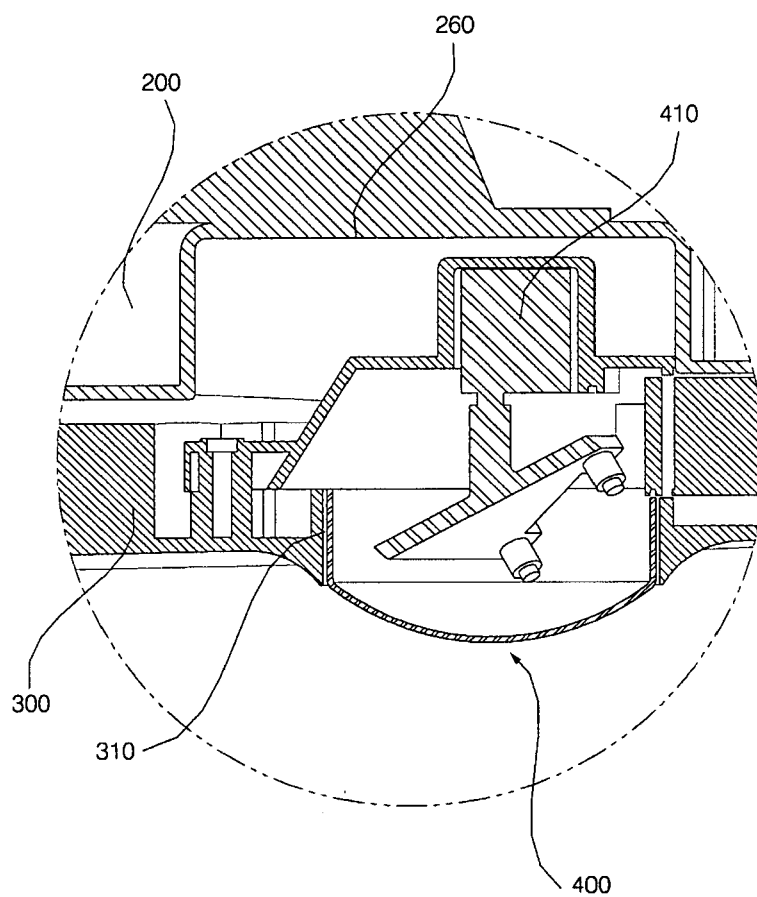


FIG. 7





## EUROPEAN SEARCH REPORT

Application Number  
EP 09 25 2875

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<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... &amp; : member of the same patent family, corresponding document</p>			

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