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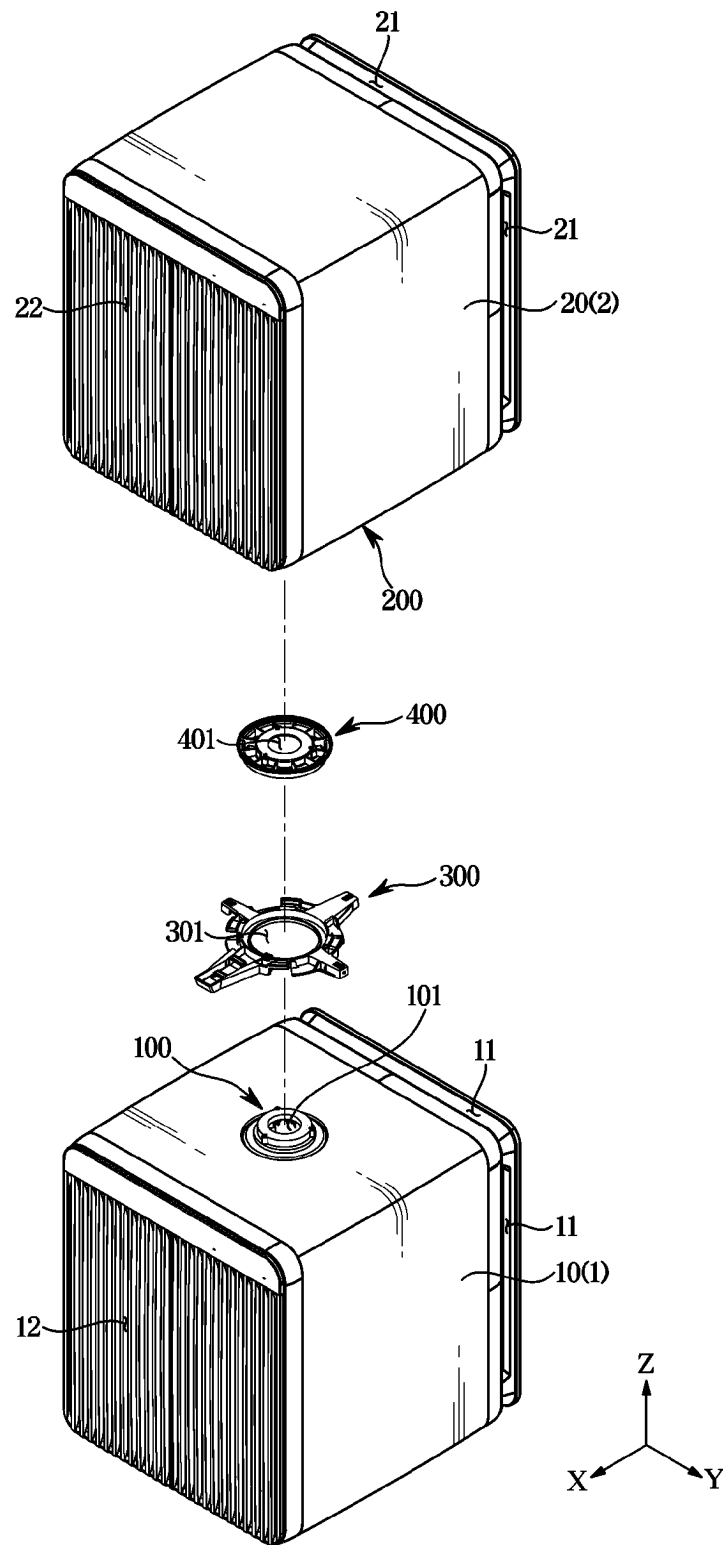
(54) **AIR PURIFIER AND INSTALLING METHOD THEREOF**

(57) This air purifier comprises: a first air purification module including a coupling body; a second air purification module disposed above the first air purification module and including a coupling plate; a holder that can be coupled to the coupling body and disposed between the first air purification module and the second air purification

module; and a rotating member that can be coupled to the coupling plate and disposed between the holder and the first air purification module. The second air purification module coupled to the rotating member can be rotated with respect to the first air purification module coupled to the holder.

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FIG. 3



Description

[Technical Field]

[0001] The disclosure relates to an air purifier that is easy to stack.

[Background Art]

[0002] The air purifier is a device used to remove contaminants in the air. The air purifier may remove germs, viruses, mold, fine dust and chemicals in the air drawn in, which cause offensive odor.

[0003] The air purifier may include a filter for purifying contaminated indoor air. The air drawn into the air purifier may be purified into clean air with the contaminants removed therefrom while passing through the filter, and the purified air may be discharged out of the air purifier.

[0004] The air purifier may be used in various indoor spaces. The indoor spaces may be relatively wide or narrow. Hence, air purifiers having various capacities have been released, and the user may select and purchase an air purifier with a suitable capacity for the user by considering the residential indoor space.

[0005] These days, a growing number of users are using a structure that may be used by piling up the same sized air purification modules.

[DISCLOSURE]

[Technical Problem]

[0006] An aspect of the disclosure is to provide an air purifier that is easy to stack and couple together.

[0007] Another aspect of the disclosure is to provide an air purifier that is securely coupled not to be damaged or decoupled in the process of being distributed and treated and that is also easily coupled in a restricted space.

[0008] Technological objectives of the disclosure are not limited to what are mentioned above, and throughout the specification, it will be clearly appreciated by those of ordinary skill in the art that there may be other technological objectives unmentioned.

[Technical Solution]

[0009] According to an embodiment, an air purifier includes a first air purification module including a coupling body, a second air purification module arranged on top of the first air purification module and including a coupling plate, a holder configured to be coupled with the coupling body and arranged between the first air purification module and the second air purification module, and a rotation member configured to be coupled with the coupling plate and arranged between the holder and the first air purification module. The second air purification module coupled with the rotation member is able to

rotate against the first air purification module coupled with the holder.

[0010] The rotation member may include a rotation body including an opening at the center. The holder may include a connection hole connected to the opening, and a holder body enclosing the connection hole and covering an upper portion of the rotation body.

[0011] The rotation member may include a first circumferential projection protruded upward from the rotation body and extended along circular edges and a second circumferential projection spaced from the first circumferential projection. The holder may include a circumferential guider protruded downward from the holder to be inserted between the first circumferential projection and the second circumferential projection.

[0012] The rotation member may include a rotation body including an opening formed in a circular shape at the center and circular edges enclosing the opening, and a rotation projection protruded inward from the rotation body in a radial direction. The coupling body may include a base wall extended in a circumferential direction to include circular edges to support a lower portion of the rotation projection, a guide wall guiding an inner side end of the rotation projection, protruded upward from the base wall and extended in the circumferential direction, and a stopper protruded outward from the guide wall in the radial direction to interfere with the rotation projection.

[0013] The rotation member may include a rotation body including an opening at the center and having a circular shape, and a guide blade extended outward from the rotation body in a radial direction. The coupling plate may include an upper hole connected to the opening, and a guide groove recessed upward to allow the guide blade to be inserted thereto and extended toward the edges of the coupling plate from the upper hole.

[0014] The guide blade may be able to rotate between a first position and a second position within the guide groove.

[0015] The guide groove may include a first inner wall extended from the upper hole toward edges of the coupling plate to support one side end of the guide blade in response to the guide blade being placed in the first position, and a second inner wall extended from the upper hole toward edges of the coupling plate to support the other side end of the guide blade in response to the guide blade being placed in the second position.

[0016] The coupling plate may include a fastener which forms a fastening hole arranged to be coupled with the rotation member. The rotation member may include a boss portion arranged to match the fastener in response to the guide blade being arranged in the second position, and a coupling blade protruded outward from the rotation body in the radial direction.

[0017] The coupling plate may include a coupling blade groove recessed upward to allow the coupling blade to be inserted thereto and extended in the circumferential direction. The coupling blade may be able to rotate between an additional first position where the coupling

blade is placed as the guide blade is placed in the first position and an additional second position where the coupling blade is placed as the guide blade is placed in the second position within the coupling blade groove.

[0018] The coupling blade groove may include a first support wall which supports one side end of the coupling blade in response to the coupling blade being placed in the additional first position and a second support wall which supports the other side end of the coupling blade in response to the coupling blade being placed in the additional second position.

[0019] The coupling plate may further include a support plate extended from the second support wall toward the first support wall to support a lower portion of the coupling blade placed in the additional second position.

[0020] The coupling plate may further include a circumferential inner wall extended in a circumferential direction to enclose the upper hole, and an insertion projection protruded inward from the circumferential inner wall in the radial direction. The rotation member may include an insertion groove extended in the circumferential direction to allow the insertion projection to be inserted thereto.

[0021] The insertion projection may be able to rotate from an additional first position where the insertion projection is placed as the guide blade is placed in the first position to an additional second position where the insertion projection is placed as the guide blade is placed in the second position within the insertion groove. The insertion projection located in the additional second position may be fixed in a position.

[0022] The insertion projection may include a top surface and a fixing groove recessed downward from the top surface. The rotation member may include a cover arranged to cover an upper portion of the insertion projection located in the additional second position, and a fixing projection protruded downward from the cover to match the fixing groove.

[0023] The insertion projection may include a top surface and a fixing projection protruded upward from the top surface. The rotation member may include a cover arranged to cover the upper portion of the insertion projection located in the additional second position, and a fixing groove recessed upward from the cover to match the fixing projection.

[0024] According to an embodiment, an air purifier includes a first air purification module including a coupling body including a lower hole at the center, a second air purification module arranged on top of the first air purification module and including a coupling plate having an upper hole connected to the lower hole, a rotation member arranged between the first air purification module and the second air purification module, and including a boss portion allowed to be coupled with the coupling plate, and a holder arranged between the rotation member and the second air purification module and allowed to be coupled with the coupling body. The coupling plate includes a fastener formed to match the boss portion and

arranged between the first air purification module and the second air purification module.

[0025] The rotation member may include a rotation body including an opening at the center, and a circumferential guider protruded upward from the rotation body and extended along circular edges. The holder may include a circumferential groove recessed upward for the circumferential projection to be inserted thereto.

[0026] The rotation member may include a rotation body including an opening formed in a circular shape at the center and circular edges enclosing the opening, and a rotation projection protruded inward from the rotation body in a radial direction. The coupling body may include a guide wall arranged inside the rotation projection and extended along the circular edges, and a stopper protruded outward from the guide wall in the radial direction to prevent movement of the rotation projection.

[0027] The rotation member may include a guide blade protruded outward from the rotation body in the radial direction, and a coupling blade protruded in a direction opposite to the protruded direction of the guide blade. The coupling plate may include a guide groove and a coupling blade groove formed for the guide blade and the coupling blade to be inserted thereto. The guide blade and the coupling blade may be rotationally inserted to the guide groove and the coupling blade groove, respectively.

[0028] According to an embodiment, a method of installing an air purifier includes installing a first air purification module which includes a coupling body on the top. The method may include placing a rotation member including an opening arranged for the coupling body to be inserted thereto on the top of the first air purification module. The method may include placing a holder which covers the top of the rotation member and allowed to be coupled with the coupling body on the top of the rotation member. The method may include coupling the holder with the coupling body. The method may include placing a second air purification module which includes a coupling plate arranged underneath to be coupled with the rotation member on the top of the cover. The method may include coupling the coupling plate and the rotation member from outside with a screw.

[Advantageous Effects]

[0029] According to an aspect of the disclosure, upper and lower air purification modules may be more easily coupled together, so that an air purifier may be provided with less parts and at lower expenses.

[0030] According to another aspect of the disclosure, the last coupling stage, i.e., screw coupling, may be done from outside of the air purification modules, so that the user is able to couple or decouple the upper and lower air purification modules more easily.

[0031] According to another aspect of the disclosure, the second position of the rotation member inserted to the coupling plate may be fixed, so that the coupling process

may be more easily performed.

[DESCRIPTION OF DRAWINGS]

[0032]

FIG. 1 illustrates an air purifier in a state where a first air purification module and a second purification module are coupled to each other, according to an embodiment of the disclosure.

FIG. 2 illustrates an air purifier in a state where a second air purification module is rotated against a first air purification module, according to an embodiment of the disclosure.

FIG. 3 is an exploded perspective view of an air purifier, according to an embodiment of the disclosure.

FIG. 4 is an enlarged perspective view of a first air purification module, according to an embodiment of the disclosure.

FIG. 5 is a perspective view of a coupling body of a first air purification module, according to an embodiment of the disclosure.

FIG. 6 is a perspective view of a rotation member, according to an embodiment of the disclosure.

FIG. 7 is a bottom perspective view of the rotation member according to the embodiment shown in FIG. 6.

FIG. 8 is a perspective view of a holder, according to an embodiment of the disclosure.

FIG. 9 is a bottom perspective view of the holder according to the embodiment of the disclosure shown in FIG. 8.

FIG. 10 is a bottom view of the holder according to the embodiment of the disclosure shown in FIG. 8.

FIG. 11 is a perspective view of a coupling body before coupled with a holder, according to an embodiment of the disclosure.

FIG. 12 is a side cross-sectional view of a coupling body, a rotation member and a holder after the coupling body is coupled with the holder, according to an embodiment of the disclosure.

FIG. 13 is a plan view of a rotation member before rotating against a coupling body, according to an embodiment of the disclosure.

FIG. 14 is a plan view of a rotation member in a state of being rotated against a coupling body, according to an embodiment of the disclosure.

FIG. 15 is a bottom view of a coupling plate, according to an embodiment of the disclosure.

FIG. 16 is a bottom perspective view of the coupling plate according to the embodiment shown in FIG. 15.

FIG. 17 schematically illustrates a rotation member before inserted to a coupling plate, which is viewed from below, according to an embodiment of the disclosure.

FIG. 18 schematically illustrates a rotation member in a state of being inserted to a coupling plate, which

is viewed from below, according to an embodiment of the disclosure.

FIG. 19 schematically illustrates the coupling plate in a state of being rotated against the rotation member, which is viewed from below, according to the embodiment of the disclosure shown in FIG. 18.

