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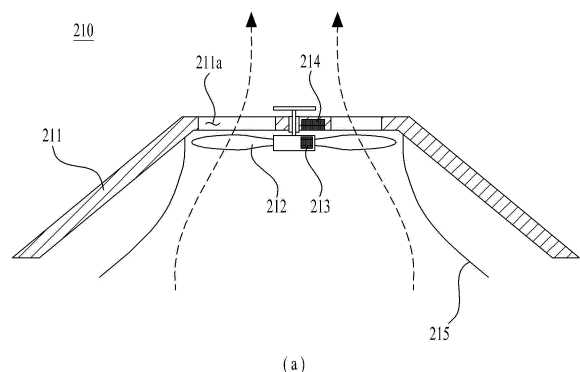
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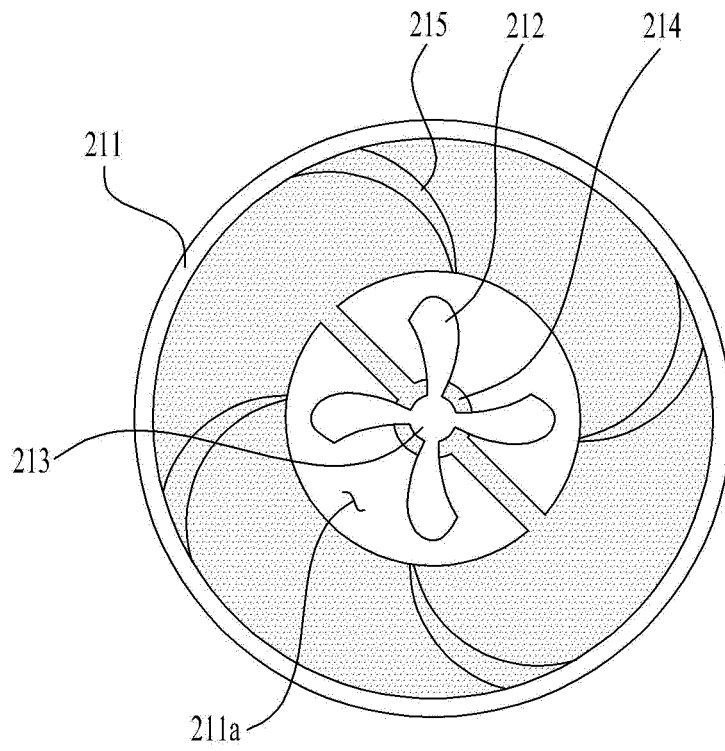
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(54) **AIR PURIFIER AND SMART WALL**

(57) An air purifier comprises: a body including a discharge port on one side thereof; a blowing fan mounted on the body; a filter through which air introduced into the blowing fan passes; an exhaust chamber connected to the discharge port, and including a plurality of vents; and a plurality of airflow volume sensing units positioned so as to be adjacent to the plurality of vents, wherein each of the airflow volume sensing units comprises: a rotating fan rotated by air passing therethrough; a magnet positioned on the rotating fan; and a Hall sensor generating a signal when the magnet is adjacent thereto, wherein the airflow volume passing through the vents is determined on the basis of the period of the signal sensed by the Hall sensor. The air purifier can supply purified air to both sides of a smart wall, and can sense and adjust the amount of air discharged through each vent.

FIG. 11





(b)

Description

Technical Field

[0001] The present disclosure relates to a wall on which a multimedia device and a home appliance such as a TV, a speaker, and the like are mounted, and more particularly, to a unitized smart wall and an air purifier mounted thereon.

Background Art

[0002] Recently, as the infrastructure in which all media devices and home appliances at home beyond the smartphone are connected to the Internet is built, the smart home is emerging as a keyword of a new smart ecosystem. In particular, user experiences and values accumulated through smartphones, which are personal media devices, have begun to expand to other devices.

[0003] As various attempts such as building a home network system were made in order to make media devices and home appliances to interoperate with each other, the number of electronic devices at home has increased and there is a hassle of connecting the devices one by one.

[0004] In particular, it is a recent trend to minimize the number of pieces of furniture and electronics that are placed near the living room wall, around which the TV is usually placed, to keep a neat appearance of the living room wall, which represents the house. In addition, where there are children in a house, they may be pushed over or bumped and injured due to a TV table or a loudspeaker placed in the living room. Therefore, it is important to reduce the number of pieces of furniture and electronics protruding into the space of the living room.

Disclosure

Technical Problem

[0005] The present disclosure relates to a wall on which a multimedia device and a home appliance such as a TV, a speaker, and the like are mounted, and is to provide a unitized smart wall and an air purifier mounted thereon.

Technical Solutions

[0006] Provided is an air purifier including a body including a discharge port on one side thereof, a blower fan mounted in the body, a filter for allowing air introduced into the blower fan to pass therethrough, an exhaust chamber connected to the discharge port and including a plurality of outlets, and a plurality of air amount sensors respectively positioned adjacent to the plurality of outlets, wherein the air amount sensor senses an amount of air passing through the outlet, wherein the air amount sensor includes a rotating fan rotated by air passing there-

through, a magnet positioned in the rotating fan, and a hall sensor for generating a signal when the magnet is adjacent thereto, wherein the air amount sensor senses the amount of air passing through the outlet based on a period of the signal sensed by the hall sensor.

[0007] The air purifier may further include an inclined guide having an entrance facing the discharge port of the body and an exit with the air amount sensor located therein, and narrowing from the entrance to the exit.

[0008] The inclined guide may further include a bridge crossing the exit, and a rotation shaft of the rotating fan may be fixed to the bridge and rotate.

[0009] The rotating fan may include a center of rotation pin-coupled to the bridge and a plurality of blades extending radially from the center of rotation, the magnet may be disposed biased to one side from the center of rotation, and the hall sensor may be located on the bridge.

[0010] The inclined guide may include a plurality of ribs protruding from an inner surface thereof and extending from the entrance to the exit, and the blade and the rib may have curved surfaces having a convex shape in one direction.

[0011] The outlets may include a first outlet and a second outlet oriented in different directions, and the exhaust chamber may include a first chamber where the first outlet is located, a second chamber where the second outlet is located, and a partition plate for partitioning the first chamber and the second chamber.

[0012] The air purifier may further include an air amount adjusting portion for adjusting a flow of air in directions of the first outlet and the second outlet.

[0013] The blower fan may include a sirocco fan for sucking air from the front and discharging air in a lateral direction, and the air amount adjusting portion may adjust an angle of the sirocco fan to adjust the air discharging direction.

[0014] The air amount adjusting portion may move a position of the blower fan in a direction of one side or the other side of the partition plate.

[0015] The air amount adjusting portion may move the partition plate in a direction of the first outlet or in a direction of the second outlet.

[0016] The air purifier may further include a controller that, when one of a first amount of air sensed by a first air amount sensor located in the first outlet and a second amount of air sensed by a second air amount sensor located in the second outlet is different from a percentage set therefor, controls the air amount adjusting portion such that the amount of air lower than the set percentage increases.

[0017] The partition plate may be disposed to be biased toward the second outlet.

[0018] The plurality of air amount sensors may be disposed to have the same distance from the discharge port.

[0019] Provided is a smart wall including a plurality of frame modules having one or more mounting cells defined therein, a fastener for fastening the plurality of frame modules to form a frame structure, and an air purifier

inserted into one of the mounting cells, wherein the air purifier includes a body including a discharge port on one side thereof, a blower fan mounted in the body, a filter for allowing air introduced into the blower fan to pass therethrough, an exhaust chamber connected to the discharge port and including a plurality of outlets, and a plurality of air amount sensors respectively positioned adjacent to the plurality of outlets, wherein the air amount sensor includes a rotating fan rotated by air passing therethrough, a magnet positioned in the rotating fan, and a hall sensor for generating a signal when the magnet is adjacent thereto, wherein the air amount sensor senses an amount of air passing through the outlet based on a period of the signal sensed by the hall sensor.

[0020] The mounting cell with the air purifier inserted therein may be located at a lower portion of the frame structure, and the discharge port may be located at an upper portion of the body.

Advantageous Effects

[0021] The air purifier according to the present disclosure may supply the purified air to the both surfaces of the smart wall, and may sense and adjust the amount of air discharged to each outlet.

[0022] A media wall according to the present disclosure may be installed on a wall at the same height as a multimedia device such as a TV or an audio device mounted thereon, and may therefore provide a tidy appearance.

[0023] Further scope of applicability of the present disclosure will become apparent from the detailed description below. Various changes and modifications within the spirit and scope of the present disclosure may be clearly understood by those skilled in the art, and therefore, the detailed description and specific embodiments, such as preferred embodiments of the present disclosure, should be understood as given by way of example only.

Description of Drawings

[0024]

FIG. 1 is a view illustrating an installation example of a media wall of the present disclosure;

FIG. 2 is an exploded perspective view of the media wall according to an embodiment of the present disclosure;

FIG. 3 is a view illustrating a configuration of frames of the media wall according to an embodiment of the present disclosure;

FIG. 4 shows examples of various frame structures according to a combination of frame modules of the present disclosure;

FIG. 5 is a view illustrating a frame module of the media wall according to an embodiment of the present disclosure;

FIG. 6 is a view illustrating a method of installing a

frame structure of the media wall according to an embodiment of the present disclosure;

FIG. 7 is a view illustrating a basket of the media wall according to an embodiment of the present disclosure;

FIG. 8 is a view illustrating a smart wall equipped with an air purifier according to an embodiment;

FIG. 9 is a view illustrating a cross-section of an air purifier according to an embodiment;

FIG. 10 is a view illustrating an exhaust chamber of an air purifier according to an embodiment;

FIG. 11 is a view illustrating an air amount sensor of an air purifier according to an embodiment;

FIG. 12 is a view illustrating a method for measuring an amount of air using an air amount sensor in FIG. 11;

FIG. 13 is a view illustrating an air amount sensor of an air purifier according to another embodiment;

FIG. 14 is a view illustrating a method for measuring an amount of air using an air amount sensor in FIG. 13;

FIGS. 15 to 17 are views illustrating a method for adjusting an amount of air of an air purifier according to an embodiment; and

FIG. 18 is a view illustrating a method for controlling an air purifier according to an embodiment.

Best Mode

[0025] Hereinafter, exemplary embodiments disclosed herein will be described in detail with reference to the accompanying drawings. The same reference numbers will be used throughout the drawings to refer to the same or like parts, and redundant description thereof will be omitted. As used herein, the suffixes "module" and "unit" are added or used interchangeably to facilitate preparation of this specification and are not intended to suggest distinct meanings or functions. In the following description of the embodiments of the present disclosure, a detailed description of known technology will be omitted to avoid obscuring the subject matter of the present disclosure. The accompanying drawings are intended to facilitate understanding of the embodiments disclosed herein, and should not be construed as limiting the technical idea disclosed in the present specification. The disclosure is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the embodiments.

[0026] Terms including ordinal numbers such as first, second, etc. may be used to explain various elements. However, it will be appreciated that the elements are not limited to such terms. These terms are merely used to distinguish one element from another.

[0027] Stating that one constituent is "connected" or "linked" to another should be understood as meaning that the one constituent may be directly connected or linked to another constituent or another constituent may be interposed between the constituents. On the other hand,

stating that one constituent is "directly connected" or "directly linked" to another should be understood as meaning that no other constituent is interposed between the constituents.

[0028] As used herein, the singular forms "a", "an", and "the" include plural referents unless context clearly dictates otherwise.

[0029] In this specification, terms such as "includes" or "has" are intended to indicate existence of characteristics, figures, steps, operations, constituents, components, or combinations thereof disclosed in the specification. The terms "includes" or "has" should be understood as not precluding possibility of existence or addition of one or more other characteristics, figures, steps, operations, constituents, components, or combinations thereof.

[0030] FIG. 1 is a view showing a wall-type frame of a media wall 100 of the present disclosure. The present disclosure relates to a media wall 100 systemized by integrating electronic devices used at home, such as media devices and home appliances, with a wall so as not to be exposed through the exterior of the media wall. The present disclosure provides a total space solution that minimizes the exposure of electronic devices in a space by mounting various electronic devices such as a display, an interphone, a loudspeaker, an air purifier, a humidifier, a light, a digital clock, a router, and a set-top box on a wall.

[0031] Recently, the thickness of a display device 161 has become thin. Thus, the media wall 100 of the present disclosure may be formed to have a the thickness of 15 to 20 cm, thereby preventing the interior space from being narrowed during installation. Rather, the storage furniture and a home appliance 160 may be embedded in the media wall 100 to provide a neat appearance. When necessary, a part of the wall may be selectively drawn out to allow a necessary home appliance to protrude from the wall, and the space where the home appliances are not embedded may be used as a mounting cell 114 for an item such as a drawer.

[0032] Recently, it has become possible to design a thin TV, and thus a thin display is implementable. Accordingly, the TV itself may serve as a cover of a frame and may be coupled to the frame to define a front appearance. An opening 153 may be formed in an art wall 151 to expose the display of the display device 161. A cover to open and close the opening 153 may be further provided.

[0033] A display employing organic light-emitting diodes (OLED) is bendable, and therefore it may be exposed to the outside only when used and may be rolled up and kept inside the wall when not in use, thereby providing a tidy screen by appearance.

[0034] Regarding projectors, a unifocal projector has recently been developed. This projector may be mounted on the wall and drawn out like a drawer to output images on a screen, thereby implementing a large screen. In this case, when the projector is in use, the display is unseeable from the outside of the media wall 100, and therefore

may provide a tidier appearance.

[0035] FIG. 2 is an exploded view of the media wall 100 of the present disclosure. A frame structure formed by a plurality of pieces of shape steel arranged in a grid form may be disposed inside the art wall 150, which is the front. The frame structure 110 is a rigid member. The frame structure 110 may support the wall so as not to collapse even when an impact is applied to the wall. A panel may be attached to the front of the frame structure 110 to hide the electronic appliance 160 mounted on the frame structure 110, thereby looking like a wall. The front wall covered with such a panel is called an art wall 150.

[0036] The art wall 150 may be changed according to the preference of the consumer. The art wall 150 may be easily changed after being installed to change the mood of the home.

[0037] The shape steel 115 arranged in a grid form may partition the mounting cell 114, and seat the electronic appliance 160 in each of the partitioned mounting cells 114. The partitioned mounting cells 114 may have the same size or sizes which are multiples of a size. Thus, the electronic appliance 160 to be mounted may be modularized and disposed at any position in the frame structure 110.

