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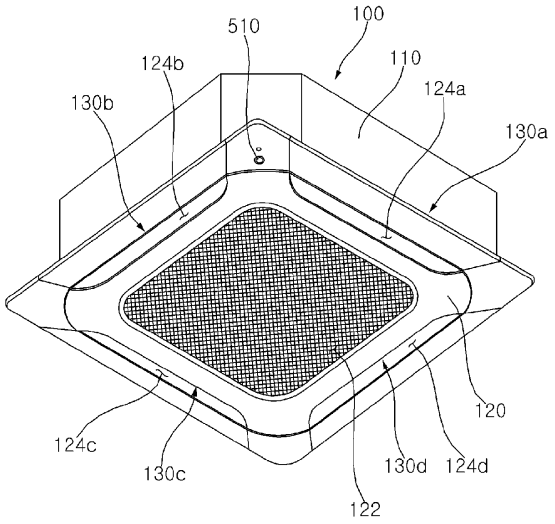
(54) AIR CONDITIONER AND CONTROL METHOD THEREOF

(57) The present disclosure relates to an air conditioner including: a; a panel which is disposed in the lower side of the case, and has an inlet and a plurality of outlets disposed around the inlet; a fan which is disposed in the case; a plurality of wind adjuster which is disposed in each of the outlet, and adjusts a wind direction of air flowing through each of the outlet in the up-and-down side direction; a camera which obtains an image of an indoor space; and a controller which controls the wind adjuster based on image information obtained from the camera, wherein the controller divides the plurality of outlets into a first area outlet and a second area outlet, and adjusts each of the plurality of wind adjusters so that air discharged from the first area outlet and air discharged from the second area outlet are formed differently in the up-and-down side direction.

Fig. 1



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Description

BACKGROUND OF THE INVENTION

1. Field of the invention

[0001] The present disclosure relates to an air conditioner and a control method thereof, and more particularly, to an air conditioner being able to individually controlling an air flow to an area out of a plurality of divided areas, and a control method thereof, whereas the areas are detected by using a camera.

2. Description of the Related Art

[0002] An air conditioner may be installed on a wall surface, a floor surface, or a ceiling of an indoor space depending on a structure.

[0003] A ceiling type air conditioner may be mounted on a ceiling, and discharge a heat-exchanged air downward. In addition, the ceiling type air conditioner includes a plurality of outlets opened in different directions, and thus may discharge the heat-exchanged air to a plurality of areas.

[0004] In the ceiling type air conditioner, when wind adjusters disposed in or at the plurality of outlets are identically controlled, the same air flow is formed over an entire area. Such an air discharge forms the same air flow over the entire area, so that the temperature can be uniformly changed in a plurality of directions of the indoor space.

[0005] KR 10-2034663 B1 discloses the content of detecting the temperature of a floor, and controlling a wind adjuster disposed in a plurality of outlets based on the temperature of the floor. However, such control can perform a control only according to the temperature of the floor, but there is a problem in that an unnecessary air control can be accomplished for an area where a user does not mainly move or live or cannot live.

SUMMARY OF THE INVENTION

[0006] The present disclosure has been made in view of the above problems, and provides an air conditioner that maintains a comfortable indoor space in consideration of the living environment of occupants, and a control method thereof.

[0007] It is an object of the present disclosure to provide an air conditioner capable of quickly reaching a desired temperature of an indoor space in the living area of an occupant, and maintaining the comfort of the indoor space while minimizing the air flow in a direction of the occupant when it approaches the desired temperature, and a control method thereof.

[0008] It is an object of the present disclosure to provide an air conditioner capable of increasing the accuracy of classification between living area and non-living area of an indoor space, and a control method thereof.

[0009] The object of the present invention is solved by the features of the independent claims. Preferred embodiments are given in the dependent claims.

[0010] In accordance with an aspect of the present disclosure, the air conditioner includes: a plurality of outlets opened downward and a plurality of wind adjusters disposed in the plurality of outlets, and a controller is configured to divide the plurality of outlets into a first area outlet facing a living area and a second area outlet facing a non-living area based on accumulated data of the image information obtained from the camera, and adjusts each of the plurality of wind adjusters so that air discharged from the first area outlet and air discharged from the second area outlet are formed differently in the up-and-down side direction, so that the airflows discharged to the living area and the non-living area can be formed differently.

[0011] The air conditioner may further include a temperature sensor for detecting a temperature of the indoor space.

[0012] The controller may adjust the wind adjuster to change airflow in the up-and-down side direction of the first area outlet, when the temperature detected by the temperature sensor is within a set temperature range, so that airflow can be set differently depending on whether the indoor temperature is within or beyond the set temperature range.

[0013] When the temperature detected by the temperature sensor is beyond a set range, the controller may control the wind adjuster so that air discharged to the first area outlet is formed or blown lower in an up-and-down side direction than air discharged to the second outlet, so that direct airflow can be formed in the living area., to thereby reduce the temperature in that first area.

[0014] When the temperature detected by the temperature sensor is within a set range, the controller may adjust the wind adjuster so that air discharged through the first outlet is formed higher in an up-and-down side direction than air discharged through the second area outlet, so that indirect airflow can be formed in the living area.

[0015] The controller may adjust the wind adjuster so that air discharged through the first area outlet is discharged in a first direction toward a ground, when the temperature detected by the temperature sensor is beyond a set range, and may adjust the wind adjuster so that the air discharged to the first area outlet is discharged in a second direction toward an upper side than the first direction, when the temperature detected by the temperature sensor is within the set temperature range, so that the airflow range can be adjusted in the up-and-down side direction according to the temperature of the indoor air.

[0016] The controller may adjust the wind adjuster so that the air discharged to the second area outlet is discharged in a third direction between the first direction and the second direction in an up-and-down side direction, so that a uniform airflow can be formed in the non-living area.

[0017] The wind adjuster may include a vane which is disposed in the outlet and which may change a disposition to adjust a wind direction of air flowing through the outlet.

[0018] The controller may change a disposition of vane disposed in each of the first area outlet and the second area outlet, so that the airflows of the air discharged to the living area and the non-living area can be formed differently.

[0019] The wind adjuster may comprise a wind direction adjusting fan which is disposed in one side of the outlet, and may adjust a wind direction of air discharged through the outlet by adjusting a rotation speed.

[0020] The controller may adjust a rotation speed of the wind direction adjusting fan disposed in each of the first area outlet and the second area outlet, so that the airflows of the air discharged to the living area and the non-living area can be formed differently.

[0021] The air conditioner may further include a timer for measuring a time during which the camera obtains an image.

[0022] The controller may classify a user's living area from accumulated image information obtained from the camera, after a set time measured by the timer, thereby enhancing the accuracy of the classification between the living area and the non-living area.

[0023] The air conditioner may further include an output unit for outputting an image obtained from the camera.

[0024] The controller may divide an image, which may optionally displayed on the output unit, into a plurality of areas, and classify a living area and a non-living area of an occupant.

[0025] The image, which might be preferably displayed on the output unit, may be divided based on a direction in which the outlet faces, so that the living area and the non-living area can be classified based on the area in which the air flow is controlled by the outlet.

[0026] In accordance with another aspect of the present disclosure, a method of controlling an air conditioner is provided, including: obtaining an image of a plurality of areas into which the plurality of outlets discharge air by a camera; determining a living area and a non-living area based on image information obtained by the camera; and adjusting a wind adjuster so that up-and-down side airflows discharged from each of a first area outlet facing the living area and a second area outlet facing the non-living area are set differently, so that airflow can be controlled for each classified area by classifying the indoor space into the living area and the non-living area.

[0027] The adjusting a wind adjuster may include: detecting a temperature of an indoor space by a temperature sensor; and adjusting the wind adjuster so that airflow of an air discharged from the first area outlet is varied based on a relationship between the temperature of the indoor space sensed by the temperature sensor and a set temperature range, so that airflow can be controlled in detail based on whether the temperature of the indoor space reaches the set temperature range.

[0028] When the temperature of the indoor space sensed by the temperature sensor is within the set temperature range, the wind adjuster may be adjusted to set the airflow of the air discharged from the first area outlet to be higher than airflow of an air discharged from the second area outlet, thereby sending an indirect airflow into the living area.

[0029] When the temperature of the indoor space sensed by the temperature sensor is beyond the set temperature range, the wind adjuster may be adjusted to set the airflow of the air discharged from the first area outlet to be lower than airflow of an air discharged from the second area outlet, thereby sending a direct airflow into the living area.

[0030] The determining a living area and a non-living area may include classifying the plurality of outlets into the first area outlet disposed in the living area and the second area outlet disposed in the non-living area, thereby distinguishing the outlets disposed to face the living area and the non-living area.

[0031] The determining a living area and a non-living area may include: dividing an area displayed on an output unit into a plurality of areas based on a direction in which the plurality of outlets face; accumulating the image information obtained by the camera over the set time; and determining the living area and the non-living area based on the accumulated image information obtained by the camera.

[0032] The adjusting a wind adjuster may include: uniformly maintaining an air flow discharged from the second area outlet; and forming an air flow discharged from the first area outlet to be higher or lower than the air flow discharged from the second area outlet, so that the airflow of the first area outlet disposed in the living area may be varied in the up-and-down side direction.

[0033] The adjusting a wind adjuster may comprise disposing a vane disposed in the first area outlet and a vane disposed in the second area outlet differently, so that the airflows of the air discharged to the living area and the non-living area can be formed differently.

[0034] The adjusting a wind adjuster may comprise adjusting rotation speeds of each of a wind direction adjusting fan disposed in the first area outlet and a wind direction adjusting fan disposed in the second area outlet to be different from each other, so that the airflows of the air discharged to the living area and the non-living area can be formed differently.

[0035] The details of other embodiments are included in the detailed description and drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0036] The above and other objects, features and advantages of the present disclosure will be more apparent from the following detailed description in conjunction with the accompanying drawings, in which:

FIG. 1 is a perspective view of an air conditioner of a first embodiment of the present disclosure;
FIG. 2 is a cross-sectional view of one side of the air conditioner according to the first embodiment of the present disclosure;
FIG. 3 is a view for explaining an outlet and a wind adjuster of the air conditioner according to the first embodiment of the present disclosure;
FIG. 4A is a view for explaining a disposition of a first position of the wind adjuster according to the first embodiment of the present disclosure;
FIG. 4B is a view for explaining a disposition of a second position of the wind adjuster according to the first embodiment of the present disclosure;
FIG. 4C is a view for explaining a disposition of a third position of the wind adjuster according to the first embodiment of the present disclosure;
FIG. 5A is a view for explaining an airflow range according to a disposition of the wind adjuster in a heating mode of an air conditioner according to an embodiment of the present disclosure;
FIG. 5B is a view for explaining an airflow range according to a disposition of the wind adjuster in a cooling mode of an air conditioner according to an embodiment of the present disclosure;
FIG. 6 is a block diagram of a controller of an air conditioner according to an embodiment of the present disclosure and a relevant configuration;
FIG. 7A is a view for explaining a corresponding area of an air conditioner and an output unit of an embodiment of the present disclosure, (a) is a view of the first embodiment in which the output unit is partitioned, and (b) is a view showing a disposition of an outlet of the air conditioner;
FIG. 7B is a view for explaining a corresponding area of an air conditioner and an output unit of an embodiment of the present disclosure, (a) is a view of a second embodiment in which the output unit is partitioned, and (b) is a view showing a disposition of an outlet of the air conditioner;
FIG. 8A is an image which is a divided image output to the output unit according to an embodiment of the present disclosure;
FIG. 8B is a view illustrating a cumulative detection area of a human body in a cumulative image of FIG. 8A;
FIG. 8C is a view in which a living area and a non-living area are divided in the output unit based on the view of FIG. 8B;
FIG. 9 is data showing a change in airflow setting for each outlet according to a temperature change in an indoor space;
FIG. 10A is a view for explaining an air flow for each outlet in an indirect air flow of FIG. 9;
FIG. 10B is a view for explaining an air flow for each outlet in a direct air flow of FIG. 9;
FIG. 11 is a flowchart of a method for controlling an air conditioner according to an embodiment of the present disclosure;
FIG. 12 is a flowchart of a control method of the air conditioner embodying a living area determination step of FIG. 11;
FIG. 13 is a flowchart of a control method of the air conditioner embodying an airflow control step for each outlet of FIG. 11;
FIG. 14 is a cross-sectional view of one side of an air conditioner according to a second embodiment of the present disclosure;
FIG. 15A is a view for explaining a disposition of a first position of a wind adjuster according to the second embodiment of the present disclosure;
FIG. 15B is a view for explaining a disposition of a second position of the wind adjuster according to the second embodiment of the present disclosure;
FIG. 15C is a view for explaining a disposition of a third position of the wind adjuster according to the second embodiment of the present disclosure;
FIG. 16 is a cross-sectional view of one side of an air conditioner according to a third embodiment of the present disclosure;
FIG. 17A is a view for explaining a disposition of a first position of a wind adjuster according to the third embodiment of the present disclosure;
FIG. 17B is a view for explaining a disposition of a second position of the wind adjuster according to the third embodiment of the present disclosure;
FIG. 17C is a view for explaining a disposition of a third position of the wind adjuster according to the third embodiment of the present disclosure;
FIG. 18 is a cross-sectional view of one side of an air conditioner according to a fourth embodiment of the present disclosure;
FIG. 19A is a view for explaining an air flow according to a first rotation speed of a wind adjuster according to the fourth embodiment of the present disclosure;
FIG. 19B is a view for explaining an air flow according to a second rotation speed of the wind adjuster according to the fourth embodiment of the present disclosure; and
FIG. 19C is a view for explaining an air flow according to a third rotation speed of the wind adjuster according to the fourth embodiment of the present disclosure.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0037] Advantages and features of the present disclosure and methods of achieving them will become apparent with reference to the embodiments described below in detail in conjunction with the accompanying drawings. However, the present disclosure is not limited to the embodiments disclosed below, but may be implemented in various different forms, and these embodiments are provided only to allow the disclosure of the present disclosure to be complete, and to completely inform those of

ordinary skill in the art to which the present disclosure belongs, the scope of the invention, and the present disclosure is only defined by the scope of the claims. Like reference numerals refer to like elements throughout.

[0038] Hereinafter, the present disclosure will be described with reference to the drawings for explaining a method of controlling an air conditioner according to embodiments of the present disclosure.

[0039] A configuration of an air conditioner 100 according to a first embodiment will be described with reference to FIGS. 1 to 4C.

[0040] The air conditioner 100 of the present disclosure may be an air conditioner 100 mounted on a ceiling.

[0041] Referring to FIG. 1, the air conditioner 100 includes an inlet 122 opened downwardly, and an outlet 124 which is disposed around the inlet 122 and also opened downwardly.

[0042] Referring to FIG. 2, the air conditioner 100 includes a case 110 that forms a space therein and is opened downwardly, a panel 120 which is disposed on or in a lower side of the case 110 and forms the inlet 122 and the outlet 124, a fan 112 disposed inside the case 110, a fan motor 114 for rotating the fan 112, a heat exchanger 116 which is disposed inside the case 110, and exchanges the air flowing by the fan 112, and a wind adjuster 130 which is disposed in the outlet 124 and adjusts the wind direction of the flowing air.

