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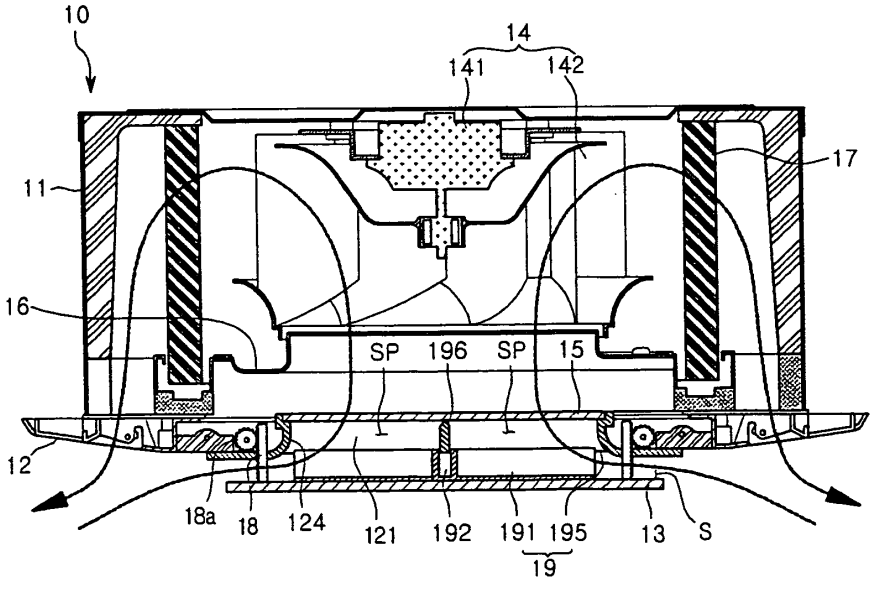
(54) Indoor unit of an air conditioner with movable intake panel

(57) An air conditioner includes a cabinet (11) and a fan assembly (14) positioned within the cabinet (11) and configured to guide air inside of the cabinet (11) toward an outside of the cabinet (11). The air conditioner also includes a front panel (12) coupled to the cabinet (11) and configured to communicate air into the cabinet (11) from the outside. The air conditioner further includes an intake panel (13) moveable with respect to the front panel (12) and configured to open or close an intake portion defined by the front panel. In addition, the air conditioner includes a guide unit (19) positioned between the front panel (12) and the intake panel (11) and configured to partition the intake portion (121) into at least two intake passages (SP).

FIG.2



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Description

Field

[0001] The present disclosure relates to air conditioner technology.

BACKGROUND

[0002] In general, air conditioners are apparatuses that heat or cool air using a refrigeration cycle. The air conditioners are divided into home air conditioners and industrial air conditioners.

[0003] The home air conditioners may be divided into a split type air conditioner including an indoor unit and an outdoor unit and an integrated type air conditioner including an indoor unit and an outdoor unit that are integrally formed in one body.

[0004] The indoor unit of the split type air conditioner may be divided into a wall mount type indoor unit that is attached to a wall surface in a room, a floor standing type indoor unit that is mounted on a floor, and a ceiling-suspended type (or cassette type) indoor unit that is attached to a ceiling.

[0005] Since an indoor unit includes various parts therein, a noise may occur in the indoor unit due to operations of the various parts and an air flow.

SUMMARY

[0006] Thus, it is an object of the present invention to provide an improved air conditioner that can be operated with reduced noise.

[0007] According to the present invention an air conditioner includes a cabinet and a fan assembly positioned within the cabinet and configured to guide air inside of the cabinet toward an outside of the cabinet. The air conditioner also includes a front panel coupled to the cabinet and configured to communicate air into the cabinet from the outside. The air conditioner further includes an intake panel moveable with respect to the front panel and configured to open or close an intake portion defined by the front panel. In addition, the air conditioner includes a guide unit positioned between the front panel and the intake panel, and configured to reduce turbulence of air within the intake portion when the intake portion is opened.Further, the guide unit may be configured to partition the intake portion into at least two intake passages.

[0008] Implementations may include one or more of the following features. For example, guide unit comprises a plurality of guide parts. The plurality of guide parts include a first guide part supported by the intake panel and a second guide part assembled with the front panel.