[0038] In addition to the display device 161 described above, a sound device 152 such as a loudspeaker 162 may be mounted in the mounting cell 114. Multiple sound devices 152 may be configured according to the number of channels. The art wall 152 covering the sound device may be configured in a mesh form to allow sound to be output, or may selectively open and close the openings through which the sound is output, such that the openings exposed to the outside are minimized. To prevent infiltration of water, the openings may be formed using a waterproof mesh or the like.

[0039] A dehumidifier 163, a humidifier 165, an air conditioner, a stove, and the like, which are seasonal household appliances, may be provided. Leaving the seasonal appliances exposed to the outside when not in use may cause dust to accumulate on the appliances and undermine the appearance. Thus, the seasonal appliances are usually kept in a storage area with a cover put thereon when they are not in use. When such appliances are embedded in the media wall 100 in the present disclosure, they may be covered with the art wall 150 so as not to be exposed to the outside when they are not used, and therefore the need for the separate mounting cell 114 may be eliminated.

[0040] The dehumidifier 163 or the humidifier 165 may implement a drawer type space for collecting/storing water to remove collected water or supply water. Openings 154 through which air passes are needed to discharge water or to collect moisture in the surroundings. An air cleaner may be installed at a lower end of the media wall 100 to allow a user to easily open the air cleaner to periodically replace the filter with a new one.

[0041] The openings 154 may not be necessarily formed in the art wall 150, but a gap between the art wall

150 and the frame structure 110 may be used.

[0042] In addition, when a set-top box or a Wi-Fi router is provided, a home network system may be implemented. a not only functional units mounted on the media wall 100 but also other electronic devices such as a computer or a mobile terminal located outside the media wall 100 may be connected via the Wi-Fi router and controlled in an interworking manner.

[0043] An LED or a small display panel may be arranged on an upper portion to provide a user with simple information such as weather, time, event information, or may be used as lighting. A light may be provided to the media wall 100 to obtain an interior effect.

[0044] When different communication schemes or signals are used between the devices, the router serves as an intermediate device to coordinate the schemes or signals and guide a path. In addition, a functional unit mounted on the media wall 100 may be connected and controlled via a WIFI router, rather than being connected by wire.

[0045] The router also serves to connect an external network and the internal network to each other. Accordingly, the user staying outside may control the router connected to the external network to control not only the functional units mounted on the media wall 100 but also as home appliances and media devices connected to the internal network.

[0046] In addition, the electronic devices of the media wall 100 may be controlled in operative connection with a mobile device. That is, when the mobile device is mounted on the media wall 100, media images and music on the mobile device may be output. In addition, when a video call is received through the mobile device, the image of the other party may be provided through the display of the media wall 100.

[0047] In addition, a wall pad connected to a camera or security system of the front door may be provided in the mounting cell 114 of the media wall 100. The wall pad embedded in the existing bearing wall is difficult to repair and replace in case of failure, and there is a difficulty in changing the location thereof. However, when the wall pad is configured in a unit form and provided in the media wall 100, maintenance thereof is easy.

[0048] The media wall 100 may be installed in a room as well as the living room. The wall between the rooms may be configured as the media wall 100 to use the media wall 100 in both directions in neighboring rooms. For example, one air conditioner or air purifier may be used in both spaces when it is arranged to be reachable in both directions. Instead of the TV and loudspeaker 162 used in the living room, a monitor and a personal computer (PC) may be mounted and used based on the purpose of the room. Alternatively, another functional unit such as an electronic board may be mounted and used according to the age of a child.

[0049] When installed in an office, a media wall 100 equipped with functional units such as an electronic board, an air purifier, a video conference system, and a PC may be used. The electronic appliance 160 mounted

on the media wall 100 is covered by the art wall 150 and thus do not require a separate exterior case.

[0050] When the media wall 100 is installed after being manufactured at a factory according to a user's installation location, large quantities of the same module may be manufactured and supplied to a hotel/resort or apartment under construction, thereby reducing defect rate and manufacturing costs.

[0051] However, it is difficult to transport the media wall 100 that has been assembled. Further, when construction of a building is completed, it is difficult to bring the media wall 100 into the building. Accordingly, when the media wall 100 is installed at the time of movement into an existing building or remodeling of the interior, the media wall 100 may be implemented by installing a frame in the building and inserting a unit module. In this case, for ease of installation and standardization, the frame structure 110 may be implemented using a plurality of module frames.

[0052] FIG. 3 is a view illustrating coupling of frame modules 111, 112, and 113 of the media wall 100 according to an embodiment of the present disclosure. In order to mount each component, bookcase-type frame modules 111, 112, and 113 including the mounting cell 114 may be used. In order to partition the mounting cell 114, the frame modules 111, 112, and 113 may be manufactured by arranging a plurality of beam-shaped members in a grid form.

[0053] The frame modules 111, 112, and 113 may include a first frame module 111 having mounting cells 114 arranged side by side in a horizontal direction, a second frame module 112 provided to mount a large appliance 160 such as the display device 161, a third frame module 113 having mounting cells 114 arranged side by side in a vertical direction.

[0054] The second frame module 112 includes a large space to allow the display device 161 of any size to be mounted therein. When necessary, as shown in FIG. 4, beams to partition the mounting cell 114 may be provided to fix the display device 161 and to enhance rigidity of the frame structure 110.

[0055] The first frame module 111 and the second frame module 112 may be stacked in a vertical direction. The horizontal length of the first frame module 111 may be the same as the horizontal length of the second frame module 112. Thus, when the modules are stacked in the vertical direction, they may be disposed so as not to be misaligned.

[0056] The first frame module 111 may be disposed both over and under the second frame module 112. The number of first frame modules 111 stacked in the vertical direction may be increased or decreased depending on the sizes of the first frame module 111 and the second frame module 112 or the size of the installation space.

[0057] The third frame module 113, in which the mounting cells 114 are arranged side by side in the vertical direction, may have the same height as that of the first frame module 111 and the second frame module 112

stacked in the vertical direction. As shown in FIG. 4, the third frame module 113 may be located on the lateral sides of the first frame module 111 and the second frame module 112. The frame modules 111, 112, and 113 may be coupled with fasteners to form the frame structure 110 having a rectangular parallelepiped shape.

[0058] FIG. 4 is a view illustrating a method of manufacturing the frame modules 111, 112, and 113 of the present disclosure. The third frame module 113 in which the mounting cells 114 are arranged in the vertical direction will be described as an example. Each of the frame modules 111, 112, and 113 may be formed using the shape steel 115 extending in one direction. The shape steel is a structural member and represents all rod-shaped members having various cross-sectional shapes. Rod-shaped steel having the same cross section in the longitudinal direction may be formed by rolling or by bending a sheet material. The shape steel has a hollow space compared to a beam-shaped member having a circular or rectangular cross section. Thus, it is a lightweight member obtaining rigidity greater than or equal to a predetermined value with a little amount of material.

[0059] As shown in FIG. 4, the present disclosure may employ C-shape steel 115 having a C-shaped cross section. The C-shape steel 115 may be formed by vertically bending both width ends of a metal plate. When both ends of the metal plate are vertically bent only once, the plate may have a square bracket-shaped cross section. When both ends of the metal plate are vertically bent twice, the plate may have a C-shaped cross section. A power line or signal line connected to the electronic appliance 160 may be disposed in the internal space of the steel, and an outlet module 140 to which a power cable or a data cable is fastened may be disposed.

[0060] The outlet module 140 may include a power terminal for supplying power, a data terminal for data transmission and reception such as an Internet line or a cable input, and a connector by which a functional unit inserted into the frame is connected to another functional unit. The connector has terminals on both sides of the frame. When data connection lines of electronic devices are inserted into the terminals, the devices may exchange data with each other. The outlet module 140 may include a rail structure that moves along the frame modules 111, 112, and 113.

[0061] A vent hole 116 may be formed in the shape steel 115 as shown in FIG. 4. The vent hole 116 may reduce the weight of the shape steel 115 and discharge heat generated from the electronic appliance 160. A fan may also be used to discharge hot air to the outside to more actively discharge heat. When the heat of the electronic appliance 160 is discharged into an indoor space, a heating effect may be obtained in winter. However, in summer, discharging the heat into the indoor space may cause the indoor temperature to rise. Thus, the fan may be used to internally circulate heat, or a structure to discharge heat to the outside may be added to the wiring connected to the outdoor unit of the air conditioner.

[0062] Each of the frame modules 111, 112, and 113 may include outer steel defining a rectangular outer periphery and an inner steel arranged therein to partition the mounting cell 114. The outer steel may include vertical steel extending in the vertical direction and horizontal steel extending in the horizontal direction. The first frame module 111 to the third frame module 113 may be assembled by arranging the horizontal steel between a pair of vertical steels. In order to fasten the vertical steel with a fixing member 120, which is fixed to the ceiling and the floor, the upper and lower ends of the vertical steel may need to be exposed. Therefore, the vertical steel may be arranged outside the horizontal steel may be fastened by inserting vertical brackets 122 and 123 of the fixing member 120 to the end of the vertical steel.

[0063] The inner steel positioned inside the outer steel may define the mounting cell 114 by partitioning a space surrounded by the outer steel. The inner steel may be immovably connected to the outer steel by welding, and part of the inner steel may be bolted or hooked so as to be removed when necessary.

[0064] Thus, by fascinating the frame modules 111, 112, and 113 in the form of a semi-finished appliance 160 in the above-described manner, the number of connection operations to be performed on the site may be reduced. The dimensions of the appliance 160 may be kept constant and the installation time may be reduced. In addition, the product may be modularized into a size that facilitates movement of the product, and therefore may be easily moved to the site.

[0065] FIG. 5 shows examples of various frame structures 110 according to a combination of the frame modules 111, 112, 113 of the present disclosure. FIG. 5(a) illustrates assembly of a frame structure 110 consisting of a pair of first frame modules 111a, one second frame module 112a, and a pair of third frame modules 113. Since the first frame module 111a has four mounting cells 114, the width of the first frame module 111a may not fit to a narrow indoor space for installation.

[0066] Accordingly, as shown in FIG. 5(b), a first frame module 111b having three mounting cells 114 to have a short horizontal length may be used. The second frame module 112b may have a length corresponding to the horizontal length of the first frame module 111b.

[0067] In addition, the third frame modules 113 may be disposed on both sides of the vertical stack of the first frame module 111 and the second frame module 112. The height of a typical house is 220 cm to 230 cm, the third frame module 113 may be configured to have a height a little less than 220 cm. While a five-stage vertical frame is illustrated in the drawings, a six-stage vertical frame may be manufactured in case of a multilayer house or a house having a great floor height.

[0068] When installed in a narrower space, the frame structure 110 may be configured using only the first frame module 111a and the second frame module 112a without the third frame module 113. When a large display device 161 is not mounted, only the third frame modules may

be arranged in a line to implement the frame structure 110. Each frame module 111, 112, 113 may be fastened by bolts, or may be fastened by welding.

[0069] FIG. 6 is a view illustrating a method of installing a frame structure 110 of the media wall 100 according to an embodiment of the present disclosure. The frame structure 110 formed by fastening the frame modules 111, 112, and 113 may be fixed to the ceiling and the floor so as to be installed in an indoor space.

[0070] The fixing bracket 125, which is installed on the ceiling or the floor, is a member bent in an L shape. One side 125b of the fixing bracket 125 is disposed on the ceiling or the floor, and the opposite side 125a thereof vertically extends from the ceiling or the floor. The frame structure may include a first vertical bracket 122 inserted into an internal space of the vertical steel thereof.

[0071] The first vertical bracket 122 may be formed to be longer than the vertical length of the first frame module 111 but also the second frame module 112. The frame structure may further include a second vertical bracket 123 disposed in parallel with the first vertical bracket 122 and inserted into the third frame module 113. Since the vertical steel of the third frame module 113 is one member, the vertical steel does not need to be as long as the first vertical bracket 122.

[0072] A coupling bracket 121 may be coupled to an end of each of the first vertical bracket 122 and the second vertical bracket 123 to form a T-shape together with the vertical brackets 122 and 123. The coupling bracket 121 may include a seating portion 121b coupled to the vertical brackets 122 and 123 and seated on the top surfaces of the first frame module 111 and the third frame module 113, and a fastening portion 121a vertically extending from the seating portion 121b and fastened to the fixing bracket 125. The coupling bracket 121 and the fixing bracket 125 may be fastened to each other using a screw, and may each have a fastening hole, which the screw is fastened. The fastening hole may be vertically elongated such that the brackets may be adjusted according to the ceiling height.

[0073] When the media wall 100 is installed on the existing wall, a fixing member 120 may be further provided to fasten the media wall to the existing wall.

[0074] A sound device such as the loudspeaker 162 is positioned on the media wall 100. Accordingly, when the media wall 100 is used as a temporary wall, spaces separated by the wall are formed. In this case, the media wall 100 may be fixed by adding a soundproof structure to prevent sound from leak to the two spaces through the ceiling, the floor, and the sidewalls which are in contact with the media wall 100.

[0075] FIG. 7 is a view illustrating a basket 130 of the media wall 100 according to an embodiment of the present disclosure. The frame modules 111, 112, and 113 may be divided into a plurality of mounting cells 114 using the inner shape steel 115. As shown in FIG. 7, the basket 130 may be inserted into the mounting cells 114

to provide a space in which the electronic appliance 160 is seated. The second frame module 112 has a relatively large mounting cell 1144 because the display device 161 is located therein. On the other end, the mounting cells 114 of the first frame module 111 and the third frame module 113 may be formed to have standardized sizes. Using the mounting cells 114 of the standardized sizes, the basket 130 may also be standardized. Thereby, the number of types of parts may be reduced.

[0076] However, when the mounting cells are formed to have the same size, a larger space may be needed depending on the electronic appliance 160 to be mounted. For example, since the size of the air conditioner is different from that of the air cleaner, the mounting cell 114 may be formed to have a size which is an integer multiple of a base size in consideration of the difference in size. For example, based on a first mounting cell 1141 having a horizontal dimension equal to a and a vertical dimension equal to b, a second mounting cell 1142 having a horizontal dimension equal to an integer multiple of a or a third mounting cell 1143 having a vertical dimension equal to an integer multiple of b may be provided.