[0043] Referring to FIG. 1, in the panel 120, a plurality of outlets 124a, 124b, 124c, and 124d spaced apart from each other are formed around the inlet 122 or at each side of the inlet 122.. The outlet 124 includes a first outlet 124a, a second outlet 124b, a third outlet 124c, and a fourth outlet 124d. Each of the first outlet 124a, the second outlet 124b, the third outlet 124c, and the fourth outlet 124d is adjacent to each other, and is disposed in a direction perpendicular to each other based on the inlet 122. In each of the first outlet 124a, the second outlet 124b, the third outlet 124c, and the fourth outlet 124d, a first wind adjuster 130a, a second wind adjuster 130b, a third wind adjuster 130c, and a fourth wind adjuster 130d are disposed.

[0044] Since the configuration of one outlet 124 and the wind adjuster 130 disposed therein that are described below can be applied to the other outlets and the wind direction controlling device disposed therein, a common reference numeral is used.

[0045] Referring to FIG. 3, the wind adjuster 130 includes a first vane 140 connected to two links 160 and 170, and a second vane 150 which is connected to one link that is connected to the first vane 140, and has one side that is rotatably connected to the panel 120. The first vane 140 and the second vane 150 disposed in each of the first outlet 124, the second outlet 124, the third outlet 124, and the fourth outlet 124 may be disposed in different positions.

[0046] The first vane 140 may cover the outlet 124 or may be disposed in the lower side of the outlet 124. The first vane 140 is formed longer than the second vane 150.

[0047] Referring to FIG. 3, the first vane 140 is disposed in the lower side than the second vane 150, in a stop state in which a fan 112 does not operate. The first vane 140 includes a first vane plate 142 for guiding the wind direction of flowing air, and a first link plate 144 which protrudes upward from both ends in the left-right direction of the first vane plate 142 and is connected to a plurality of links 160 and 170.

[0048] The second vane 150 includes a second vane plate 152, a second link plate 154 that protrudes upward from both ends in the left-right direction of the second vane plate 152 and is connected to a third link 180, and a connector 156 which is disposed in the left-right direction of the second vane plate 152 and connected to the panel 120. The second vane plate 152 may be formed in a curved shape. However, as another embodiment, the second vane plate 152 may have a flat shape.

[0049] Referring to FIG. 3, the wind adjuster 130 includes a first link 160 rotatably connected to the panel 120 and the first vane 140, and a second link 170 which is spaced apart from the first link 160 and rotatably connected to the panel 120 and the first vane 140. Referring to FIG. 3, the wind adjuster 130 includes a third link 180 rotatably connected to one end of the first link 160 and the second vane 150.

[0050] The first link 160 is rotatably connected to the first vane 140 and the second vane 150. The first link 160 may be connected to a vane motor (not shown) to rotate. The first link 160 includes a panel connection portion 162 rotatably connected to the panel 120, a first link bar 164 which extends from the panel connection portion 162 toward the first vane 140 and has a distal end rotatably connected to the first vane 140, and a second link bar 166 which extends from the panel connection portion 162 toward the second vane 150 and has a distal end rotatably connected to the second vane 150.

[0051] Referring to FIG. 4A, a length 164L of the first link bar 164 is formed to be longer than a length 166L of the second link bar 166. The length 164L of the first link bar 164 is formed to be shorter than a length 170L of the second link 170. The length 164L of the first link bar 164 is formed to be longer than a length 180L of the third link 180.

[0052] The first link 160 is disposed adjacent to the inlet 122 than the second link 170.

[0053] The disposition of the first vane 140 may be changed by the first link 160 and the second link 170. Since the disposition of the first vane 140 is changed by the first link 160 and the second link 170, the first vane 140 may be disposed to be spaced downward from the outlet 124. The first vane 140 is elevated downward from the outlet 124, and then the inclination is changed in a direction perpendicular to a ground.

[0054] In the second vane 150, a first end 151a moves downward, and then the first end 151a may move inwardly and outwardly according to the disposition of the third link 180.

[0055] Referring to FIG. 3, each of the first vane 140

and the second vane 150 sets an end that is disposed at a distance to the inlet 122 as a first end 141a, 151a, and sets an end that is adjacent to the inlet 122 as a second end 141b, 151b. Hereinafter, the first vane 140 and the second vane 150 will be described.

[0056] The second vane 150 is rotatably connected to the panel 120 in an inward direction than the first vane 140. Here, the direction adjacent to the inlet 122 may be set as an inward direction, and the direction away from the inlet 122 may be set as an outward direction.

[0057] Referring to FIGS. 4A to 4C, the wind adjuster 130 according to a first embodiment may adjust the wind direction of the air discharged through the outlet 124 according to the disposition.

[0058] Referring to FIG. 4A, the wind adjuster 130 may be disposed in a first position P1 for transmitting the air discharged through the outlet 124 in a direction horizontal to a ground. Referring to FIG. 4A, when the wind adjuster 130 is disposed in the first position P1, the first vane 140 may be disposed substantially horizontal to a ground. Referring to FIG. 4A, when the wind adjuster 130 is disposed in the first position P1, the first vane 140 may form a first inclination angle $\theta 1$ within 30 degrees with respect to a virtual horizontal line parallel to the ground. Here, the first inclination angle $\theta 1$ is an inclination angle formed between a virtual horizontal line parallel to the ground and the first vane 140, and may vary depending on the disposition of the first vane 140.

[0059] Referring to FIG. 4A, when the wind adjuster 130 is disposed in the first position P1, the second end 141b of the first vane 140 may be disposed adjacent to the first end 151a of the second vane 150. The second end 141b of the first vane 140 may be disposed to face the first end 151a of the second vane 150.

[0060] Referring to FIG. 4A, when the wind adjuster 130 is disposed in the first position P1, the first inclination angle $\theta 1$ between the first vane 140 and the virtual horizontal line may be formed to be smaller than a second inclination angle $\theta 2$ (or 'second inclination angle between the second vane and a virtual horizontal line') between a virtual line connecting the first end 151a and the second end 151b of the second vane 150 and a virtual horizontal line. Here, the second inclination angle $\theta 2$ is an inclination angle formed between a virtual line connecting the first end 151a and the second end 151b of the second vane 150 and a virtual horizontal line, and may vary depending on the disposition of the second vane 150.

[0061] Accordingly, the air flowing downward through the outlet 124 may sequentially flow through the second vane 150 and the first vane 140. Referring to FIG. 4A, when the wind adjuster 130 is disposed in the first position P1, the air discharged from the outlet 124 may flow in a direction horizontal to the ground.

[0062] Referring to FIG. 4B, the first vane 140 and the second vane 150 may be disposed in a second position P2 for transmitting the air discharged from the outlet 124 in a direction perpendicular to the ground. Referring to FIG. 4B, when the wind adjuster 130 is disposed in the second position P2, the first vane 140 may be disposed substantially perpendicular to the ground. Referring to FIG. 4B, when the wind adjuster 130 is disposed in the second position P2, the first vane 140 may form a first inclination angle $\theta 1$ of 60 degrees or more with respect to a virtual horizontal line parallel to the ground.

[0063] Referring to FIG. 4B, when the wind adjuster 130 is disposed in the second position P2, the second end 141b of the first vane 140 may be disposed to be spaced apart from the first end 151a of the second vane 150. Referring to FIG. 4B, when the wind adjuster 130 is disposed in the second position P2, the second end 141b of the first vane 140 may be disposed in the upper side than the first end 151a of the second vane 150.

[0064] Referring to FIG. 4B, when the wind adjuster 130 is disposed in the second position P2, the second end 141b of the first vane 140 is disposed to face to the upper side than the second end 151b of the second vane 150. Referring to FIG. 4B, when the wind adjuster 130 is disposed in the second position P2, the first vane 140 and the second vane 150 may be disposed substantially parallel to each other.

[0065] Referring to FIG. 4B, when the wind adjuster 130 is disposed in a second position P2, the first inclination angle $\theta 1$ between the first vane 140 and the virtual horizontal line is formed similarly to the second inclination angle $\theta 2$ between the second vane 150 and the virtual horizontal line. Referring to FIG. 4B, when the wind adjuster 130 is disposed in the second position P2, the air discharged from the outlet 124 may flow in a direction perpendicular to the ground.

[0066] Referring to FIG. 4C, the first vane 140 and the second vane 150 may be disposed in a third position P3 which transmit the air discharged from the outlet 124 in an inclined direction to the ground. When the wind adjuster 130 is disposed in the third position P3, the air discharged through the first vane 140 and the second vane 150 is directed to a lower side than a horizontal wind in the first position P1, and may form an inclined wind that is directed to an upper side than a vertical wind in the second position P2.

[0067] Referring to FIG. 4C, when the wind adjuster 130 is disposed in the third position P3, the first vane 140 may be disposed at an inclination angle between the first vane 140 when the wind adjuster 130 is disposed in the first position P1, and the first vane 140 when the wind adjuster 130 is disposed in the second position P2. Referring to FIG. 4C, when the wind adjuster 130 is disposed in the third position P3, the first vane 140 may form a w first inclination angle $\theta 1$ of 30 degrees or more and 60 degrees or less with respect to a virtual horizontal line parallel to the ground.

[0068] When the wind adjuster 130 is disposed in the third position P3, a spaced distance between the second end 141b of the first vane 140 and the first end 151a of the second vane 150 is formed to be longer than a spaced distance between the second end 141b of the first vane 140 and the first end 151a of the second vane 150 in the

first position.

[0069] When the wind adjuster 130 is disposed in the third position P3, a spaced distance between the second end 141b of the first vane 140 and the first end 151a of the second vane 150 is formed to be shorter than a spaced distance between the second end 141b of the first vane 140 and the first end 151a of the second vane 150 when the wind adjuster 130 is disposed in the second position P2.

[0070] When the wind adjuster 130 is disposed in the first position P1, it is possible to form an indirect wind that sends the air discharged through the outlet in a direction horizontal to the ground. When the wind adjuster 130 is disposed in the second position P2, it is possible to form a vertical wind that sends the air discharged through the outlet in a direction perpendicular to the ground. When the wind adjuster 130 is disposed in the third position P3, it is possible to form an inclined wind that sends the air discharged through the outlet into between the indirect wind and the vertical wind.

[0071] Referring to FIGS. 5A and 5B, the air discharged through the outlet 124 may be divided into three directions in an up-and-down side direction by the wind adjuster 130.

[0072] When the wind adjuster 130 is disposed in the first position P1, the air discharged from the outlet 124 may flow in an upward direction. When the wind adjuster 130 is disposed in the second position P2, the air discharged from the outlet 124 may flow in a downward direction. When the wind adjuster 130 is disposed in the third position P3, the air discharged from the outlet 124 may flow in an intermediate direction between the upward direction and the downward direction.

[0073] In the range of up-and-down side airflows according to the first position P1, the second position P2, and the third position P3 of the wind adjuster 130, in the case of third position P3, it is formed to be lower than the airflow at the first position P1, and to be higher than the airflow at the second position P2.

[0074] In a cooling condition and a heating condition, the range of the up-and-down side airflows of the wind adjuster 130 according to the first position P1, the second position P2, and the third position P3 may be different.

[0075] Referring to FIGS. 5A and 5B, when the wind adjuster 130 is disposed in the first position P1, the air discharged from the outlet 124 may flow in a first direction D1. Here, the first direction D1 may mean that the angle, which is formed between a direction in which the main airflow of the air discharged from the outlet 124 flows and a ground, is formed in a range of 0 degrees to 30 degrees. The first direction D1 may be formed in the same manner under the heating condition or the cooling condition.

[0076] Referring to FIGS. 5A and 5B, when the wind adjuster 130 is disposed in the second position P2, the air discharged from the outlet 124 may flow in a second direction D2.

[0077] The second direction D2 may be formed to have a different range under the heating condition and the cooling condition. Referring to FIG. 5A, in the heating condition, the second direction D2 may mean that the angle, which is formed between a direction in which the main airflow of the air discharged from the outlet 124 flows and a ground, is formed in a range of 60 degrees to 90 degrees. Referring to FIG. 5B, in the cooling condition, the second direction D2 may mean that the angle, which is formed between a direction in which the main airflow of the air discharged from the outlet 124 flows and a ground, is formed in a range of 45 degrees to 90 degrees.

[0078] Referring to FIGS. 5A and 5B, when the wind adjuster 130 is disposed in the third position P3, the air discharged from the outlet 124 may flow in a third direction D3.

[0079] The third direction D3 may be formed to have a different range under the heating condition and the cooling condition. Referring to FIG. 5A, in the heating condition, the third direction D3 may mean that the angle, which is formed between a direction in which the main airflow of the air discharged from the outlet 124 flows and a ground, is formed in a range of 30 degrees to 60 degrees. Referring to FIG. 5B, in the cooling condition, the third direction D3 may mean that the angle, which is formed between a direction in which the main airflow of the air discharged from the outlet 124 flows and a ground, is formed in a range of 45 degrees to 60 degrees.

[0080] The angle ranges of the first direction D1, the second direction D2, and the third direction D3 are just an embodiment, and may be set differently depending on a space in which the air conditioner is disposed or a structure of the air conditioner.

[0081] In addition, in FIGS. 5A to 5B, there are three divided areas, but there can be 4 to 6 subdivided areas.

<Relation to a controller>

[0082] The air conditioner of the present disclosure includes a camera 510 which is disposed in one side of the panel 120, and obtains image information of an indoor space.

[0083] The air conditioner of the present disclosure may also includes an output unit 530 that outputs the image information obtained from the camera 510.

[0084] The air conditioner of the present disclosure includes a temperature sensor 520 that detects the temperature of the indoor space, and a controller 500 that adjusts the wind adjuster 130 based on the image information obtained from the camera 510.

[0085] Referring to FIG. 7A(a), the output unit 530 may be divided into a plurality of areas. The output unit 530 of FIG. 7A(a) may be divided into a plurality of areas (I, II, III, IV, V, VI) which are divided based on a direction in which the plurality of outlets 124a, 124b, 124c, and 124d disposed in the air conditioner of FIG. 7A(b) are directed.

[0086] Referring to FIG. 7A(a), the area displayed on the output unit 530 may be divided into a first area (I), a second area (II), a third area (III), and a fourth area (IV) based on the outlet 124a, 124b, 124c, and 124d shown

in FIG. 7A(b). In addition, according to the screen display of the output unit 530, an additional area may be divided into a fifth area (V) and a sixth area (VI) in the outside of the second area (II) and the fourth area (IV).

[0087] Referring to FIG. 7B(a), the area displayed on the output unit 530 may be divided into a first area (I), a second area (II), a third area (III), and a fourth area (IV) based on the outlet 124a, 124b, 124c, and 124d shown in FIG. 7A(b). In addition, an additional area may be divided into a fifth area (V) and a sixth area (VI) in the outside of the second area (II) and the fourth area (IV), and an additional area may be divided into a seventh area (V) and an eighth area (VI) in the outside of the first area (I) and the third area (III).