[0009] In some implementations, the first guide part is positioned on a surface of the intake panel. The first guide part is assembled with the intake panel as one body. The second guide part and the front panel are one body. Any one of the first guide part and the second guide part is combined with the other one. The end portion of the second guide part narrows in thickness toward the fan assembly.

[0010] In some examples, the guide unit has a cross shape. The guide unit is configured to partition the intake portion into four intake passages.

[0011] In another aspect, the air conditioner includes a guide unit having at least a first guide part configured to move in connection with movement of the intake panel and guide flow of air passing through the intake portion, wherein the guide part and the intake panel move in a same direction when the air conditioner turns on or turns off.

[0012] Implementations may be include one or more of the following features. For example, the guide unit is located between the front panel and the intake panel when the intake portion is opened. The guide unit is configured to move with respect to a guide part that guides movement of the guide unit. The guide unit and the guide part are coupled to each other when the intake portion is closed.

[0013] The guide unit is configured to move vertically when the air conditioner turns on or turns off. The guide unit is configured to partition the intake portion into at least two passages.

[0014] Implementations may include one or more of the following features. For example, the guide unit includes a first guide part that moves vertically. The guide unit further includes a second guide part assembled with the front panel. The first guide part is positioned on a surface of the intake panel.

[0015] The first guide part is assembled with the intake panel as one body. Any one of the first guide part and the second guide part is combined with the other one. The guide unit has a cross shape. The air conditioner may include at least two input parts configured to communicate air into the intake portion.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] Fig. 1 is a perspective view showing an indoor unit of an air conditioner;

[0017] Figs. 2 and 3 are vertical cross-sectional views showing an inner structure of the indoor unit;

[0018] Fig. 4 is a perspective view showing a structure of a guide unit ;and

[0019] Fig. 5 is a perspective view showing a structure of a guide unit.

DETAILED DESCRIPTION

[0020] Referring to Fig. 1, an indoor unit 10 of an air conditioner includes a cabinet 11, a front panel 12, and an intake panel 13. The cabinet 11 defines an outer appearance of the indoor unit 10 and has an opening at the lower side thereof. As an example, the indoor unit 10 is a ceiling-suspended type air conditioner. The front panel 12 is coupled to a lower portion of the cabinet 11. An

intake portion 121 is defined in the front panel 12. The intake panel is coupled to the front panel 12 in a manner that enables vertical movement to open or close the intake portion 121.

[0021] A body of the indoor unit 10 may include the cabinet 11 and the front panel 12. Here, a plurality of discharge holes 122 is defined in edge portions of the front panel 12. A discharge vane 123 that is rotatable is positioned on the front panel 12. Thus, a direction of discharged air is adjusted based on a rotation angle of the discharge vane 123.

[0022] When the indoor unit 10 turns on, the intake panel 13 opens the intake portion 121 by moving toward a bottom of a room (moving down). When the indoor unit 10 turns off, the intake panel 13 closes the intake portion 121 by moving toward the ceiling (moving up).

[0023] Referring to Figs. 2 to 4, the cabinet 11 includes a heat-exchanger 17, a fan assembly 14, a shroud 16, and a filter 15 therein. The fan assembly 14 is positioned within an inner space of the heat-exchanger 17. The shroud 16 is located in a lower side of the fan assembly 14 to guide a flow of air sucked from outside of the cabinet 11. The filter 15 is also positioned at the lower side of the fan assembly 14 to filter the sucked air.

[0024] An orifice 124 for guiding an air flow is positioned around the intake portion 121. The filter 15 is positioned on an upper portion of the orifice 124. The orifice 124 is configured to have a round shape from the front panel 12 toward the fan assembly 14.

[0025] A rack 18 is positioned on an upper portion of the intake panel 13. A pinion 18a coupled to the rack 18 and a drive motor (not shown) for rotating the pinion 18a. The pinion 18a may be positioned on an upper portion of the front panel 12.

[0026] Thus, the intake panel 13 is vertically moved by an operation of the drive motor, and the intake portion 121 is selectively opened or closed by the movement of the intake panel 13. When the intake portion 121 is opened, the intake panel 13 may cover the intake portion 121 at a position spaced from the intake portion 121. So, the intake portion 121 may be minimally exposed by the intake panel 13.

