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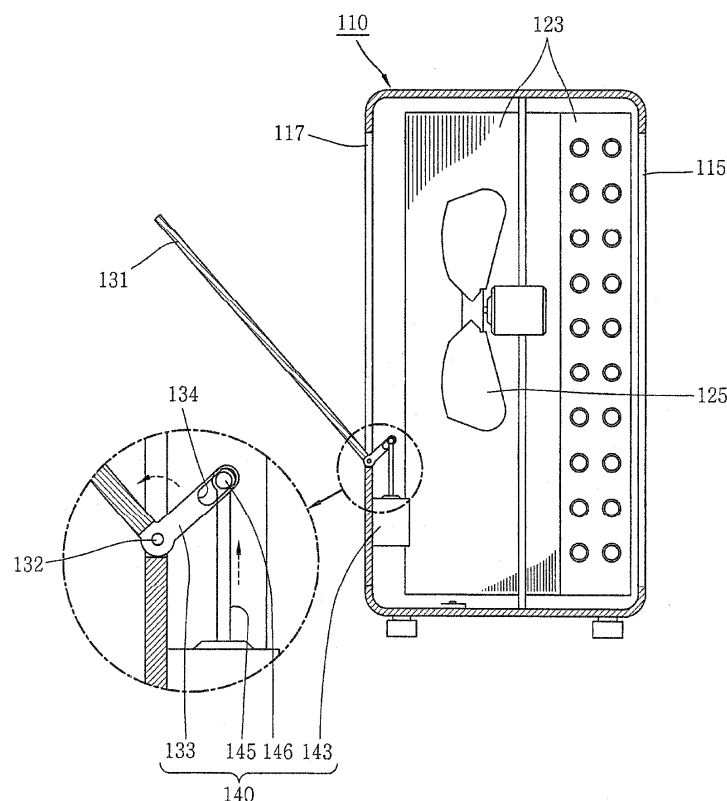
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(54) **Outdoor unit for air conditioner and operation method thereof**

(57) Provided are an outdoor unit of an air conditioner, and an operation method thereof. The outdoor unit of the air conditioner includes: a case including an outlet; and an outlet door installed at the case to open/dose the

outlet, and guiding the air being discharged when opened. Thus, the air being discharge can be guided in a desired direction when the outlet is opened, and foreign substances can be prevented from flowing into the case when the outlet is closed.

FIG. 6



Description

[0001] The present invention relates to an outdoor unit of an air conditioner, an operation method thereof, and more particularly, to an outdoor unit of an air conditioner, and an operation method thereof capable of guiding exhausted air to a desired direction when an outlet is opened, and preventing inflow of foreign substances when the outlet is closed.

[0002] In general, an air conditioner is an apparatus that is disposed within a space such as a room, a living room, an office, or a store in order to control a temperature, a humidity, cleanness, and a current of the air to maintain a fresh indoor environment.

[0003] The air conditioner includes an outdoor unit including a compressor compressing a refrigerant, a condenser condensing the compressed refrigerant, and a blower disposed at one side of the condenser and blowing out the air toward the condenser to accelerate heat release of the refrigerant; and an indoor unit including an indoor heat exchanger disposed in a room and performing cooling or heating.

[0004] FIG. 1 is a perspective view of an outdoor unit of an air conditioner in accordance with related art, and FIG. 2 is a plan sectional view of the outdoor unit of FIG. 1. As illustrated in FIGS. 1 and 2, the outdoor unit of the air conditioner includes a case 10 forming therein a receiving space, a compressor 21 installed in the case 10 and compressing a refrigerant, a heat exchanger 23 installed in the case 10, and a blower 25 provided at one side of the heat exchanger 23 to accelerate a heat exchange operation of the heat exchanger 23.

[0005] The case 10 has a rough rectangular parallel-piped shape, and a division plate 13 dividing an internal space is installed in the case 10. The compressor 21 compressing a refrigerant is received in one space divided by the division plate 13. An inlet 15 is formed at rear and side surfaces of the other space divided by the division plate 13 in order to take in the air, and an outlet 17 is formed at a front surface of the other space so that the air introduced through the inlet 15 can be discharged through the outlet 17. The outlet 17 includes a discharge grill 18 allowing passage of the air while preventing foreign substances of a predetermined size from being introduced thereinto.

[0006] The heat exchanger 23 having an "L" shape is disposed near to the inlet 15. The blower 25 of an axial fan type is installed in a front region of the heat exchanger, in order to introduce the air outside the case 10 through the inlet 15, and discharge the air to the outside through the outlet 17 after the introduced air is heat-exchanged while passing through the heat exchanger.