[0088] The controller 500 may determine the living area of the occupant based on the image obtained by the camera 510. The controller 500 may capture an image photographed by the camera 510, and detect a human body based on the obtained image. In addition, by accumulating position information of the human body based on the accumulated image information, it is possible to determine an area in which the position information of the human body is accumulated as a living area.

[0089] The camera 510 may include an image sensor (not shown) that converts light into an electrical signal. The image sensor may include a plurality of photodiodes corresponding to a plurality of pixels constituting an image. The image sensor may be implemented of a charged coupled device (CCD) sensor or a complementary metal oxide semiconductor (CMOS) sensor, but the present disclosure is not limited thereto.

[0090] Meanwhile, the air conditioner may further include a lens through which light emitted from a subject passes, a digital signal processor which constructs and processes an image based on a signal output from the image sensor, and the like. Here, the digital signal processor may be configured as at least a portion of the controller 500, or may be configured as a separate processor operated independently of the controller 500. For example, when the digital signal processor is configured as a separate processor, the image processed by the digital signal processor may be stored in a storage unit 540 by the controller 500 intactly or after an additional processing.

[0091] The controller 500 may process the image obtained through the image sensor. For example, the controller 500 may remove noise from an image, or may perform signal processing such as gamma correction, color filter array interpolation, color matrix, color correction, and color enhancement for an image.

[0092] The controller 500 may detect an object included in the image using at least one method. For example, the controller 500 may extract a feature point included in the image through a method such as scale invariant feature transform (SIFT), and histogram of oriented gradient (HOG), and may detect an object included in the image based on the extracted feature point. In this case, the controller 500 may detect the object included in the image by determining a boundary of the object through an algorithm such as a support vector machine (SVM), and Adaboost.

[0093] The controller 500 may detect a motion of an object included in the plurality of images, based on a result of processing the plurality of images. For example, the controller 500 may calculate a motion vector for a plurality of pixels constituting the object detected from the image by using a dense optical flow method, and may compute the motion of the object based on the calculated motion vector. In the present embodiment, it is described that a dense optical flow method is used, but the present disclosure is not limited thereto, and a sparse optical flow method of calculating a motion vector for some characteristic pixels may be used.

[0094] The controller 500 may determine the amount of activity of the object detected from the image. For example, the controller 500 may determine the amount of activity of the object included in the image, according to a value obtained by dividing the sum of the magnitudes of motion vectors for pixels constituting the object by the number of pixels constituting the object.

[0095] The air conditioner of the present disclosure may include a storage unit 540 for storing an image obtained from the camera 510 and a timer 550 for measuring an image acquisition time of the camera 510. The storage unit 540 may sequentially store images obtained from the camera 510.

[0096] After a set time measured by the timer 550, the controller 500 may classify the user's living area from the accumulated image information obtained from the camera, thereby increasing the accuracy of the classification between the living area and the non-living area.

[0097] Referring to FIGS. 8A to 8C, based on the image information obtained from the camera 510, the first area (I), the fourth area (IV), and the sixth area (VI) are determined as living area, and the second area (II), the third area (III), and the fifth area (V) may be determined as non-living area. At this time, the outlet 124a and 124d disposed to face the first area (I), the fourth area (IV), and the sixth area (VI) may be set as a first area outlet 124-1, and the outlet 124b and 124c disposed to face the second area (II), the third area (III), and the fifth area (V) may be set as a second area outlet 124 - 2.

[0098] Specifically, as shown in FIG. 8A, the screen displayed on the output unit 530 is divided into a plurality of areas based on the area where the outlet is disposed. The image shown in FIG. 8A is an image photographed from a ceiling through the camera 510 disposed in one side of the panel 120.

[0099] As shown in FIG. 8B, an area in which a human body is detected is extracted based on the accumulated image information. Based on the data extracted in FIG. 8B, the area divided in the output unit 530 is divided into a living area and a non-living area as shown in FIG. 8C.

[0100] The controller 500 may receive human body detection data including a result of recognizing an occupant's position from the image information obtained from

the camera 510, and may accumulate the received human body detection data. The controller 500 may generate a histogram, if a certain number or more of data is accumulated while accumulating and counting human body detection data.

[0101] The controller 500 may use the generated histogram as input data to classify a living area and a non-living area based on machine learning. The machine learning may use a technique such as a support vector machine (SVM) or Adaboost, and more preferably, use a deep learning technique.

[0102] The controller 500 may include an artificial neural network pre-learned by machine learning, generate a histogram for each of a plurality of areas, and use the generated histogram as input data of the artificial neural network to classify the living area and the non-living area.

[0103] In addition, while repeatedly performing the above process, the controller 500 may collect a plurality of classification result, and finally classify the plurality of areas of the indoor space into living area and non-living area based on the collected result. That is, by deriving the final result when the living area classification result is accumulated over a certain number, the reliability of the living area recognition result can be secured, and temporary errors in the non-living area caused by the human body detection error can be removed.

[0104] The controller 500 may adjust a first area wind adjuster 130 disposed in the first area outlet 124-1 disposed in the living area. The controller 500 may adjust a second area wind adjuster 130 disposed in the second area outlet 124-2 disposed in the non-living area.

[0105] The controller 500 may adjust the second wind adjuster 130 to uniformly form a discharge direction of the second area outlet 124-2 disposed in the non-living area. The controller 500 may adjust the first area wind adjuster 130 so that the discharge direction of the first area outlet 124-1 disposed in the living area is formed to be higher or lower than the discharge direction of the second area outlet 124-2.

[0106] The controller 500 may adjust the wind adjuster 130 based on the temperature of the indoor space detected by the temperature sensor 520 and a desired temperature set by a user.

[0107] The controller 500 may adjust the wind adjuster 130 depending on whether the temperature of the indoor space detected by the temperature sensor 520 is within or outside a set temperature range.

[0108] The set temperature range may be set to a value which is obtained by considering a correction temperature for the desired temperature set by a user. The desired temperature may be set by a user. The correction temperature may be set according to a use environment, and the like.

[0109] That is, the set temperature range may be set to a desired temperature $\pm$ a correction temperature. Referring to FIG. 9, when the correction temperature is set to 2 degrees, the controller 500 may determine as the set temperature range from an area that is 2 degrees higher than the desired temperature.

[0110] The controller 500 may adjust the second area wind adjuster 130 so that the air discharged from the second area outlet 124-2 flows in the third direction D3. Referring to FIGS. 10A to 10B, the air discharged from the second area outlet 124-2 may be formed uniformly regardless of the temperature of the indoor space. However, the air discharged from the second area outlet 124-2 may have different up-and-down side airflows depending on the cooling condition or the heating condition.

[0111] The controller 500 may adjust the first area wind adjuster 130 so that the air discharged from the first area outlet 124-1 flows in the first direction D1 or the third direction D3. Referring to FIG. 10A, when the temperature detected by the temperature sensor 520 is beyond the set temperature range, the first area wind adjuster 130 may be controlled so that the air discharged from the first area outlet 124-1 flows in the second direction D2 that is lower than the third direction D3. Referring to FIG. 10B, when the temperature detected by the temperature sensor 520 is within the set temperature range, the first area wind adjuster 130 may be controlled so that the air discharged from the first area outlet 124-1 flows in the first direction D1 that is higher than the third direction D3.

[0112] Hereinafter, a method of controlling the air conditioner will be described with reference to FIGS. 11 to 13.

[0113] The air conditioner is operated, and the camera 510 goes through a step S100 of obtaining image information. The camera 510 may be disposed in one side of the panel 120 to photograph the lower space from a ceiling of an indoor space.

[0114] Thereafter, the controller 500 undergoes a step S200 of determining a living area with respect to a space photographed by the camera 510, based on the accumulated data of image information obtained by the camera 510. In the step S200 of determining the living area, a portion having a high accumulated detection of the human body may be classified as a living area, and the remaining area may be classified as a non-living area. In the step S200 of determining the living area, the plurality of outlets 124a, 124b, 124c and 124d may be classified into a first area outlet 124-1 facing the living area and a second area outlet 124-2 facing the non-living area.

[0115] Referring to FIG. 12, the step S200 of determining as the living area and the non-living area may include a step S210 of detecting a human body with respect to the image obtained from the camera 510, and a step S220 of accumulating position information of the human body.

[0116] The controller 500 may capture the image photographed by the camera 510, and detect a human body based on the obtained image. In addition, an area in which the position information of the human body is accumulated may be determined as a living area, by accumulating the position information of the human body based on the accumulated image information.

[0117] The controller 500 may determine an area in which the human body information is accumulated as a

living area, and may determine the remaining area as a non-living area, based on the plurality of areas partitioned in the output unit 530.

[0118] The step S200 of determining as the living area and the non-living area may include a step S230 of determining whether a set time for the camera 510 to obtain image information has elapsed. When the set time for the camera 510 to acquire image information is elapsed, the controller 500 may divide the indoor space into the living area and the non-living area through the accumulated data of the position information of the human body. When the accumulated position information of the human body is determined based on data over a certain period of time, the accuracy of the occupant's actual life area and non-living area may be improved.

[0119] The controller 500 may perform a step S300 of controlling the airflow for each outlet.

[0120] The controller 500 may set the outlet disposed in a direction toward the living area as the first area outlet 124-1, and set the outlet disposed in a direction toward the non-living area as the second area outlet 124-2, among the plurality of outlets formed in the air conditioner.

[0121] The controller 500 controls the wind adjuster 130 so that the airflow of the air discharged from the first area outlet 124-1 and the airflow of the air discharged from the second area outlet 124-2 are set differently in the up-and-down side direction.

[0122] The wind adjuster 130 may be divided into a first area wind adjuster 130 disposed in the first area outlet 124-1, and a second area wind adjuster 130 disposed in the second area outlet 124-2.

[0123] The step S300 of adjusting the wind adjuster may maintain the airflow discharged from the second area outlet 124-2 uniformly, and may form the airflow discharged from the first area outlet 124-1 to be higher or lower than the air flow discharged from the second area outlet 124-2.

[0124] The step S300 of controlling the airflow for each outlet may include a step S310 of detecting the temperature of the indoor space by a temperature sensor, and a step S320 of determining whether the temperature of the indoor space detected by the temperature sensor is included in the set temperature range.

[0125] When the temperature of the indoor space detected by the temperature sensor 520 is within the set temperature range, the wind adjuster 130 may be controlled so that the airflow of the air discharged from the first area outlet 124-1 is set to be higher than the airflow of the air discharged from the second area outlet 124-2 (S330). That is, referring to FIGS. 5A and 5B, the wind adjuster 130 may be controlled so that the air discharged from the second area outlet 124-2 flows in the third direction D3, and the air discharged from the first area outlet 124-1 flows in the first direction D1.

[0126] In addition, when the temperature of the indoor space detected by the temperature sensor 520 is beyond the set temperature range, the wind adjuster 130 may be controlled so that the airflow of the air discharged from the first area outlet 124-1 is formed to be lower than the airflow of the air discharged from the second area outlet 124-2 (S340). That is, referring to FIGS. 5A and 5B, the wind adjuster 130 may be controlled so that the air discharged from the second area outlet 124-2 flows in the third direction D3, and the air discharged from the first area outlet 124-1 flows in the second direction D2.

[0127] However, when a user sets an indirect wind as a preferred wind, the wind adjuster 130 may be controlled so that the air discharged from the first area outlet 124-1 flows in the first direction D1, and the air discharged from the second area outlet 124-2 flows in the second direction D2. The user may set a preferred wind through an input unit such as a remote control (not shown). Here, the indirect wind refers to a case in which a vane is disposed so that the air flow is not directly transmitted to a user.

[0128] When the user sets the indirect wind as the preferred wind, only an indirect air flow is set in the first area outlet 124-1 for discharging air to the living area. Accordingly, the first area outlet 124-1 discharges air in the first direction D1. However, when the indoor temperature is beyond the set temperature range, the second area outlet 124-2 for discharging air to the non-living area may discharge air in the second direction D2 so as to quickly reach the set temperature.

[0129] The step S300 of adjusting the wind adjuster may maintain the airflow discharged from the second area outlet 124-2 uniformly, and may form the airflow discharged from the first area outlet 124-1 to be higher or lower than the air flow discharged from the second area outlet 124-2.

<Second embodiment>

[0130] Hereinafter, a configuration of an air conditioner 200 according to a second embodiment will be described with reference to FIGS. 14 and 15C.

[0131] The air conditioner 200 according to the second embodiment is different from the air conditioner 100 according to the first embodiment in a configuration of a wind adjuster 230.

[0132] Accordingly, for the remaining configuration excluding the wind adjuster 230, the description of the air conditioner 100 according to the first embodiment may be substituted.

[0133] The wind adjuster 230 of the air conditioner 200 according to the second embodiment includes one vane 240 disposed in each outlet 224, and a vane motor (not shown) for driving the vane 240. The disposition of the vane 240 is varied by the operation of the vane motor.

[0134] Referring to FIGS. 15A to 15C, the wind adjuster 230 may adjust the wind direction of the air flowing through an outlet 224 by varying the inclination angle of the vanes 240 disposed in the outlet 224. The vane 240 is disposed to close the outlet 224, or to control the wind direction of the air flowing through the outlet 224.

[0135] Referring to FIG. 15A, the wind adjuster 230

may be disposed in a first position P1 in which the vane 240 is disposed substantially parallel to a virtual horizontal line parallel to a ground. When the wind adjuster 230 is disposed in the first position P1, the vanes 240 may form an inclination angle θ within 30 degrees for a virtual horizontal line HL. The inclination angle θ is formed between the vane 240 and the virtual horizontal line HL, and may vary depending on the disposition of the vane 240.

[0136] Referring to FIG. 15B, the wind adjuster 230 may be disposed in a second position P2 in which the vane 240 is disposed substantially perpendicular to a horizontal line parallel to a ground. When the wind adjuster 230 is disposed in the second position P2, an inclination angle θ of 60 degrees or more may be formed for the virtual horizontal line HL.

[0137] Referring to FIG. 15C, the wind adjuster 230 may be disposed in a third position P3 in which the vane 240 forms an angle between the first position P1 and the second position P2. When the wind adjuster 230 is disposed in the third position P3, an inclination angle θ of 30 degrees or more and 60 degrees or less may be formed for the virtual horizontal line HL.

[0138] When the wind adjuster 230 is disposed in the first position P1, an indirect wind that sends the air discharged through the outlet in a direction horizontal to a ground may be formed. When the wind adjuster 230 is disposed in the second position P2, a vertical wind that sends the air discharged through the outlet in a direction perpendicular to the ground may be formed. When the wind adjuster 230 is disposed in the third position P3, an inclined wind that sends the air discharged through the outlet into between the indirect wind and the vertical wind may be formed.

[0139] As in FIGS. 5A to 5B, the air conditioner according to the second embodiment may also send the air discharged from the outlet 224 in the first direction D1, the second direction D2, and the third direction D3, according to the first position P1, the second position P2, and the third position P3 of the wind adjuster 230.

<Third embodiment>

[0140] Hereinafter, the configuration of the air conditioner according to a third embodiment will be described with reference to FIGS. 16 to 17C.