[0027] In this implementation, an ascending/descending unit of the intake panel 13 is not limited to the above-described rack/pinion structure. The air sucked through the intake portion 121 is filtered of foreign substances by passing through the filter 15. Then, the filtered air flows toward the fan assembly 14. The fan assembly includes a centrifugal fan 142 that sucks air in an axial direction and discharges air in a radius direction and a fan motor 141 for driving the centrifugal fan 142. Therefore, by driving the centrifugal fan 142 the air is passed through the heat-exchanger 17 and is discharged again to an indoor room through the discharge hole 122.

[0028] A guide unit 19 for guiding the flow of the sucked air is positioned between the intake panel 13 and the filter 15. The guide unit 19 is configured to be located from the intake panel 13 toward the intake portion 121 or from the intake portion 121 toward the intake panel 13.

[0029] At least a portion of the guide unit 19 is positioned in the intake portion 121 and the portion of the guide unit 19 partitions the intake portion 121 into a plurality of intake passages SP, which in some examples, reduces a flow noise of the air sucked through the intake portion 121.

[0030] The guide unit 19 includes a first guide part 191 positioned on a top surface (a surface facing the intake portion) of the intake panel 13 and a second guide part 195 relatively movable with respect to the first guide part 191. The second guide part 195 can be positioned on the front panel 12 as one body.

[0031] As shown in FIG. 4, the first guide part 191 may have a cross shape in section that is perpendicular to a flow direction of air. The first guide part 191 has an insertion portion 192 such that at least portion of the second guide part 195 can be combined with (e.g., inserted in) the first guide part 191. So, the insertion portion 192 is configured to have a shape to be combined with a horizontal section of the second guide part 195.

[0032] The first guide part 191 is vertically moved together with the intake panel 13 because the first guide part 191 is positioned on a top surface of the intake panel 13. When the intake panel 13 descends or moves down in response to, for example, a turning on of the air conditioner, the first guide part 191 also moves down due to its weight. On the contrary, when the intake panel 13 ascends or moves up, the intake panel 13 can lift the first guide part 191.

[0033] Alternatively, the first guide part 191 may be assembled with the intake panel 13 as one body. The second guide part 195 is positioned on an inner surface of the orifice 124 as shown in FIG. 4. For example, the second guide part 195 is positioned on the intake portion 121. Like the first guide part 191, the second guide part 195 may have a cross shape in section that is perpendicular to the flow direction of the air passing through the intake portion 121.

[0034] As an example, the intake portion 121 is partitioned into four intake passages SP as shown in FIG. 4.

[0035] The second guide part 195 has a cusp-shaped end portion 196 as shown FIG.2 and FIG.3. A thickness of the end portion 196 of the second guide part 195 narrows toward the fan assembly 14 such that the air smoothly flows.

[0036] Although the first guide part 191 and the second guide part 195 have cross shapes in section that are perpendicular to the flow direction of the air passing through the intake portion 121 respectively, the implementation is not limited to the shape of each of the guide parts 191 and 195. Each of the guide parts 191 and 195 may have various shapes for partitioning the intake portion 121 into the plurality of intake passages.

[0037] An operation of the guide unit 19 will be described below. When the indoor unit 10 turns on, the intake panel 13 descends by the drive motor, and the centrifugal fan 142 is rotated.

[0038] When the intake panel 13 descends, the first guide part 191 descends together with the intake panel 13. The first guide part 191 is positioned on the top surface of the intake panel 13. As the first guide part 191 and the second guide part 195 are relatively movable with respect to each other, the first guide part 191 slides downwardly along an outer surface of the second guide part 195. When the first guide part 191 is moved downwardly, at least portion of the first guide part 191 is located to the outside of the intake portion 121.

[0039] As the first guide part 191 descends, the total height of the guide unit 19 increases. When the intake panel 13 descends, a space S (see FIG. 2) is defined between the top surface of the intake panel 13 and a bottom surface of the front panel 12, and indoor air flows into the space S. The air flowing into the space S can be sucked into the cabinet 11 through the intake portion 121 under the condition that a flow direction of the air is changed due to the defined space.

[0040] The top surface of the intake panel 13 is substantially horizontal to the bottom surface of the front panel 12, so the indoor air flows into the space S in a substantially horizontal direction.

[0041] If the guide unit 19 is not provided, the air is concentrated at a central portion of the top surface of the intake panel 13. Thus, air turbulence may occur at the central portion of the top surface of the intake panel 13. As a result, the air may not smoothly flow.