[0007] However, the outdoor unit of the conventional air conditioner is problematic in that unpleasantness of a pedestrian may be caused when the air introduced through the inlet 15 and heat exchanged with the heat exchanger 23 (hot air at the time of cooling operation) is discharged through the outlet 17 and contacts the pe-

destrian.

[0008] Therefore, an object of the present invention is to provide an outdoor unit of an air conditioner capable of guiding discharged air to a desired direction.

[0009] Another object of the present invention is to provide an outdoor unit of an air conditioner capable of guiding the discharged to a desired direction when operated, and preventing introduction of foreign substances thereinto by closing an outlet when not operated.

[0010] Another object of the present invention is to provide an outdoor unit of an air conditioner, and an operation method thereof capable of preventing operation when an outlet is closed to achieve stable operation of system, and guiding the discharged air to a desired in direction when the outlet is opened.

[0011] To achieve these and other advantages and in accordance with the purpose of the present invention, as embodied and broadly described herein, there is provided an outdoor unit of an air conditioner including: a case including an outlet; and an outlet door installed at the case to open/close the outlet, and guiding the air being discharged when opened.

[0012] To achieve these and other advantages and in accordance with the purpose of the present invention, as embodied and broadly described herein, there is also provided an outdoor unit of an air conditioner including: a case forming a receiving space therein, and including an inlet introducing the air, and an outlet formed at a front side of the case and discharging the air; a heat exchanger disposed toward the inlet in the case; a blower disposed at one side of the heat exchanger; an outlet door coupled to the case to be rotatable between a closing location where the outlet door closes the outlet, and an opening location where the outlet door is inclined downwardly so as to guide the air being discharged in an upward direction; and an outlet door driving unit driving the outlet door to open/close the outlet

[0013] To achieve these and other advantages and in accordance with the purpose of the present invention, as embodied and broadly described herein, there is also provided a method of operating an outdoor unit of an air conditioner comprising a case having an outlet, a blower disposed in the case, an outlet door opening/closing the outlet, and an outlet door driving unit driving the outlet door, the method including: controlling the outlet door driving unit to open the outlet; and driving the blower.

[0014] The foregoing and other objects, features, aspects and advantages of the present invention will become more apparent from the following detailed description of the present invention when taken in conjunction with the accompanying drawings.

[0015] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this specification, illustrate embodiments of the invention and together with the description serve to explain the principles of the invention.

[0016] In the drawings:

FIG. 1 is a perspective view of an outdoor unit of an air conditioner in accordance with related art;
FIG. 2 is a plan sectional view of the outdoor unit of FIG. 1;

FIG. 3 is a perspective view of an outdoor unit of an air conditioner according to a first embodiment of the present invention;

FIG. 4 is a plan sectional view of FIG. 3;

FIG. 5 is a longitudinal sectional view of FIG. 3;

FIG. 6 is a cross-sectional view showing an opened state of an outlet door of FIG. 3;

FIG. 7 is a control block diagram of the outdoor unit of the air conditioner of FIG. 3;

FIG. 8 is a longitudinal sectional view of an outdoor unit of an air conditioner according to a second embodiment of the present invention;

FIG. 9 is a cross-sectional view showing an opened state of a outlet door of FIG. 8;

FIG. 10 is a control block diagram of the outdoor unit of the air conditioner of FIG. 8;

FIG. 11 is a flow chart for describing an operation method of the outdoor unit of the air conditioner of FIG. 8;

FIG. 12 is a perspective view of an outdoor unit of an air conditioner according to a third embodiment of the present invention;

FIG. 13 is a longitudinal sectional view of FIG. 12;

FIG. 14 is a cross sectional view showing an opened state of an outlet door of FIG. 12; and

FIG. 15 is a control block diagram of the outdoor unit of the air conditioner.

[0017] Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings.

[0018] Referring to FIGS. 3 through 6, an outdoor unit of an air conditioner according to a first embodiment of the present invention includes a case 110 forming a receiving space therein and having an outlet 117 at one side, and an outdoor door 131 installed to open/close the outlet 117 of the case 110.

[0019] The case 110 is formed to have a rectangular parallelepiped shape, and includes therein a division plate 113 dividing the inside of the case 110. A compressor is installed in one space divided by the division plate 113. An inlet 115 through which the air is introduced is formed at rear and side surfaces of the other space divided by the division plate 113, and an outlet 117 through which the air is discharged is formed at a front surface thereof. A heat exchanger 123 is disposed inside the inlet 115, and a blower 125 is installed inside the heat exchanger 123 to introduce the air through the inlet 115 and discharge the introduced air to the outside through the outlet 117.