[0141] An air conditioner 300 according to the third embodiment is different from the air conditioner according to the first embodiment in the configuration and operation structure of the wind adjuster. In addition, the shape of outlet and the disposition of vane are different. Accordingly, the remaining configuration excluding the shape of outlet and the wind adjuster may be replaced with the description of the air conditioner according to the first embodiment.

[0142] In the air conditioner 300 according to the third embodiment, a plurality of outlets 324 are formed in the outer circumference of an inlet 322. Here, the inlet 322 has a rectangular shape, and an outlet 324 is formed to be spaced apart from each side forming the inlet 322 to the outside. In addition, the inlet 322 may also have a circular shape. At this time, a plurality of outlets 324 may be formed in a position spaced apart from each other in a radial direction from the outer circumference of the circular inlet 322.

[0143] In the outlet 324 formed in the air conditioner 300 according to the third embodiment, an outer end 324b is disposed in the upper side than an inner end 324a. In addition, a discharge flow path 335 formed in the upper side of the outlet 324 has a structure extending outwardly as it progresses from the upper side to the lower side.

[0144] The wind adjuster 350 of the air conditioner according to the third embodiment includes a vane 340 which is disposed in the panel 320, and protrudes with a variable length to the outlet 324, a vane motor (not shown) which is disposed in the panel 320, and drives the vane 340, and a vane gear 350 which rotates by the vane motor, and is engaged with the vane 340 to move the disposition of the vane 340.

[0145] One end of the vane 340 engaged with the vane gear 350 may have a rack gear structure.

[0146] The vane 340 is disposed in the inner end 324a of the outlet 324. The vane 340 is disposed to protrude outward from the inner end 324a of the outlet 324. The length of the vane 340 protruding to the outlet 324 is varied by the operation of the vane motor.

[0147] The wind adjuster 330 may adjust the wind direction of the air flowing through the outlet 324 according to the length of the vane 340 protruding to the outlet 324.

[0148] Referring to FIGS. 17A to 17C, the wind adjuster 330 may adjust the wind direction of the air flowing through the outlet 324, by varying the length of the vane 340 protruding to the outlet 324.

[0149] Referring to FIG. 17A, the wind adjuster 330 may be disposed in a first position P1 in which the vane 340 protrudes to the outlet 324 to the maximum. When the wind adjuster 330 is disposed in the first position P1, the vane 340 may protrude to the maximum of the protruding range. Accordingly, when the wind adjuster 330 is disposed in the first position P1, the air flowing through the discharge flow path 335 may be guided in a direction horizontal to a ground. When the wind adjuster 330 is disposed in the first position P1, the vanes 340 is disposed to be lower than the outer end 324b of the outlet 324. Therefore, the air discharged through the outlet 324 may flow in a direction horizontal to the ground along the vane 340.

[0150] Referring to FIG. 17B, the wind adjuster 330 may be disposed in a second position P2 in which the vane 340 does not protrude to the outlet 324. When the wind adjuster 330 is disposed in the second position P2, it is disposed so as not to be exposed to the outlet 324. Accordingly, when the wind adjuster 330 is disposed in the second position P2, the air flowing through the discharge flow path 335 may be discharged in a direction

substantially perpendicular to a ground through the outlet 324. However, according to the shape of the discharge flow path 335, the air flowing through the outlet 324 is able to flow at some oblique angles to the ground.

[0151] Referring to FIG. 17C, the wind adjuster 330 is disposed in a third position P3 in which it protrudes to be shorter than a protrusion length of the vane 340 which is disposed in the first position P1. When the wind adjuster 330 is disposed in the third position P3, the vane 340 protrudes to be longer than the length of the vane 340 protruding to the outlet 324 in the second position P2. When the wind adjuster 330 is disposed in the third position P3, it may protrude with a length of 1/3 to 2/3 of a length of the vane 340 protruding to the outlet 324 when the wind adjuster 330 is disposed in the second position P2.

[0152] When the wind adjuster 330 is disposed in the first position P1, an indirect wind that sends the air discharged through the outlet in a direction horizontal to the ground may be formed. When the wind adjuster 330 is disposed in the second position P2, a vertical wind that sends the air discharged through the outlet in a direction perpendicular to the ground may be formed. When the wind adjuster 330 is disposed in the third position P3, an inclined wind that sends the air discharged through the outlet into between the indirect wind and the vertical wind may be formed.

[0153] As in FIGS. 5A to 5B, the air conditioner according to the third embodiment may also send the air discharged from the outlet 324 in the first direction D1, the second direction D2, and the third direction D3, according to the first position P1, the second position P2, and the third position P3 of the wind adjuster 330.

<Fourth embodiment>

[0154] Hereinafter, the configuration of the air conditioner according to a fourth embodiment will be described with reference to FIGS. 18 to 19C.

[0155] An air conditioner 400 according to the fourth embodiment is different from the air conditioner 100 according to the first embodiment in the configuration of the wind adjuster. In the air conditioner according to the fourth embodiment, an inlet 422 may have a circular shape, and an outlet 424 may be formed in an annular shape around the inlet 422.

[0156] The wind adjuster 430 of the air conditioner according to the fourth embodiment includes a wind direction adjusting fan 440 disposed in one side of the outlet 424. The wind direction adjusting fan 440 may be disposed in one side of the direction in which the inlet 422 is disposed in an area where the outlet 424 is formed, thereby adjusting the wind direction of the air discharged through the outlet 424.

[0157] The wind direction adjusting fan 440 is disposed in one side of the outlet 424 to control the wind direction of the air discharged through the outlet 424. A plurality of wind direction adjusting fans 440 are spaced apart along the circumferential direction of the annular shape in which the outlet 424 is formed.

[0158] The wind direction adjusting fan 440 may adjust the wind direction of the air flowing to the outlet 424 by changing the pressure by sucking the air around the outlet 424. The wind direction adjusting fan 440 may control the suction amount of air around the outlet 424.

[0159] The wind adjuster 430 may adjust the wind direction of the air discharged through the outlet 424 by adjusting or stopping the rotation speed of the wind direction adjusting fan 440. When the wind direction adjusting fan 440 is stopped, the air flowing to the outlet 424 is affected by the shape of a discharge flow path 425 and the opening direction of the outlet 424. Accordingly, when the wind direction adjusting fan 440 is stopped, the air flowing through the outlet 424 may be discharged in a direction perpendicular to the ground.

[0160] However, when the wind direction adjusting fan 440 is operated, a portion of the air discharged through the outlet 424 is affected by the wind direction adjusting fan 440. Therefore, the air discharged through the outlet 424 may be inclined in a direction horizontal to the ground to flow. In this case, the flow direction of the air flowing through the outlet 424 may be adjusted according to the amount of air sucked into the wind direction adjusting fan 440. When the rotation speed of the wind direction adjusting fan 440 is increased, the amount of air sucked into the wind direction adjusting fan 440 is increased, so that air can flow in a direction parallel to the ground.

[0161] Referring to FIGS. 19A to 19C, the wind adjuster 430 may adjust the wind direction of the air discharged through the outlet 424 by adjusting the operation or rotation speed of the wind direction adjusting fan 440.

[0162] Referring to FIG. 19A, the wind adjuster 430 may rotate at a first set speed for rotating the rotation speed of the wind direction adjusting fan 440 to a maximum value. When the wind adjuster 430 rotates at the first set speed, an indirect wind that sends the air discharged through the outlet in a direction horizontal to the ground may be formed.

[0163] Referring to FIG. 19B, the wind adjuster 430 may rotate at a second set speed for rotating the wind direction adjusting fan 440 to a minimum value or for stopping the rotation. Here, the second set speed corresponds to a speed including '0'. Accordingly, the second set speed of the wind adjuster 430 may include a state in which the wind direction adjusting fan 440 is stopped. When the wind adjuster 430 rotates at the second set speed, a vertical wind that sends the air discharged through the outlet in a direction perpendicular to the ground may be formed.

[0164] Referring to FIG. 19C, the wind adjuster 430 may rotate at a third set speed for rotating the wind direction adjusting fan 440 at the rotation speed in a range between the first set speed and the second set speed. When the wind adjuster 430 rotates at the third set speed, an inclined wind that sends the air discharged through the outlet into between the indirect wind and the vertical

wind may be formed.

[0165] When the wind adjuster 430 rotates at the first rotation speed which is the maximum speed, the indirect wind that sends the air discharged through the outlet in a direction horizontal to the ground may be formed. When the wind adjuster 430 rotates at the second set speed for rotating the wind direction adjusting fan 440 to a minimum value or for stopping the rotation, the vertical wind that sends the air discharged through the outlet in a direction perpendicular to the ground may be formed. When the wind adjuster 430 rotates at the third rotation speed corresponding to between the first rotation speed and the second rotation speed, the inclined wind that sends the air discharged through the outlet into between the indirect wind and the vertical wind may be formed.

[0166] As in FIGS. 5A to 5B, the air conditioner according to the fourth embodiment may also send the air discharged from the outlet 424 in the first direction D1, the second direction D2, and the third direction D3, according to the first rotation speed, the second rotation speed, and the third rotation speed of the wind adjuster 430.

[0167] The control method of the air conditioner according to FIGS. 11 to 13 may be applied to the air conditioner according to the second to fourth embodiments.

[0168] According to the air conditioner of the present disclosure and the control method thereof, there are one or more of the following effects.

[0169] First, the airflow of the air discharged to the living area and the non-living area of the occupant can be set differently in the indoor space, thereby enhancing the comfort level in the living area of the occupants.

[0170] Second, the desired temperature can be reached quickly in the living area by adjusting the relative height of the airflow discharged from the indoor space to the living area of the occupant and the airflow discharged to the non-living area.

[0171] In addition, when the indoor space approaches the desired temperature, the discomfort caused by the direct friction of the air discharged to the occupant can be minimized by adjusting the relative height of the airflow discharged to the living area and the airflow discharged to the non-living area.

[0172] Third, the accuracy of the living area determination can be enhanced by classifying the living area and the non-living area based on the accumulated position detection of the human body.

[0173] While the present disclosure has been particularly shown and described with reference to exemplary embodiments thereof, it will be understood by those of ordinary skill in the art that various changes in form and detail may be made herein without departing from the scope of the present disclosure as defined by the following claims and such modifications and variations should not be understood individually from the technical idea or aspect of the present disclosure.

Claims

1. An air conditioner comprising:

   a case (110) having a space therein and having an open lower side;
   a panel (120) disposed in the lower side of the case, and having an inlet (122) and a plurality of outlets (124) disposed around the inlet (122);
   a fan (114) disposed inside the case (110), the fan is provided for forming an air flow from the inlet (122) to the plurality of outlets (124);
   a plurality of wind adjuster (130), one wind adjuster (130) is disposed in one of the outlet, respectively, the outlets are provided for adjusting a wind direction of air flowing through each of the outlet (124);
   a camera (510) disposed in one side of the panel (120), the camara is provided to obtain one or more images of an indoor space; and
   a controller (500) configured to control one or more of the wind adjusters (130) based on image information obtained from the camera (510),
   wherein the controller (500) is configured to assign one or more of the outlets to a first area outlet facing a living area and to a second area outlet facing a non-living area based on image information obtained from the camera, and to adjust one or more of the wind adjusters (130) so that air discharged from the first area outlet and air discharged from the second area outlet are formed differently in the up-and-down side direction.

2. The air conditioner of claim 1, further comprising a temperature sensor (520) for detecting a temperature of the indoor space, wherein the controller (500) is configured to adjust the one or more wind adjusters (130) of the first area outlet to change the airflow in up-and-down side direction, when the temperature detected by the temperature sensor (520) is within a set temperature range.

3. The air conditioner of claim 1 or 2, wherein when the temperature detected by the temperature sensor (520) is beyond the set temperature range, the controller (500) is configured to control the one or more wind adjusters (130) so that air discharged to the first area outlet is formed lower in an up-and-down side direction than air discharged to the second area outlet.

4. The air conditioner of claim 1, 2 or 3, wherein when the temperature detected by the temperature sensor (520) is within the set temperature range, the controller (500) is configured to adjust the one or more wind adjusters (130) so that air discharged through the first area outlet is formed higher in an up-and-

down side direction than air discharged through the second area outlet.

5. The air conditioner of any one of the preceding claims, wherein the controller (500) is configured to adjust the one or more wind adjusters (130) so that air discharged through the first area outlet is discharged in a first direction (D1), when the temperature detected by the temperature sensor (520) is within the set temperature range, and
to adjust the one or more wind adjusters (130) so that the air discharged to the first area outlet is discharged in a second direction (D2) toward an lower side than the first direction(D1), when the temperature detected by the temperature sensor (520) is beyond the set temperature range, wherein the controller (500) is configured to adjust the one or more wind adjusters (130) so that the air discharged to the second area outlet is discharged in a third direction (D3) between the first direction (D2) and the second direction (D1) in an up-and-down side direction.

6. The air conditioner of any one of the preceding claims, wherein the wind adjuster (130) comprises a vane (140, 150, 240, 340) disposed in the outlet (124), the vane (140, 150, 240, 340) is configured to change a disposition to adjust a wind direction of air flowing through the outlet (124), and/or the controller (500) is configured to change a disposition of the vane (140, 150, 240, 340) disposed in each of the first area outlet and the second area outlet.

7. The air conditioner of any one of the preceding claims, wherein the wind adjuster (130) comprises a wind direction adjusting fan (430) disposed in one side of the outlet (124), the wind direction adjusting fan (430) is provided to adjust a wind direction of air discharged through the outlet (124) by adjusting a rotation speed, and/or wherein the controller (500) is configured to adjust a rotation speed of the wind direction adjusting fan (430) disposed in each of the first area outlet and the second area outlet.

8. The air conditioner of any one of the preceding claims, further comprising a timer (530) for measuring a time during which the camera (510) obtains an image, wherein the controller (500) is configured to classify a user's living area from accumulated image information obtained from the camera (510), after a set time measured by the timer (530).

9. The air conditioner of any one of the preceding claims, further comprising an output unit (530) for outputting an image obtained from the camera (510), wherein the controller (500) is configured to divide an image displayed on the output unit (530) into a plurality of areas, and to classify a living area and a non-living area of an occupant, the image displayed on the output unit (530) is divided based on a direction in which the plurality of outlets (124) faces.

10. A method of controlling an air conditioner (100) having an inlet (122) and a plurality of outlets (124) disposed around the inlet (122), wherein the plurality of outlets (124) discharge air to different areas, the method comprising:

Obtaining (S100) by a camera (510) an image of a plurality of areas to which the plurality of outlets (124) discharge air;
determining (S200) a living area and a non-living area based image information obtained by the camera (510); and
adjusting (S300) a wind adjuster (130) so that up-and-down side airflows discharged from each of a first area outlet facing the living area and a second area outlet facing the non-living area are set differently.

11. The method of claim 10, wherein adjusting (S300) a wind adjuster (130) comprises:

detecting (S310) a temperature of an indoor space by a temperature sensor (520); and
adjusting the wind adjuster (130) so that airflow of an air discharged from the first area outlet is varied based on a relationship between the temperature of the indoor space sensed by the temperature sensor (520) and a set temperature range.