FIG. 20 is an enlarged view of portion A where an insertion projection of the coupling plate shown in FIG. 19 is inserted to an insertion groove of the rotation member.

FIG. 21 is a cross-sectional view taken along line B-B' illustrating a fixing projection of a cover of the rotation member inserted to the fixing groove of the insertion projection shown in FIG. 20.

FIG. 22 is a side cross-sectional view of a first air purification module and a second air purification module in a state where a coupling plate is rotated against a rotation member, according to an embodiment of the disclosure.

FIG. 23 is a side view of the first air purification module and the second purification module shown in FIG. 22.

FIG. 24 is a side cross-sectional view of a fixing projection of an insertion projection coupled with a fixing groove of a cover, according to an embodiment of the disclosure.

FIG. 25 is a side cross-sectional view of a coupling body, a rotation member and a holder after the coupling body is coupled with the holder, according to an embodiment of the disclosure.

[MODES OF THE INVENTION]

[0033] Embodiments and features as described and illustrated in the disclosure are merely examples, and there may be various modifications replacing the embodiments and drawings at the time of filing this application.

[0034] Throughout the drawings, like reference numerals refer to like parts or components.

[0035] The terminology used herein is for the purpose of describing particular embodiments only and is not intended to limit the disclosure. It is to be understood that the singular forms "a," "an," and "the" include plural references unless the context clearly dictates otherwise. It will be further understood that the terms "comprises" and/or "comprising," when used in this specification, specify the presence of stated features, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components, and/or groups thereof.

[0036] The terms including ordinal numbers like "first" and "second" may be used to explain various components, but the components are not limited by the terms. The terms are only for the purpose of distinguishing a component from another. Thus, a first component discussed below could be termed a second component and vice versa, without departing from the teachings of the

disclosure. Descriptions shall be understood as to include any and all combinations of one or more of the associated listed items when the items are described by using the conjunctive term "~ and/or ~," or the like.

[0037] The terms "upward (or up)" and "downward (or down)" as herein used are defined with respect to the drawings, but the terms may not restrict the shape and position of the respective components.

[0038] FIG. 1 illustrates air purification modules in a state where a first air purification module and a second purification module are coupled to each other, according to an embodiment of the disclosure. FIG. 2 illustrates air purification modules in a state where a first air purification module is rotated against a second air purification module, according to an embodiment of the disclosure.

[0039] As shown in FIGS. 1 and 2, according to an embodiment of the disclosure, an air purifier may include a first air purification module 1 and a second air purification module 2.

[0040] Two air purification modules will now be taken as an example, but there may be three or more air purification modules to be coupled together.

[0041] Throughout the specification, the air purifier is taken as an example, but the structures will be equally applied to humidifiers and dehumidifiers. Furthermore, it may also be possible to couple or decouple differently functional modules such as air purifiers, humidifiers and dehumidifiers.

[0042] The first air purification module 1 may include a main body 10 having an inlet 11 through which air is drawn in and an outlet 12 through which the air drawn in is discharged. Although not shown, there may be a filter unit and a blower fan arranged in the main body 10, the blower fan may draw in outside air through the inlet 11 and discharge the air through the outlet 12, and the filter unit may purify the air drawn in through the inlet 11.

[0043] The inlet 11 may be arranged to draw in outside air from behind the main body 10. The outside air drawn into the main body 10 through the inlet 11 may be filtered and then discharged through the outlet 12 facing forward of the main body 10.

[0044] Likewise, the second air purification module 2 may include a main body 20 that may be stacked on the main body 10 of the first air purification module 1. The main body 20 of the second air purification module 2 may include an inlet 21 and an outlet 22 to correspond to the main body 10 of the first air purification module 1. Similarly, a filter unit for filtering air drawn in through the inlet 21, and a blower fan for drawing in outside air through the inlet 21 and discharging the air through the outlet 22 may be arranged in the main body 20 of the second air purification module 2.

[0045] The first air purification module 1 may include a coupling body 100 arranged on a top surface 10a (see FIG. 4) of the main body 10. The second air purification module 2 may include a coupling plate 200 arranged on a bottom surface of the main body 20 (see FIG. 3).

[0046] The first air purification module 1 and the sec-

ond air purification module 2 may be detachably stacked. Furthermore, the second air purification module 2 may be configured to be able to rotate in a state where the first air purification module 1 and the second air purification module 2 are stacked. The second air purification module 2 may be arranged to be able to rotate even while in operation. For example, the second air purification module 2 may be able to rotate about 170 degrees clockwise against the first air purification module 1. Furthermore, the second air purification module 2 may be able to rotate about 170 degrees counterclockwise against the first air purification module 1.

[0047] As such, the second air purification module 2 may be configured to be able to rotate against the first air purification module 1 while being stacked on top of the first air purification module 1. Accordingly, the outlet 22 of the second air purification module 2 may be positioned to face a different direction from the outlet 12 of the first air purification module 1. The outlet 12 of the first air purification module 1 and the outlet 22 of the second air purification module 2 may be positioned to face different directions, thereby purifying the air in a wide indoor space at a higher rate on the whole. Alternatively, to intensely purify air of a particular direction, the outlet 12 of the first air purification module 1 and the outlet 22 of the second air purification module 2 may be positioned to face the same direction.

[0048] The first air purification module 1 and the second air purification module 2 may be stacked up vertically. In a case that the first air purification module 1 and the second air purification module 2 are coupled in a left-right direction or front-back direction, there is no difference in floor area occupied by the first air purification module 1 and the second air purification module 2 between before and after being coupled, so there is no merit of coupling the two modules.

[0049] In an embodiment of the disclosure, the coupling body 100 and the coupling plate 200 are placed on a top surface 10a of the main body 10 of the first air purification module 1 and a lower surface of the main body 20 of the second air purification module 2, respectively, so the first air purification module 1 and the second air purification module 2 are coupled vertically (in the direction Z).

[0050] When the first air purification module 1 and the second air purification module 2 are coupled vertically (in the direction Z), the floor area occupied by the two air purification modules is equal to an area occupied by a single air purification module even though the purification capacity doubles as the two air purification modules purify the air. Accordingly, for the area occupied by the air purification modules, the capacity increases and space utilization is improved as well.

[0051] As there may be three or more air purification modules provided in this way, the capacity for area may further increase depending on the number of the coupled air purification modules. However, when four or more air purification modules are coupled together vertically, an

increase in height may reduce user convenience, so it is desirable to have three or less air purification modules to be coupled vertically.

[0052] FIG. 3 is an exploded perspective view of an air purifier, according to an embodiment of the disclosure. FIG. 4 is an enlarged perspective view of a first air purification module, according to an embodiment of the disclosure. FIG. 5 is a perspective view of a coupling body of a first air purification module, according to an embodiment of the disclosure.

[0053] Referring to FIGS. 3 to 5, according to an embodiment of the disclosure, an air purifier may include the first air purification module 1 to be installed on a lower side and the second air purification module 2 to be stacked on top of the first air purification module 2. The air purifier may include a rotation member 300 and a holder 400 arranged between the first air purification module 1 and the second air purification module 2.

[0054] The rotation member 300 may be a component to be coupled with the second air purification module 2. The holder 400 may be a component to be coupled with the first air purification module 1. The rotation member 300 may be arranged between the first air purification module 1 and the holder 400. The holder 400 may be arranged between the rotation member 300 and the second air purification module 2.

[0055] A lower portion of the rotation member 300 may be supported by the first air purification module 1. An upper portion of the rotation member 300 may be covered by the holder 400. The coupling body 100 arranged on top of the first air purification module 1 may be placed within the rotation member 300. As the rotation member 300 is coupled with the second air purification module 2 while being placed underneath the holder 400, the rotation member 300 may be rotated between the holder 400 and the first air purification module 1 without changes in height and center position.

[0056] The holder 400 may be coupled with the coupling body 100, and while the rotation member 300 is being rotated, the holder 400 and the first air purification module 1 may not be rotated. An upper portion of the holder 400 may be supported by the second air purification module 2. A lower portion of the holder 400 may be supported by the rotation member 300.

[0057] The coupling body 100 may include a lower hole 101 formed in a circular shape at the center. The rotation member 300 may include an opening 301 formed in a circular shape, the center of which matches the center of the lower hole 101. The holder 400 may include a connection hole 401, the center of which matches the position of the center of the opening 301. The coupling plate 200 may include an upper hole 201 (see FIG. 15) connected to the lower hole 101, the opening 301 and the connection hole 401.

[0058] With this structure, the lower hole 101 of the first air purification module 1 may be connected to the upper hole 201 of the second air purification module 2, so the first air purification module 1 and the second air purification module 2 may be electrically connected.

Specifically, as a wire in the main body 10 of the first air purification module 1 may be inserted to the main body 20 of the second air purification module 2 through the upper hole 201 of the second coupling plate 200, the first air purification module 1 and the second air purification module 2 may be electrically connected to each other. With this, the second air purification module 2 may be operated by manipulating the first air purification module 1. Likewise, the first air purification module 1 may be operated by manipulating the second air purification module 2.

[0059] The main body 10 of the first air purification module 1 may be shaped substantially like a cuboid. The main body 10 may include the top surface 10a, a right surface 10b, a front surface 10c, a left surface 10d, a rear surface 10e and a bottom surface 10f. The first air purification module 1 may include the coupling body 100 arranged at the center of the top surface 10a. The center of the top surface 10a may refer to a point where a pair of diagonal lines of the top surface 10a intersect. An installation hole 10g formed for the coupling body 100 to be installed may be included at the center of the main body 10 of the first air purification module 1.

[0060] The inlet 11 of the first air purification module 1 may be arranged at the rear surface 10e. The outlet 12 of the first air purification module 1 may be arranged at the front surface 10c. Alternatively, in another embodiment, the inlet 11 of the first air purification module 1 may be arranged at the front surface 10c. The outlet 12 of the first air purification module 1 may be arranged at the rear surface 10e.

[0061] The coupling body 100 may include a base 110 formed with circular edges to enclose the lower hole 101 formed at the center in a circular shape. The base 110 may include a base wall 111 extended in the circumferential direction centered at the lower hole 101. The base 110 may include a base support wall 112 extended downward (in the direction -Z) from an outer side end of the base wall 111.

[0062] The coupling body 100 may be placed in the installation hole 10g such that the base wall 111 of the base 110 is aligned with the top surface 10a of the main body 10. Specifically, the base wall 101 may be arranged to match the size of the installation hole 10g of the main body 10.

[0063] The coupling body 100 may include fixing blades 120 each extended from the base 110 to an either side. The fixing blade 120 may include a fixer 121, and a screw hole 122 formed at the fixer 121. The fixing blades 120 may be placed farther down than the top surface 10a of the first air purification module 1. The fixing blades 120 may be screwed with the rear side of the top surface 10a of the first air purification module 10 through the screw hole 122. Supporting portions 123 protruded forward and backward from the fixer 121 may be components that support the top surface 10a of the first air purification module 1. The supporting portions 123 and the fixers 121 may be arranged farther down than the base wall 111.

[0064] The coupling body 100 may include an embossed wall 130 extended upward from an inner edge of the base wall 111. The embossed wall 130 may include a guide wall 131 connected to the inner side of the base wall 111 and extended vertically, and an edge wall 132 extended inward from an upper end of the guide wall 131 to the lower hole 101 in the radial direction.

[0065] The coupling body 100 may include a coupling wall 140 extended upward from the inner side of the embossed wall 130. The coupling wall 140 may include a top wall 141 having circular edges to enclose the lower hole 101, and a coupling hole 142 hollowed from the top wall 141. The coupling wall 140 may include a rounding wall 143 that encloses the coupling hole 142. The rounding wall 143 may be hollowed for the coupling hole 142 to be arranged therein. The rounding wall 143 may extend vertically. The upper end of the rounding wall 143 may be connected to the top wall 141 and the lower end may be connected to the guide wall 132.

[0066] FIG. 6 is a perspective view of a rotation member, according to an embodiment of the disclosure. FIG. 7 is a bottom perspective view of the rotation member according to the embodiment shown in FIG. 6. FIG. 8 is a perspective view of a holder, according to an embodiment of the disclosure. FIG. 9 is a bottom perspective view of the holder according to the embodiment of the disclosure shown in FIG. 8. FIG. 10 is a bottom view of the holder according to the embodiment of the disclosure shown in FIG. 8. FIG. 11 is a perspective view of the coupling body before coupled with a holder, according to an embodiment of the disclosure. FIG. 12 is a side cross-sectional view of a coupling body, a rotation member and a holder after the coupling body is coupled with the holder, according to an embodiment of the disclosure. Coupling between the coupling body, the rotation member and the holder will now be described in detail with reference to FIGS. 6 to 12.

[0067] Referring to FIGS. 6 to 12, the rotation member 300 may include an opening 301 formed in a circular shape at the center. As the opening 301 is formed to be bigger than the size of the base wall 110 (see FIG. 5), the rotation member 300 is able to move down from an upper side of the coupling body 100 toward the top surface 10a of the first air purification module 1. In other words, the rotation member 300 may be installed on an outer side of the coupling body 100 in the radial direction.

[0068] The rotation member 300 may include a rotation body 310 that encloses the opening 301 and includes circular edges. The opening 301 may be arranged to match the center of the lower hole 101. The rotation body 310 may be installed on the top surface 10a of the first air purification module 1. The center of rotation of the rotation body 310 may be a center of the opening 301.

[0069] The rotation member 300 may include a first circumferential projection 320 formed at the edge of the opening 301. The rotation member 300 may include a second circumferential projection 330 arranged farther outside than the first circumferential projection 320 in the

radial direction. The circumferential projections 320 and 330 of the rotation member 300 may have the form of ribs that protrude upward from the rotation body 310. The rotation member 300 may include a circumferential groove 325 formed at the first circumferential projection 320 and the second circumferential projection 330. The circumferential groove 325 may extend to correspond to the circumferential direction of the first circumferential projection 320 and the second circumferential projection 330.

[0070] The rotation member 300 may include a rotation projection 335 protruded toward the center of the opening 301 from the first circumferential projection 330. The rotation projection 335 may be rotated along with the rotation of the rotation member 300. The height of the rotation projection 335 may be equal to or lower than the height of the guide wall 131.