[0020] The outlet 117 has a quadrangular shape, and the outlet door 131 of a quadrangular shape is installed at the outlet 117. A rotary shaft 132 is formed at lower portions of both sides of the outlet door 131 so that the

outlet door 131 can be rotated downwardly and upwardly. A protrusion 133 protrudes rearward from one lower portion of a rear surface of the outlet door 131, and an outlet door driving unit 140 is installed at one side of the protrusion 133 to open/close the outlet door 131.

[0021] The outlet door driving unit 140 includes the protrusion 133 formed on the outlet door 131, and a solenoid 143 having a rod 145 that is protruded or retracted in a vertical direction. When power is applied to the solenoid 143, the rod 145 is extendingly protruded in a longitudinal direction, and when power is cut off, the rod 145 is retracted into the solenoid 143 by an elastic force of a spring provided therein. A pint portion 14 is formed at an end of the rod 145, and is bent perpendicularly to be connected to the protrusion 133. A slot 134 of a long hole type is formed at the protrusion 133 so that the pin portion 146 is inserted therein and makes a relative motion.

[0022] The outdoor unit of the air conditioner according to the current embodiment includes a controller 161 controlling the solenoid 143. The controller 161 opens the outlet 117 when an operation signal is input from an indoor unit (not shown), and closes the outlet 117 when an operation stop signal is input. As illustrated in FIG. 7, the controller 161 is connected to a signal receiver 163 receiving a signal from the indoor unit, and the solenoid 143 so as to allow electric signal transfer.

[0023] By the aforementioned structure, when an operation signal is input through the signal receiver 163, the controller 161 controls the solenoid 143 to protrude the rod 145. When the rod 145 is protruded, the pin portion 145 presses the protrusion 133, and thus the outlet door 131 is rotated downward to open the outlet 117 as illustrated in FIG. 6. When the blower 125 is driven, the air is introduced through the inlet 115, and the introduced air is heat-exchanged while passing through the heat exchanger 123. The heat-exchanged air is discharged through the outlet 117, and the discharged air is guided to an upper portion of a front side of the case 110 by the outlet door 131. When an operation stop signal is input through the signal receiver 163, the controller 161 controls the solenoid 143 to retract the rod 145. When the rod 145 is retracted, the protrusion 133 and the outlet door 131 is rotated about the rotary shaft 132, thereby closing the outlet 117 as illustrated in FIG. 5.

[0024] An outdoor unit of an air conditioner according to a second embodiment of the present invention will now be described with reference to accompanying drawings. Like reference numerals are used to like elements with the above-mentioned and illustrated elements for the convenience of description. Referring to FIGS. 8 and 9, the outdoor unit of the air conditioner according to the current embodiment includes a case 110 forming a receiving space therein and having an outlet 117 at one side, a blower 125 installed inside the case 110, an outlet door 131 installed to open/close the outlet 117 of the case 110, an outlet door driving unit 170 driving the outlet door 131, an opening detector 165 detecting opening of the outlet 117, and a controller 161 controlling the blower

125 and the outlet door driving unit 170 on the basis of a detection result of the opening detector 165.

[0025] A heat exchanger 123 is installed in the case 110 along an inlet 115, and a blower 125 is provided inside the heat exchanger 123.

[0026] The outlet 117 of a quadrangular shape is formed at a front surface of the case 110, and the outlet door 131 of a quadrangular shape is installed at the outlet 117. A rotary shaft 132 is formed at a lower portion of both sides of the outlet door 131 so as to allow the outlet door 131 to be rotated upwardly and downwardly. The outlet door driving unit 170 is installed in the case 110 so as to rotate the outlet door 131.

[0027] The outlet door driving unit 170 includes a drive motor 171 disposed at one side of the outlet door 131, a driving gear 175 coupled to a rotation shaft 173 of the drive motor 171, a driven gear 176 coupled to the rotary shaft 132 of the outlet door 131, and a gear 177 rotated in mesh with the driving gear 175 and the driven gear 176.

[0028] The opening detector 165 is installed at the outlet 117 in order to detect opening of the outlet door 131.