[0077] The horizontal dimension of the first mounting cell 1141 corresponds to the horizontal dimension of the third frame module 113, and the vertical dimension thereof corresponds to the vertical dimension of the first frame module 111. Here, the mounting cell 114 refers to an internal space partitioned by the shape steel 115, and thus the difference in size between the first frame module 111 and the third frame module 113 caused by the thickness of the shape steel 115 is ignored.

[0078] Since the first frame module 111 has a short vertical length, the first frame module 111 may include only the first mounting cell 1141 and the second mounting cell 1142. Since the third frame module 113 has a short horizontal length, the third frame module 113 may include only the first mounting cell 1141 and the third mounting cell 1143.

[0079] FIG. 8 is a perspective view showing an example of an air purifier 164 according to an embodiment. The air purifier 164 may be placed in one of the mounting cells 114 of the frame structure 110, and the basket 130 may be omitted by forming an external casing to fit the mounting cell 114.

[0080] The air purifier 164 may have openings 16461a and 16461b through which air purified from the air purifier 164 is discharged defined in a front surface of the art wall 150 such that air may be sucked to remove impurities therefrom and be discharged again. The openings 16461a and 16461b may be opened and closed or selectively exposed. The air purifier 164 may be located below the display device 161.

[0081] The smart wall 100 may be additionally installed on the wall, but itself may serve as the wall partitioning the interior space as shown in (a) in FIG. 8. In this case, the openings 16461a and 16461b may be respectively defined in both surfaces 150a and 150b of the smart wall 100, and the purified air discharged from the air purifier

164 may be provided to two spaces with the smart wall 100 interposed therebetween. (a) in FIG. 8 shows a first outlet 16461a directed toward a living room (a first room, a room 1), and (b) in FIG. 8 shows a second outlet 16461b directed toward a main room (a second room, a room 2). Positions, sizes, and shapes of the first outlet 16461a and the second outlet 16461b are not necessarily the same, and a plurality of air purifiers 164 may be mounted in the smart wall 100.

[0082] FIG. 9 is a view showing a cross-section of the air purifier 164 according to an embodiment. The air purifier 164 includes a body 1641, and a filter 1643 and a blower fan 1644 positioned inside the body 1641. The blower fan 1644 is an apparatus that sucks air such that outside air passes through the air purifier 164. The filter 1643 may be placed between the blower fan 1644 and an inlet of the air purifier 164 to purify the air introduced into the air purifier 164. The blowing fan 1644 may receive the air from the front and discharge the air from the side as shown in FIG. 9. The blowing fan 1644 may discharge the air by changing a direction of the air introduced into the air purifier 164, thereby increasing utilization of an internal space of the air purifier 164.

[0083] The air that has passed through the blower fan 1644 is discharged to the outside again through the outlets 16461a and 16461b. The air purifier 164 is mounted on the smart wall 100 located between the first room (the room 1) and the second room (the room 2), so that the purified air may be supplied to the both rooms at the same time using one air purifier 164.

[0084] An exhaust chamber 1646 for distributing the purified air to be discharged to the two spaces may be further included. FIG. 10 is a view showing the exhaust chamber 1646 of the air purifier 164 according to an embodiment. The exhaust chamber 1646 may include a plurality of outlets 1646 directed toward one surface and the other surface of the smart wall 100. In order to minimize the number of members exposed on the art wall 150a, the first outlet 16461a may be directed in a direction that is not easily seen from the front. As shown in FIG. 10, the first outlet 16461a may be positioned below the display device 161 to face upward.

[0085] Because the display device 161 or the like is not disposed, the second outlet 16461b directed toward the main room (the room 2) is difficult to be placed to face upward like the first outlet 16461a so as not to be seen by a user, so that the second outlet 16461b may be formed perpendicular to the art wall 150b. in addition, vertical levels of the first outlet 16461a and the second outlet 16461b may be changed depending on conditions of the space.

[0086] The exhaust chamber 1646 may include a partition plate 16463 such that the air is distributed and discharged to the first outlet 16461a and the second outlet 16461b. Amounts of air flowing to the first outlet 16461a and the second outlet 16461b may be adjusted based on a position of the partition plate 16463. In general, because a size of the living room (the room 1) is greater

than a size of the main room (the room 2), the partition plate 16463 may be disposed to be biased from a center to the second room (the room 2) such that more air flows to the living room. When a surface of the smart wall 100 facing the living room is referred to as a front surface and a surface facing the main room is referred to as a rear surface, the partition plate 16463 may be disposed to be biased toward the rear surface.

[0087] A connection body 1645 may be further included to seal a space defined between the exhaust chamber 1646 and the body 1641. The connection body 1645 may protrude from a discharge port of the body 1641 and be in close contact with the exhaust chamber, and the connection body 1645 may seal the space defined between the exhaust chamber 1646 and the body 1641, so that the air that has passed through the air purifier 164 may not leak in the middle and may be discharged through the first outlet 16461a and the second outlet 16461b.

[0088] When the user inserts the air purifier 164 into the mounting cell of the frame structure using a lever 1647 and a pressing protrusion 1648, the pressing protrusion 1648 may push the lever 1647, and the connection body 1645 may move toward the exhaust chamber 1646 to connect the space between the exhaust chamber 1646 and the body 1641.

[0089] When the air is supplied to the two spaces using one air purifier 164, the air must be properly distributed and supplied to the two spaces. First, the amount of air discharged through the first outlet 16461a and the amount of air discharged through the second outlet 16461b must be sensed. According to the present disclosure, an air amount sensor 210 may be disposed in each of the first outlet 16461a and the second outlet 16461b to sense the amount of air discharged through each outlet.

[0090] The air amount sensor 210 is a device for measuring the amounts of air discharged through the first outlet 16461a and the second outlet 16461b. Even when the positions of the first outlet 16461a and the second outlet 16461b are different as shown in FIG. 9, the air amount sensor 210 in the first outlet 16461a and the air amount sensor 210 in the second outlet 16461b may be disposed at the same vertical level from the blower fan 1644. In order to accurately compare the amounts of air discharged through the first outlet 16461a and the second outlet 16461b, it is desirable that distances from the blower fan 1644 of the air amount sensor 210 in the first outlet 16461a and the air amount sensor 210 in the second outlet 16461b are the same.

[0091] FIG. 11 is a view showing the air amount sensor 210 of the air purifier 164 according to an embodiment, and FIG. 12 is a view showing a method for measuring an amount of air using the air amount sensor 210 in FIG. 11.

[0092] The air amount sensor 210 of the present embodiment includes a rotating fan 212, a magnet 213, and a hall sensor 214. The rotating fan 212 rotates when the air passes through the rotating fan 212, and rotates faster

when the amount of air passing therethrough is large. The rotating fan 212 may include a plurality of blades extending radially from a center of rotation. The blade may be formed in a streamlined shape curved in one direction as shown in (b) in FIG. 11. The rotating fan 212 may rotate faster when the amount of air passing therethrough is large.

[0093] In order to accelerate a flow of air passing through the rotating fan 212, an inclined guide 211 whose exit is narrower than an entrance may be further included. As the air that has passed through the blower fan 1644 passes through the inclined guide 211 with the narrow exit, the air is accelerated to rotate the rotating fan 212 with greater force.

[0094] The inclined guide 211 may further include a curved rib 215 curved in the same direction as a curved direction of the blade of the rotating fan 212 such that air may pass in line with the rotating direction of the rotating fan 212. When the air flows spirally along the rib 215, the rotating fan 212 may rotate faster.

[0095] In order to rotatably fix the rotating fan 212 at the exit of the inclined guide 211, a bridge that crosses the exit may be included as shown in FIG. 11, and the rotating fan 212 may rotate as a center of rotation thereof is pin-coupled to the bridge. The air may flow to a space 211a other than the bridge and flow out through the outlets 16461a and 16461b.

[0096] In order to sense a rotation period of such a rotating fan 212, the magnet 213 located in the rotating fan 212 and the hall sensor 214 for sensing the magnet 213 may be placed adjacent to each other. The hall sensor 214 is a device that senses magnetism of the magnet 213, and when the magnet 213 is located close to the hall sensor 214 within a predetermined distance, the hall sensor 214 may generate a signal.

[0097] When the magnet 213 is disposed to be biased in one direction from the center of rotation of the rotating fan 212, a distance thereof from the hall sensor 214 periodically changes when the rotating fan 212 rotates. In a state shown in (a) in FIG. 12, the hall sensor 214 generates the signal, and in a state in (b) in FIG. 12, the hall sensor 214 does not generate the signal, so that a graph as shown in (c) in FIG. 12 may be obtained. When a period in which the hall sensor 214 generates the signal is short, it may be determined that, because the speed of the rotating fan 212 is high, the amount of air passing through the corresponding air amount sensor 210 is large.

[0098] In addition to the magnet and the hall sensor, a sensor that may sense the rotation period of the rotating fan 210 is applicable. For example, the number of rotations may be calculated by sensing the blade of the rotating fan 210 using a proximity sensor.

[0099] FIG. 13 is a view showing the air amount sensor 210 of the air purifier 164 according to another embodiment, and FIG. 14 is a view showing a method for measuring an amount of air using the air amount sensor 210 in FIG. 13.

[0100] The present embodiment may also use the conical inclined guide 211 like the above-described embodiment, and may further include a piezo sensor disposed at the exit of the inclined guide as shown in (a) in FIG. 13. Because amounts of the air flowing into the entrance (a lower side in the drawing) and the air discharged through the exit (an upper side in the drawing) of the inclined guide 211 are the same, a pressure of the air passing through the narrow exit may increase.

[0101] The piezo sensor may include a piezo disk 216 that bends in response to the pressure, a sensor substrate 219 positioned at a circumference of the exit of the inclined guide 211, and a terminal that is in contact with the piezo disk 216 and connects the piezo disk 216 to the sensor substrate 219.

[0102] The piezo disk 216, which is a disk-shaped member, may include a first disk 216a and a second disk 216b that is located on one surface of the first disk 216a and is smaller in size than the first disk 216a. When the pressure is applied to the piezo disk 216, an electronic arrangement between the first disk 216a and the second disk 216b changes and a signal is generated. The first disk 216a may contain a metal, and the second disk 216b may be made of a ceramic material.

[0103] A first electrode 217a connected to the first disk 216a and a second electrode 217b connected to the second disk 216b may be included, and the electrode may be implemented in a form of a clip having a predetermined strength in order to fix the piezo disk 216 to the exit of the inclined guide 211. (b) in FIG. 13, which is a view showing one surface of the piezo sensor, and (c), which is a view showing the other surface of the piezo sensor, include the first electrode 217a in contact with the first disk 216a on the other surface of the piezo disk 216 and the second electrode 217b in contact with the second disk 216b on one surface of the piezo disk 216. The piezo disk 216 may be interposed between the first electrode 217a and the second electrode 217b, and the first electrode 217a and the second electrode 217b may extend from the sensor substrate 219 and contain a material having a predetermined rigidity to support the piezo disk 216.

[0104] Because only the first disk 216a is located on the other surface of the piezo disk 216, the second electrode 217b may be in contact with anywhere on the other surface of the piezo disk 216, so that a thickness of the first electrode 217a may be uniform as shown in (c). Both ends of the first electrode 217a may be supported on the sensor substrate and may be bent in a U-shape to stably support the piezo disk 216.

[0105] Because both the second disk 216b and the first disk 216a are exposed on one surface of the piezo disk 216, the second electrode 217b should not come into direct contact with the first disk 216a. The second electrode 217b is formed such that only a portion in contact with the second disk 216b is thick and the remaining portion is thin, so that a portion thereof overlapping with the first disk 216a does not directly contact the piezo disk

216. In order to stably support the piezo disk 216, the second electrode 217b may be located in the middle of both points of the first electrode 217a connected to the sensor substrate 219.

[0106] There is a difference in the pressure applied to the piezo disk 216 when the air does not pass as shown in (a) in FIG. 14 and when the air passes as shown in (b) in FIG. 14, so that the signal may be generated as shown in (c) in FIG. 14 as the piezo disk 216 is bent. The amount of air passing through the piezo sensor may be measured based on a magnitude or a pattern of the signal.

[0107] A controller may sense the amounts of air discharged through the first outlet 16461a and the second outlet 16461b using the air amount sensors 210 as described above, and may adjust the amounts of air discharged through the first outlet 16461a and the second outlet 16461b. For example, the air purifier 164 may be controlled to discharge more air toward the living room during times when people are active in the living room and to supply more purified air to the main room at night.

[0108] FIGS. 15 to 17 are views showing various examples of an air amount adjusting portion of the air purifier 164. The air amount adjusting portion adjusts the amounts of air discharged through the first outlet 16461a and the second outlet 16461b.

[0109] An air amount adjusting portion 221 in FIG. 15 includes a gear for adjusting an angle of the blower fan 1644, and the angle of the blower fan 1644 is changed as shown in (a) and (b) in FIG. 15 as a motor rotates. When a sirocco fan that discharges the air in a lateral direction is used as the blower fan 1644, it is possible to increase the amount of air directed toward the first outlet 16461a as shown in (a) in FIG. 15 or increase the amount of air directed toward the second outlet 16461b as shown in (b) in FIG. 15 by adjusting the air discharging direction of the sirocco fan.

[0110] An air amount adjusting portion 222 in FIG. 16 may include a rack pinion gear for adjusting a position of the blower fan 1644. The blower fan 1644 may move in a direction of the first outlet 16461a or in a direction of the second outlet 16461b using a rotational force of the motor. That is, the air amount adjusting portion 222 of the present disclosure may increase the amount of air directed to the first outlet 16461a as shown in (a) in FIG. 16 or may increase the amount of air directed to the second outlet 16461b as shown in (b) in FIG. 16 by adjusting the position of the fan.

[0111] The air amount adjusting portion in FIG. 17 may selectively move the partition plate 16463 of the exhaust chamber toward one surface or the other surface of the smart wall 100 to increase the amount of air directed to the first outlet 16461a as shown in (a) in FIG. 17 or increase the amount of air directed to the second outlet 16461b as shown in (b) in FIG. 17.

[0112] FIG. 18 is a view showing a method for controlling the air purifier 164 according to an embodiment. Air discharge amounts of the first room (the room 1) and the second room (the room 2) are respectively set as $x\%$

and $y\%$ (S11), and the amount of air passing through each outlet is measured by sensing the signal from the air amount sensor 210 (S12). In this regard, the amount of air may mean a relative amount of air between the first outlet 16461a and the second outlet 16461b, not an absolute amount of air. After a predetermined time, an average value of the signals of the air amount sensor 210 is obtained. Although shown as 60 seconds in the drawing, the average value may be obtained after a time longer or shorter than the same (S13).