[0042] However, when the guide unit 19 is provided between the intake panel 13 and the filter 15 or a bottom surface of the front panel 12, the air flowing into the space S flows along the respective intake passages SP partitioned by the guide unit 19. Thus, occurrence of air turbulence may be reduced at the central portion of the top surface of the intake panel 13.

[0043] In addition, since the air flow is guided up to an end portion of the second part 195, the air is not concentrated until the air flows up to an upper end portion of the second guide part 195.

[0044] When the indoor unit 10 turns off, the intake panel 13 ascends by the drive motor. At this time, the first guide part 191 ascends along the outside of the second guide part 195 and is positioned inside the orifice 124.

[0045] Also, as a volume of the second guide part 195 can be combined with the insertion portion 192 of the first guide part 191, it reduces the possibility of the first guide part 191 interfering with the filter 15.

[0046] Here, since the first guide part 191 is relatively movable with respect to the second guide part 195, the total height of the guide unit 19 may be maximized in a state where the intake panel 13 opens the intake portion 121.

[0047] The increase of the total height of the guide unit 19 denotes an increase of a flow distance of the air flowing along the respective intake passages SP partitioned by the guide unit 19. Thus, as the total height of the guide unit 19 increases, the occurrence of the air turbulence may be reduced.

[0048] Referring to Fig. 5, a guide unit 29 includes a first guide part 291 positioned on a top surface of an intake panel 13 and a second guide part 295 that at least portion of the first guide part 291 is combined or inserted into. The second guide part 295 can be assembled with a front panel 12 as one body .

[0049] The second guide part 295 has an insertion portion 296. So, the first guide part 291 is inserted into the second guide part 295. When the intake panel 13 is vertically moved, the second guide part 295 is vertically moved in a state where at least portion of the first guide part 291 is inserted into the insertion portion 296.

[0050] Although the guide unit includes two guide parts, the present disclosure is not limited thereto. For example, the guide unit may include three or more guide parts relatively movable with respect to each other.

[0051] It will be understood that various modifications may be made without departing from the spirit and scope of the claims. For example, advantageous results still could be achieved if steps of the disclosed techniques were performed in a different order and/or if components in the disclosed systems were combined in a different manner and/or replaced or supplemented by other components. Accordingly, other implementations are within the scope of the following claims.

Claims

1. An air conditioner, comprising:

a cabinet (11);
a fan assembly (14) positioned within the cabinet (11) and configured to guide air inside of the cabinet (11) toward an outside of the cabinet (11);
a front panel (12) coupled to the cabinet (11) and configured to communicate air into the cabinet (11) from the outside; and
an intake panel (13) moveable with respect to the front panel (12) and configured to open or close an intake portion (121);

characterized by
a guide unit (19) positioned between the front panel (12) and the intake panel (13), and configured to reduce turbulence of air within the intake portion (121) when the intake portion (121) is opened.

2. The air conditioner of claim 1, wherein
the guide unit (19) is configured to partition the intake portion (121) into at least two intake passages (SP), preferably into four intake passages.

3. The air conditioner of claim 1 or 2, wherein the guide unit (19) has a cross shape.

4. The air conditioner of claim 1, 2 or 3, wherein the guide unit (19) includes a first guide part (191) configured to move in connection with movement of the intake panel (13) vertically.

5. The air conditioner of claims 4, wherein the first guide part (191) and the intake panel (13) move in a same direction when the air conditioner turns on or turns off.

6. The air conditioner of any one of claims 1 to 5, wherein the guide unit (19) comprises at least:

a first guide (191) part supported by the intake panel (13); and
a second guide part (195) assembled with the front panel (12).

7. The air conditioner of claim 6, wherein the first guide part (191) is positioned on a surface of the intake panel (13).

8. The air conditioner of claim 6, wherein the first guide part (191) is assembled with the intake panel (13) as one body.