[0029] The outdoor unit of the air conditioner includes the controller 161 implemented as a microcomputer having a control program. Such a controller 161 serves to introduce the air into the outdoor unit to accelerate heat exchange when an operation signal is input from an indoor unit. As illustrated in FIG. 10, the controller 161 is connected to a signal receiver 163, the opening detector 165, the drive motor 171, the blower 125, and an indicator 171 indicating predetermined information including an error to the outside for electric signal transfer,

[0030] An operation method of the outdoor unit of the air conditioner according to the current embodiment will now be described with reference to FIG. 11.

[0031] When an operation signal is input from an indoor unit through the signal receiver 163 (S10), the controller 161 controls the drive motor 171 to allow the outlet door 131 to open the outlet 117 (S20). When the drive motor 171 rotates, the outlet door 131 is rotated downward about the rotary shaft 132 by the driving gear 175, the gear 177, and the driven gear 176, thereby opening the outlet 117. Thereafter, the opening detector 165 detects opening of the outlet 117 (S30), and when it is detected that the outlet 117 is opened, the blower 125 is driven (S40). When the blower 125 is driven, the air is introduced through the inlet 115, and the introduced air is heat-exchanged while passing through the heat exchanger 123, and then is discharged to the outside through the outlet 117. The discharged air is guided in an upwardly direction of a front side of the case 110 by the outlet door 131 inclined frontward and downward.

[0032] When it is detected that the outlet 117 is not opened, the controller 161 counts the number (Ni) of attempts to open the outlet 117 (S60). When the counted number (Ni) is the same as or smaller than a set value (Nset), the drive motor 171 is controlled again to open the outlet 117 (S20). When the counted number (Ni) is greater than the set value (Nset) (S70), the controller 161

controls the indicator 167 to indicate an error to the outside (S80). Also, the blower 125 is maintained at a stopped state (S90), and the outlet door 131 is also maintained at a closed state (S100). When an operation stop signal is input from the indoor unit through the signal receiver 163 (S50), the controller 161 stops driving of the blower 125 (S90), and controls the drive motor 171 to close the outlet 117 (S110).

[0033] An air conditioner according to a third embodiment of the present invention will now be described with reference to accompanying drawings.

[0034] Referring to FIGS. 12 through 14, the outdoor unit of the air conditioner according to the current embodiment includes a case 110 including an inlet 115 forming therein a receiving space and introducing the air, and an outlet 117 formed at a front side to discharge the air; a heat exchanger 123 disposed toward the inlet 115 in the case 110; a blower 125 disposed at one side of the heat exchanger 123; and an outlet door 131 coupled to the case 110 to be rotatable between a closing location where the outlet door 131 closes the outlet 117, and an opening location where the outlet door 131 opens the outlet 117 and is inclined downwardly so as to guide the discharged air in an upward direction.

[0035] The case 110 has a rectangular parallelepiped shape having therein a receiving space, and a division plate 113 dividing a space is installed in the case 110. A compressor 121 is received in one space divided by the division plate 113 to compress a refrigerant, and an inlet 115 introducing the air is formed at side and rear surfaces of the other space divided by the division plate 113. An outlet of a quadrangular shape is formed at a front surface of the case 110 to discharge the introduced air.

[0036] A heat exchanger 123 having a reverse "L" shape is installed inside the inlet 115, and a blower 125 is installed in a front region of the heat exchanger 123. The blower 125 introduces the external air through the inlet 115, and discharges the air heat-exchanged while passing through the heat exchanger 123 to the outside through the outlet 117.

[0037] A plurality of outlet door 131 are rotatably installed at the outlet 117 to open/close the outlet 117. A rotary shaft 132 protruding from both sides of the case 110 is formed at a lower portion of both sides of each of the outlet door 131. A outlet door driving unit 180 is provided at one side of the rotary shaft 132 so as to open/close each of the outlet door 131 in a rotating manner.

[0038] The outlet door driving unit 180 includes a transmitting member 183 disposed at one side of a rear surface of each of the outlet door 131 to be slidable in a vertical direction, a protrusion 133 protruding from one side of the rotary shaft 132 of the outlet door 131 toward the transmitting member 183 perpendicularly to a plate surface of each of the outlet doors 131, and a transmitting member driving unit 191 driving the transmitting member 183 to allow each of the outlet door 131 to be driven between the closing location where each of the outlet doors 131 closes the outlet 117 and the opening location

where each of the outlet doors 131 opens the outlet 117 to guide the air being discharged in an upward direction of the front side of the case 110.

[0039] The transmitting member driving unit 191 includes a rack part 185 formed at the transmitting member 183, a pinion 193 rotated in mesh with the rack part 183, and a drive motor 195 rotating the pinion 183 in forward and backward rotations.