12. The method of claim 11, wherein when the temperature of the indoor space sensed by the temperature sensor (520) is within the set temperature range (S330), the wind adjuster (130) is adjusted to set the airflow of the air discharged from the first area outlet to be higher than airflow of an air discharged from the second area outlet, wherein when the temperature of the indoor space sensed by the temperature sensor (520) is beyond the set temperature range (S340), the wind adjuster (130) is adjusted to set the airflow of the air discharged from the first area outlet to be lower than airflow of an air discharged from the second area outlet.

13. The method of claim 10, 11 or 12, wherein determining (S200) a living area and a non-living area comprises:

dividing an area displayed on an output unit (530) into a plurality of areas based on a direction in which the plurality of outlets (124) face;
accumulating the image information obtained by the camera over the set time; and
determining the living area and the non-living area based on the accumulated image informa-

tion obtained by the camera (510).

14. The method of any one of claim 10, 11, 12, or 13, wherein adjusting (S300) a wind adjuster comprises:

uniformly maintaining an air flow discharged from the second area outlet; and
forming an air flow discharged from the first area outlet to be higher or lower than the air flow discharged from the second area outlet.

15. The method of any one of the preceding claims 10-14, wherein adjusting (S300) a wind adjuster comprises disposing a vane (140, 150, 240, 340) disposed in the first area outlet and a vane (140, 150, 240, 340) disposed in the second area outlet differently.

Fig. 1

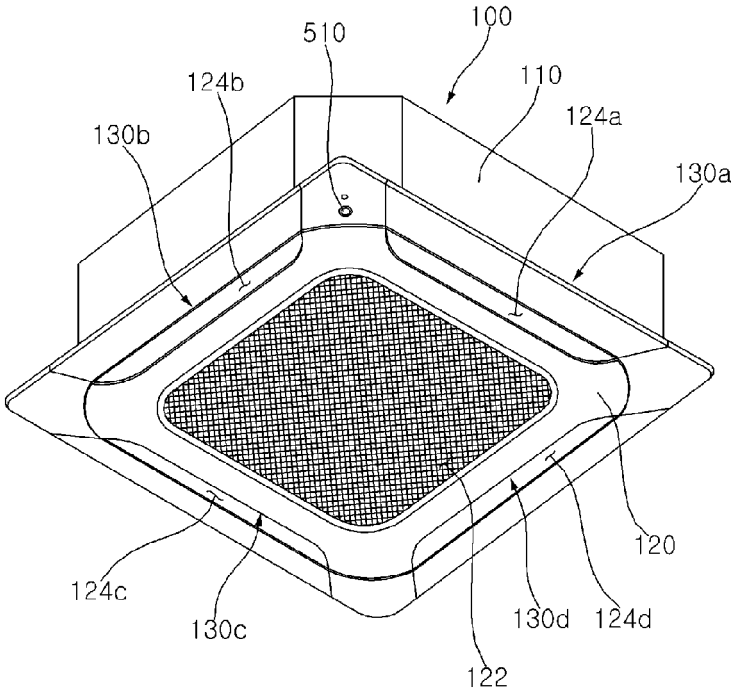

100
510
110
124b
124a
130b
130a
120
124c
130c
130d
124d
122

Fig. 2

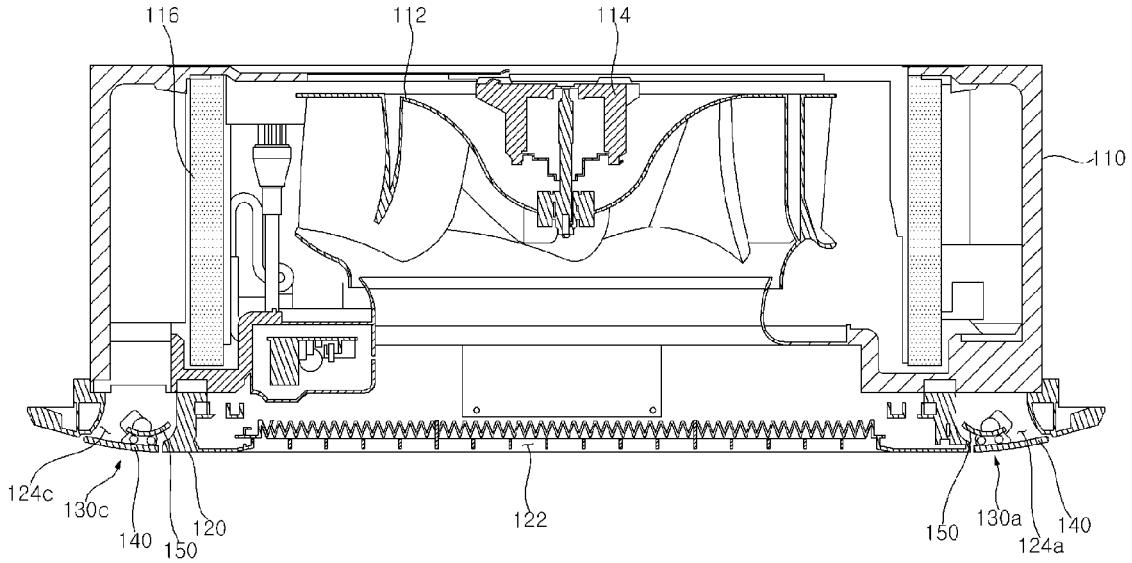

116
112
114
110
124c
130c
140
150
120
122
150
130a
140
124a

Fig. 3

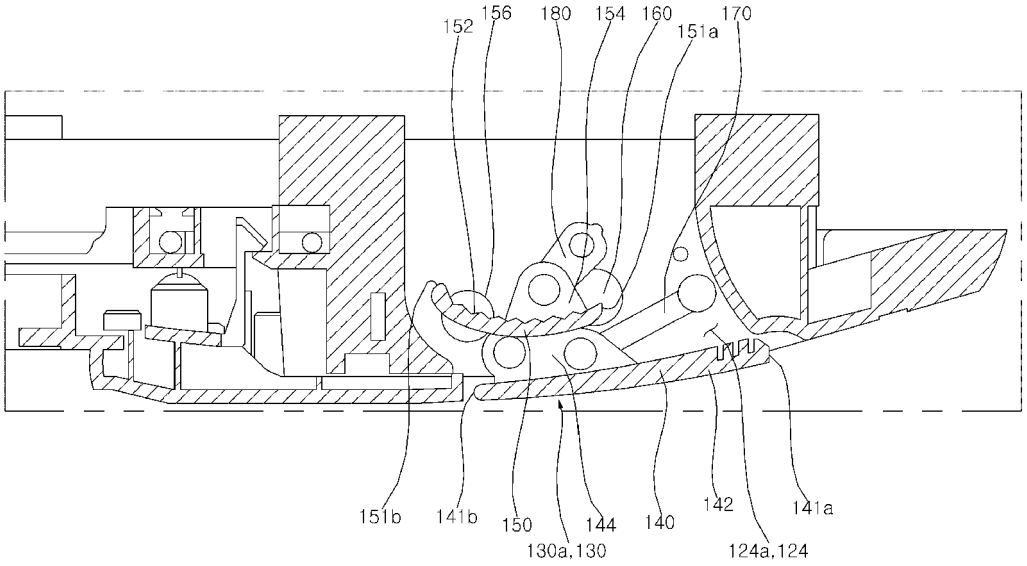

152
156
180
154
160
151a
170
151b
141b
150
144
140
142
141a
130a,130
124a,124

Fig. 4a

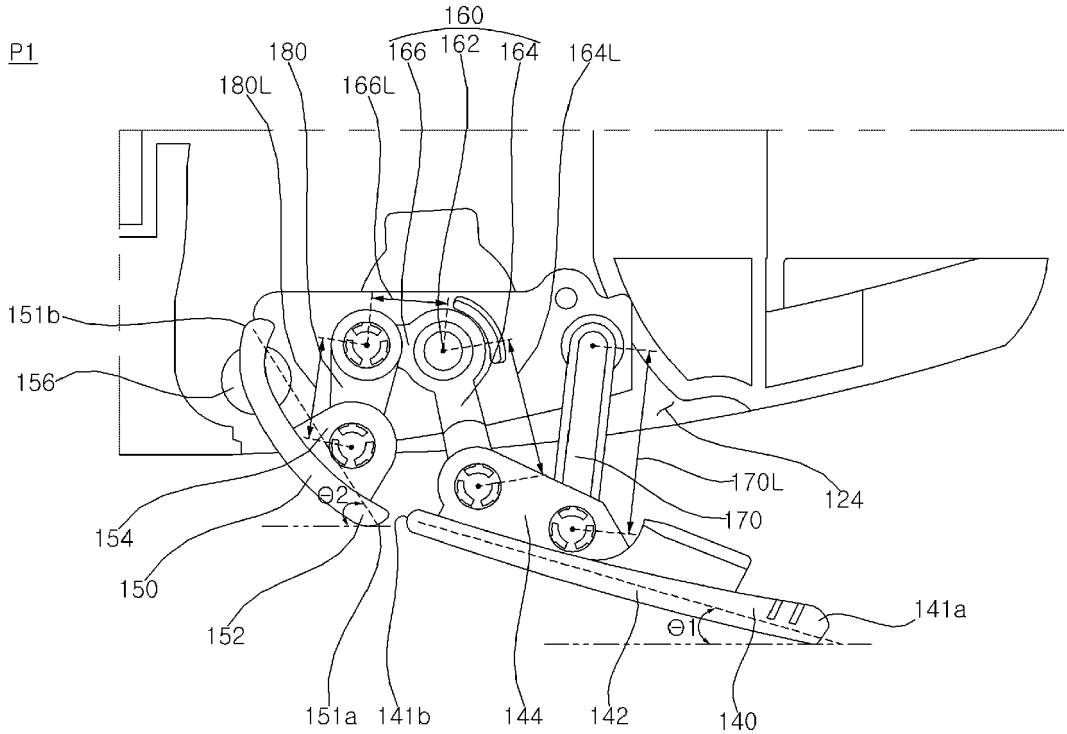

P1
160
180
166
162
164
164L
180L
166L
151b
156
170L
124
θ2
170
154
150
141a
152
θ1
151a
141b
144
142
140