[0113] Whether a measured value of the air amount sensor 210 located in the first outlet 16461a is higher than the set value $x\%$ is determined (S14). When the measured value is higher than $x\%$, the controller may control the air amount adjusting portions 221 and 222 to decrease the amount of air of the first outlet 16461a and increase the amount of air passing through the second outlet 16461b (S15).

[0114] When the measured value of the air amount sensor 210 located in the first outlet 16461a is lower than the set value $x\%$, whether a measured value of the air amount sensor 210 located in the second outlet 16461b is higher than the set value $y\%$ is determined (S16). When the measured value is higher than $y\%$, the controller may control the air amount adjusting portions 221 and 222 to decrease the amount of air of the second outlet 16461b and increase the amount of air passing through the first outlet 16461a (S17).

[0115] When the measured value in each air amount sensor 210 is not greater than the set value, that is, when a balance is achieved, the measured value is initialized again and the measurement is performed again (S18). The controller of the present disclosure may adjust the amounts of purified air supplied to the first room (the room 1) and the second room (the room 2) using the air amount sensors 210 and the air amount adjusting portions 221 and 222.

[0116] The air purifier 164 according to the present disclosure may supply the purified air to the both surfaces of the smart wall 100, and may sense and adjust the amount of air discharged through each outlet.

[0117] The smart wall 100 according to another aspect of the present disclosure may be installed on the wall at the same vertical level as the multimedia device such as the TV and the audio mounted on the wall to provide a neat appearance.

[0118] The above detailed description should not be construed as restrictive in all respects and should be considered as exemplary. The scope of the present disclosure should be determined by a reasonable interpretation of the appended claims, and all changes within the equivalent scope of the present disclosure are included in the scope of the present disclosure.

Claims

1. An air purifier comprising:

- a body including a discharge port on one side thereof;
a blower fan mounted in the body;
a filter for allowing air introduced into the blower fan to pass therethrough;
an exhaust chamber connected to the discharge port and including a plurality of outlets; and
a plurality of air amount sensors respectively positioned adjacent to the plurality of outlets, wherein the air amount sensor senses an amount of air passing through the outlet, wherein the air amount sensor includes:
- a rotating fan rotated by air passing there-through;
a magnet positioned in the rotating fan; and
a hall sensor for generating a signal when the magnet is adjacent thereto,
wherein the air amount sensor senses the amount of air passing through the outlet based on a period of the signal sensed by the hall sensor.
2. The air purifier of claim 1, further comprising an inclined guide having an entrance facing the discharge port of the body and an exit with the air amount sensor located therein, wherein the inclined guide narrows from the entrance to the exit.
 3. The air purifier of claim 2, wherein the inclined guide further includes a bridge crossing the exit, wherein a rotation shaft of the rotating fan is fixed to the bridge and rotates.
 4. The air purifier of claim 3, wherein the rotating fan includes a center of rotation pin-coupled to the bridge and a plurality of blades extending radially from the center of rotation,
wherein the magnet is disposed biased to one side from the center of rotation,
wherein the hall sensor is located on the bridge.
 5. The air purifier of claim 4, wherein the inclined guide includes a plurality of ribs protruding from an inner surface thereof and extending from the entrance to the exit, wherein the blade and the rib have curved surfaces having a convex shape in one direction.
 6. The air purifier of claim 1, wherein the plurality of air amount sensors are disposed to have the same distance from the discharge port.
 7. The air purifier of claim 1, wherein the outlets include a first outlet and a second outlet oriented in different directions, wherein the exhaust chamber includes:
- a first chamber where the first outlet is located;
a second chamber where the second outlet is located; and
a partition plate for partitioning the first chamber and the second chamber.
8. The air purifier of claim 7, further comprising an air amount adjusting portion for adjusting a flow of air in directions of the first outlet and the second outlet.
 9. The air purifier of claim 8, wherein the blower fan includes a sirocco fan for sucking air from the front and discharging air in a lateral direction, wherein the air amount adjusting portion adjusts an angle of the sirocco fan to adjust the air discharging direction.
 10. The air purifier of claim 8, wherein the air amount adjusting portion moves a position of the blower fan in a direction of one side or the other side of the partition plate.
 11. The air purifier of claim 8, wherein the air amount adjusting portion moves the partition plate in a direction of the first outlet or in a direction of the second outlet.
 12. The air purifier of claim 8, further comprising a controller configured to, when one of a first amount of air sensed by a first air amount sensor located in the first outlet and a second amount of air sensed by a second air amount sensor located in the second outlet is different from a percentage set therefor, control the air amount adjusting portion such that the amount of air lower than the set percentage increases.
 13. The air purifier of claim 7, wherein the partition plate is disposed to be biased toward the second outlet.
 14. A smart wall comprising:
a plurality of frame modules having one or more mounting cells defined therein;
a fastener for fastening the plurality of frame modules to form a frame structure; and
an air purifier inserted into one of the mounting cells,
wherein the air purifier includes:
a body including a discharge port on one side thereof;
a blower fan mounted in the body;
a filter for allowing air introduced into the blower fan to pass therethrough;
an exhaust chamber connected to the discharge port and including a plurality of outlets; and
a plurality of air amount sensors respective-

ly positioned adjacent to the plurality of outlets,
wherein the air amount sensor includes:

a rotating fan rotated by air passing therethrough;
a magnet positioned in the rotating fan;
and
a hall sensor for generating a signal when the magnet is adjacent thereto,
wherein the air amount sensor senses an amount of air passing through the outlet based on a period of the signal sensed by the hall sensor.

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15. The smart wall of claim 14, wherein the mounting cell with the air purifier inserted therein is located at a lower portion of the frame structure, wherein the discharge port is located at an upper portion of the body.