[0040] Each protrusion 133 has a pin 135 protruding outwardly parallel to the rotary shaft 132, and the transmitting member 183 includes a slot 184 formed corresponding to a rotation path of the pin 135 so that each pin 135 can be received therein to make a relative motion.

[0041] Transmitting member guides 187 are provided at both sides of the transmitting member 183 to guide sliding of the transmitting member 183 in a vertical direction.

[0042] The controller 161 implemented as a micro-processor having a control program is connected to a signal receiver 163 receiving a signal from an indoor unit (not shown), the blower 125, and the drive motor 195 for electric signal transfer, so that when an operation is started, the controller 161 can perform control allowing the outlet 117 to be opened/closed, while driving the blower 125.

[0043] By the structure, when the signal receiver 163 receives a cooling or heating operation signal, the controller 161 rotates the blower 125, and also drives the drive motor 195 to rotate the outlet door 131 in a direction in which the outlet 117 is opened. When power is applied to the drive motor 195 and thus rotation is started, the pinion 193 is rotated. Thus, the transmitting member 183 having the rack part 185 engaged with the pinion 193 is slide upwardly. Then, each of the outlet door 131 is rotated downwardly about the center of the rotary shaft 132, and thus is inclined at the opening location.

[0044] When the blower 125 is rotated, the air is introduced into the case 110 through the inlet 115. The introduced air is heat-exchanged while passing through the heat exchanger 123, and then is discharged through the outlet 117. Here, the air is discharged in an upward direction of a front side of the case 110 by each of the outlet door 131 inclined at the opening location.

[0045] When an operation stop signal of the indoor unit is received through the signal receiver 163, the controller 161 serves to stop the blower 125, and control the drive motor 195 to close the outlet 117.

[0046] Operational effects of the outdoor unit of the air conditioner and the operation method according to the present invention will now be described.

[0047] An outdoor unit of an air conditioner according to the present invention includes an outlet door opening/closing an outlet, such that the outlet is opened at the time of operation to thus guide the air being discharged in a desired direction, and the outlet is closed when the operation is stopped to thus prevent foreign substances from flowing into a case.

[0048] Accordingly, when the outlet is installed toward

a sidewalk, the air heat-exchanged with the heat exchanger is guided away from a pedestrian, thereby preventing unpleasantness of the pedestrian.

[0049] Also, when the outlet is closed, the closing of the outlet is immediately detected, so that the operation of drive elements including a blower is not started. Accordingly, the device can be prevented from being operated under abnormal conditions, and this abnormal conditions can be indicated to the outside, so that the quick action for such abnormality can be made.

[0050] As the present invention may be embodied in several forms without departing from the spirit or essential characteristics thereof, it should also be understood that the above-described embodiments are not limited by any of the details of the foregoing description, unless otherwise specified, but rather should be construed broadly within its spirit and scope as defined in the appended claims, and therefore all changes and modifications that fall within the metes and bounds of the claims, or equivalents of such metes and bounds are therefore intended to be embraced by the appended claims.

Claims

1. An outdoor unit of an air conditioner comprising:
 - a case including an outlet; and
 - an outlet door installed at the case to open/close the outlet, and guiding the air being discharged when opened.
2. The outdoor unit of claim 1, further comprising an outlet door driving unit driving the outlet door to open/close the outlet.
3. The outdoor unit of claim 1 or 2, wherein the outlet door is installed to be rotatable upwardly and downwardly about a lower end, and is inclined downwardly so as to guide the air in an upward direction when opened.
4. The outdoor unit of claim 2 or 3, wherein the outlet door driving unit comprises a solenoid.
5. The outdoor unit of claim 2 or 3, wherein the outlet door driving unit comprises a drive motor.
6. The outdoor unit of any of claims 2 to 5, wherein the outlet door is configured in plurality, and the outlet door driving unit comprises a transmitting member connected to the outlet door to simultaneously interwork therewith, and a transmitting member driving unit driving the transmitting member.
7. The outdoor unit of any of claims 2 to 6, further comprising:

an opening detector detecting opening of the outlet; and
a controller controlling the outlet door driving unit and the blower on the basis of a detection result of the opening detector.

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8. The outdoor unit of claim 7, wherein the case includes a blower therein, and the controller controls the blower on the basis of a detection result of the opening detector.

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9. A method of operating an outdoor unit of an air conditioner comprising a case having an outlet, a blower disposed in the case, an outlet door opening/closing the outlet, and an outlet door driving unit driving the outlet door, the method comprising:

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controlling the outlet door driving unit to open the outlet; and
driving the blower.