[0071] The rotation member 300 may include a guide blade 340 extended outward from the rotation body 310 in the radial direction. The rotation member 300 may include coupling blades 350 spaced from the guide blade 340 and extended outward from the rotation body 310 in the radial direction.

[0072] FIGS. 6 and 7 show three coupling blades 350, but the disclosure is not limited thereto. For example, there may be one coupling blade 350, which extends from the rotation body 310 to the opposite direction to the extension direction of the guide blade 340. Specifically, the guide blade 340 and the coupling blade 350 may extend outward toward opposite directions from the second circumferential projection 320.

[0073] The guide blade 340 may extend longer than the coupling blade 350 from the rotation body 310. The guide blade 340 may include a wire holder 341 formed to guide the wire in the first air purification module 1 or the second air purification module 2, which passes through the opening 301. A wire hole 342 is arranged in a lower portion of the wire holder 341, and the wire may pass through the wire hole 342 and may be wound from the lower portion to an upper portion of the wire holder 341. Alternatively, the wire may pass through the wire hole 342 and may be wound from the upper portion to the lower portion of the wire holder 341. This structure may avoid an unstable electrical contact problem that would occur due to extra length of the wire in the first air purification module 1 (see FIG. 1) and the second air purification module 2 when the wire passes through the upper hole 201 and the lower hole 101.

[0074] The coupling blade 350 may include a boss portion 351 formed at one end. The boss portion 351 may include a boss groove 352 to be coupled with the coupling plate 200.

[0075] The rotation member 300 may include a cover 371 arranged at edges of the rotation body 310. An insertion groove 370 may be formed underneath the cover 371 (in the direction -Z). The cover 371 and the insertion groove 370 may extend in the circumferential direction of the rotation body 310. Each of the cover 371

and the insertion groove 370 may be provided in the plural, which may be spaced from each other in the circumferential direction around the center of the opening 301.

[0076] Insertion projections 270 (see FIG. 15) of the coupling plate 200 may be inserted to the insertion grooves 370. The cover 371 may include a fixing projection 372 protruded downward (in the direction -Z). The fixing projection 372 may fix the insertion projection 270 inserted to the insertion groove 370 in the position 370. The number of insertion grooves 370 and covers 371 is not, however, limited to what is shown in the drawings.

[0077] A circumferential rib 311 protruded downward (in the direction -Z) from the rotation body 310 may be formed underneath the rotation body 310 (in the direction -Z). The circumferential rib 311 may extend in the circumferential direction. The circumferential rib 311 may be a rib that reaches the top surface 10a of the first air purification module 1. Unlike the structure of the circumferential rib 311, a structure in which the bottom surface of the rotation body 310 meets the top surface 10a (see FIG. 4) of the first air purification module 1 may reduce durability of the parts due to friction created by the surface-to-surface contact. To avoid this problem, according to an embodiment of the disclosure, instead of the surface-to-surface contact, the circumferential rib 311 may meet the top surface 10a of the first air purification module 1.

[0078] The holder 400 may be shaped like a circle with a cavity, which includes a connection hole 401 connected to the lower hole 101. The holder 400 may include a holder body 410 that covers the rotation body 310. The holder body 410 may include a first holder body 420 arranged on edges of the holder 400, and a second holder body 430 arranged on an inner side in the radial direction to be spaced from the first holder body 420.

[0079] The holder 400 may include a circumferential guider 425 arranged between the first holder body 420 and the second holder body 430 and extended downward from the outer side of the first holder body 420 and the inner side of the second holder body 430. The circumferential guider 425 may be inserted to the circumferential groove 325 of the rotation member 300. For this, the thickness of the circumferential guider 425 in the radial direction may be equal to or less than a gap between the first circumferential projection 320 and the second circumferential projection 330 of the rotation member 300. With this structure, as the first circumferential projection 320 may be rotated inside the circumferential guider 425 and the second circumferential projection 330 may be rotated outside the circumferential guider 425, the rotation member 300 may be rotated without a change in rotation center.

[0080] The holder 400 may include a settling portion 440 formed to enclose the connection hole 401. The settling portion 440 may be embossed upward (in the direction Z) from inside of the second holder body 430. The settling portion 440 may be settled on the coupling wall 140.

[0081] The settling portion 440 may include a matching hole 442 formed in a position that matches the coupling hole 142 of the coupling wall 140 (see FIG. 5). The settling portion 440 may include an upper wall 441 that encloses the matching hole 442 and the connection hole 401. The upper wall 441 may be arranged on top of the holder 400.

[0082] The holder 400 may include a radial rib 411 extended outward from the settling portion 440 in the radial direction. The radial rib 411 is a component for rigidity of the holder 400, which may be provided in the plural and spaced from one another in the circumferential direction.

[0083] The first holder body 420 may be bent upward (in the direction Z) or downward (in the direction -Z) from outer edges of the holder body 410. This structure may be designed for rigidity of the holder 400.

[0084] The holder 400 may include a rounding groove 443 formed around the matching hole 442 and extended vertically. The rounding groove 443 may be formed on the inner side of the settling portion 430. The rounding groove 443 is a component for the rounding wall 143 of the coupling body 100 to be inserted thereto, which may be recessed upward (in the direction Z). Hence, when the rounding wall 143 is inserted to the rounding groove 443, positions of the coupling hole 142 and the matching hole 442 may correspond to each other, and the positions of the holder 400 and the coupling body 100 before the holder 400 and the coupling body 100 are coupled may be virtually fixed. The virtually fixed holder 400 and coupling body 100 may be fixed by screws through the matching hole 442 and the coupling hole 142.

[0085] FIG. 13 is a plan view of a rotation member before rotating against a coupling body, according to an embodiment of the disclosure. FIG. 14 is a plan view of a rotation member in a state of being rotated against a coupling body, according to an embodiment of the disclosure.

[0086] Referring to FIGS. 13 and 14, the base wall 111 of the coupling body 100 may support the bottom of the rotation projection 335. The rotation projection 335 may be placed on an inner side of the first circumferential projection 320 in the radial direction, which is arranged on top of the base wall 111 of the coupling body 100 (in the direction Z). The guide wall 131 may extend in the circumferential direction within the rotation projection 335. The rotation projection 335 may be able to rotate clockwise or counterclockwise along the circumferential direction of the guide wall 131 and the base wall 111. The guide wall 131 may guide a rotation direction of the inner side end of the rotation projection 335.

[0087] The coupling body 100 may include a stopper 135 protruded outward from the guide wall 131 in the radial direction. The stopper 135 may be arranged farther inside than the first circumferential projection 320 in the radial direction. The stopper 135 may be a component to interfere with the rotation projection 335 to prevent the rotation projection 335 from being rotated more than a certain angle. Specifically, in an embodiment of the dis-

closure, the rotation projection 335 is able to rotate up to about 170 degrees clockwise or counterclockwise. The maximum rotation angle of the rotation projection 335 may be about 340 degrees between a position where the rotation projection 335 meets one side of the stopper 135 and a position where the rotation projection 335 meets the other side of the stopper 135. In other words, the user may understand that the second air purification module 2 is not further rotated in the rotation direction due to the structure of the rotation projection 335 interfered by the stopper 135.

[0088] FIG. 15 is a bottom view of a coupling plate, according to an embodiment of the disclosure. FIG. 16 is a bottom perspective view of the coupling plate according to the embodiment shown in FIG. 15. FIG. 17 schematically illustrates a rotation member before inserted to a coupling plate, which is viewed from below, according to an embodiment of the disclosure. FIG. 18 schematically illustrates a rotation member in a state of being inserted to a coupling plate, which is viewed from below, according to an embodiment of the disclosure. FIG. 19 schematically illustrates the coupling plate in a state of being rotated against the rotation member, which is viewed from below, according to the embodiment shown in FIG. 18. FIG. 20 is an enlarged view of portion A where an insertion projection of the coupling plate shown in FIG. 19 is inserted to an insertion groove of the rotation member. FIG. 21 is a side cross-sectional view taken along line B-B' illustrating a fixing projection of a cover of the rotation member inserted to the fixing groove of the insertion projection shown in FIG. 20. FIG. 22 is a side cross-sectional view of a first air purification module and a second air purification module in a state where a coupling plate is rotated against a rotation member, according to an embodiment of the disclosure. FIG. 23 is a side view of the first air purification module and the second purification module shown in FIG. 21.

[0089] Referring to FIGS. 15 to 23, the coupling plate 200 may be attached to the lower surface of the second air purification module 2. The coupling plate 200 may be shaped substantially like a square. The coupling plate 200 may include the upper hole 201 formed at the center. The upper hole 201 may be a hole to be connected to the lower hole 101 of the first air purification module 1. The upper hole 201 may be connected to the opening 301 of the rotation member 300. The upper hole 201 may be formed in the shape of a circle around the center of the coupling plate 200.

[0090] The coupling plate 200 may include a circumferential inner wall 220 enclosing the upper hole 201 and extended in the circumferential direction. The coupling plate 200 may include a guide groove 240 extended from the upper hole 201 toward edges of the coupling plate 200. The guide groove 240 may be recessed upward for the guide blade 340 to be inserted thereto. The guide groove 240 may extend as much as a certain angle in the circumferential direction with respect to the center of the upper hole 201. The guide groove 240 may be arranged

for the guide blade 340 to be inserted thereto and rotated therein.

[0091] Specifically, as the coupling plate 200 is moved downward (in the direction -Z) in a state where the guide blade 340 is placed under the coupling plate 200 (in the direction -Z), the guide blade 340 may be inserted to the guide groove 240. Furthermore, the guide blade 340 may be rotated while inserted to the guide groove 240, or the coupling plate 200 including the guide groove 240 may be rotated along the guide blade 340. Relative movement of the coupling plate 200 against the rotation member 300 will now be described as movement of the rotation member 300.

[0092] The guide blade 340 is able to rotate between a first position GP1 and a second position GP2 against the guide groove 240. The first position GP1 of the guide blade 340 may be a position when the guide blade 340 is inserted to the guide groove 240 of the coupling plate 200 and before the guide blade 340 is rotated in the guide groove 240. The second position GP2 of the guide blade 340 may be a position in a state where the guide blade 340 is rotated in the guide groove 240.

[0093] To make the guide blade 340 rotate only between the first position GP1 and the second position GP2, the guide groove 240 may include a first inner wall 244 formed on one side of the guide groove 240 and a second inner wall 243 formed on the other side of the guide groove 240. The first inner wall 244 may support one side end 344 of the guide blade 340 located in the first position GP1. The second inner wall 243 may support the other side end 343 of the guide blade 340 located in the second position GP2.

[0094] The coupling plate 200 may include a coupling blade groove 250 for the coupling blade 350 to be inserted thereto when the guide blade 340 is inserted to the guide groove 240. The coupling blade groove 250 may be recessed upward (in the direction Z). The coupling blade groove 250 may extend from the upper hole 201 toward edges 210 of the coupling plate 200. The coupling blade groove 250 may extend in the circumferential direction around the center of the upper hole 201.

[0095] The coupling blade 350 inserted to the coupling blade groove 250 is able to rotate between a first position CP1 and a second position CP2. Alternatively, the coupling plate 200 including the coupling blade groove 250 is able to rotate against the coupling blade 350. The first position CP1 of the coupling blade 350 may be a position in a state where the coupling blade 350 is inserted to the coupling blade groove 250 before being rotated. The second position CP2 of the coupling blade 350 may be a position in a state where the coupling blade 350 is rotated after being inserted thereto.

[0096] The coupling blade 350 may be located in the first position CP1 when the guide blade 340 is located in the first position GP1, and located in the second position CP2 when the guide blade 340 is located in the second position GP2. The coupling blade groove 250 may include a first support wall 254 for supporting one side end

354 of the coupling blade 350 located in the first position CP1. The coupling blade groove 250 may include a second support wall 253 for supporting the other side end 353 of the coupling blade 350 located in the second position CP2.

[0097] The first support wall 254 and the second support wall 253 may face each other. The coupling plate 200 may include a support plate 255 extended from a lower portion of the second support wall 253 toward the first support wall 254. The support plate 255 may be a component for supporting a lower portion of the coupling blade 350 located in the second position CP2. With this structure, the coupling blade 350 inserted to the coupling blade groove 250 and located in the second position CP2 may be fixed in the position more stably without swaying vertically (in the direction Z).

[0098] The coupling plate 200 may include a fastener 251 formed to match the boss portion 351 of the coupling blade 350 located in the second position CP2. The fastener 251 may include a fastening hole 252 formed to match the boss groove 352 of the boss portion 351. In other words, the second position CP2 of the coupling blade 350 may be a position for the boss groove 352 to match the fastening hole 252.

[0099] The fastener 251 may be arranged between the main body 10 of the first air purification module 1 and the main body 20 of the second purification module 2. With this structure, the coupling plate 200 may be coupled with the rotation member 300 by a screw inserted from outside of the first air purification module 1 and the second air purification module 2. Accordingly, the second air purification module 2 and the rotation member 300 may be more easily coupled to each other.

[0100] However, without a structure for virtually fixing the coupling blade 350 located in the second position CP2, the rotation member 300 and the coupling plate 200 may not be coupled properly. In other words, positions of the boss groove 352 and the fastening hole 252 may not match stably. To avoid this problem, the coupling plate 200 may require a structure for fixing the coupling blade 350 located in the second position CP.

[0101] The coupling plate 200 may include an insertion projection 270 protruded inward toward the center of the upper hole 201 from the circumferential inner wall 220 in the radial direction. The insertion projection 270 is shown as being provided in the plural between the guide groove 240 and the coupling blade groove 250, but is not limited thereto.