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FIG. 1

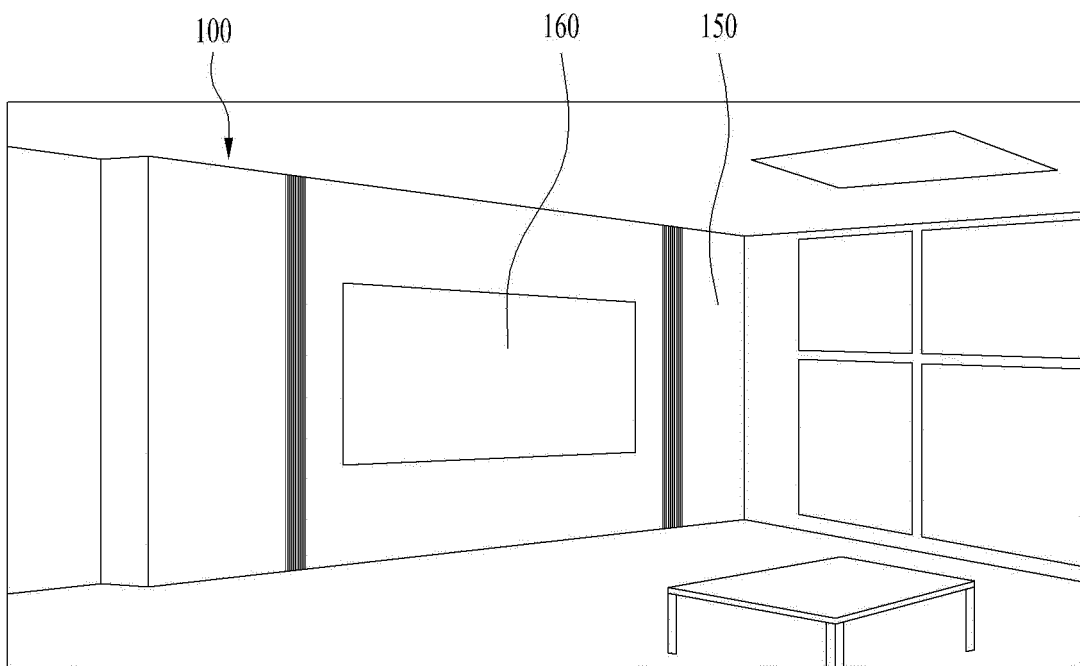


FIG. 2

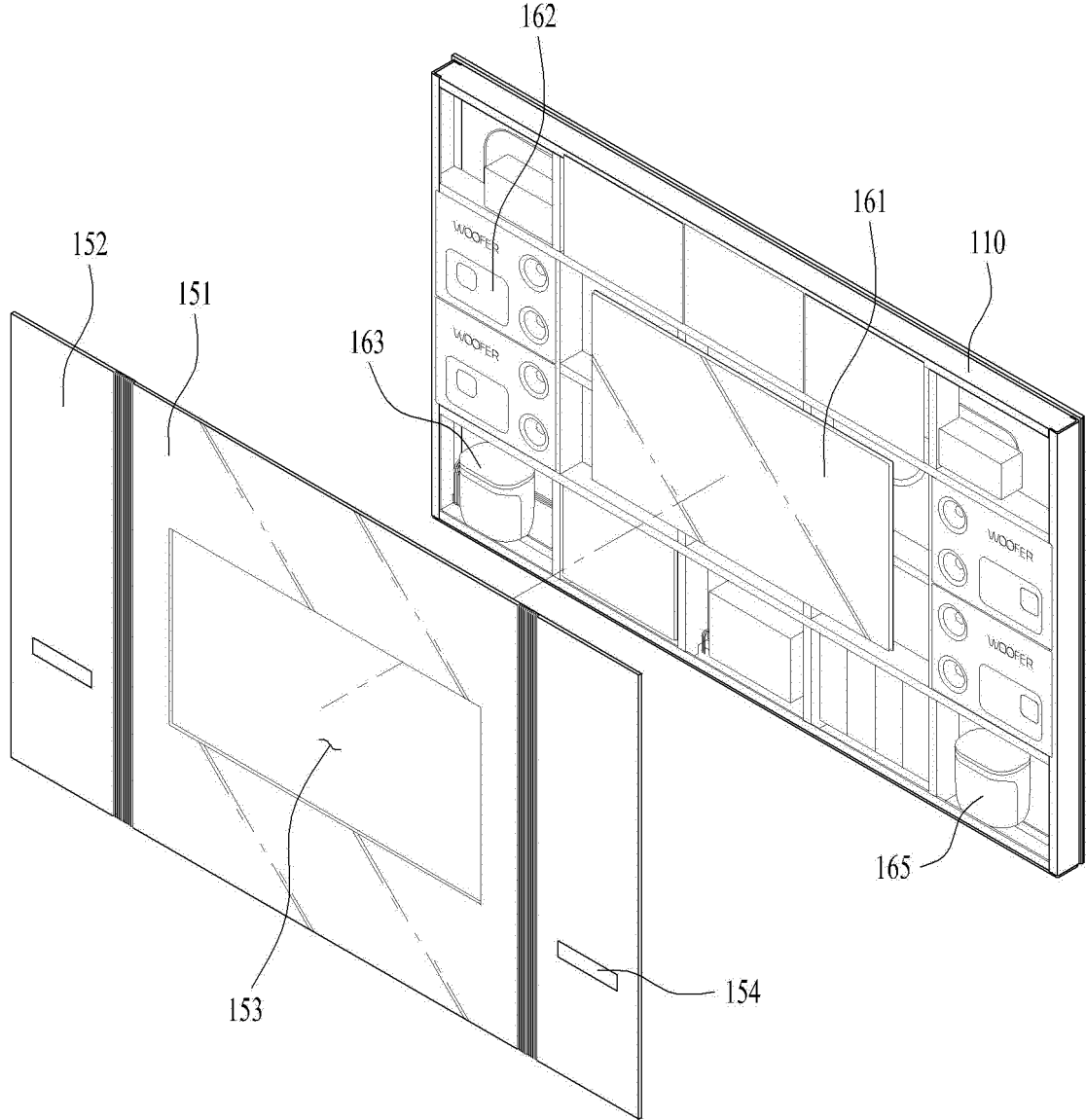


FIG. 3

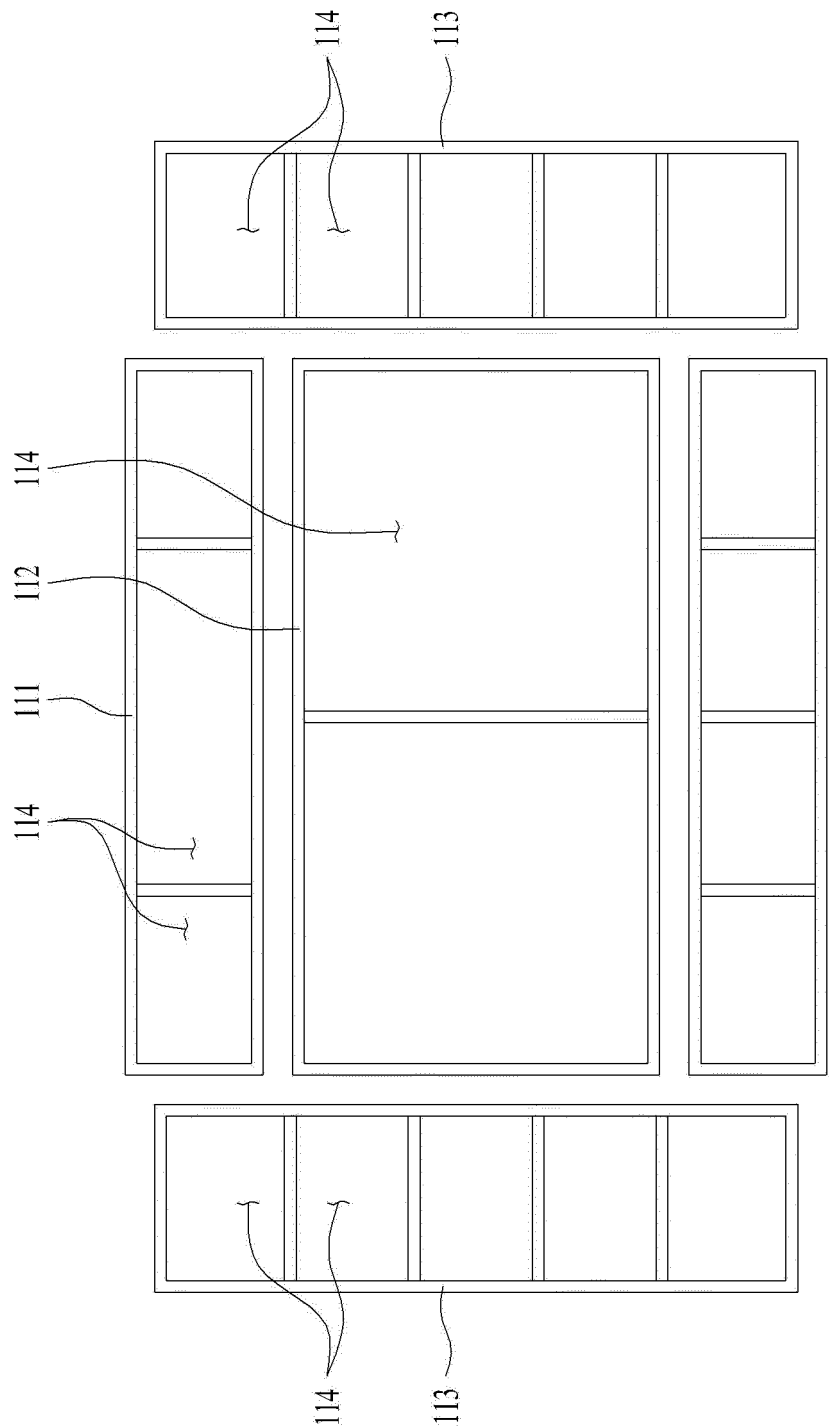


FIG. 4

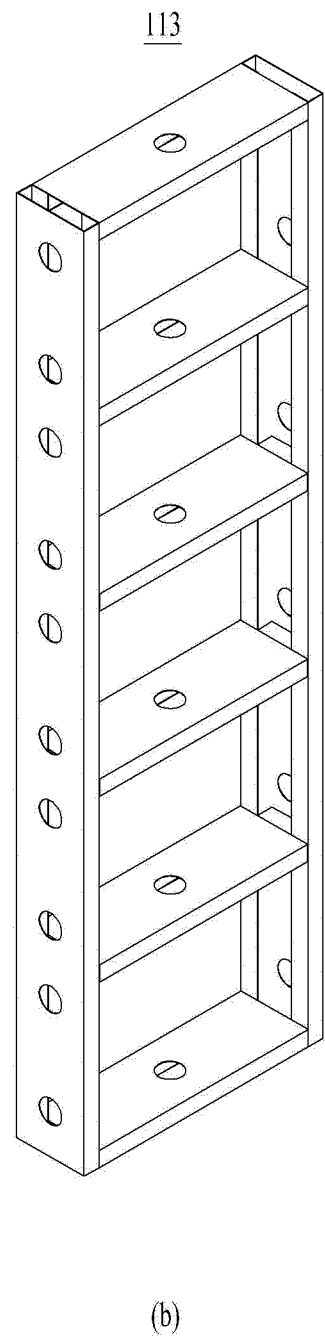
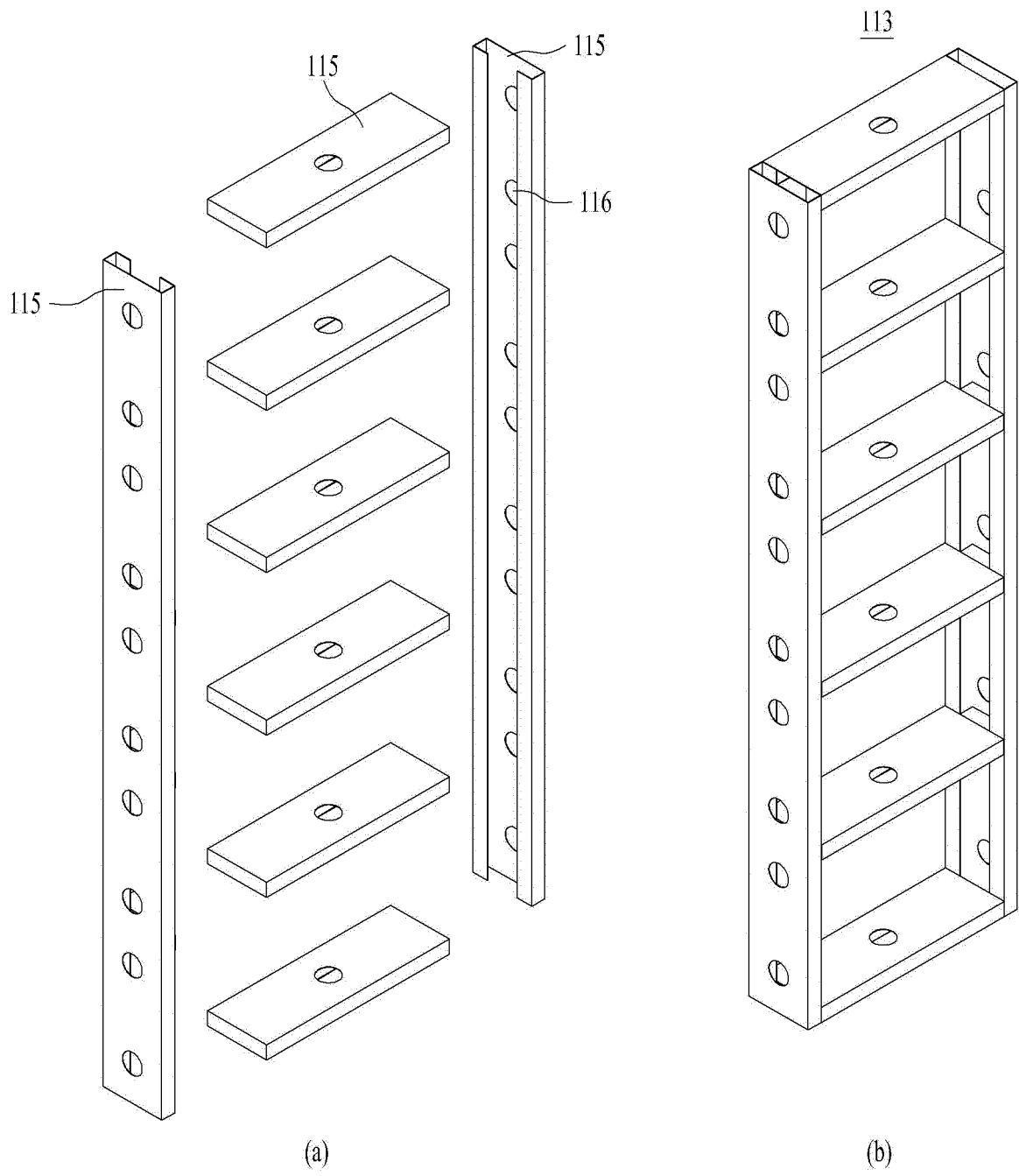
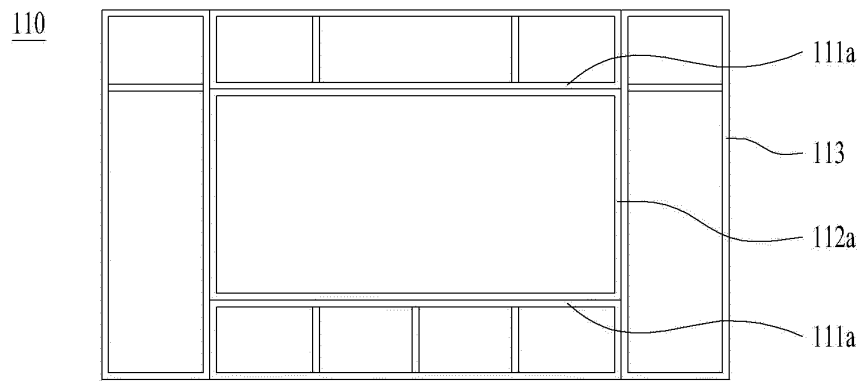
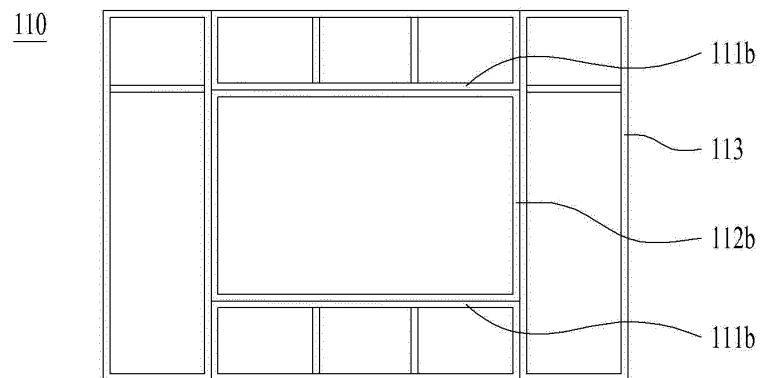


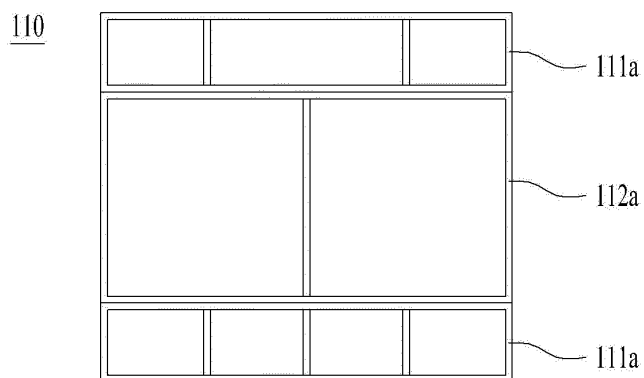
FIG. 5



(a)



(b)



(c)