Fig. 4b

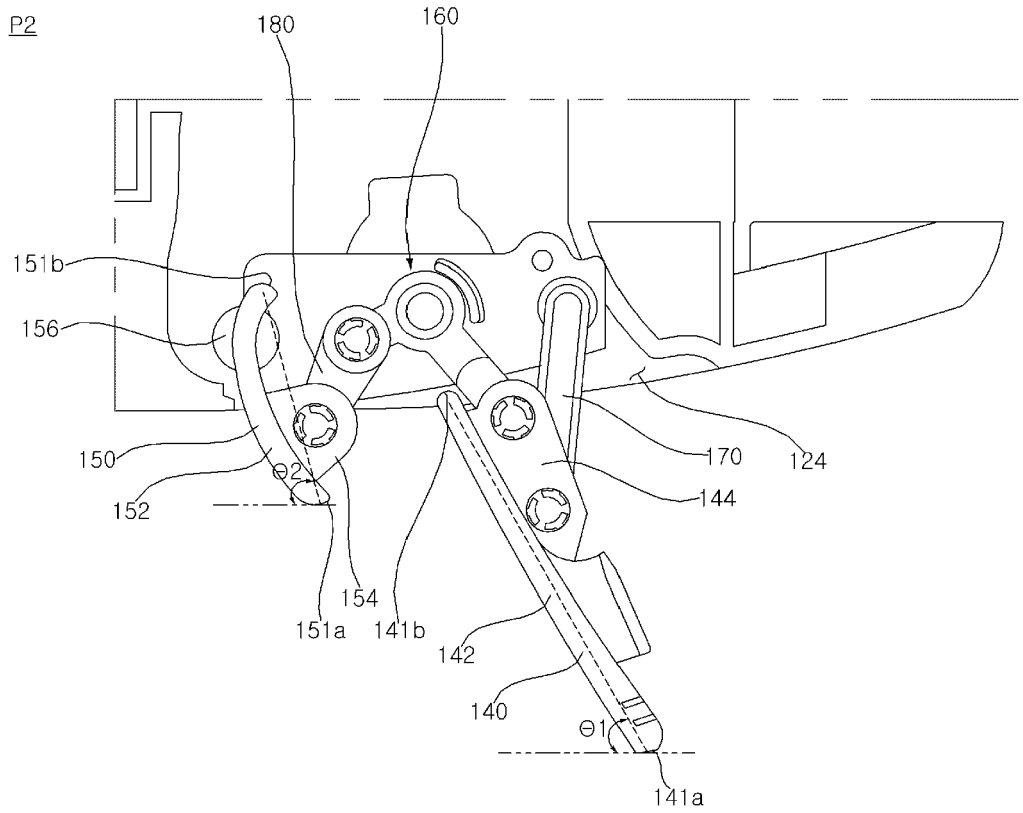

P2
180
160
151b
156
150
θ2
152
154
151a
141b
142
140
θ1
141a
170
124
144

Fig. 4c

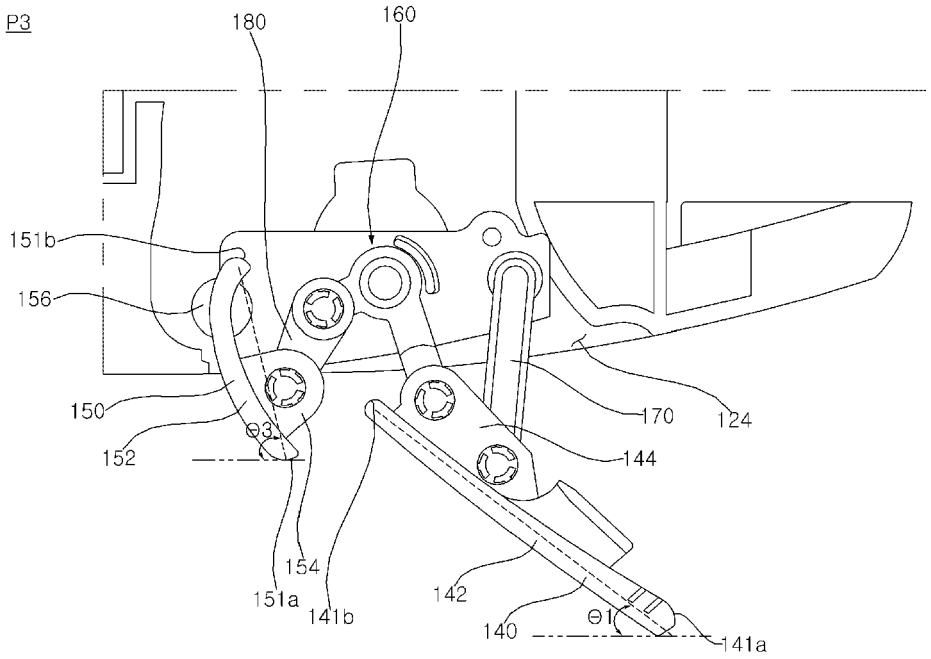

P3
180
160
151b
156
150
θ3
152
154
151a
141b
142
140
θ1
141a
170
124
144

Fig. 5a

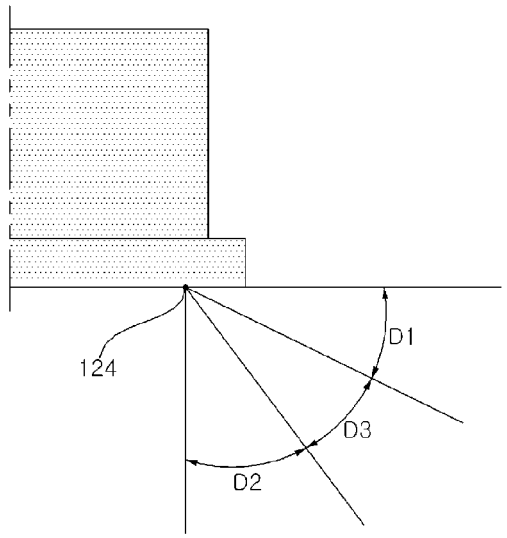


Fig. 5b

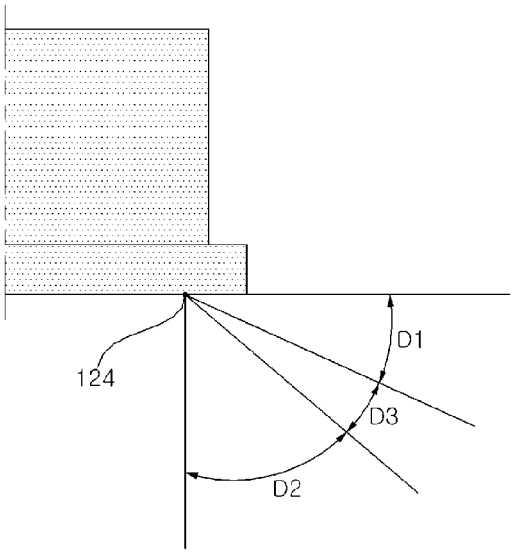


Fig. 6

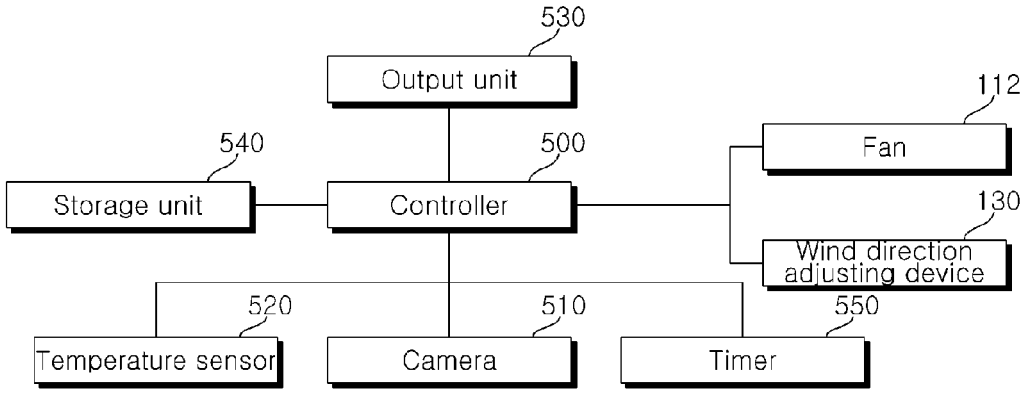


Fig. 7a

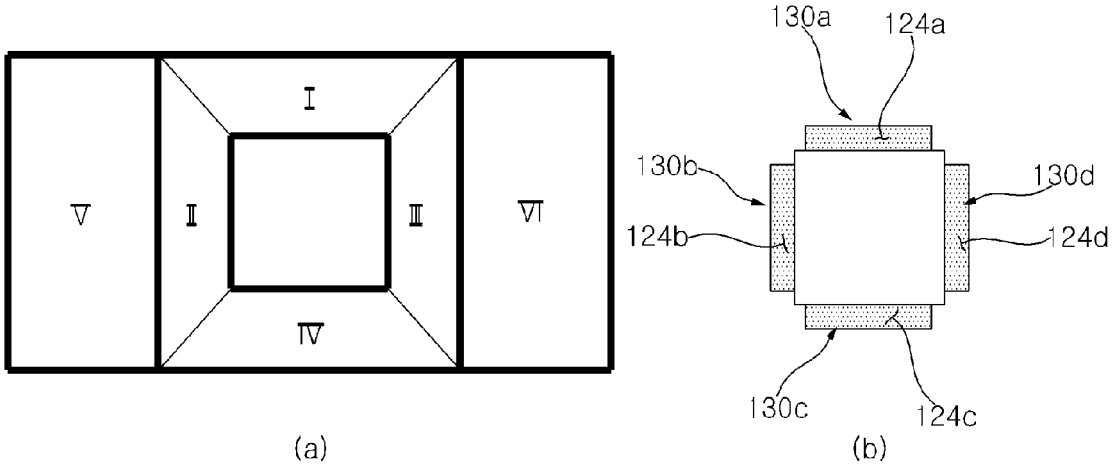


Fig. 7b

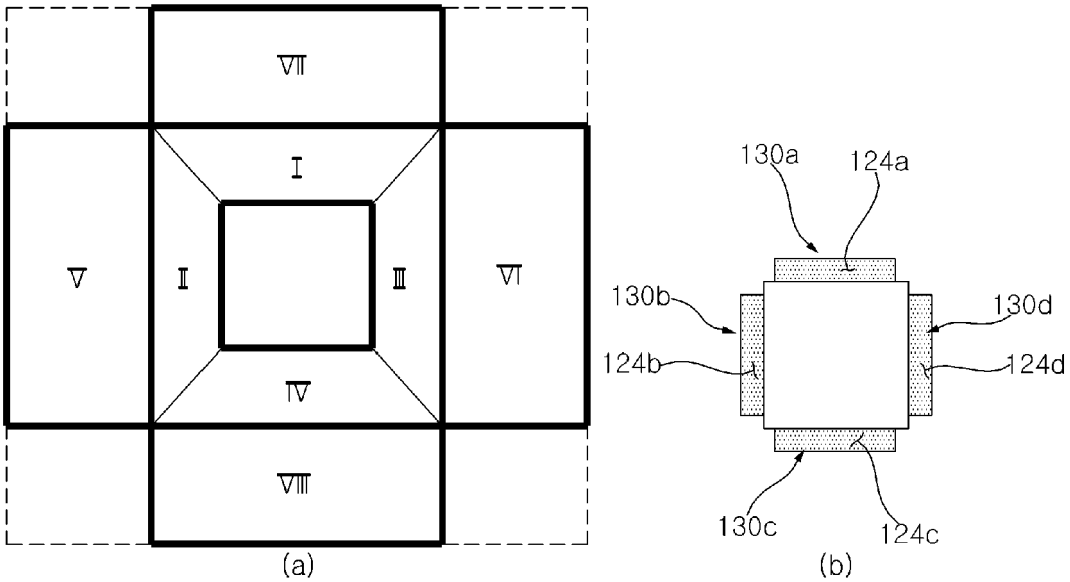

Ⅶ
Ⅰ
Ⅴ
Ⅱ
Ⅲ
Ⅵ
Ⅳ
Ⅷ
(a)
130a
124a
130b
130d
124b
124d
130c
124c
(b)