[0102] The inserting projection 270 may be a projection to be inserted to the rotation member 300. Specifically, the insertion projection 270 may be a component to be inserted to the insertion groove 370 due to relative rotation of the coupling plate 200 and the rotation member 300. The insertion projection 270 may be rotated from a first position IP1 to a second position IP2 as the guide blade 340 rotates from the first position GP1 to the second position GP2. Furthermore, the insertion projection 270 may be rotated from the first position IP1 to the

second position IP2 as the coupling blade 350 rotates from the first position CP1 to the second position CP2. The first position IP1 of the insertion projection 270 may be a position of the insertion projection 270 when inserted to the insertion groove 370. The second position IP2 of the insertion projection 270 may be a position of the insertion projection 270 inserted to the insertion groove 370 and relatively rotated in the insertion groove 370.

[0103] The cover 371 may cover an upper portion of the insertion projection 270 located in the second position IP2. The cover 371 may include the fixing projection 372 protruded downward (in the direction -Z) from a lower surface 373. The fixing projection 372 may extend in the radial direction, but is not limited thereto and may extend in the circumferential direction.

[0104] The insertion projection 270 may include a fixing groove 272 arranged on its upper surface 271. The fixing groove 272 may be recessed downward (in the direction -Z) from the upper surface 271. The fixing groove 272 may be formed to match the fixing projection 372 for the fixing projection 372 to be inserted thereto. Hence, when the fixing projection 372 extends in the radial direction, the fixing groove 272 may extend in the radial direction as well, and when the fixing projection 372 extends in the circumferential direction, the fixing groove 272 may extend in the circumferential direction as well.

[0105] As the fixing projection 372 may be formed to match the fixing groove 272, the fixing projection 372 includes the fixing projection 372 inserted to the fixing groove 272 and the insertion projection 270 located in the second position IP2 may be fixed in the position. According to this structure, as the guide blade 340 and the coupling blade 350 located in the second positions GP2 and CP2 are fixed to the positions, the position of the fastening hole 252 matches the position of the boss groove 352, so it may be easier to couple with the second air purification module 2 including the rotation member 300 and the coupling plate 200.

[0106] In this state, by screw-coupling of the fastening hole 252 of the coupling plate 200 through the boss groove 352 of the rotation member 300, the coupling plate 200 and the rotation member 300 may be coupled. With the coupling of the coupling plate 200 and the rotation member 300, the second air purification module 2 coupled with the rotation member 300 is able to rotate against the first air purification module 1 coupled with the holder 400.

[0107] FIG. 24 is a side cross-sectional view of a fixing projection of an insertion projection coupled with a fixing groove of a cover, according to an embodiment of the disclosure. Referring to FIG. 24, a cover 371a may cover an upper portion of an insertion projection 270a located in the second position IP2. The cover 371a may include a fixing groove 372a recessed upward (in the direction Z) from a lower surface 373a.

[0108] The insertion projection 270a may include a fixing projection 272a protruded upward (in the direction

Z) from an upper surface 271a. The fixing projection 272a may be formed to match the fixing groove 372a. The fixing projection 272a and the fixing groove 372a may extend in the radial direction or the circumferential direction. With the structure of the fixing projection 272a inserted to the fixing groove 372a, the insertion projection 270a located in the second position IP2 may be prevented from being rotated in a rotation direction or in a direction opposite to the rotation direction.

[0109] FIG. 25 is a side cross-sectional view of a coupling body, a rotation member and a holder after the coupling body is coupled with the holder, according to an embodiment of the disclosure. Referring to FIG. 25, a rotation member 300b may include a circumferential guider 325b protruded upward (in the direction Z) and extended in the circumferential direction.

[0110] A holder 400b may include a first circumferential projection 420b and a second circumferential projection 430b which protrude downward (in the direction -Z) from an upper wall 441b formed to enclose a connection hole 401b. The first circumferential projection 420b may be arranged to be nearer to the connection hole 401b than the second circumferential projection 430b is. Both the first circumferential projection 420b and the second circumferential projection 430b may extend in the circumferential direction, and a circumferential groove 425b recessed upward (in the direction Z) may be arranged between the first circumferential projection 420b and the second circumferential projection 430b.

[0111] As the circumferential guider 325b of the rotation member 300 is inserted to the circumferential groove 425b of the holder 400, the circumferential guider 325b is able to rotate in the circumferential direction between the first circumferential projection 420b and the second circumferential projection 430b. With this structure, the rotation member 300b arranged underneath the holder 400b (in the direction -Z) is able to rotate around the center of rotation while being fixed upward (in the direction Z) in the position, thereby helping rotation of the first air purification module.

[0112] Several embodiments of the disclosure have been described above, but a person of ordinary skill in the art will understand and appreciate that various modifications can be made without departing from the scope of the disclosure. Thus, it will be apparent to those of ordinary skill in the art that the true scope of technical protection is only defined by the following claims.

Claims

1. An air purifier comprising:

a first air purification module including a coupling body;
a second air purification module arranged on top of the first air purification module and including a coupling plate;

a holder configured to be coupled with the coupling body and arranged between the first air purification module and the second air purification module; and

a rotation member configured to be coupled with the coupling plate and arranged between the holder and the first air purification module, wherein the second air purification module coupled with the rotation member is able to rotate against the first air purification module coupled with the holder.

2. The air purifier of claim 1,

wherein the rotation member comprises a rotation body including an opening at a center, and wherein the holder comprises a connection hole connected to the opening, and a holder body enclosing the connection hole and covering a top of the rotation body.

3. The air purifier of claim 2,

wherein the rotation member comprises a first circumferential projection protruded upward from the rotation body and extended along circular edges and a second circumferential projection spaced from the first circumferential projection, and

wherein the holder comprises a circumferential guider protruded downward from the holder to be inserted between the first circumferential projection and the second circumferential projection.

4. The air purifier of claim 1,

wherein the rotation member comprises:

a rotation body including an opening formed in a circular shape at a center and circular edges enclosing the opening, and
a rotation projection protruded inward from the rotation body in a radial direction, and

wherein the coupling body comprises:

a base wall extended in a circumferential direction to include circular edges to support a lower portion of the rotation projection, a guide wall guiding an inner side end of the rotation projection, protruded upward from the base wall and extended in the circumferential direction, and
a stopper protruded outward from the guide wall in the radial direction to interfere with the rotation projection.

5. The air purifier of claim 1,

wherein the rotation member comprises:

a rotation body including an opening at a center and having a circular shape, and a guide blade extended outward from the rotation body in a radial direction, and

wherein the coupling plate comprises:

an upper hole connected to the opening, and a guide groove recessed upward to allow the guide blade to be inserted thereto, and extended toward edges of the coupling plate from the upper hole.

6. The air purifier of claim 5, wherein the guide blade is able to rotate between a first position and a second position within the guide groove.

7. The air purifier of claim 6, wherein the guide groove comprises:

a first inner wall extended from the upper hole toward edges of the coupling plate to support one side end of the guide blade in response to the guide blade being placed in the first position; and a second inner wall extended from the upper hole toward edges of the coupling plate to support the other side end of the guide blade in response to the guide blade being placed in the second position.

8. The air purifier of claim 6,

wherein the coupling plate comprises a fastener which forms a fastening hole arranged to be coupled with the rotation member, and wherein the rotation member comprises:

a boss portion arranged to match the fastener in response to the guide blade being arranged in the second position, and a coupling blade protruded outward from the rotation body in the radial direction.

9. The air purifier of claim 8,

wherein the coupling plate comprises a coupling blade groove recessed upward to allow the coupling blade to be inserted thereto and extended in a circumferential direction, and wherein the coupling blade is able to rotate between an additional first position where the coupling blade is placed as the guide blade is

placed in the first position and an additional second position where the coupling blade is placed as the guide blade is placed in the second position within the coupling blade groove.

10. The air purifier of claim 9, wherein the coupling blade groove comprises:

a first support wall supporting one side end of the coupling blade in response to the coupling blade being placed in the additional first position, and a second support wall supporting the other side end of the coupling blade in response to the coupling blade being placed in the additional second position.

11. The air purifier of claim 10, wherein the coupling plate further comprises a support plate extended from the second support wall toward the first support wall to support a lower portion of the coupling blade placed in the additional second position.

12. The air purifier of claim 6,

wherein the coupling plate further comprises:

a circumferential inner wall extended in a circumferential direction to enclose the upper hole, and an insertion projection protruded inward from the circumferential inner wall in the radial direction, and

wherein the rotation member comprises an insertion groove extended in the circumferential direction to allow the insertion projection to be inserted thereto.

13. The air purifier of claim 12,

wherein the insertion projection is able to rotate from an additional first position where the insertion projection is placed as the guide blade is placed in the first position to an additional second position where the insertion projection is placed as the guide blade is placed in the second position within the insertion groove, and wherein the insertion projection located in the additional second position is fixed in a position.

14. The air purifier of claim 13,

wherein the insertion projection comprises a top surface and a fixing groove recessed downward from the top surface, and wherein the rotation member comprises a cover arranged to cover an upper portion of the insertion projection located in the additional second

position, and a fixing projection protruded downward from the cover to match the fixing groove.

15. The air purifier of claim 13,

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wherein the insertion projection comprises a top surface and a fixing projection protruded upward from the top surface, and

wherein the rotation member comprises:

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a cover arranged to cover an upper portion of the insertion projection located in the additional second position, and
a fixing groove recessed upward from the cover to match the fixing projection.