FIG. 6

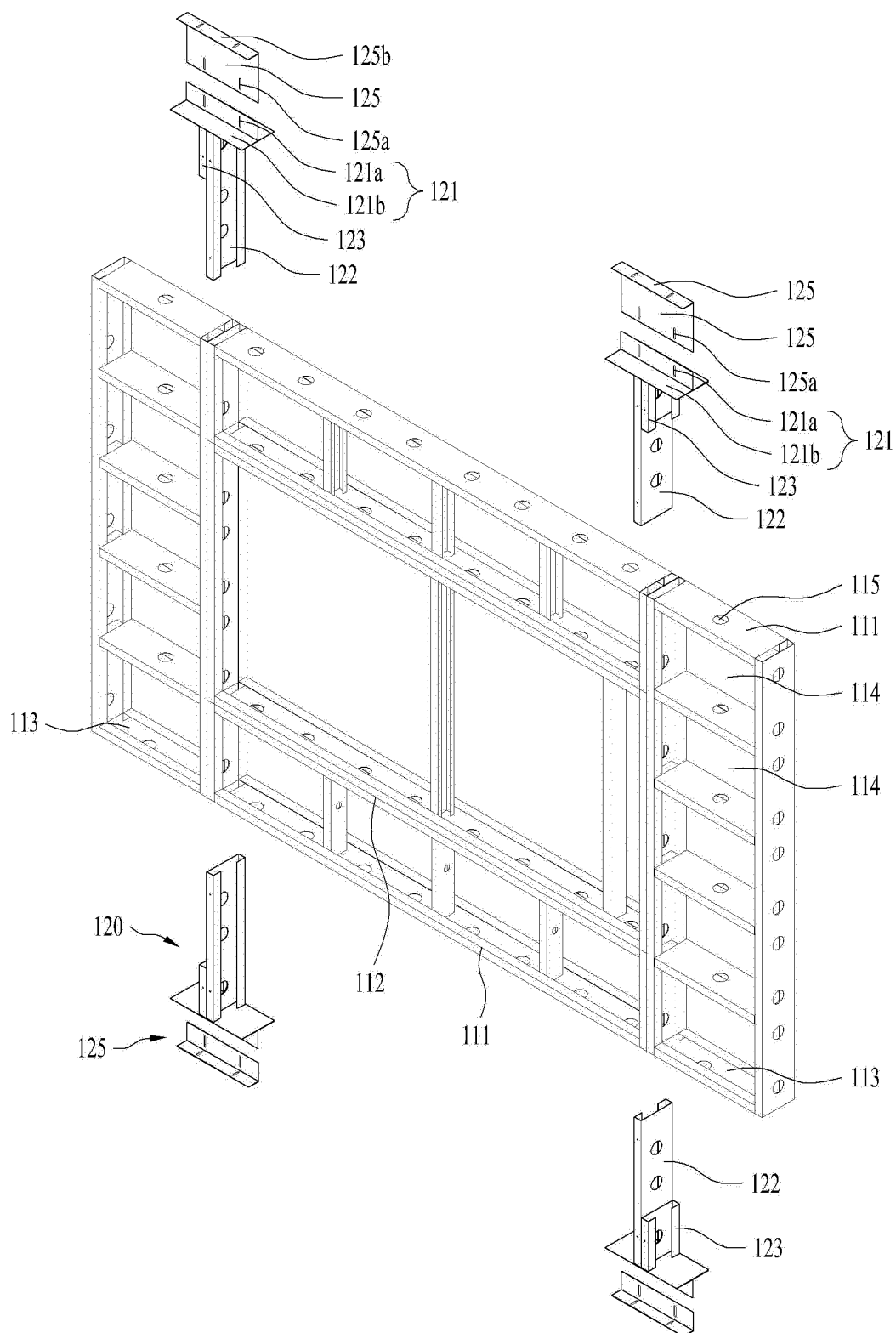


FIG. 7

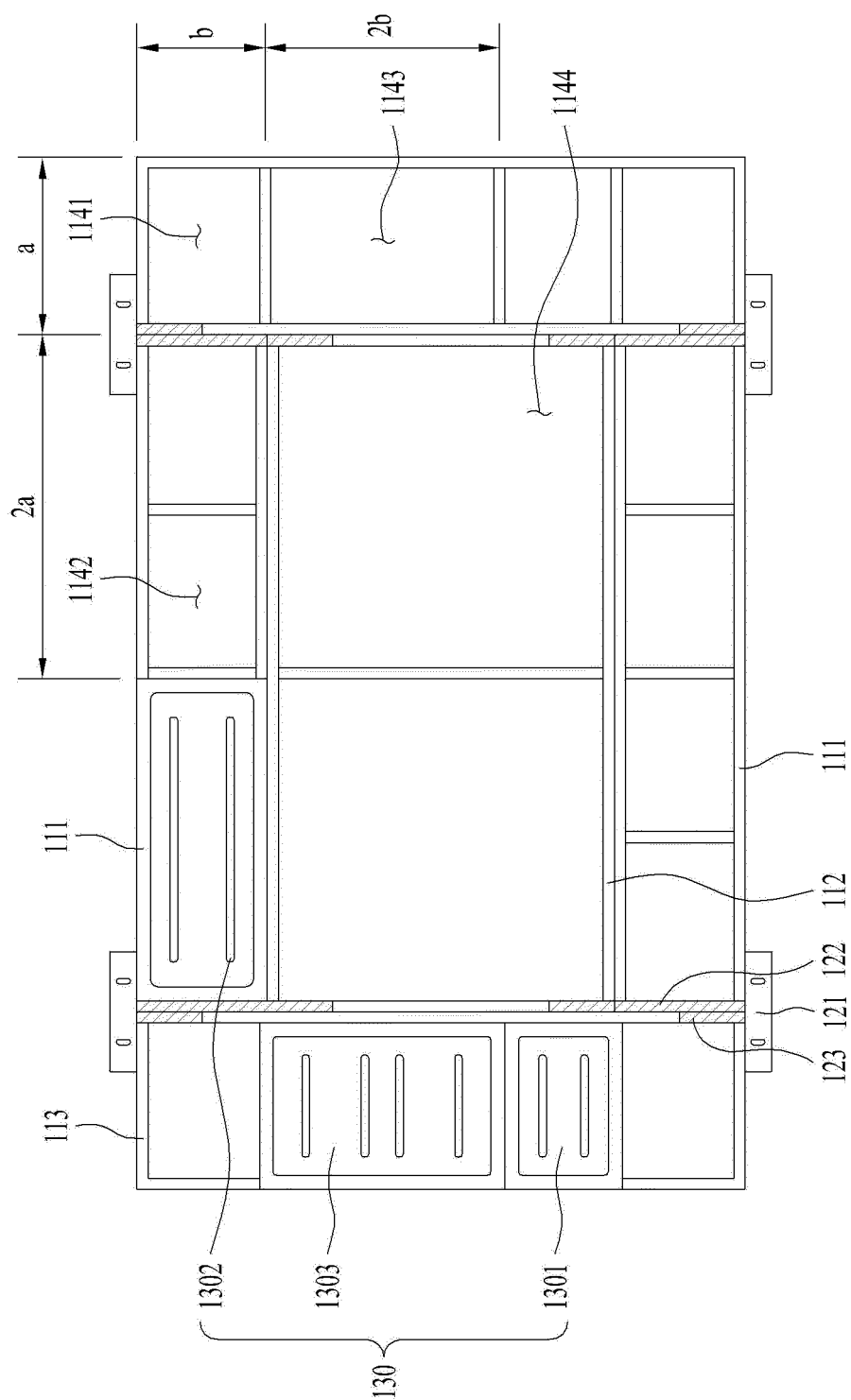


FIG. 8

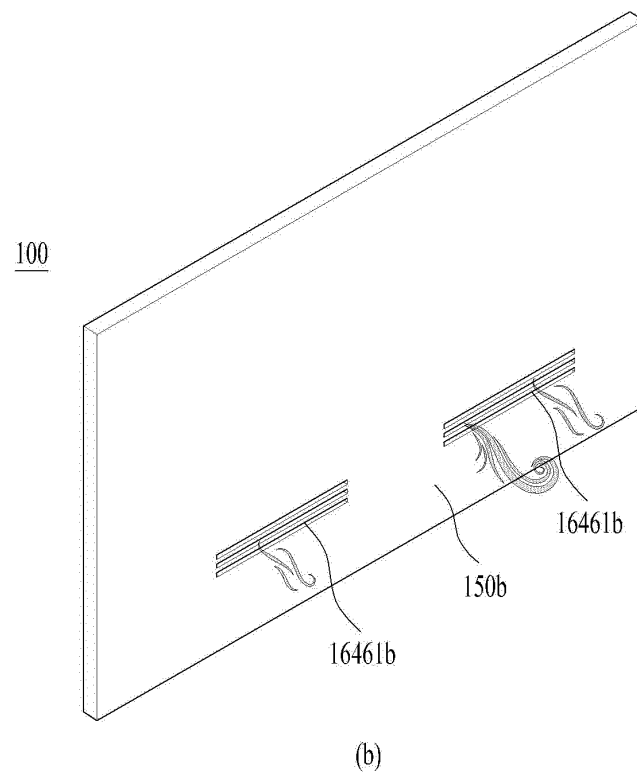
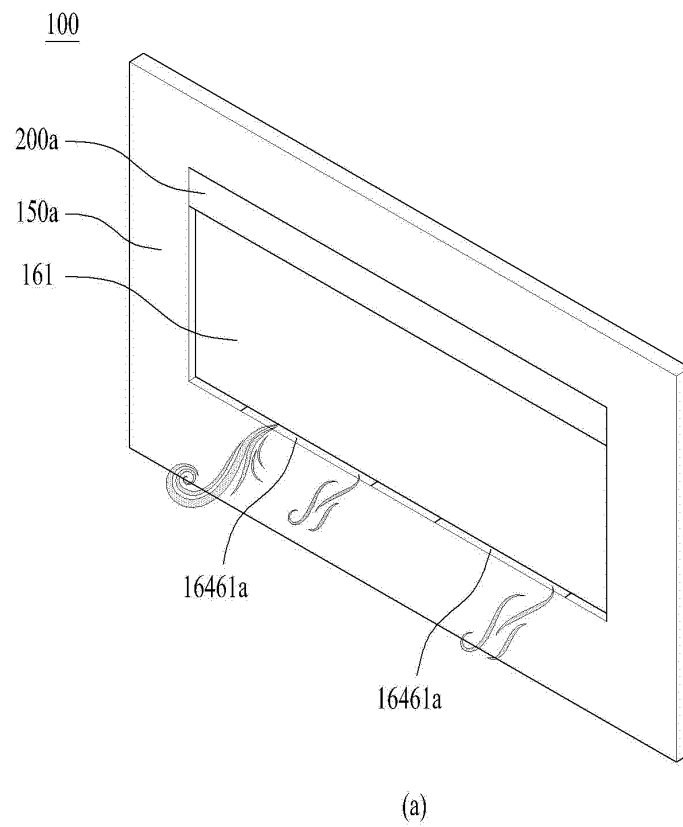


FIG. 9

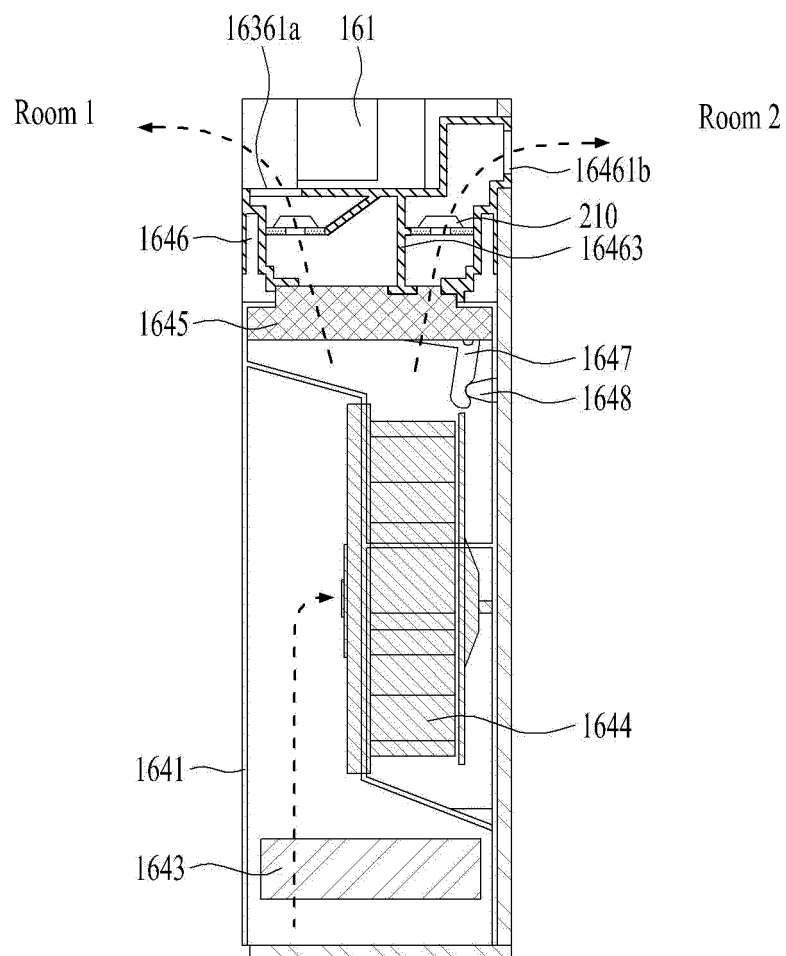


FIG. 10

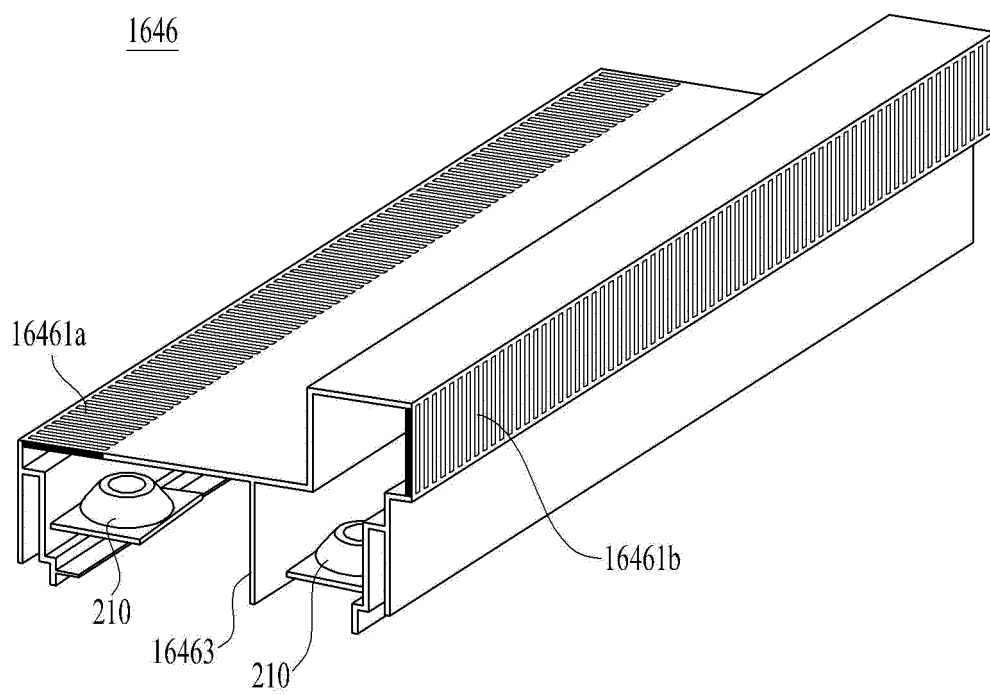
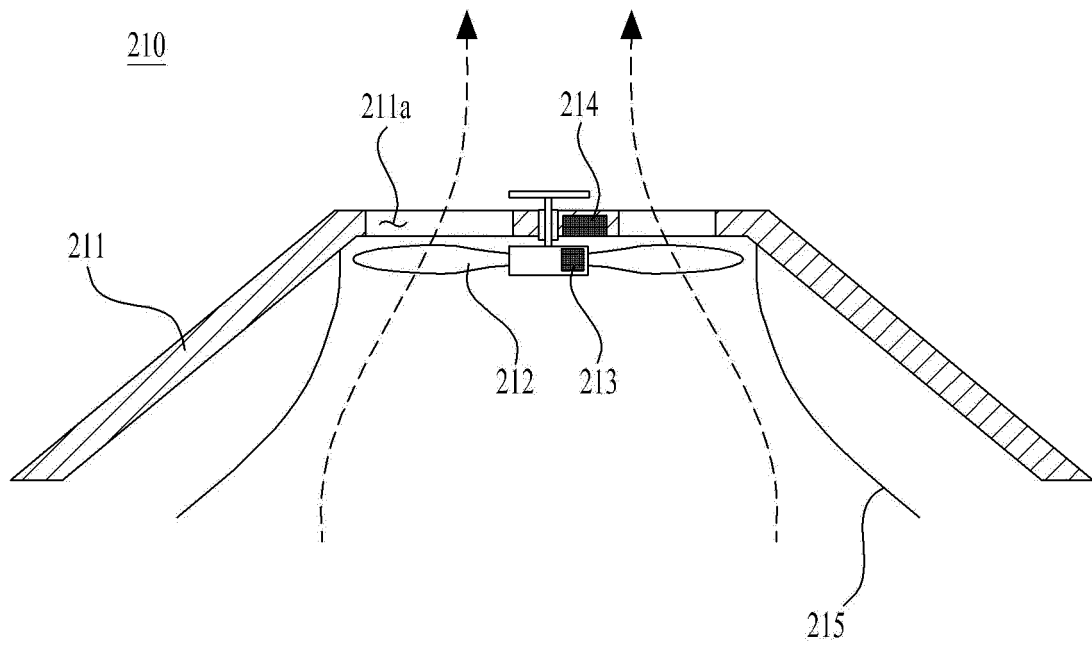
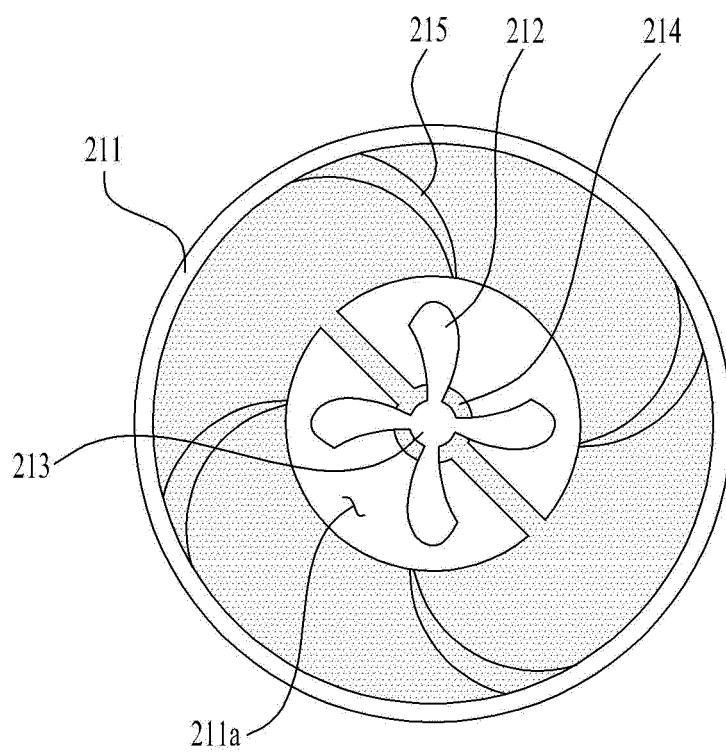