Fig. 8a

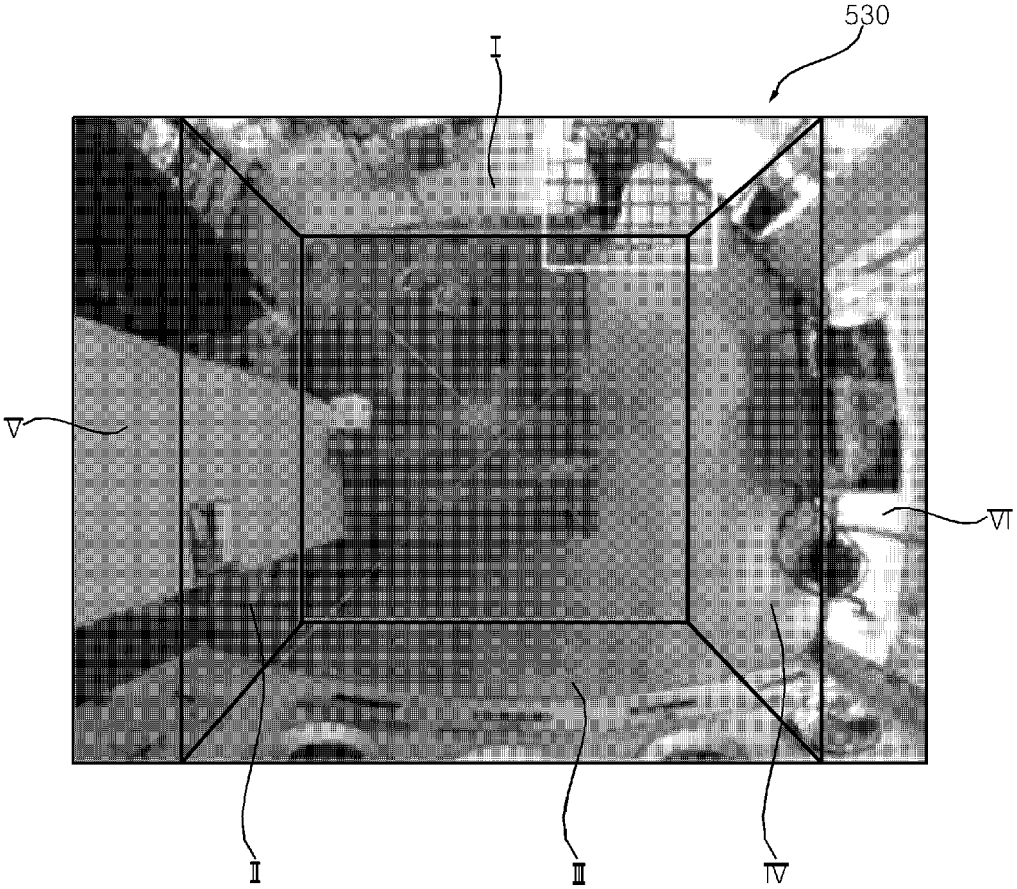

530
Ⅰ
Ⅴ
Ⅵ
Ⅱ
Ⅲ
Ⅳ

Fig. 8b

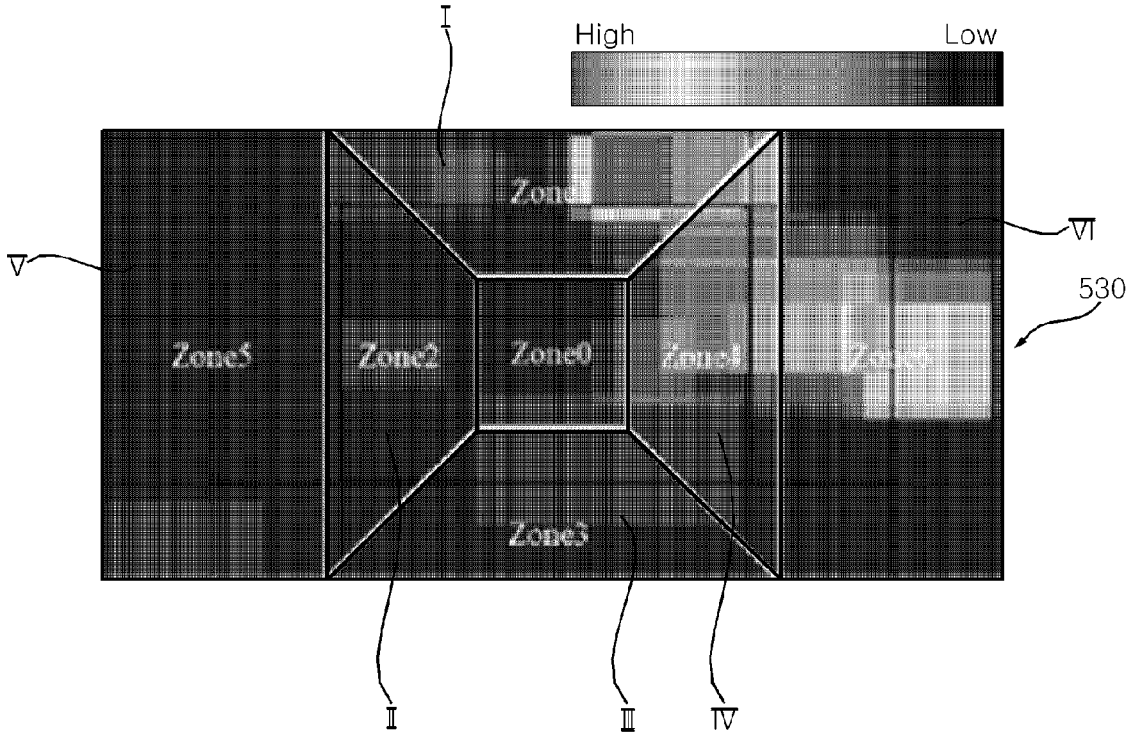

I
High
Low
Zone1
V
VI
530
Zone5
Zone2
Zone0
Zone4
Zone3
II
III
IV

Fig. 8c

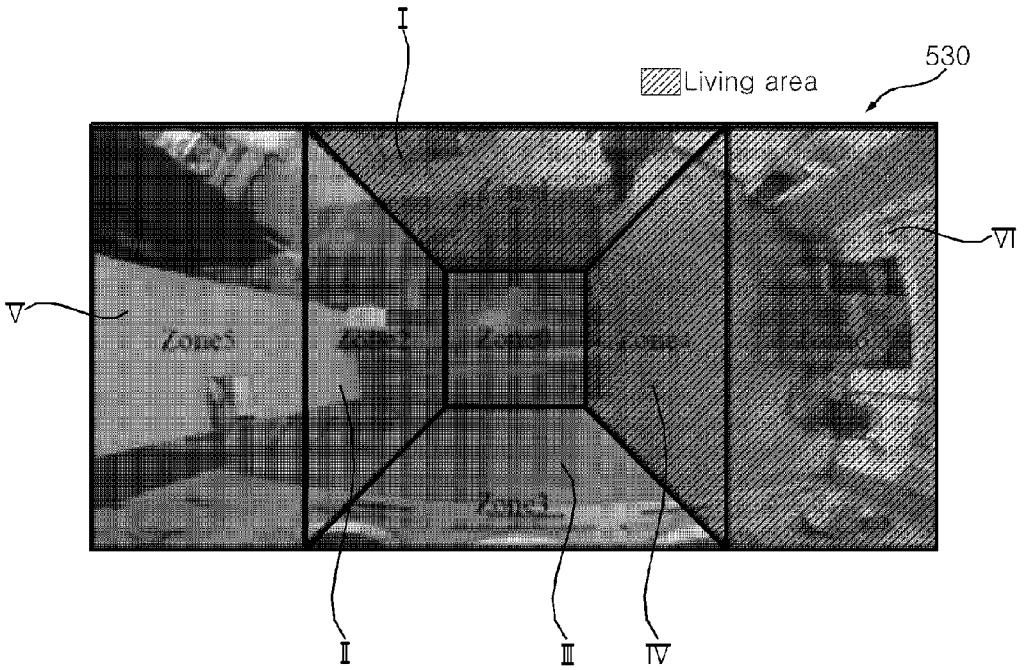

I
Living area
530
V
VI
Zone5
Zone3
II
III
IV

Fig. 9

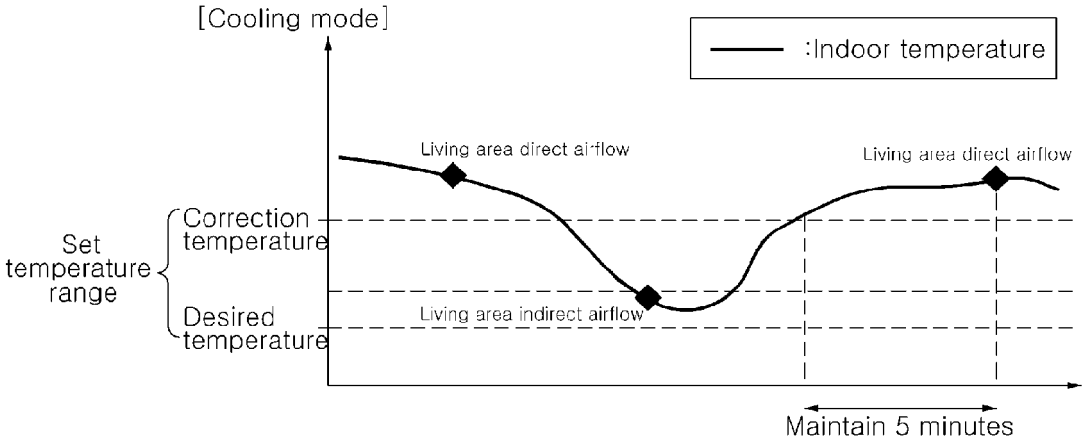


Fig. 10a

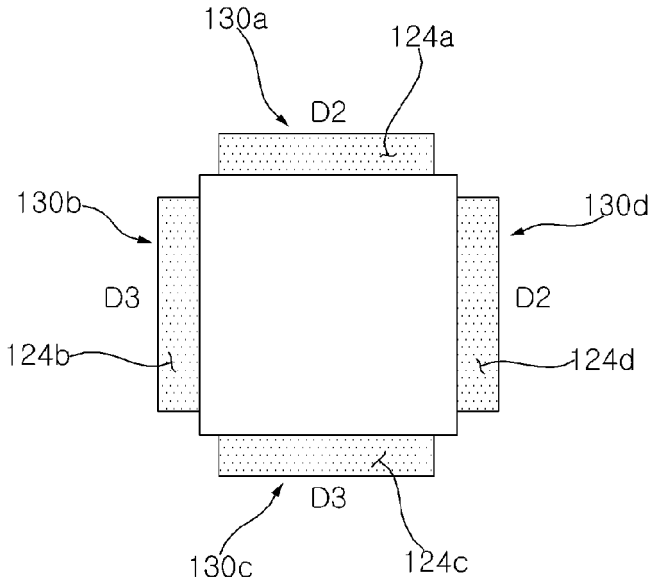


Fig. 10b

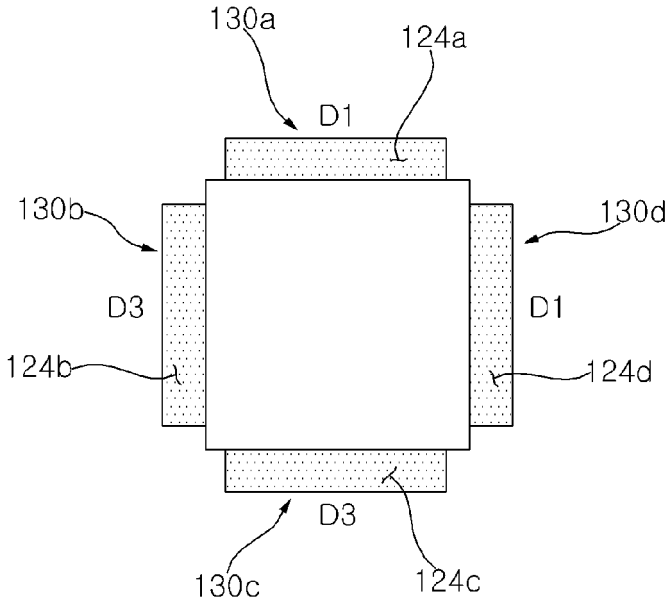


Fig. 11

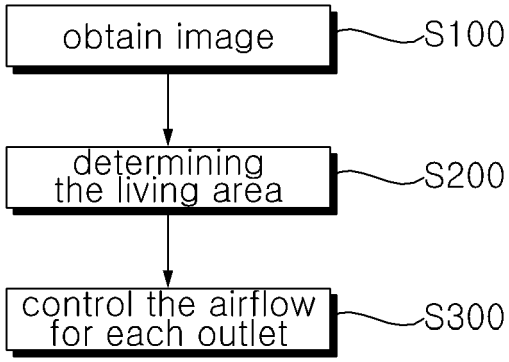


Fig. 12

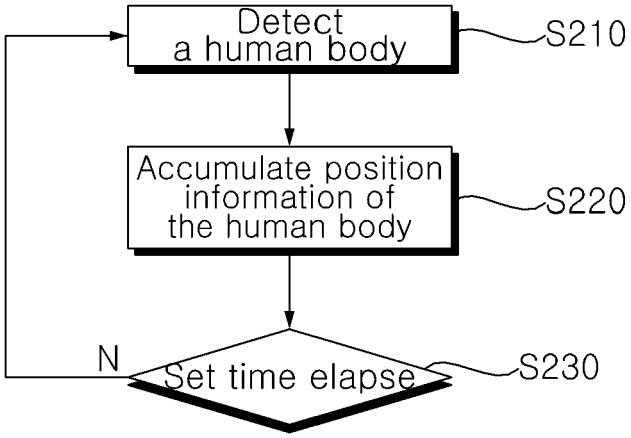


Fig. 13

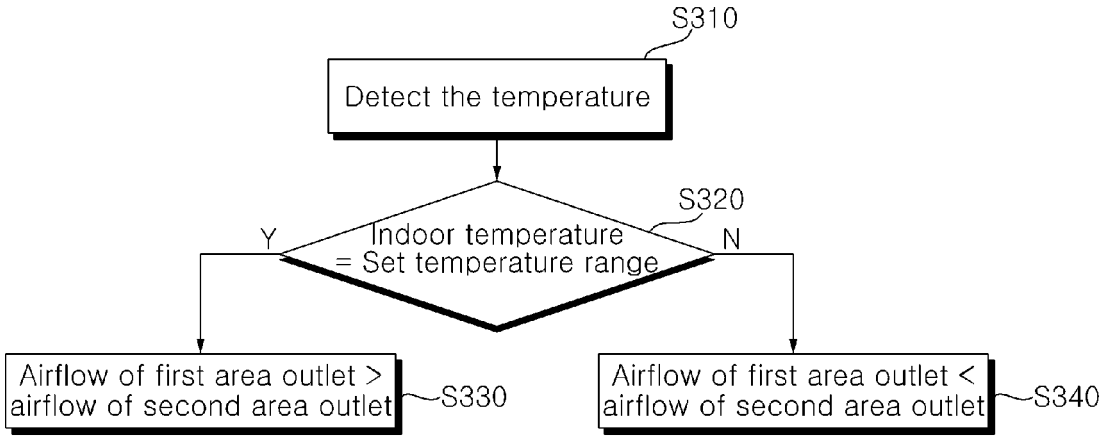


Fig. 14

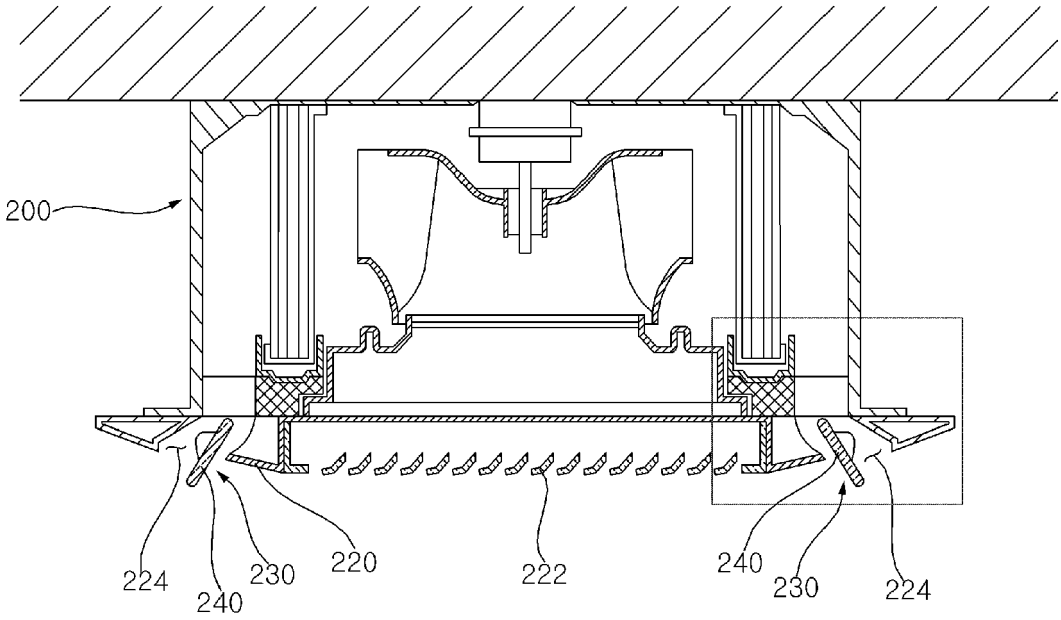


Fig. 15a

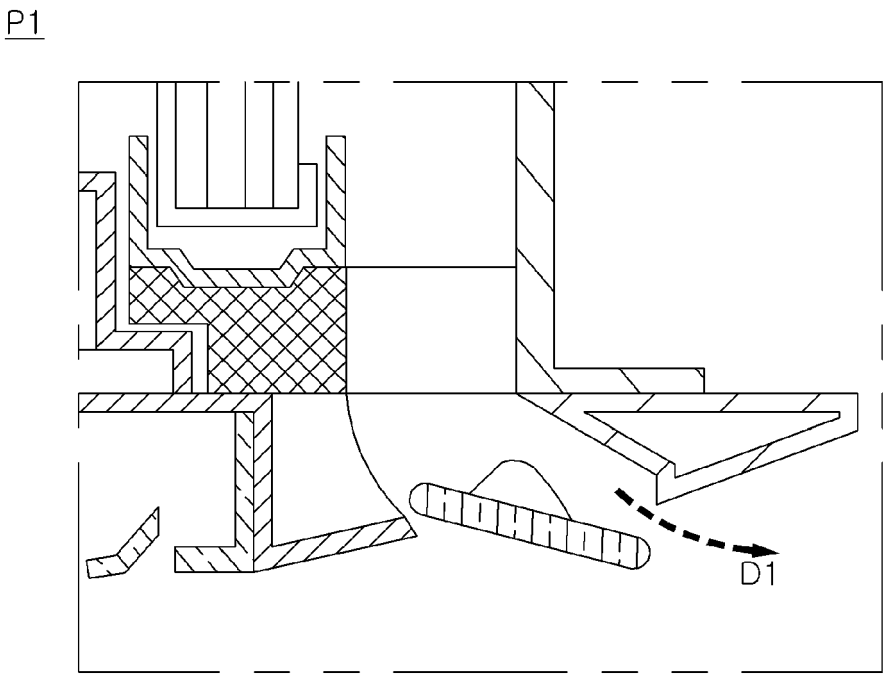


Fig. 15b

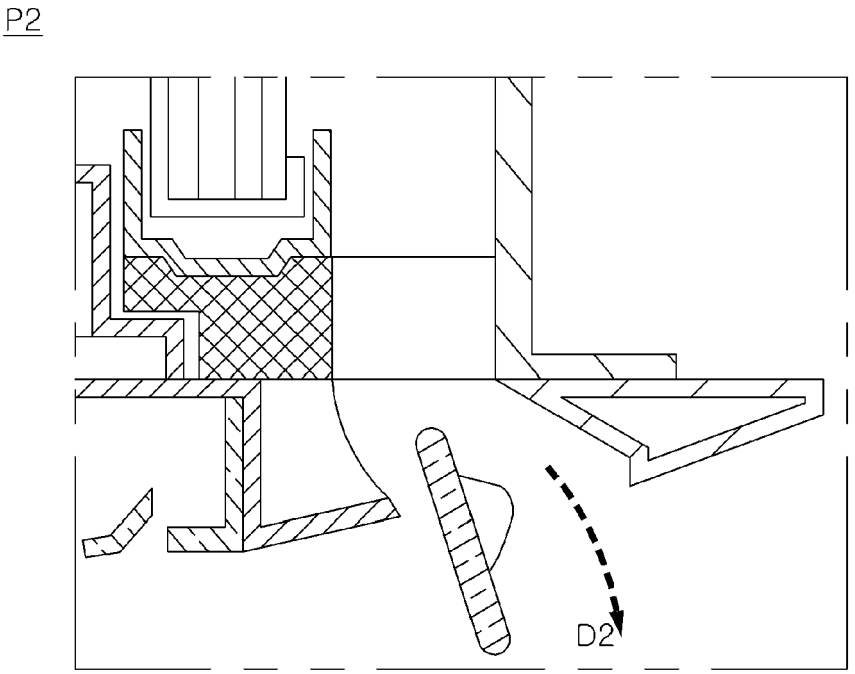


Fig. 15c

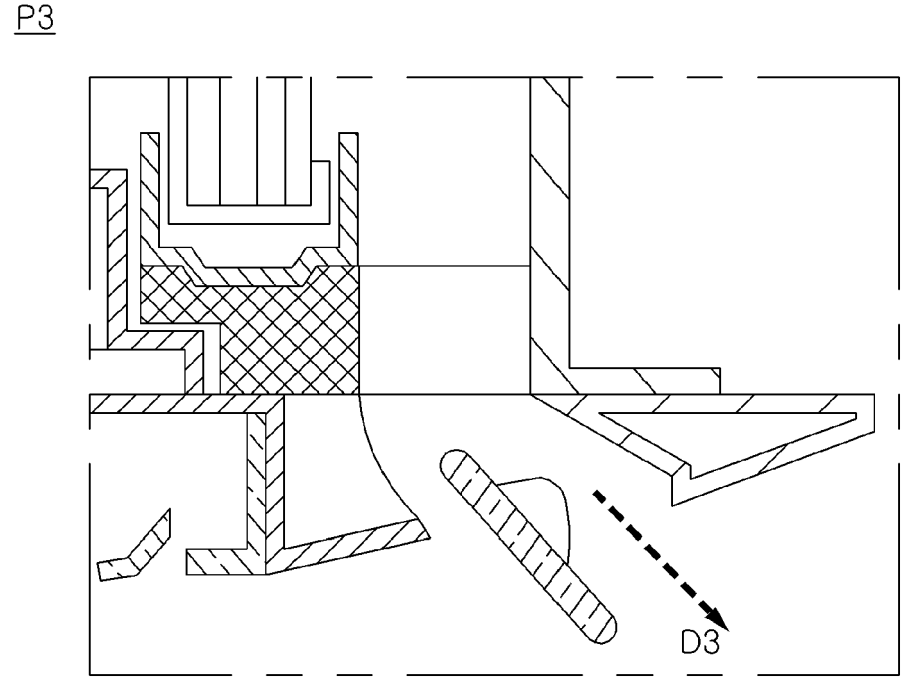


Fig. 16

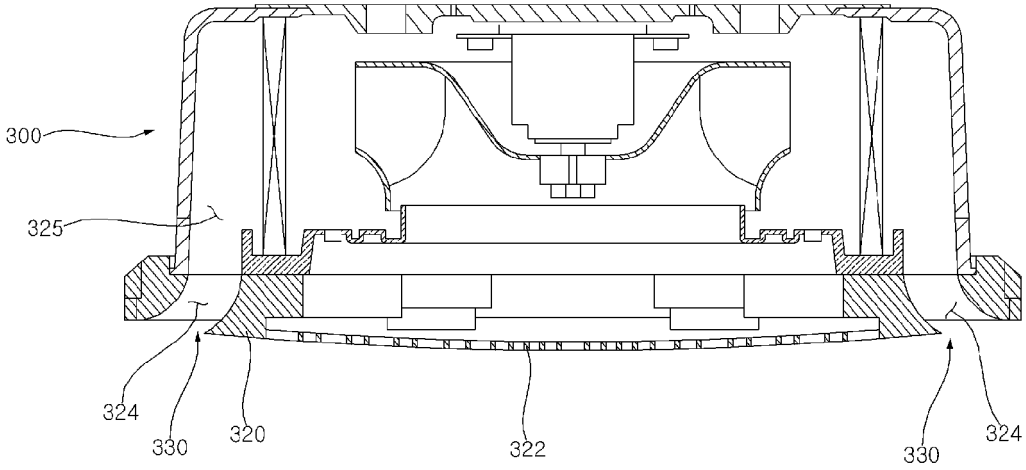


Fig. 17a

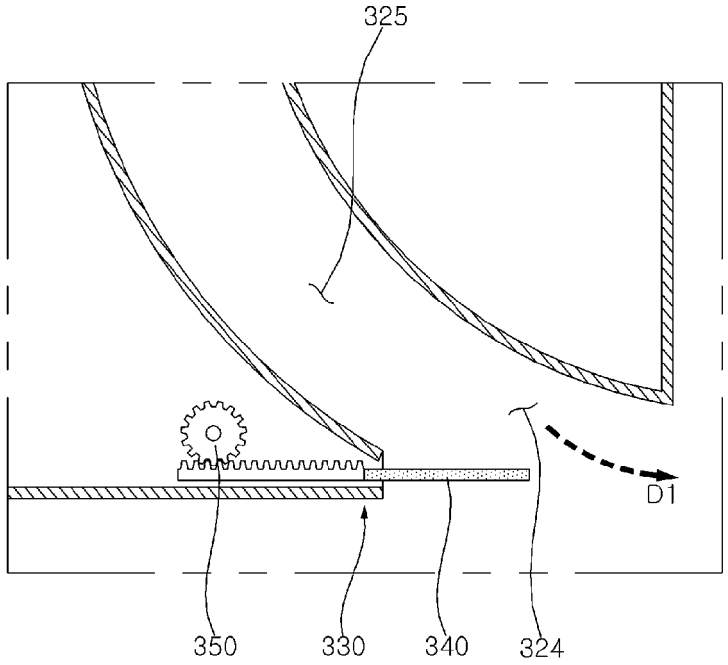


Fig. 17b

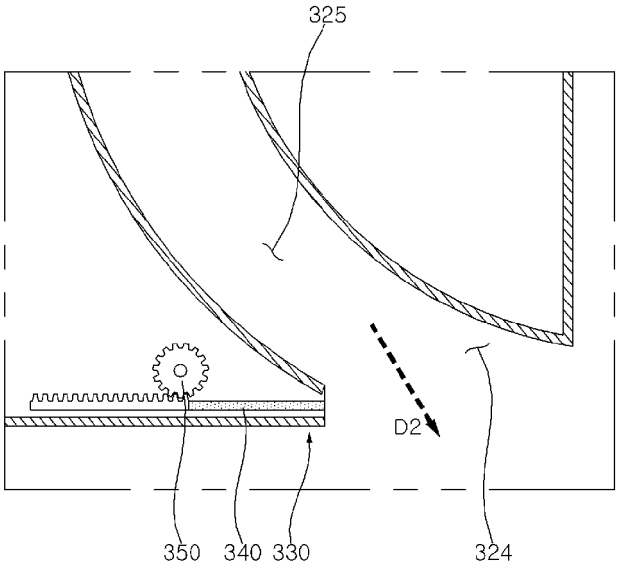


Fig. 17c

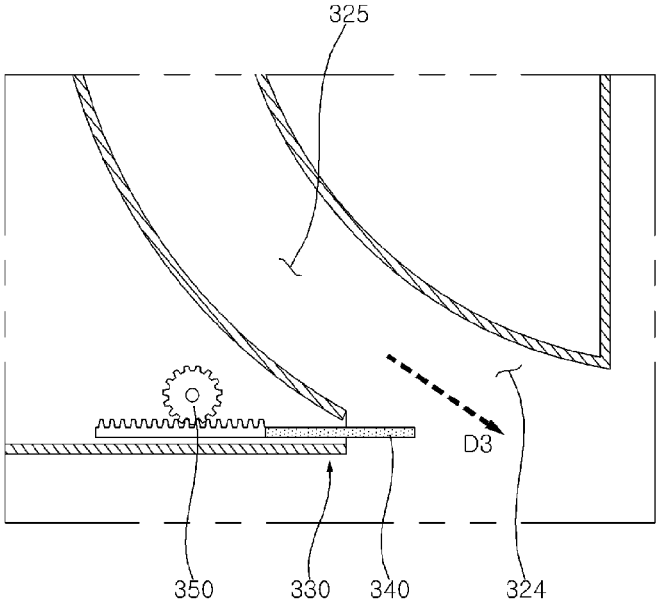


Fig. 18

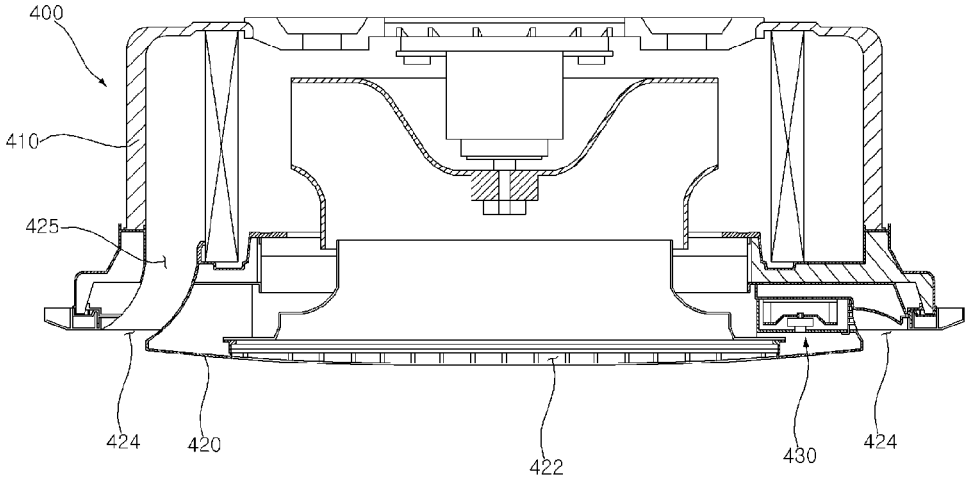


Fig. 19a

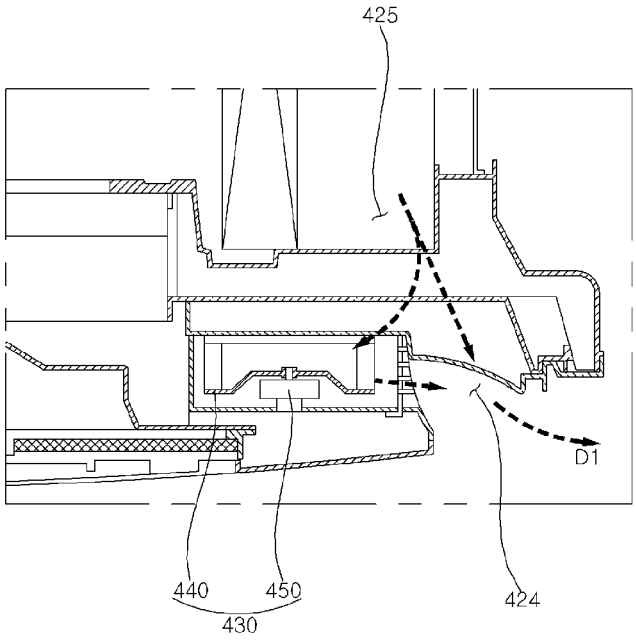


Fig. 19b

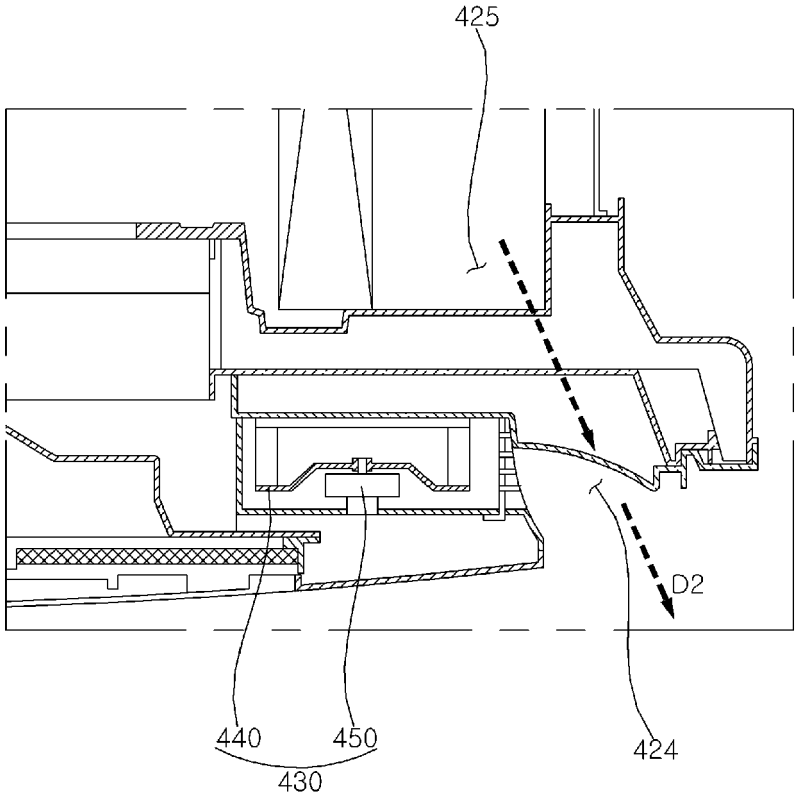
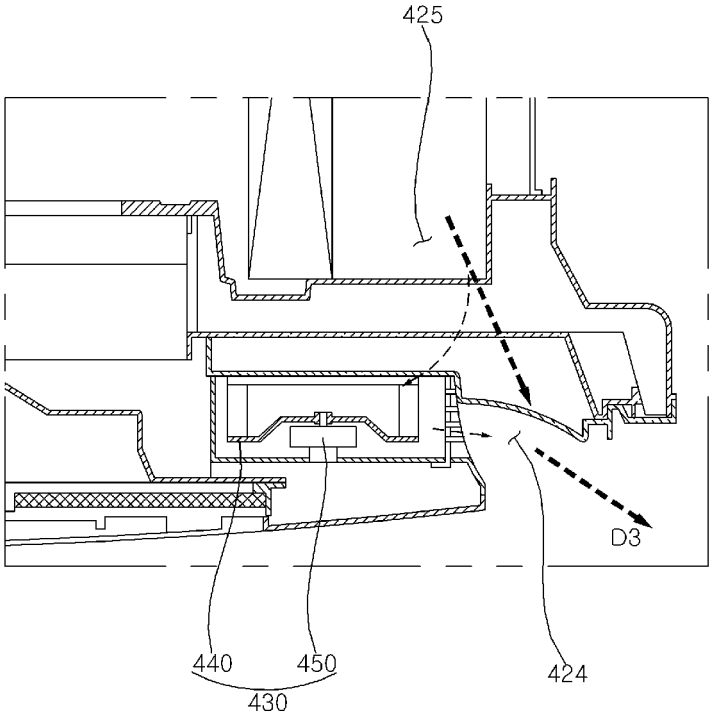


Fig. 19c



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EUROPEAN SEARCH REPORT

Application Number
EP 22 18 6431

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	GB 2 513 694 A (MITSUBISHI ELECTRIC CORP [JP]) 5 November 2014 (2014-11-05)	1,2,6, 8-10,13, 15	INV. F24F1/0014 F24F11/52