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FIG. 1

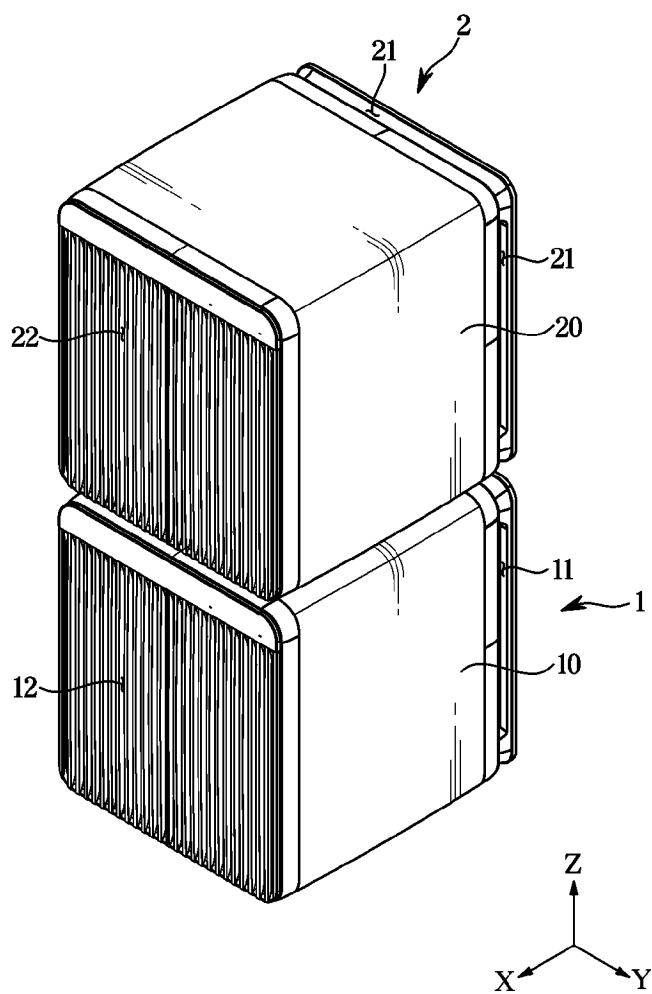


FIG. 2

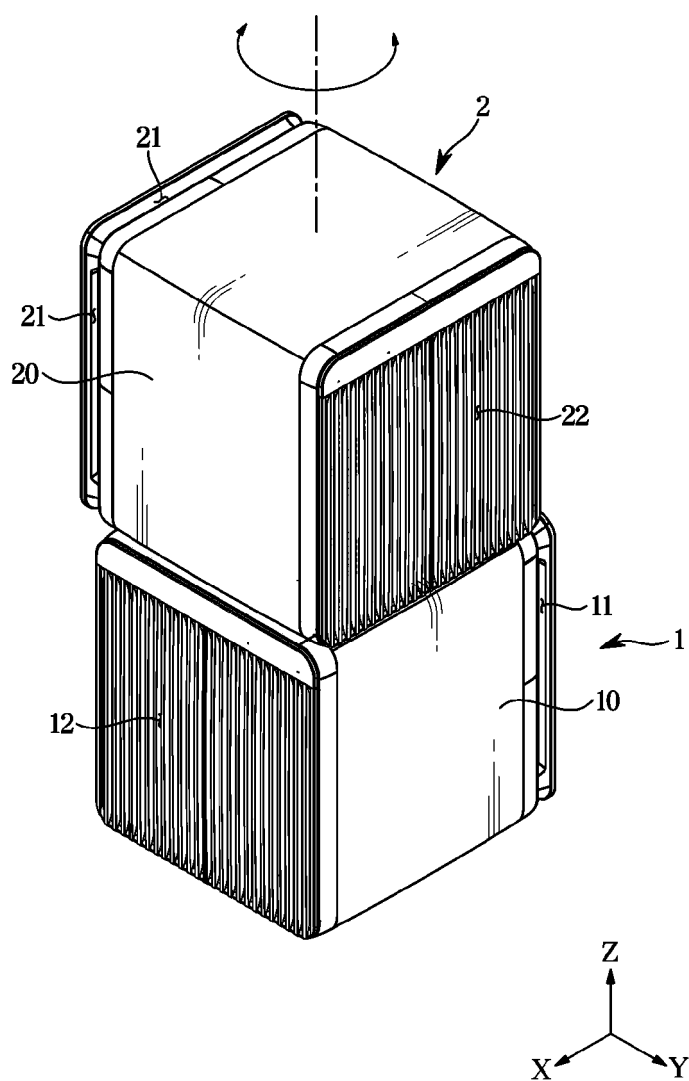


FIG. 3

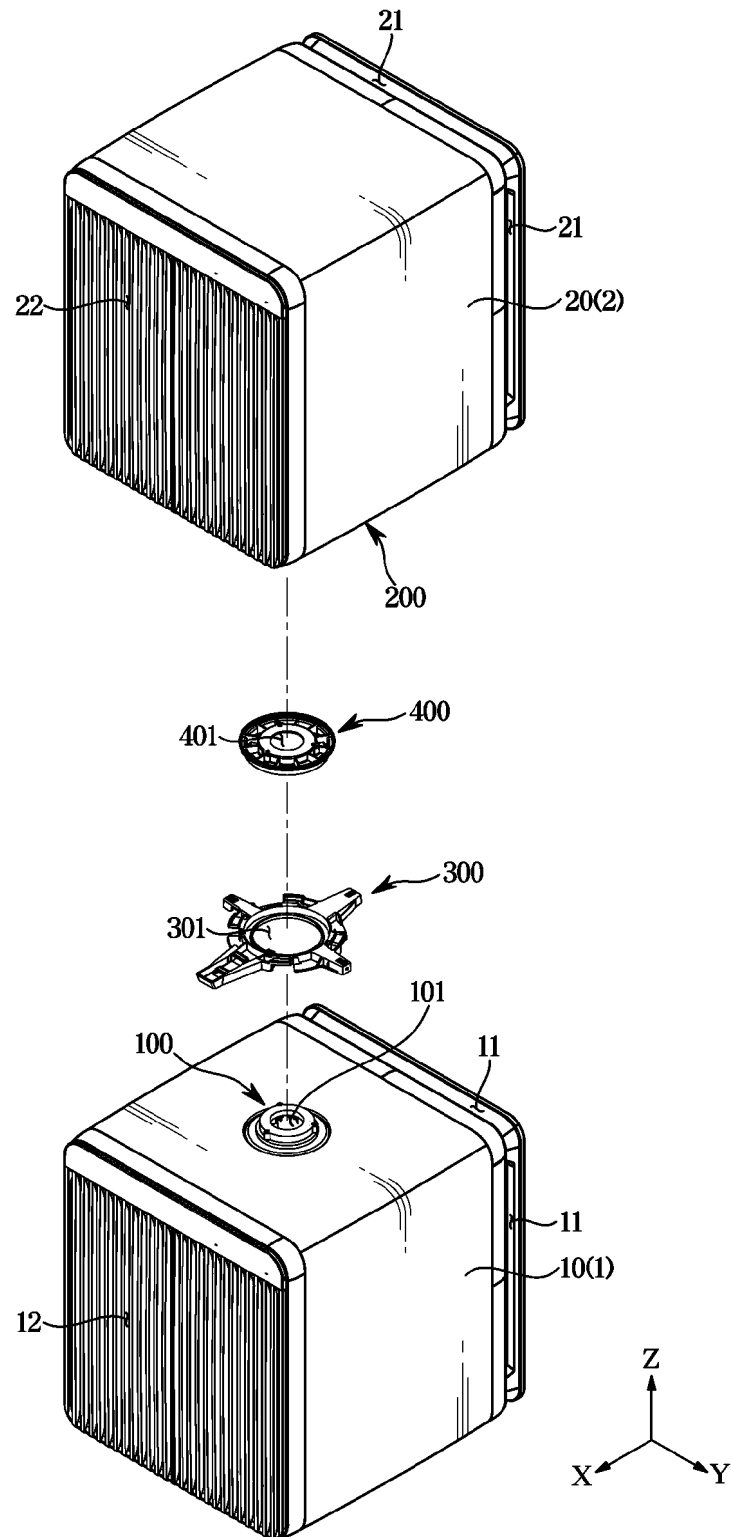


FIG. 4

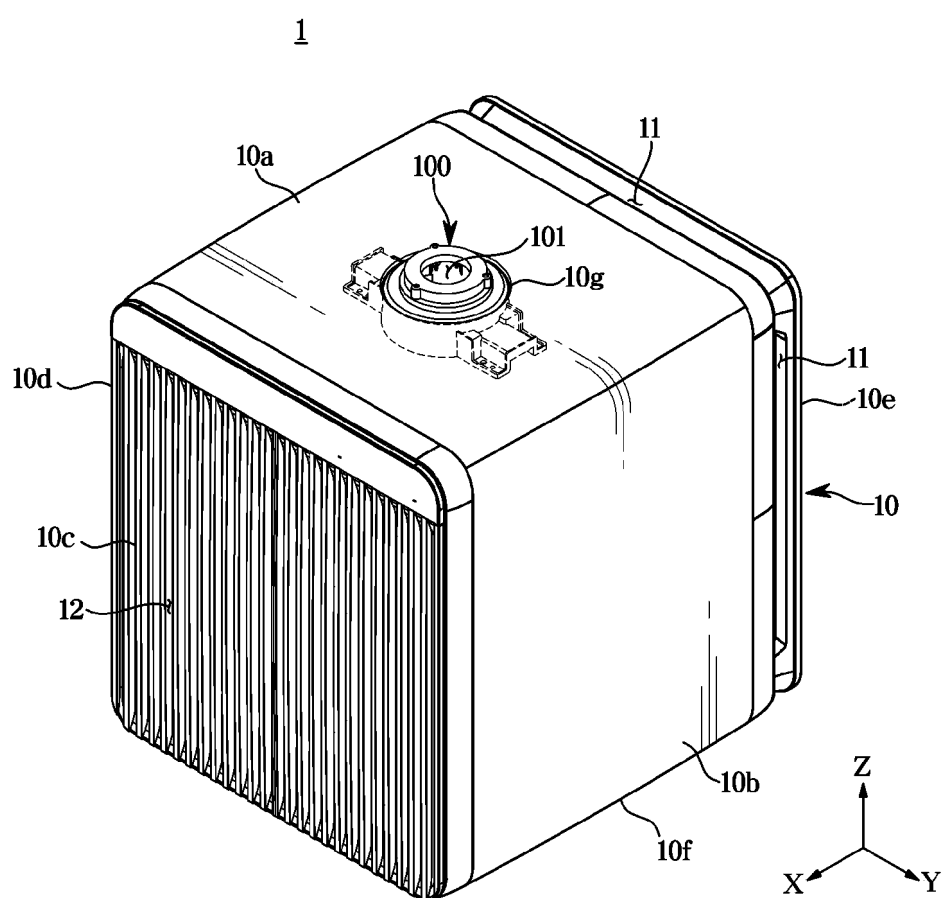


FIG. 5

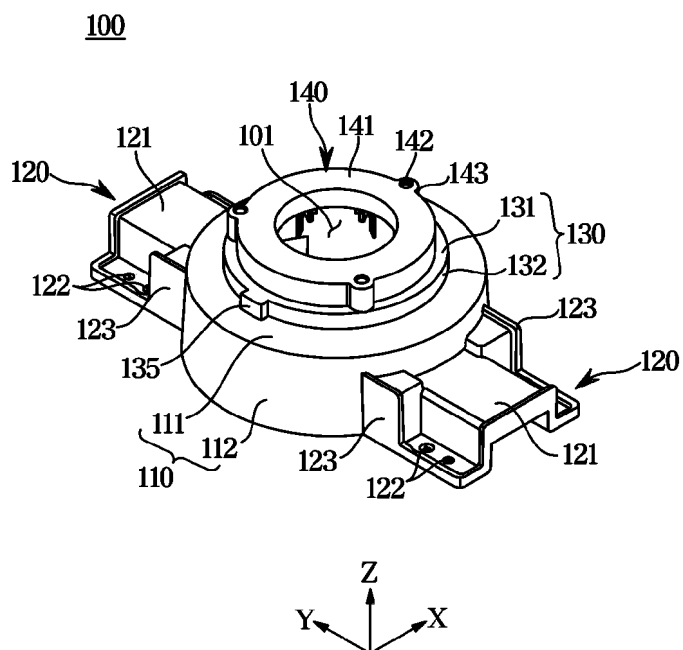


FIG. 6

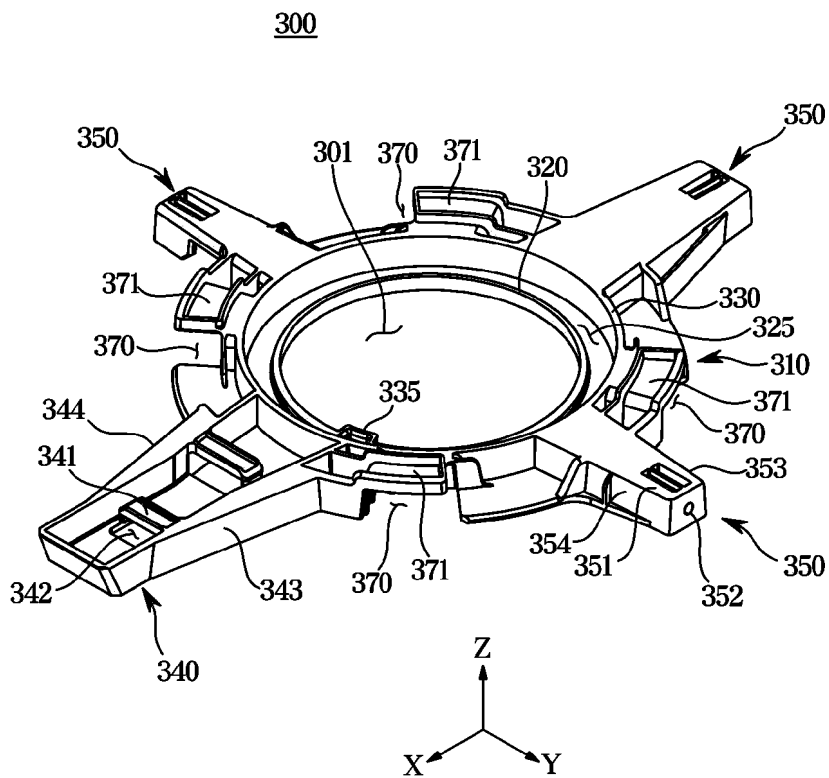


FIG. 7

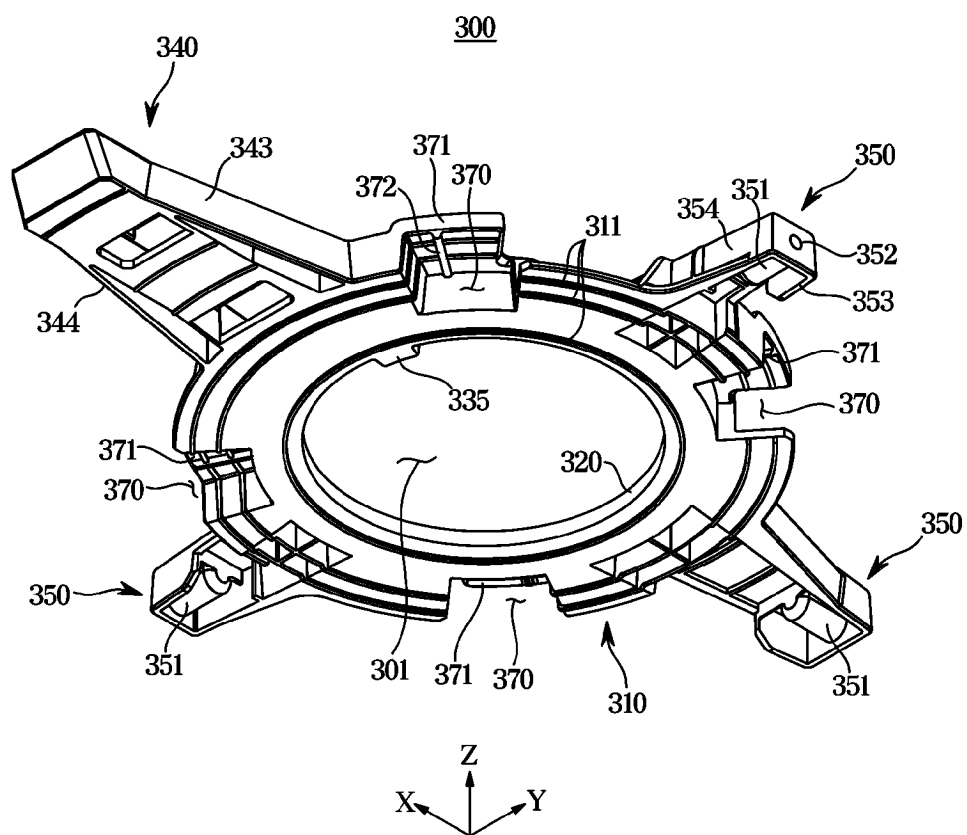


FIG. 8

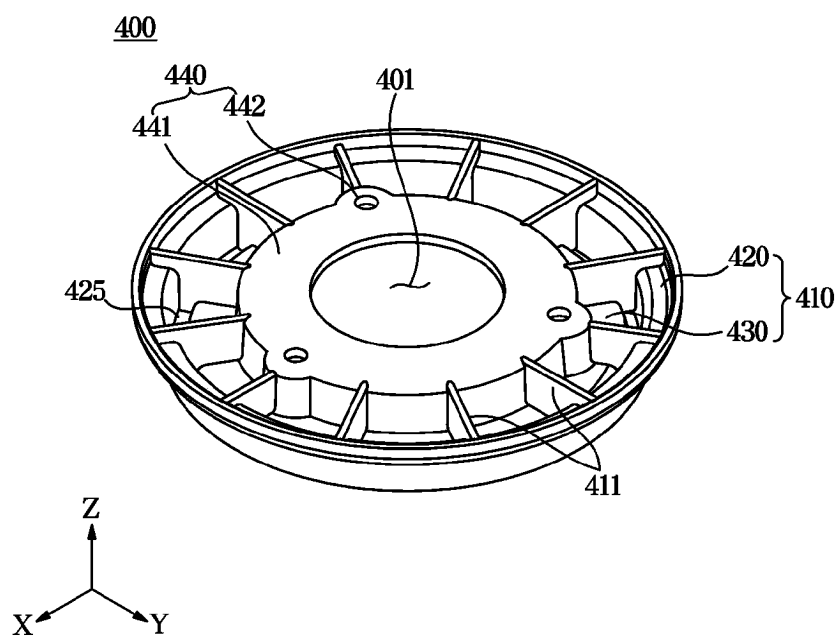


FIG. 9

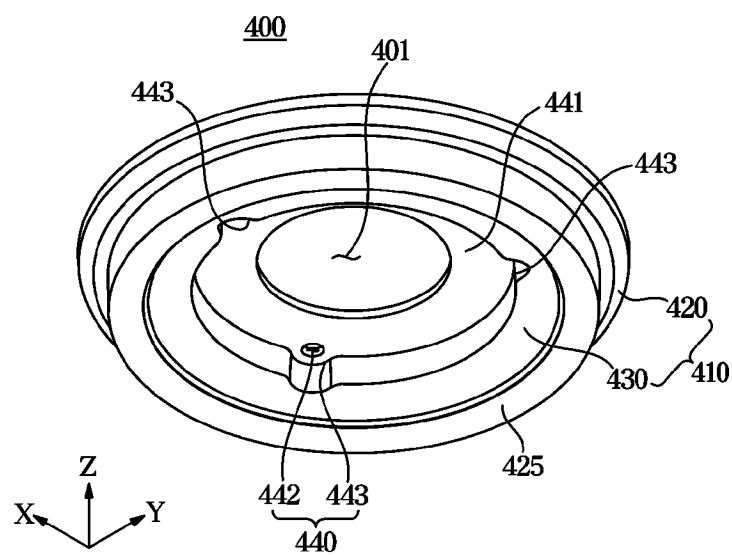


FIG. 10

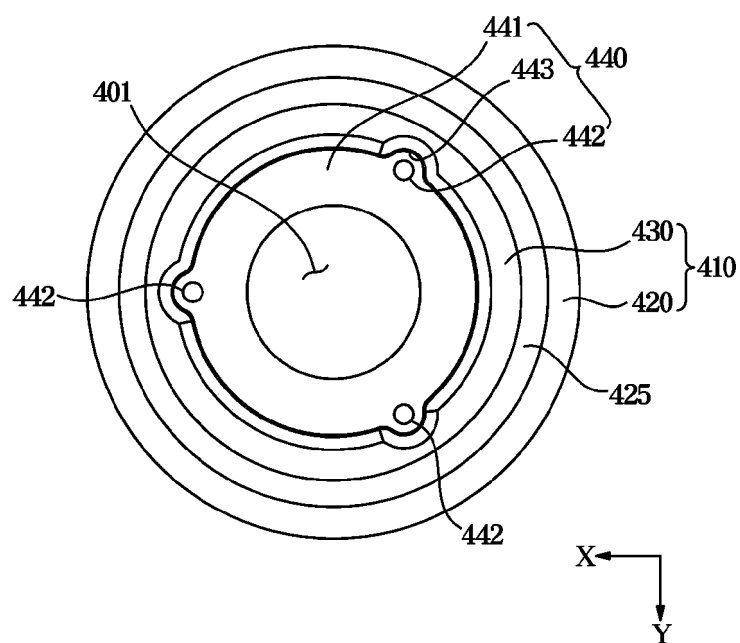


FIG. 11

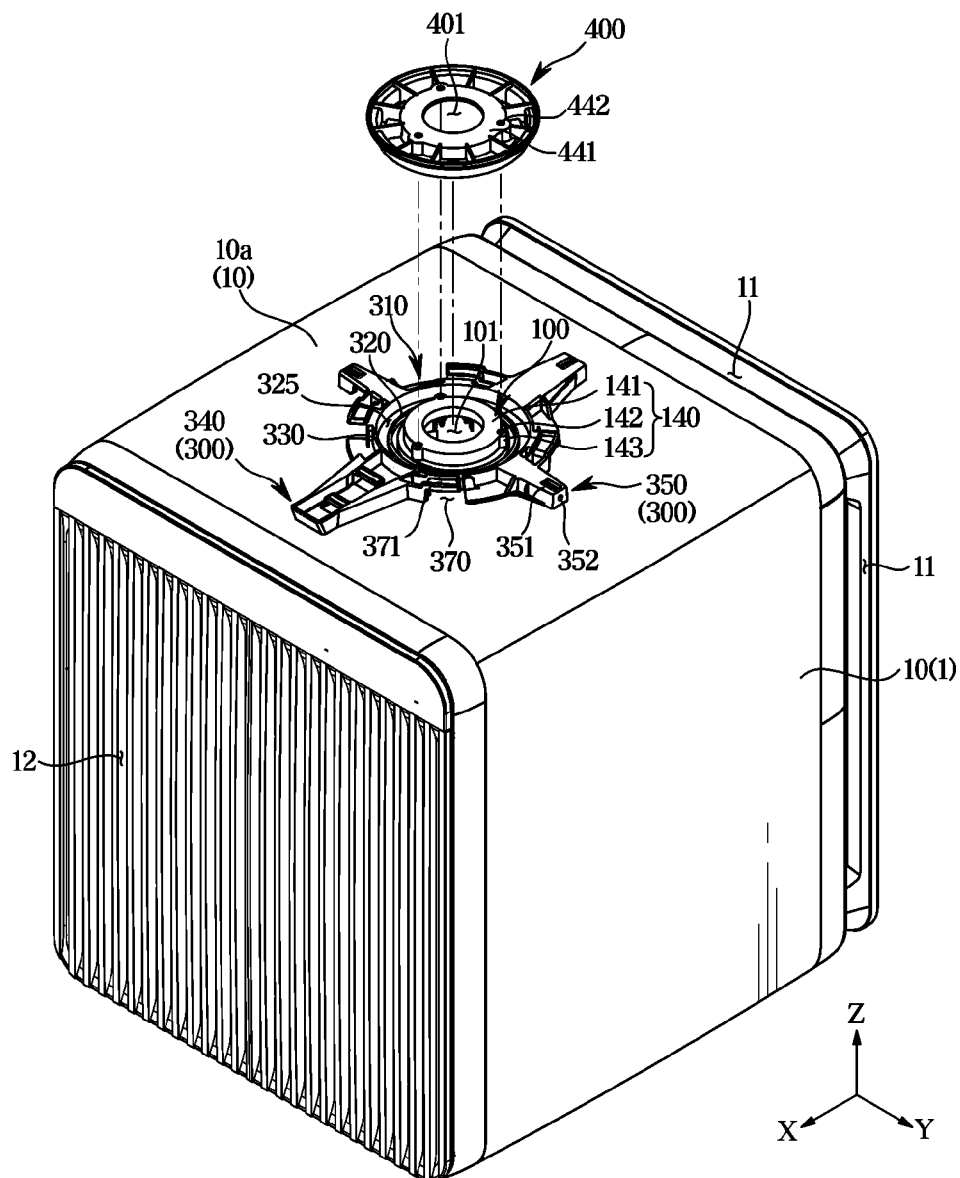


FIG. 12

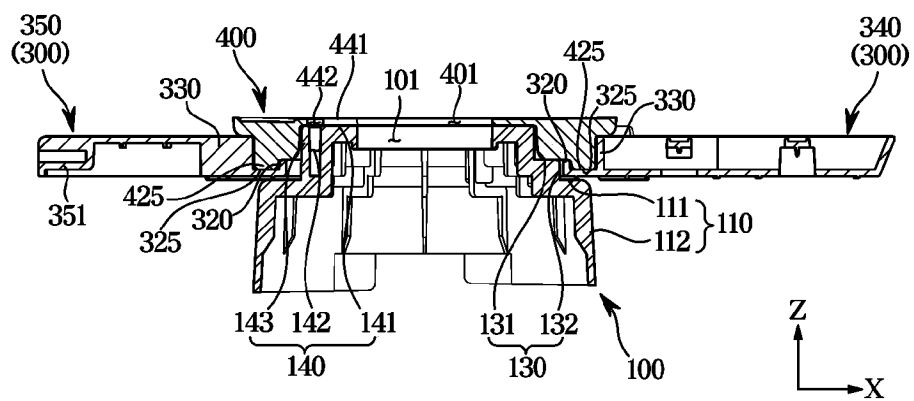


FIG. 13

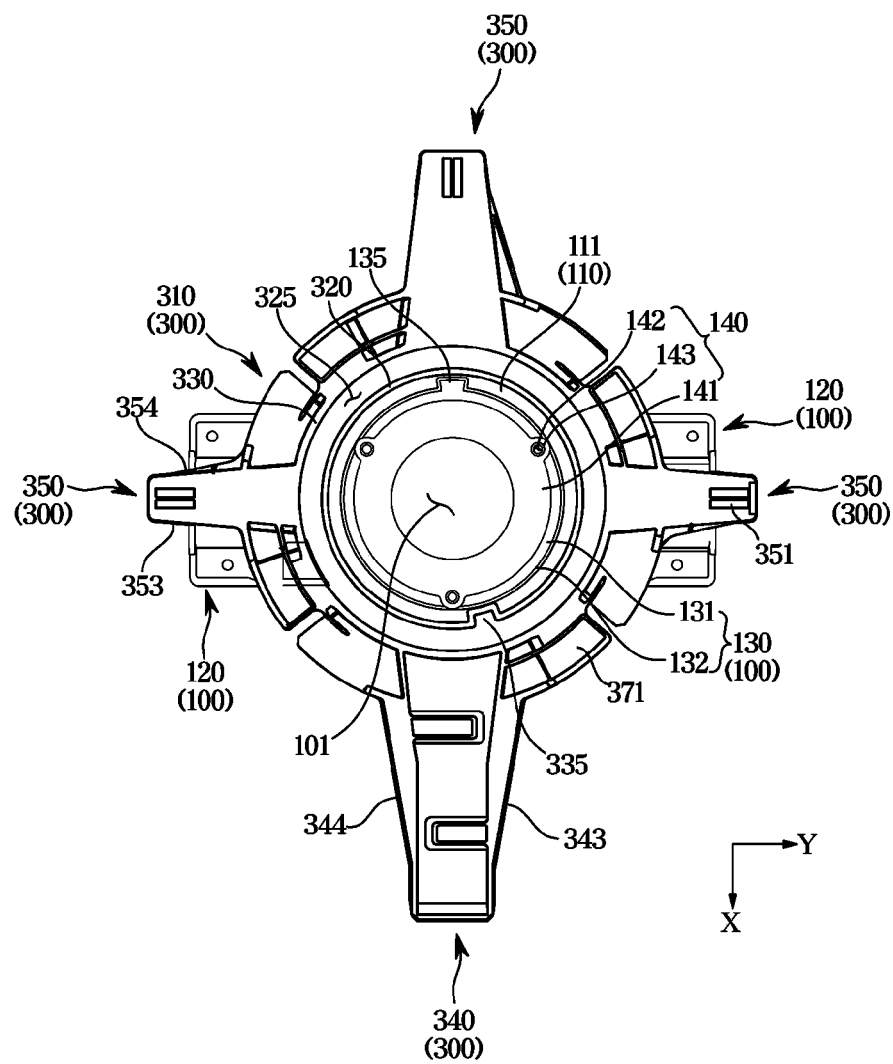


FIG. 14

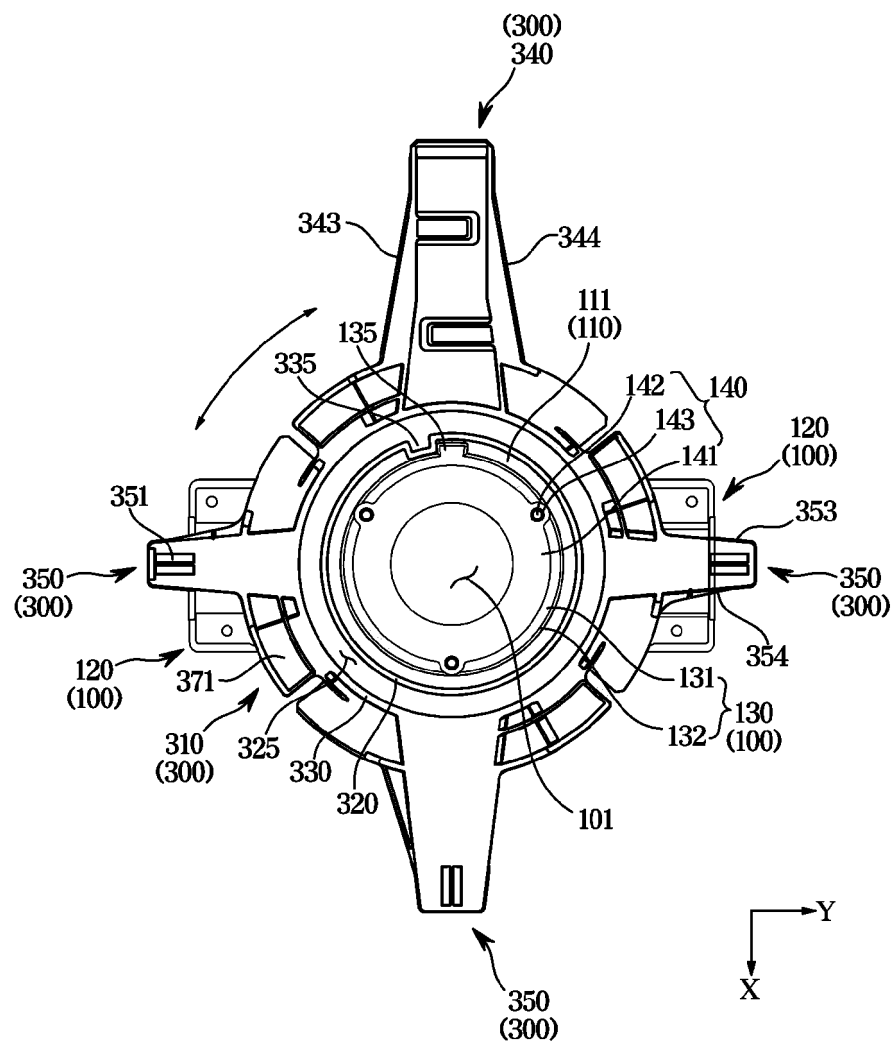


FIG. 15