9. The air conditioner of claim 6, 7 or 8, wherein the second guide part (195) and the front panel (12) are one body.

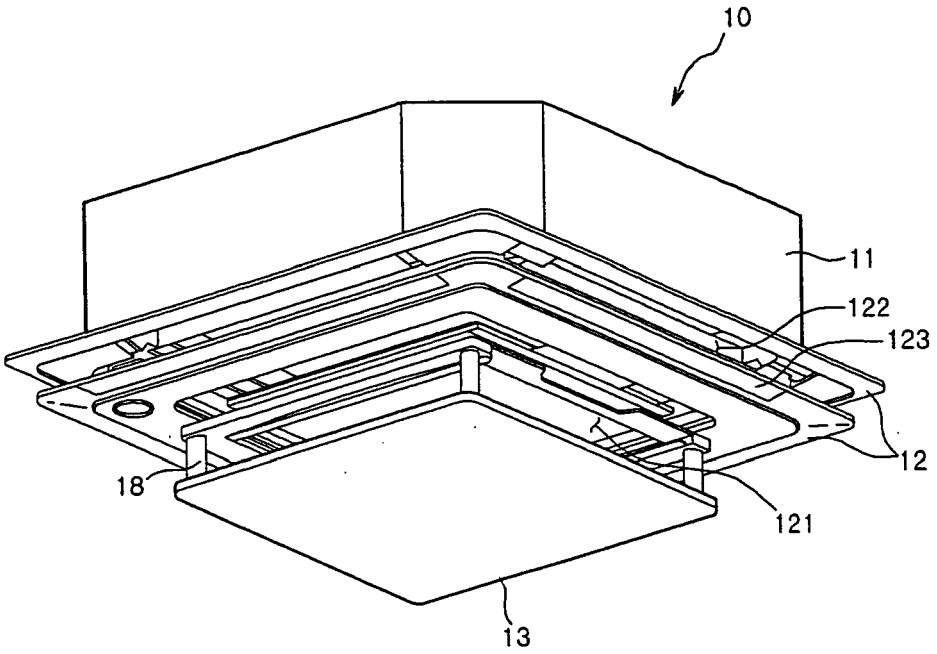
10. The air conditioner of any one of claims 6 to 9, wherein any one of the first guide part (191) and the second guide part (195) is combined with the other one.

11. The air conditioner of any one of claim 6 to 10, wherein the end portion (196) of the second guide part (195) narrows in thickness toward the fan assembly (14).

12. The air conditioner of any one of claims 6 to 11, wherein the first guide part (191) is configured to move with respect to the second guide part (195) that guides movement of the first guide part (191).

13. The air conditioner of any one of claims 6 to 12, wherein the first guide part (191) and the second guide part (195) are coupled to each other when the intake portion is closed.

FIG.1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121
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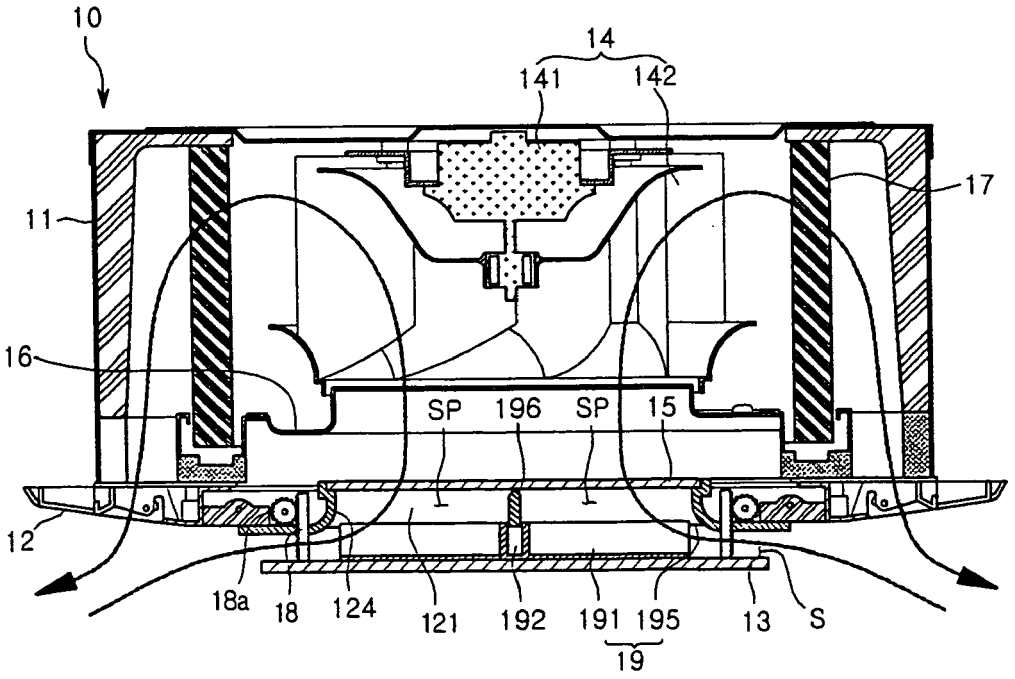
FIG.2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142
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18a
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192
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S
19