A	* paragraphs [0014] - [0016], [0026], [0032] - [0037]; figures 3,5,6,7 *	3-5,7, 11,12,14	F24F11/63 F24F11/79 F24F13/08
A	US 2018/209681 A1 (SONG TAEYUP [KR] ET AL) 26 July 2018 (2018-07-26) * paragraphs [0034], [0043], [0057], [0092]; claims 1,8; figures 8,14 *	1-15	F24F13/10
A	US 5 875 639 A (KIM NAM-SICK [KR] ET AL) 2 March 1999 (1999-03-02) * column 2, lines 22-41; claim 1 *	1-15	
A	EP 3 450 868 A1 (MITSUBISHI ELECTRIC CORP [JP]) 6 March 2019 (2019-03-06) * paragraphs [0062], [0065], [0086]; figures 7,9,10,13,14,19 *	1-15	
			TECHNICAL FIELDS SEARCHED (IPC)
			F24F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	17 November 2022	Degen, Marcello

CATEGORY OF CITED DOCUMENTS

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17-11-2022

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 2513694 A	05-11-2014	CN 104006446 A	27-08-2014
		CN 203771556 U	13-08-2014
		GB 2513694 A	05-11-2014
		GB 2527193 A	16-12-2015
		JP 6071626 B2	01-02-2017
		JP 2014163563 A	08-09-2014
		MX 350193 B	30-08-2017
US 2018209681 A1	26-07-2018	EP 3379163 A2	26-09-2018
		KR 20180071031 A	27-06-2018
		US 2018209681 A1	26-07-2018
US 5875639 A	02-03-1999	CN 1178892 A	15-04-1998
		JP 2820933 B2	05-11-1998
		JP H10115447 A	06-05-1998
		KR 19980026273 A	15-07-1998
		US 5875639 A	02-03-1999
EP 3450868 A1	06-03-2019	CN 110709645 A	17-01-2020
		EP 3450868 A1	06-03-2019
		JP WO2018229923 A1	26-12-2019
		US 2020363091 A1	19-11-2020
		WO 2018229923 A1	20-12-2018

EPO FORM P0459

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Patent documents cited in the description

- KR 102034663 B1 **[0005]**