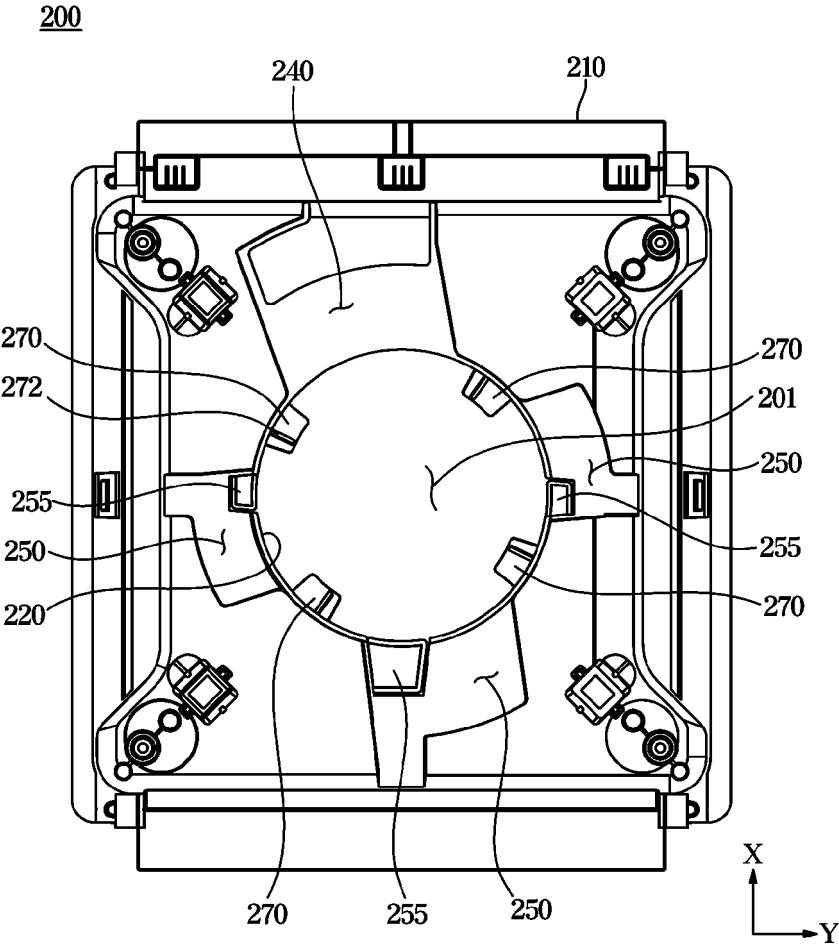


FIG. 16

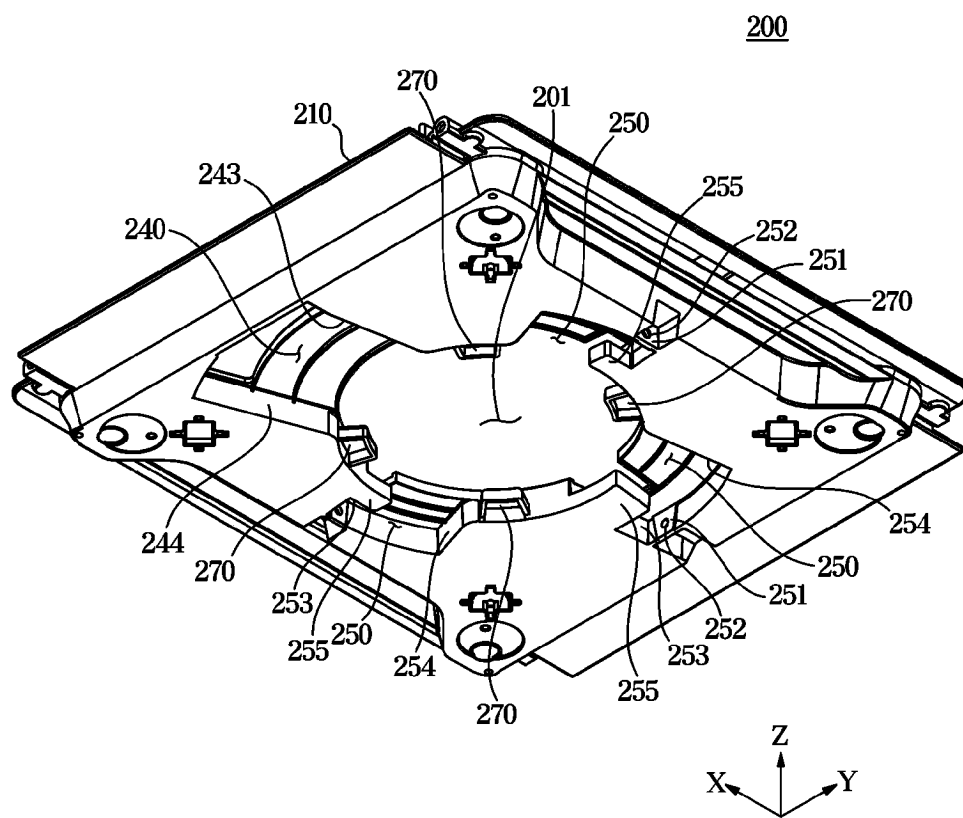


FIG. 17

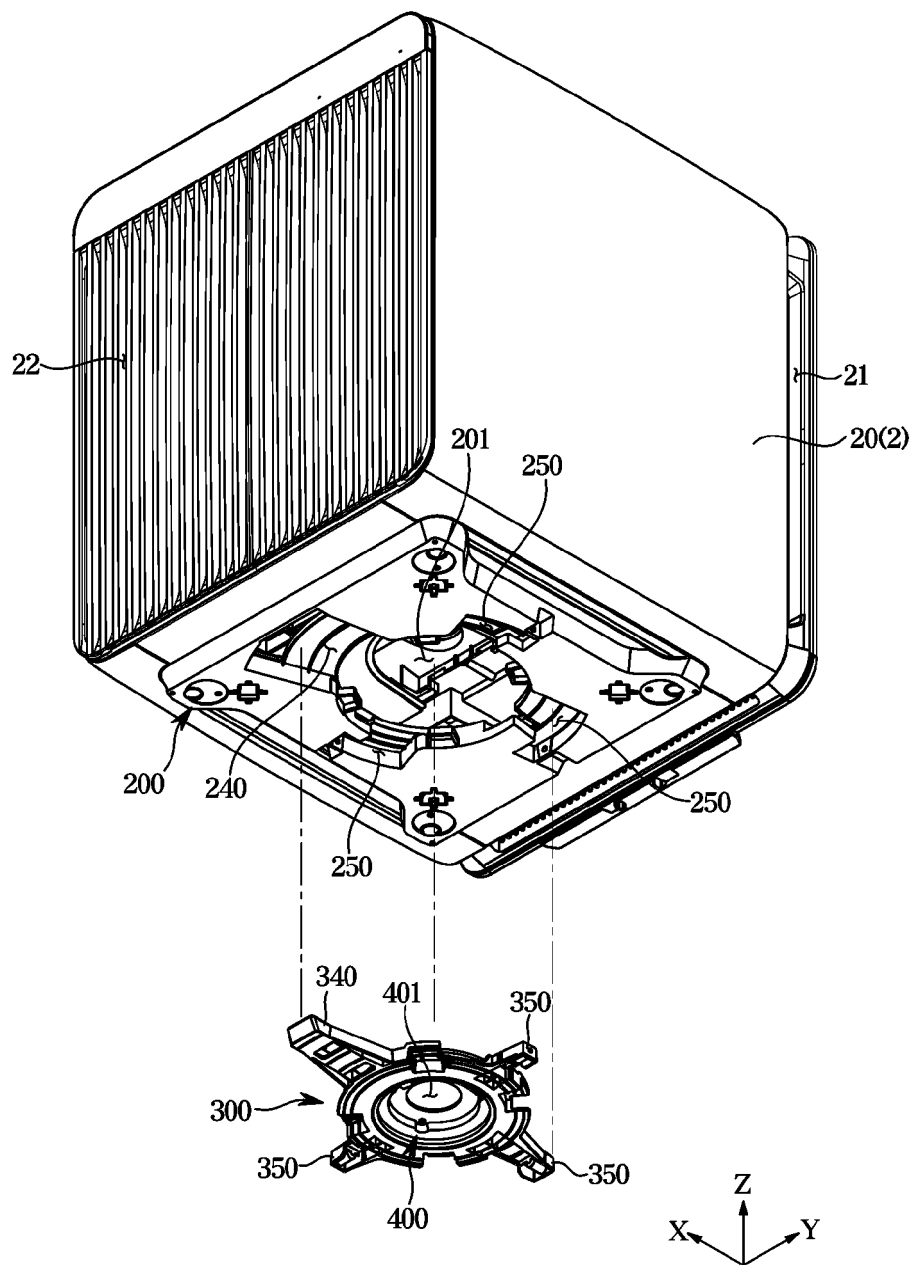


FIG. 18

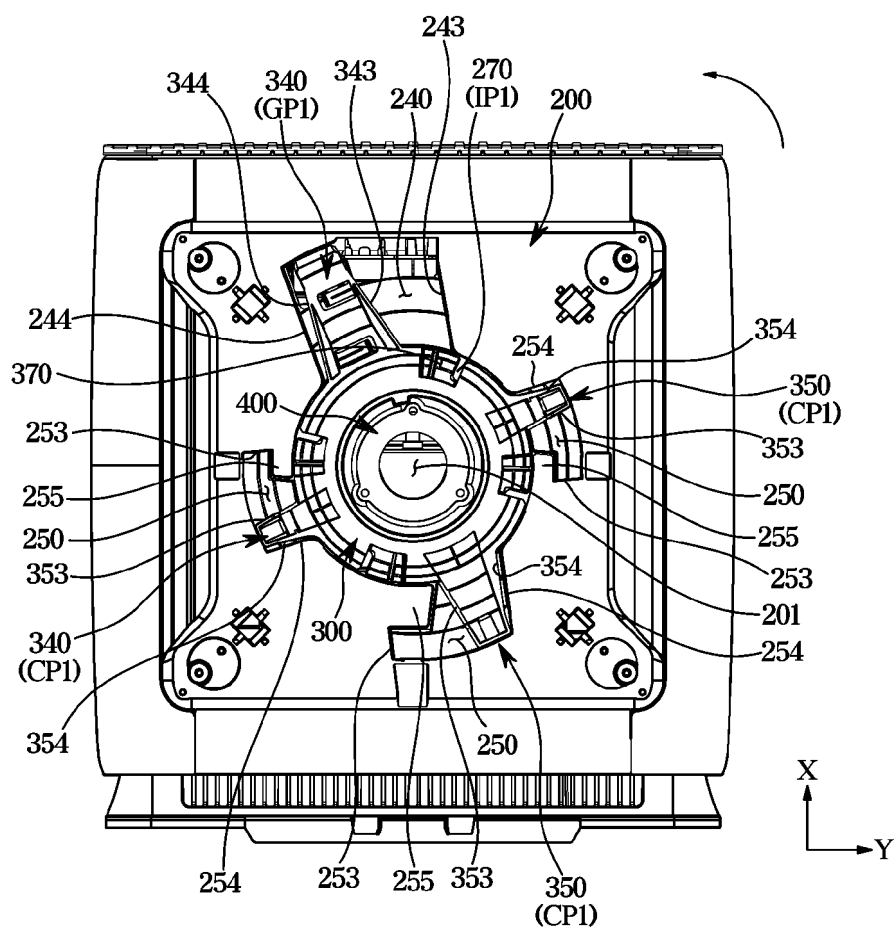


FIG. 19

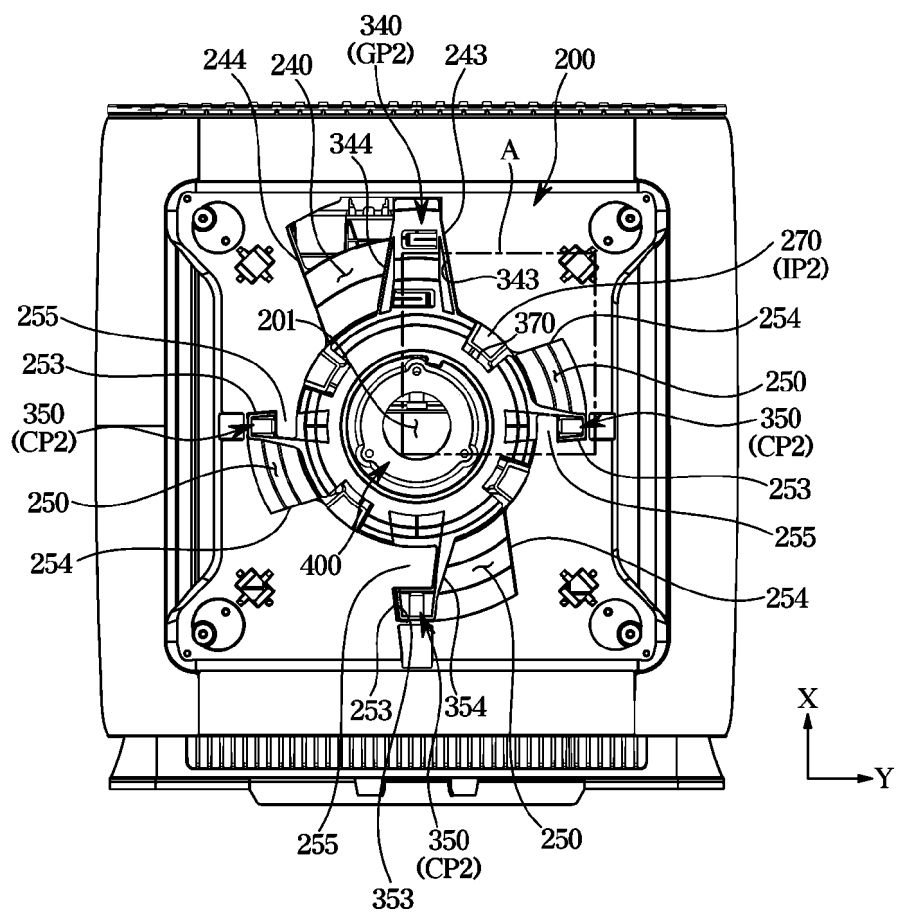


FIG. 20

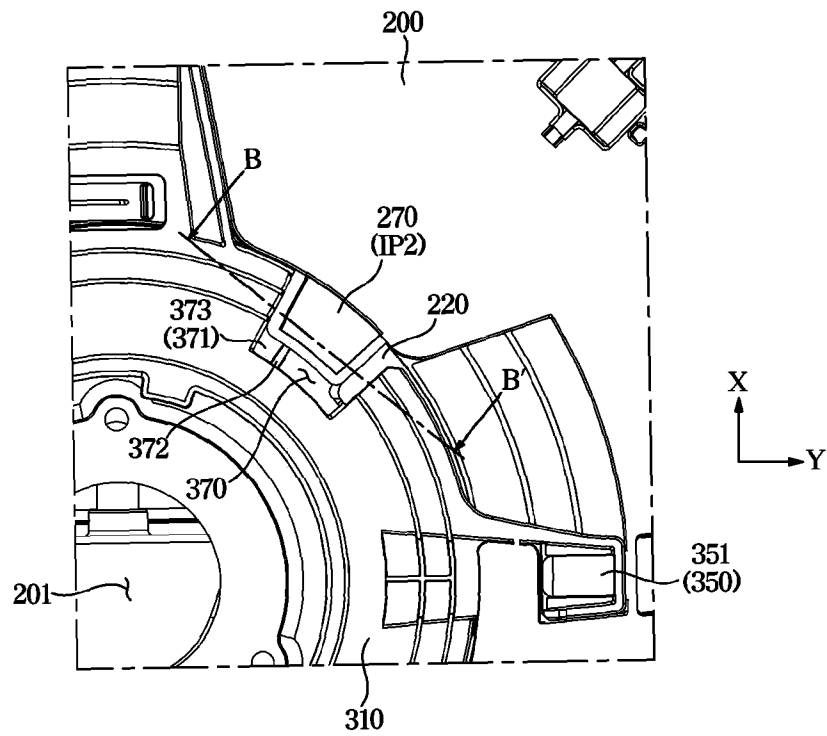


FIG. 21

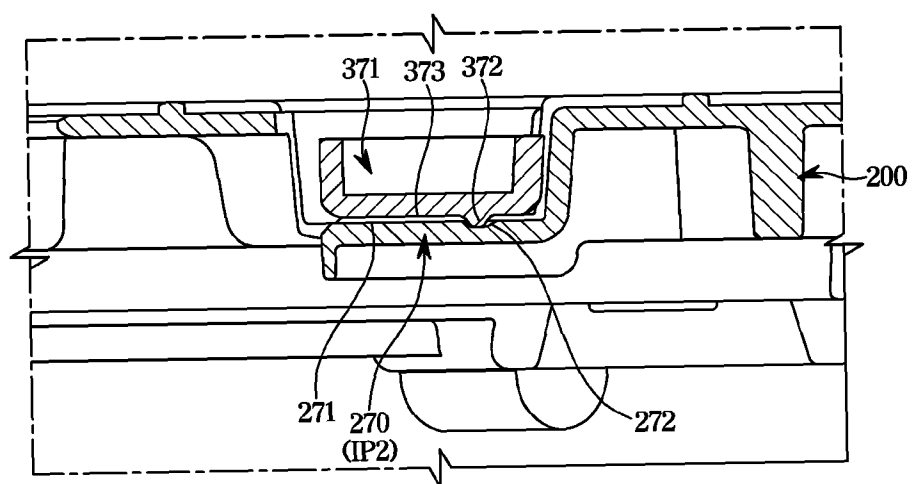


FIG. 22

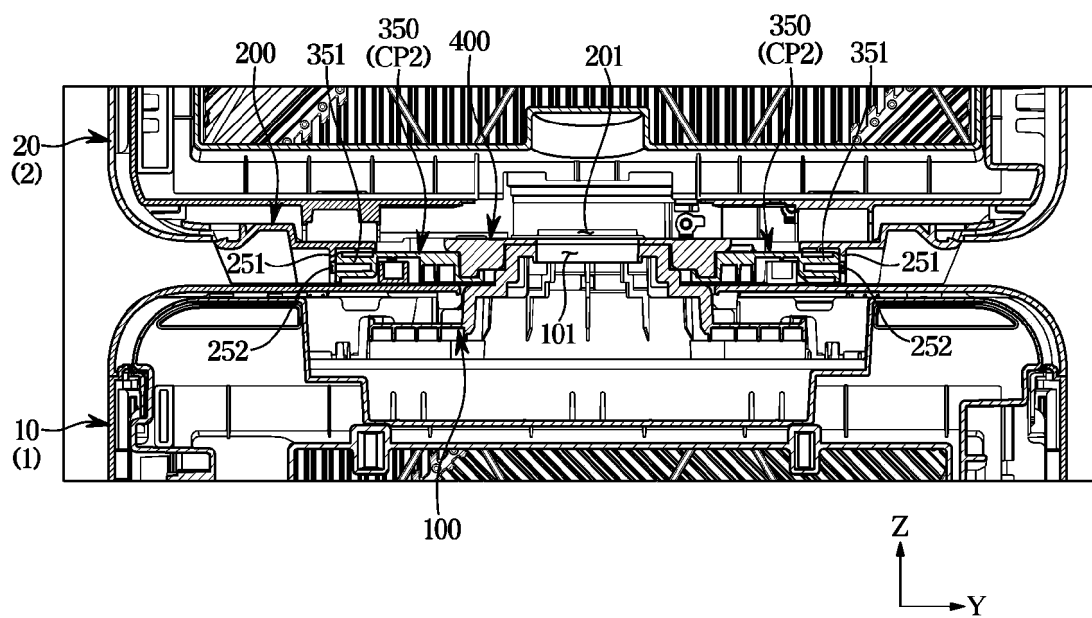


FIG. 23

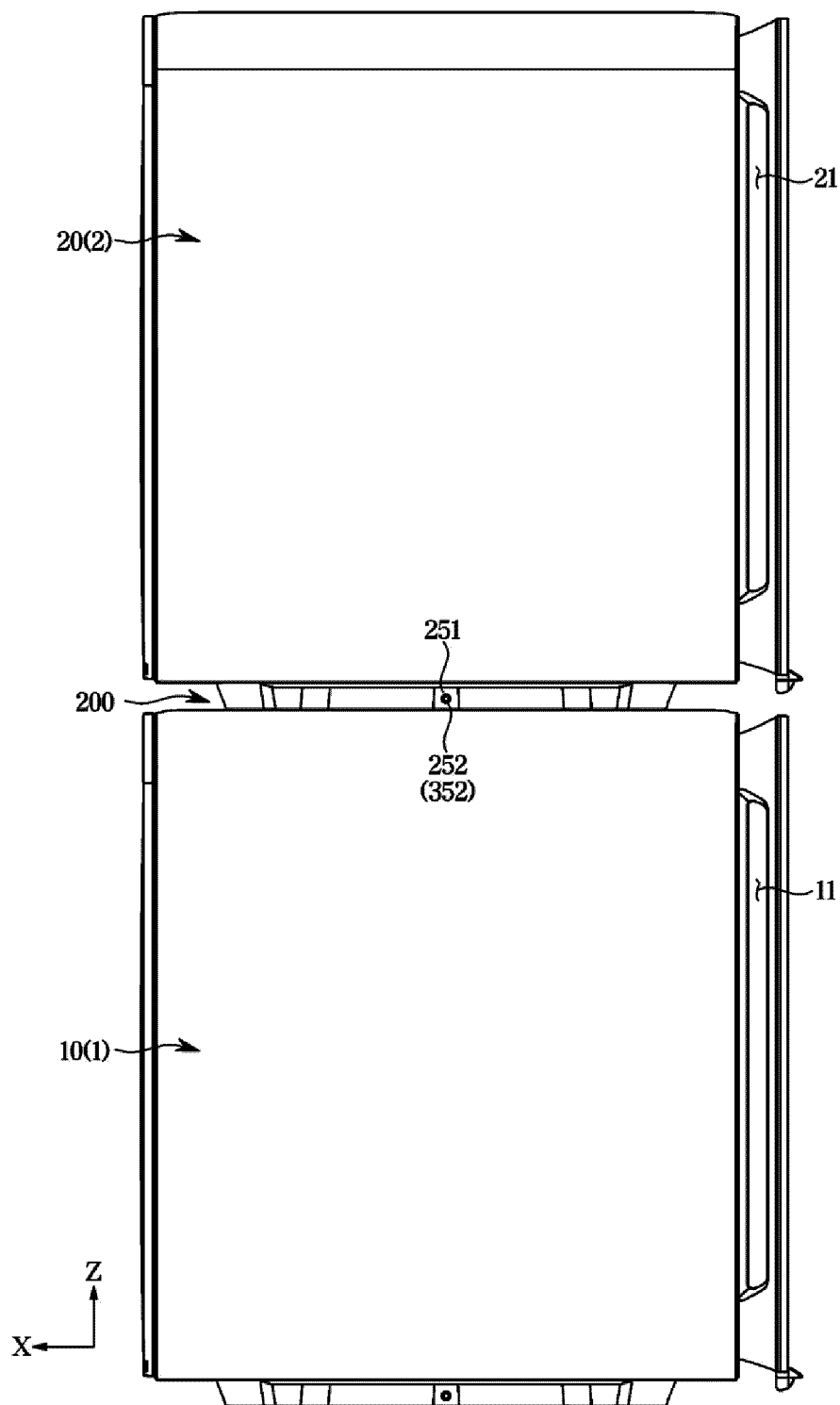


FIG. 24

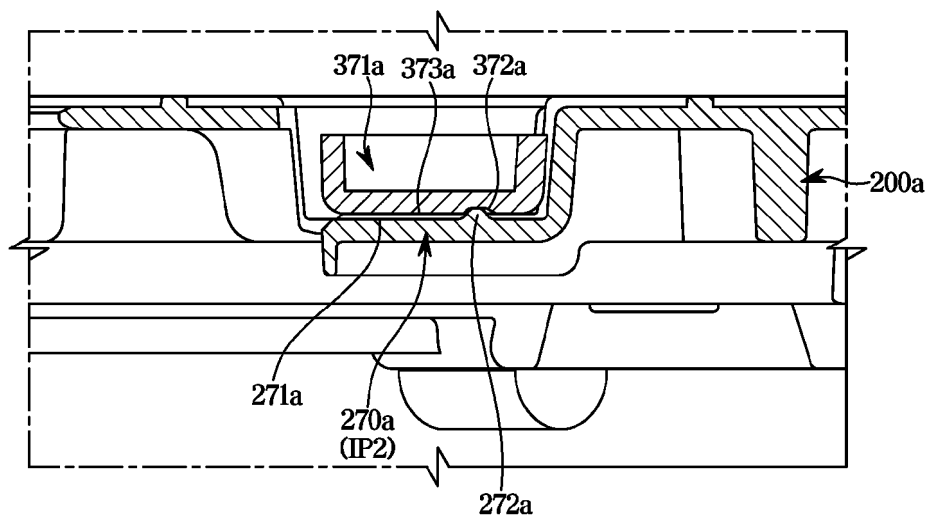
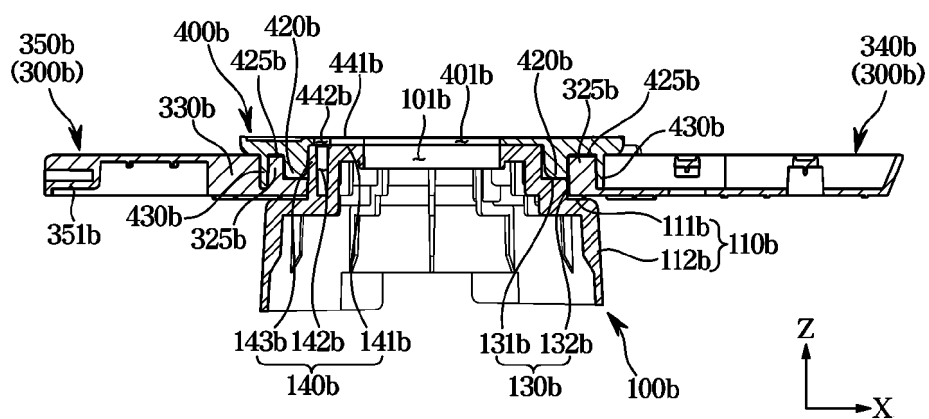


FIG. 25



INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR2023/007604

A. CLASSIFICATION OF SUBJECT MATTER**F24F 8/80**(2021.01)i; **F24F 13/20**(2006.01)i; **F24F 13/32**(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 8/80(2021.01); B01D 46/00(2006.01); B01D 46/12(2006.01); F04D 25/08(2006.01); F04D 29/60(2006.01);