FIG.3

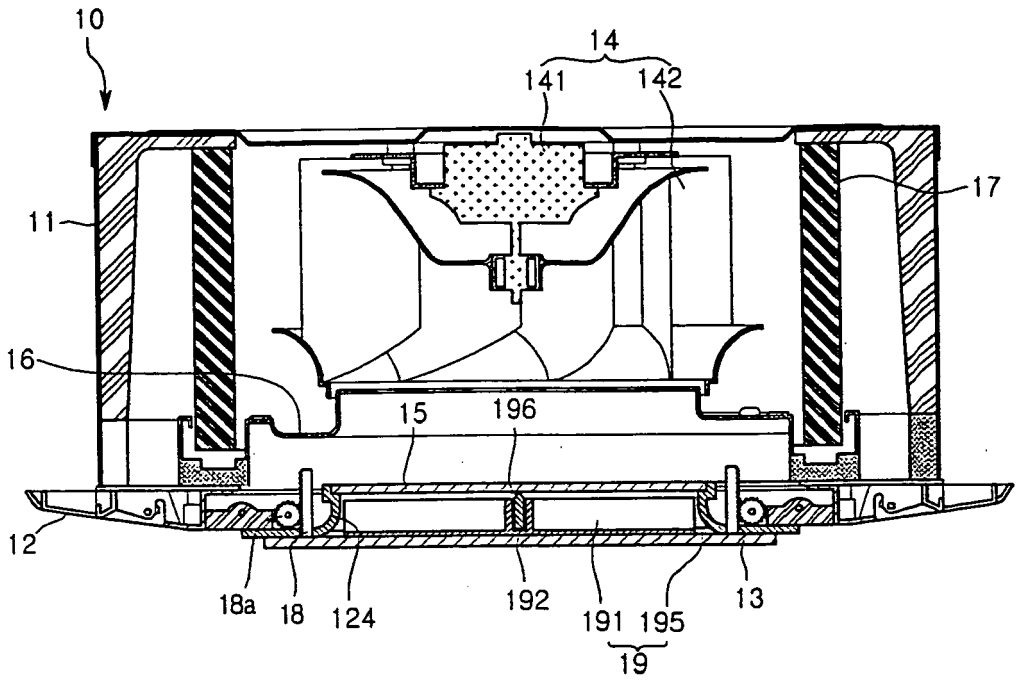
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FIG.4

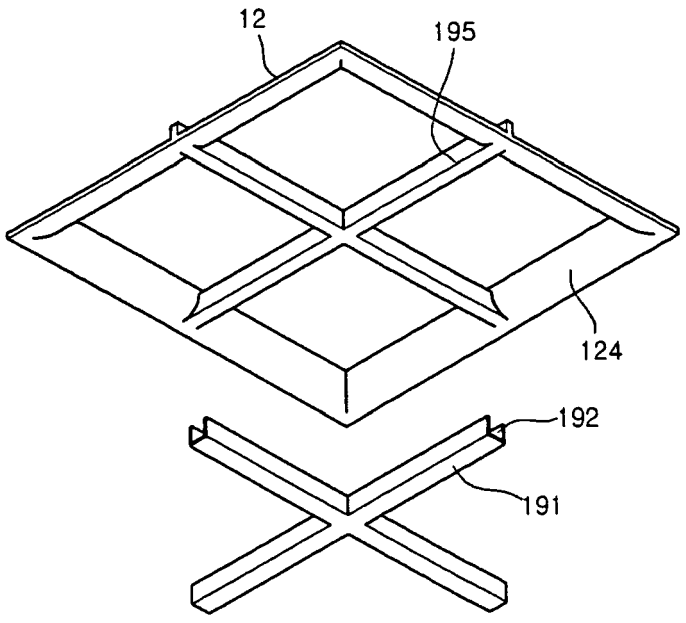
12
195
124
192
191

FIG. 5