FIG. 11



(a)



(b)

FIG. 12

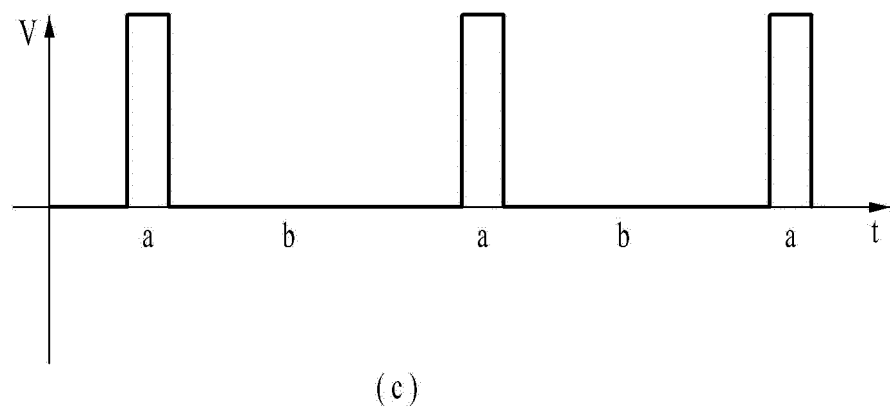
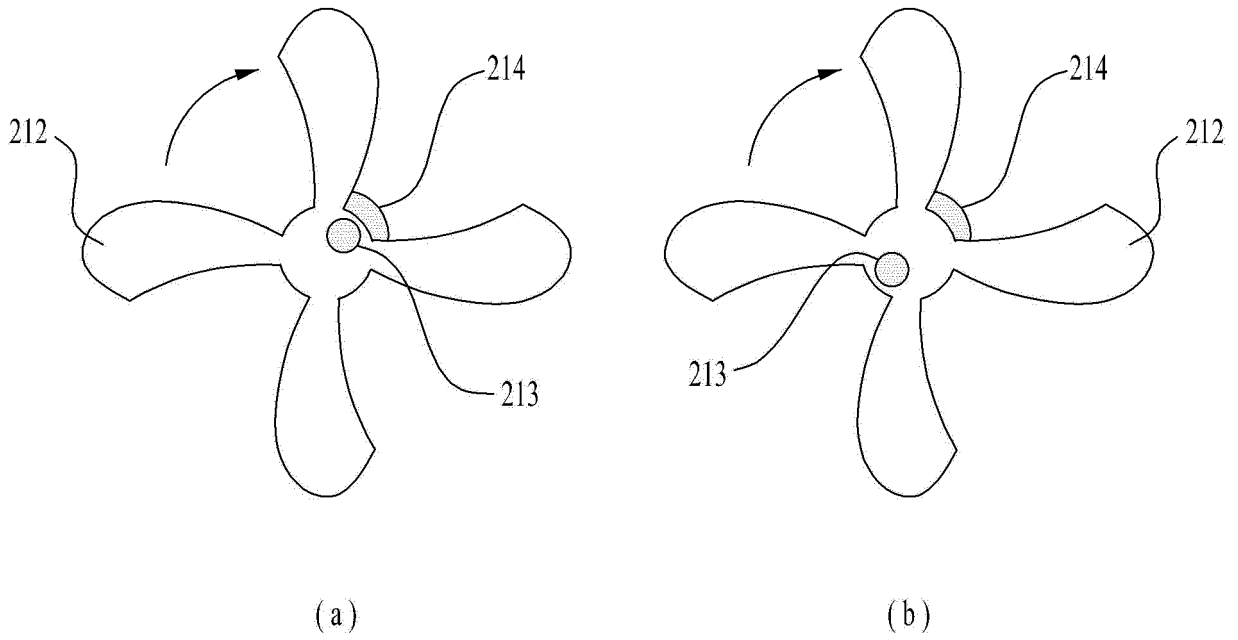


FIG. 13

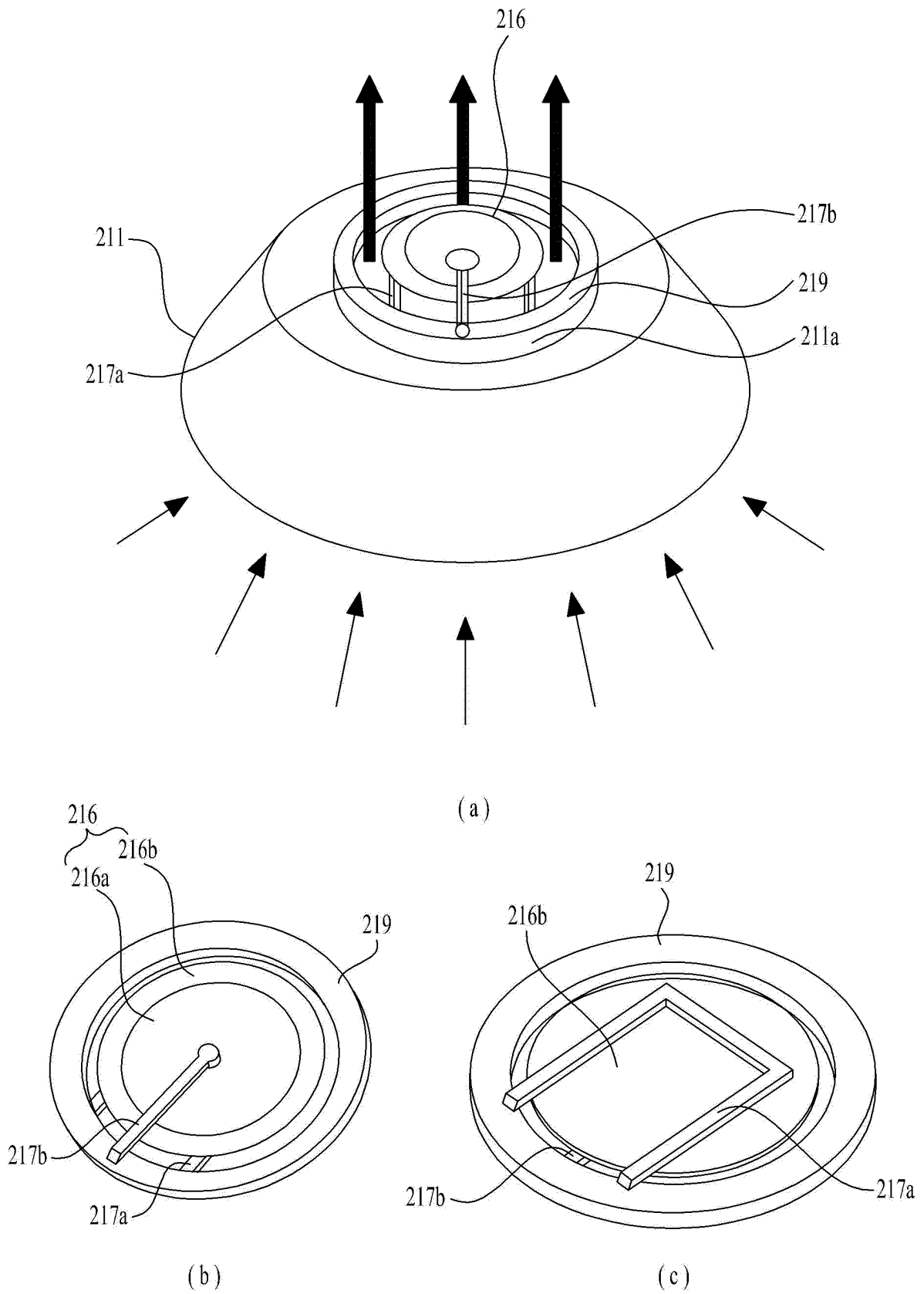


FIG. 14

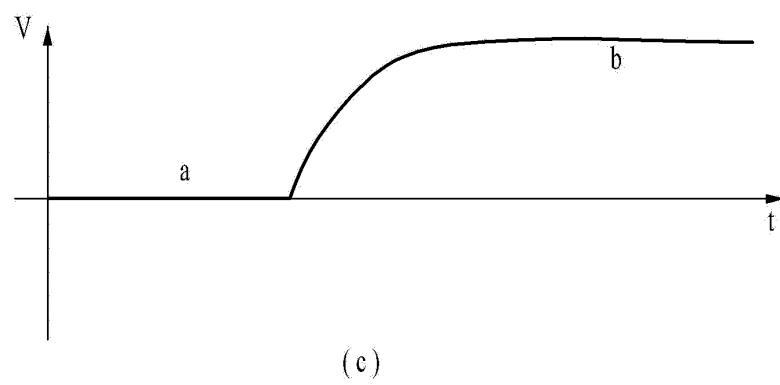
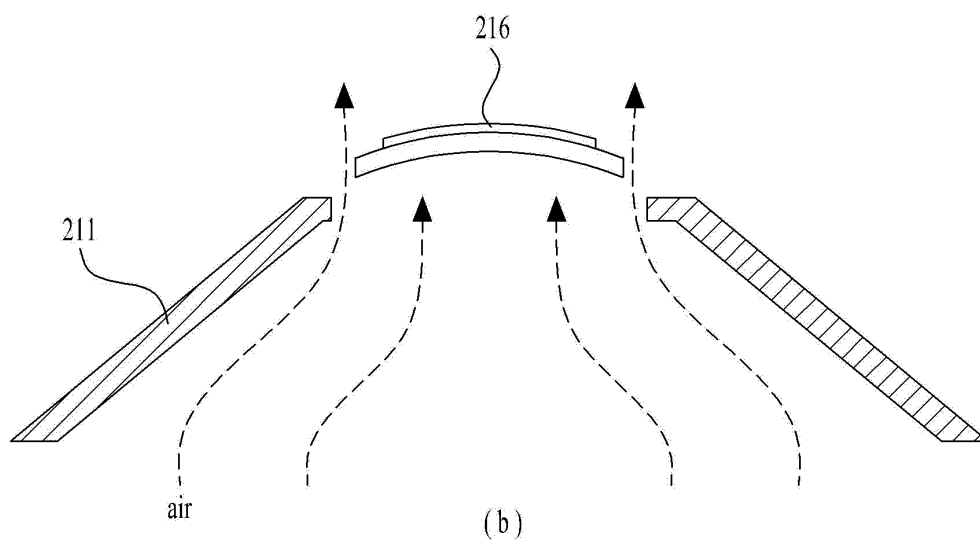
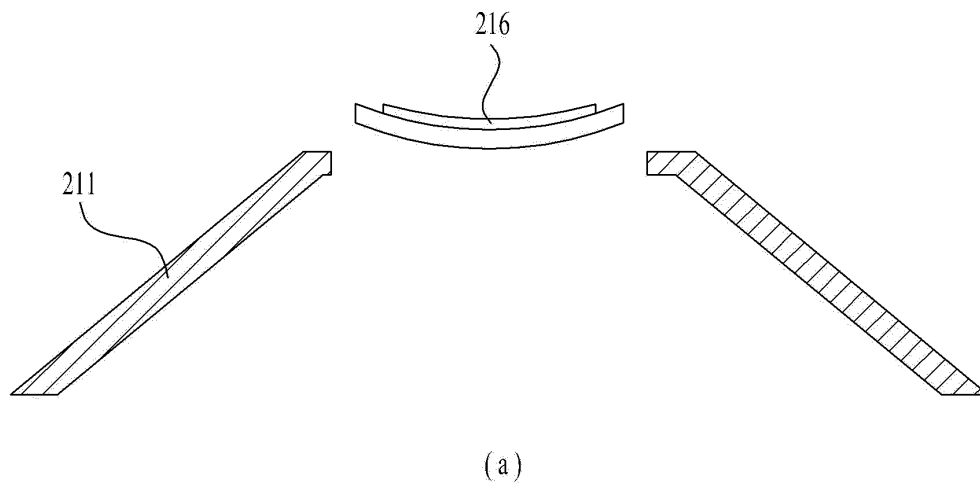