F24F 11/88(2018.01); F24F 3/16(2006.01); F24F 8/183(2021.01)

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: 공기청정기(air purifier), 제1공기 청정 모듈(first air purifying module), 제2공기 청정 모듈(second air purifying module), 홀더(holder), 회전부재(rotating member)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	KR 10-2020-0012332 A (WINIADIMCHAE CO., LTD.) 05 February 2020 (2020-02-05) See paragraphs [0001]-[0054]; and figures 1-6.	1-4 5-15
A	KR 10-2019-0061138 A (SAMSUNG ELECTRONICS CO., LTD.) 05 June 2019 (2019-06-05) See claims 1-19; and figures 1-29.	1-15
A	KR 10-2022-0086405 A (CHR COMMERCE CO., LTD. et al.) 23 June 2022 (2022-06-23) See claims 1-3; and figures 1-4.	1-15
A	KR 10-2006-0026319 A (SAMSUNG ELECTRONICS CO., LTD.) 23 March 2006 (2006-03-23) See claims 1-10; and figures 1-4.	1-15
A	JP 3182181 U (HEATEC) 14 March 2013 (2013-03-14) See claims 1-5; and figures 1-4.	1-15

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

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search 25 September 2023	Date of mailing of the international search report 25 September 2023
Name and mailing address of the ISA/KR Korean Intellectual Property Office Government Complex-Daejeon Building 4, 189 Cheongsaro, Seo-gu, Daejeon 35208 Facsimile No. +82-42-481-8578	Authorized officer Telephone No.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/KR2023/007604

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JP 3182181 U	14 March 2013	None	