FIG. 15

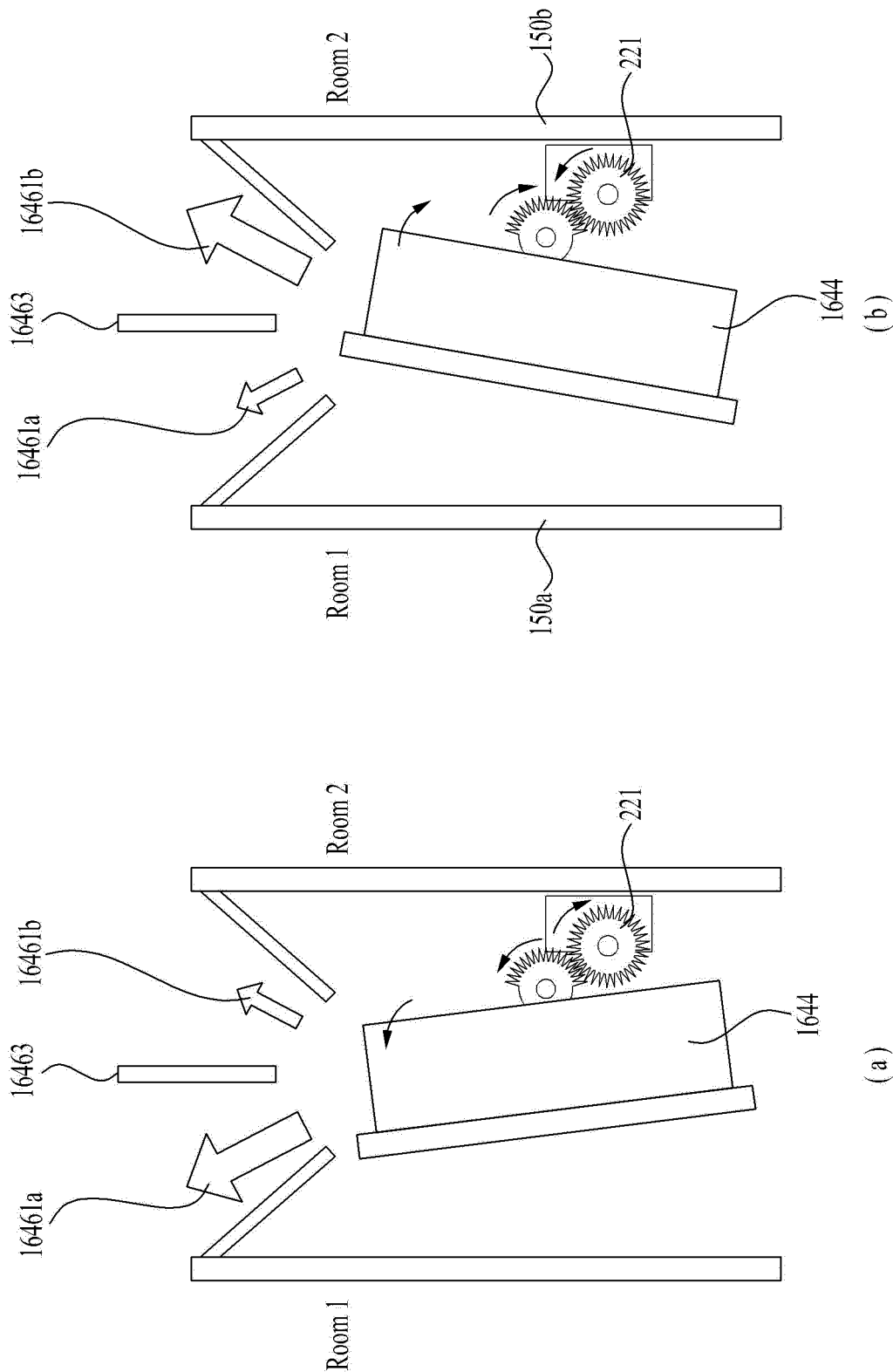


FIG. 16

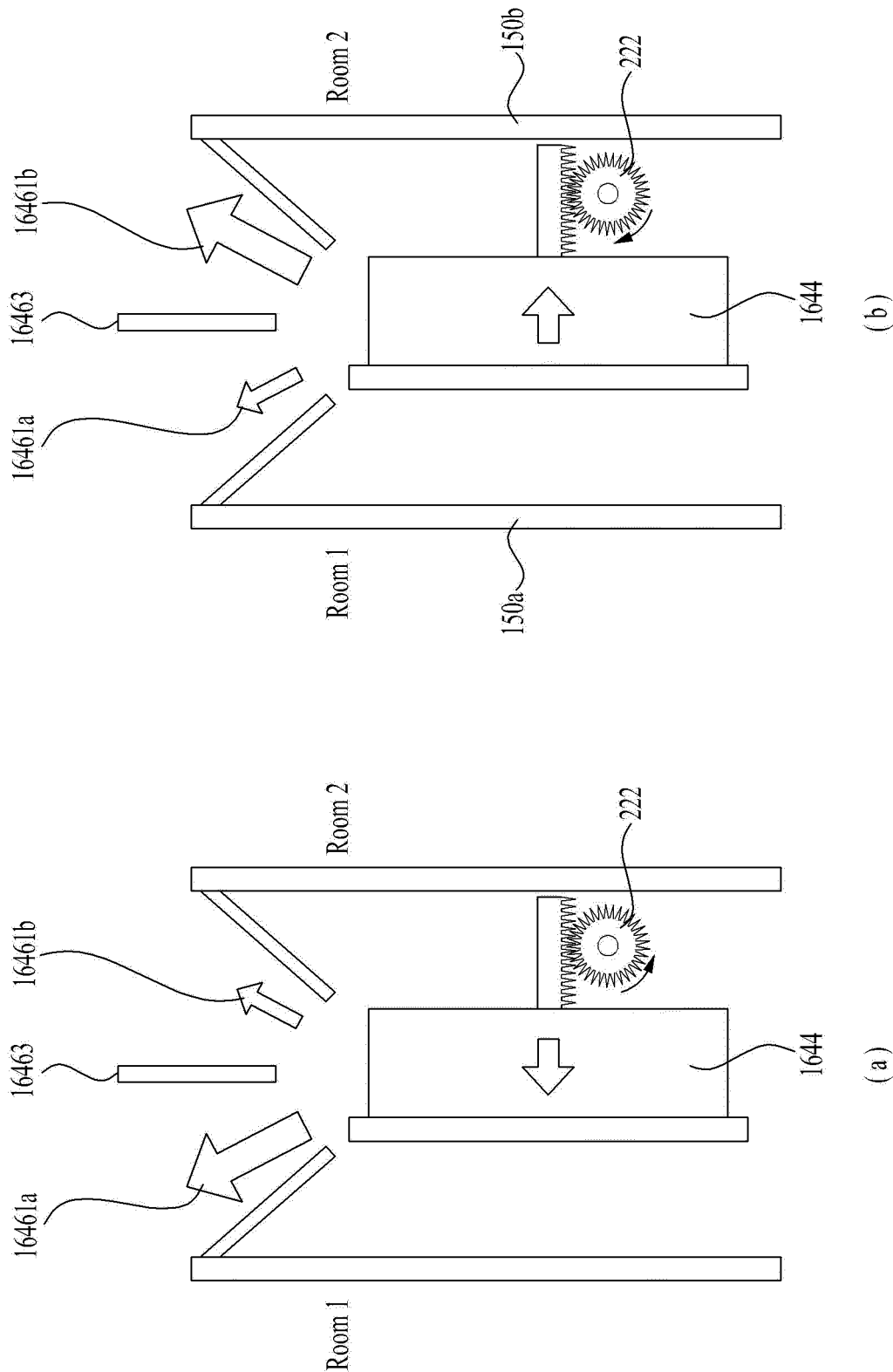


FIG. 17

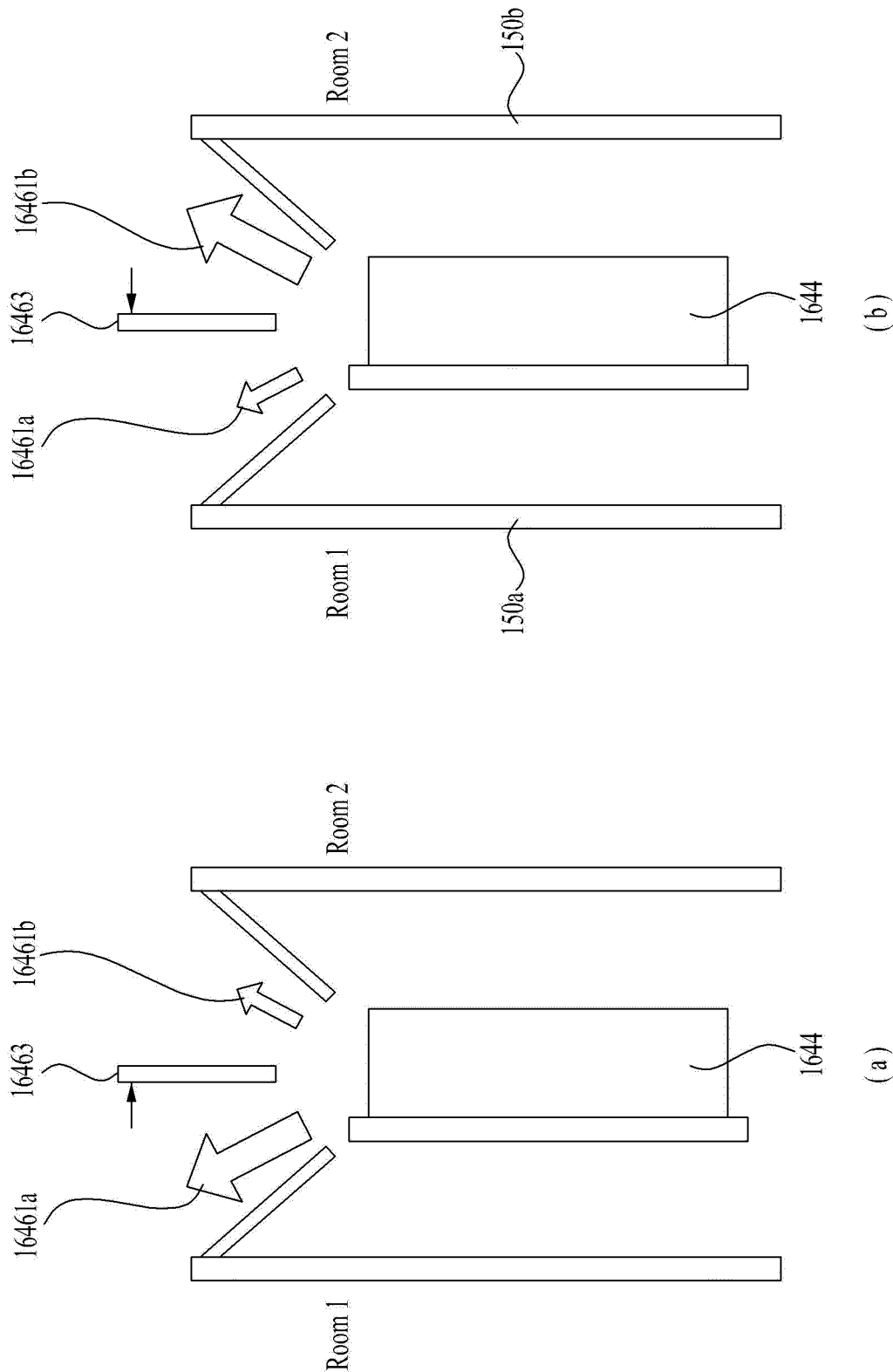
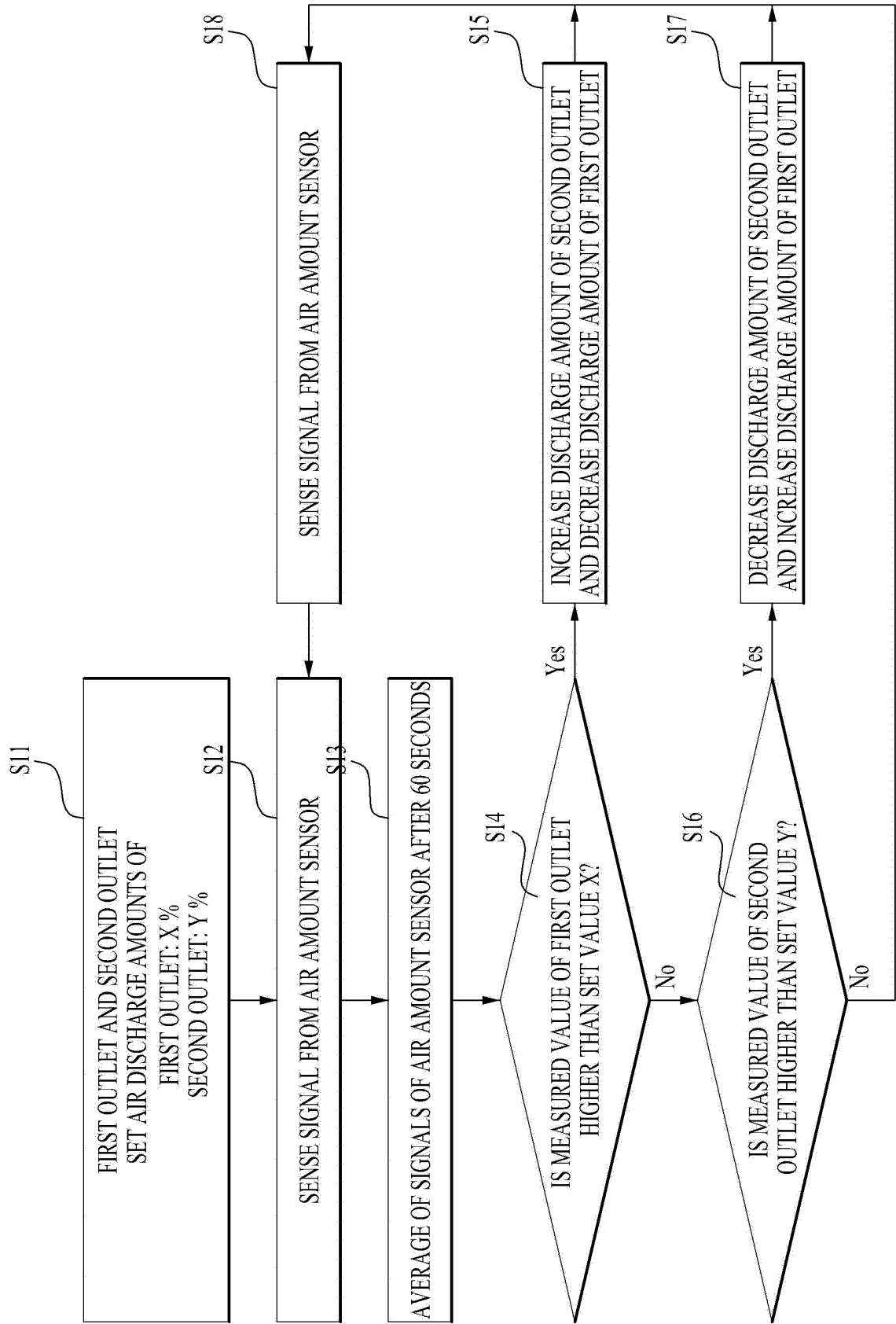


FIG. 18



INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR2019/012377

A. CLASSIFICATION OF SUBJECT MATTER

F24F 3/16(2006.01)i, F24F 11/79(2018.01)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 3/16; A47B 67/00; F04D 25/08; F04D 25/10; F24F 11/00; F24F 5/00; F24F 9/00; G01F 1/66; F24F 11/79

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: air purifier, blower fan, filter, discharge chamber, flowrate sensor, rotary fan, magnet, hall sensor, tapered guide, bridge, rib, smart wall

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	KR 10-0268043 B1 (TORNEX KK.) 01 November 2000 See abstract, pages 3-5 and figure 18.	1-15
Y	US 4658654 A (OZAKI et al.) 21 April 1987 See column 1, lines 24-32 and figure 1.	1-15
Y	KR 20-2012-0006702 U (RYOO, Sun Sik) 02 October 2012 See claim 1 and figures 7-8.	9-10
Y	KR 10-2018-0042484 A (PARK, Yong Su et al.) 26 April 2018 See paragraphs [0005]-[0014], claim 1 and figures 1-4.	14-15
A	KR 10-2018-0064873 A (LG ELECTRONICS INC.) 15 June 2018 See paragraphs [0074]-[0080] and figure 4.	1-15

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

* Special categories of cited documents:

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

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