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10. The method of claim 9, wherein the outdoor unit further comprises an opening detector, the method further comprising detecting opening of the outlet by the opening detector before the driving of the blower,
wherein in the driving of the blower, the blower is driven when the outlet is opened, and the blower is stopped when the outlet is closed.

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11. The method of claim 10, wherein the outdoor unit further comprises an indicator indicating information including error to the outside, the method further comprising controlling the indicator to indicate an error the outside in a state where the blower is stopped when the outlet is closed, after the detecting of the opening of the outlet.

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FIG. 1

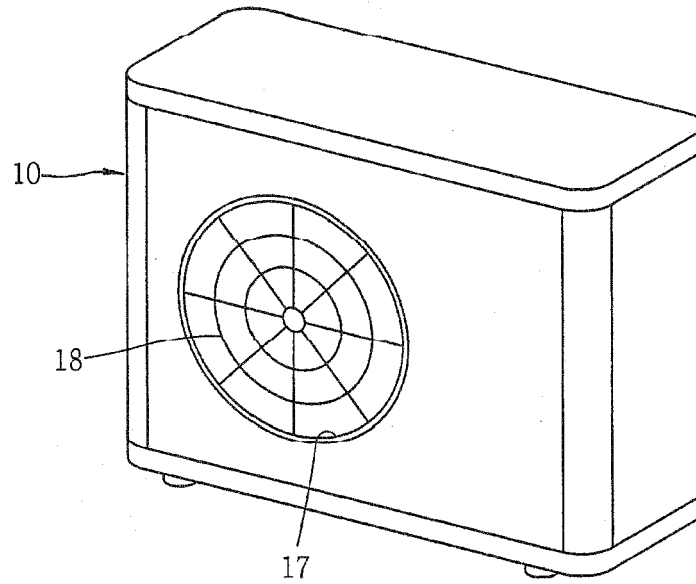


FIG. 2

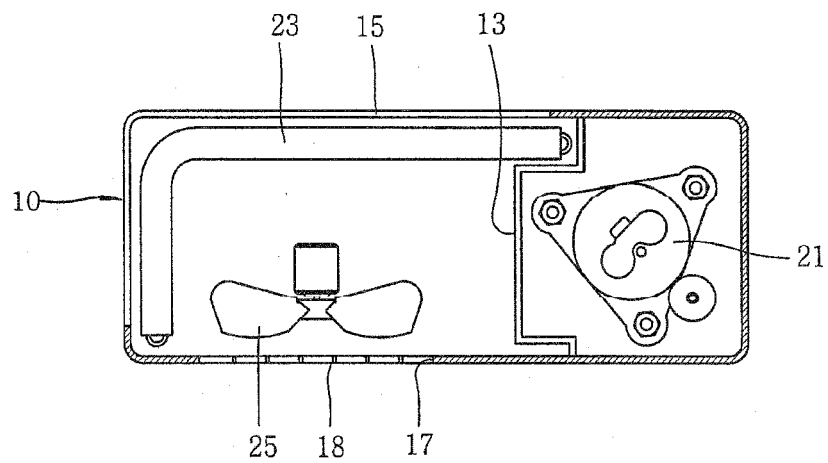


FIG. 3

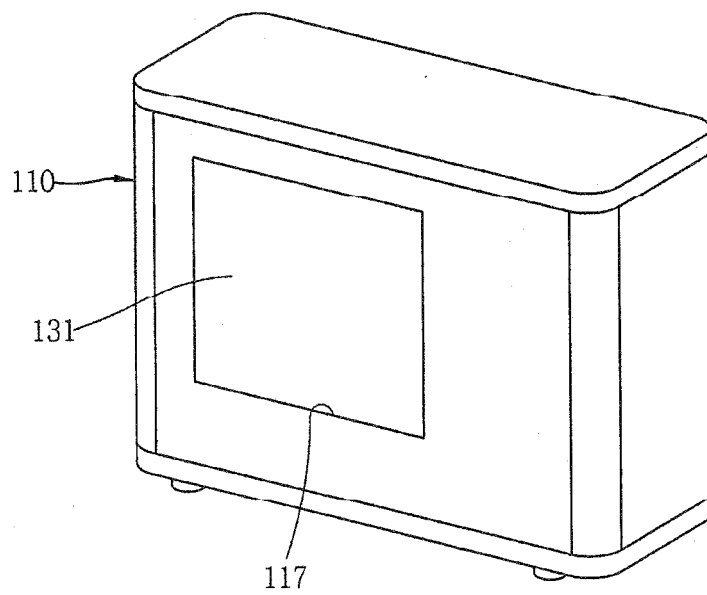


FIG. 4

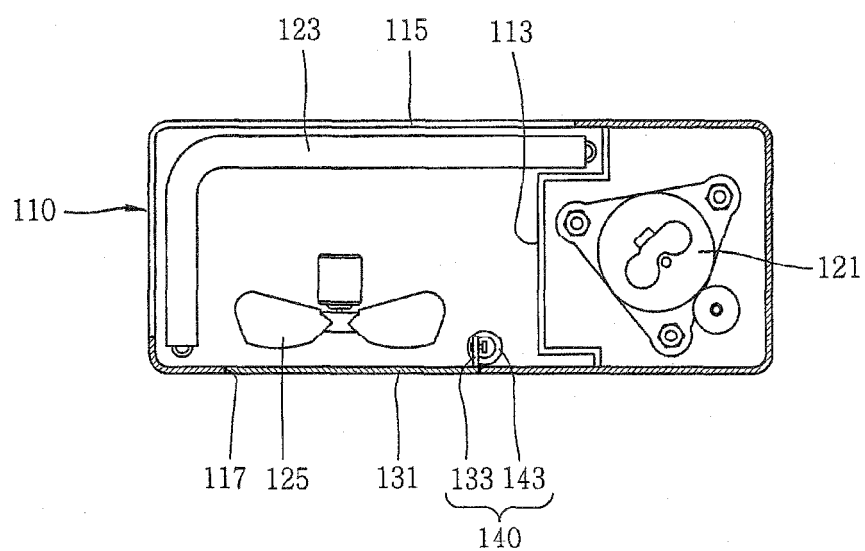


FIG. 5

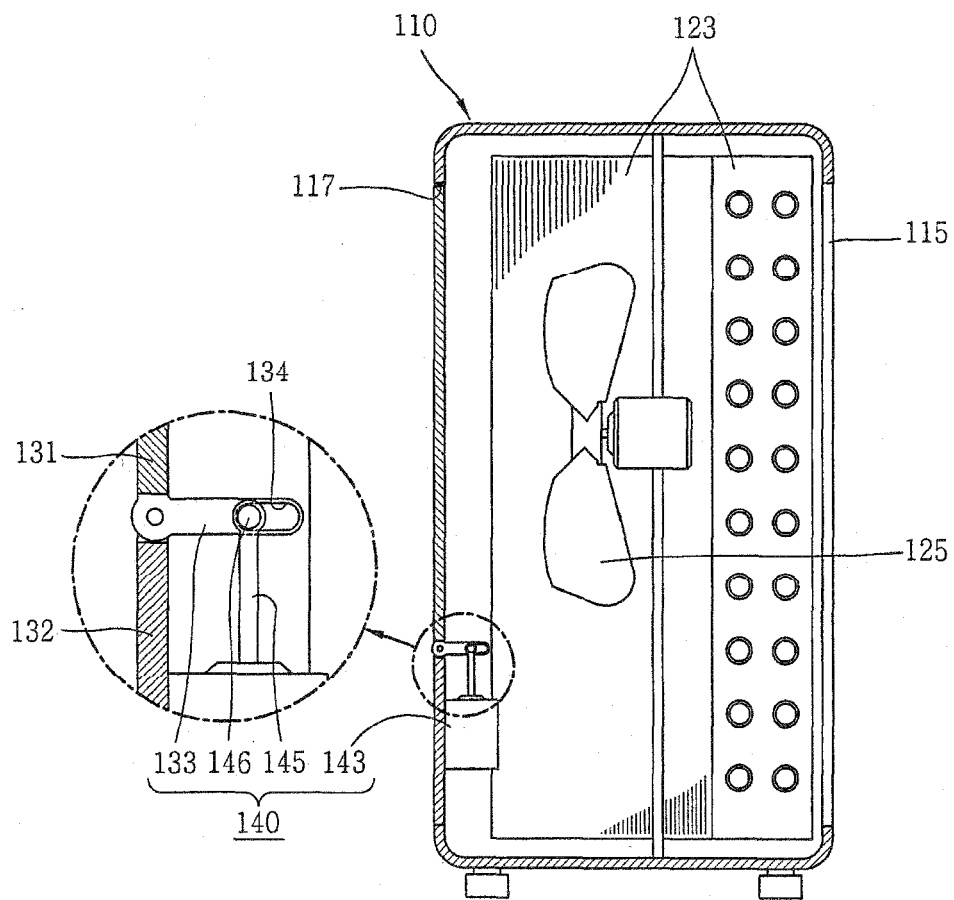


FIG. 6

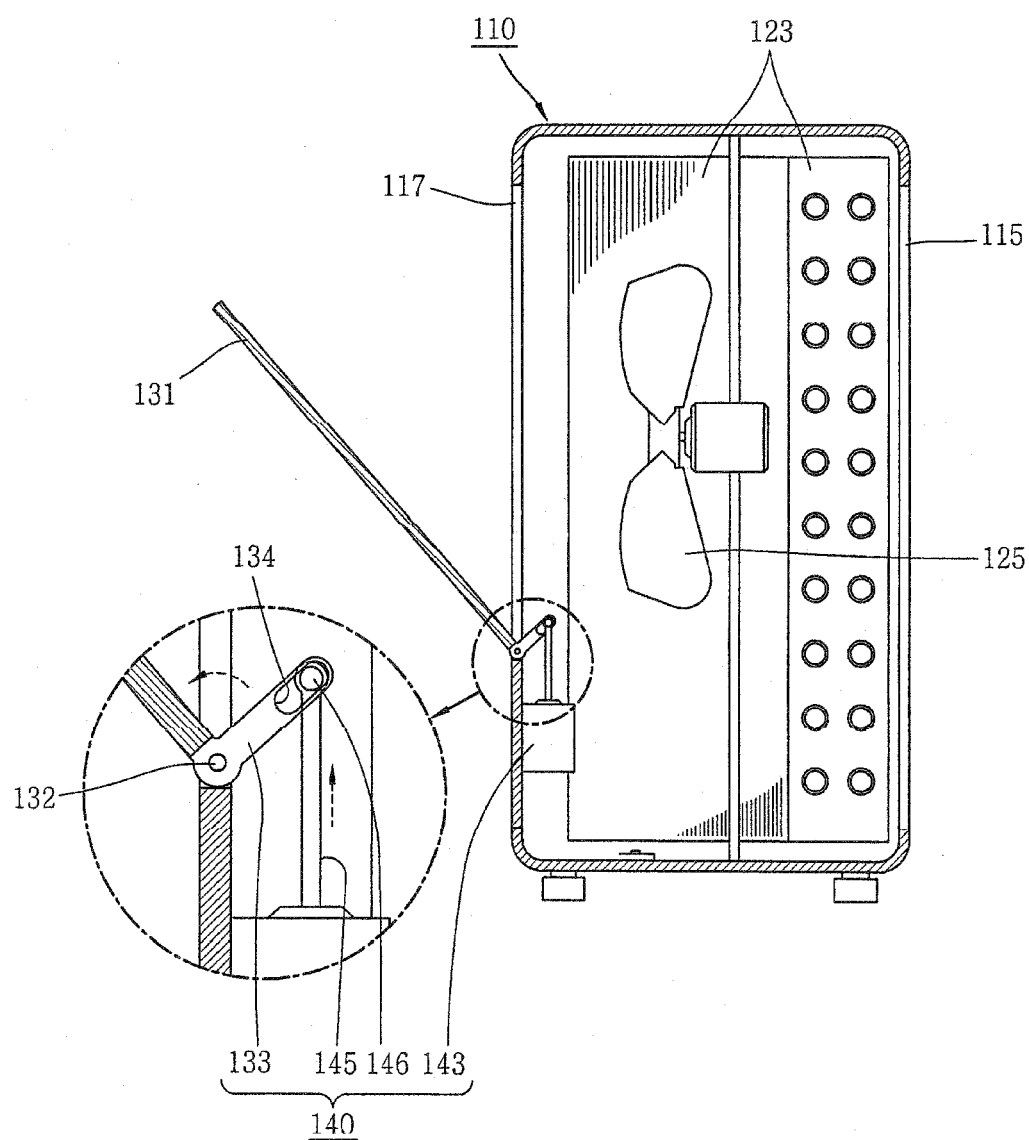


FIG. 7

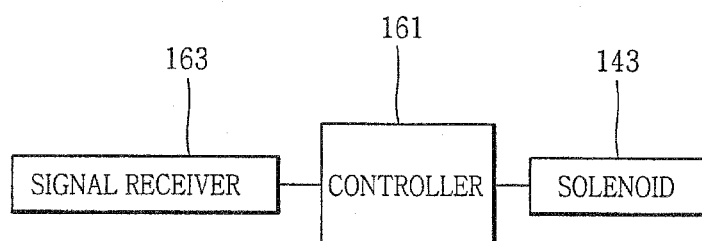


FIG. 8

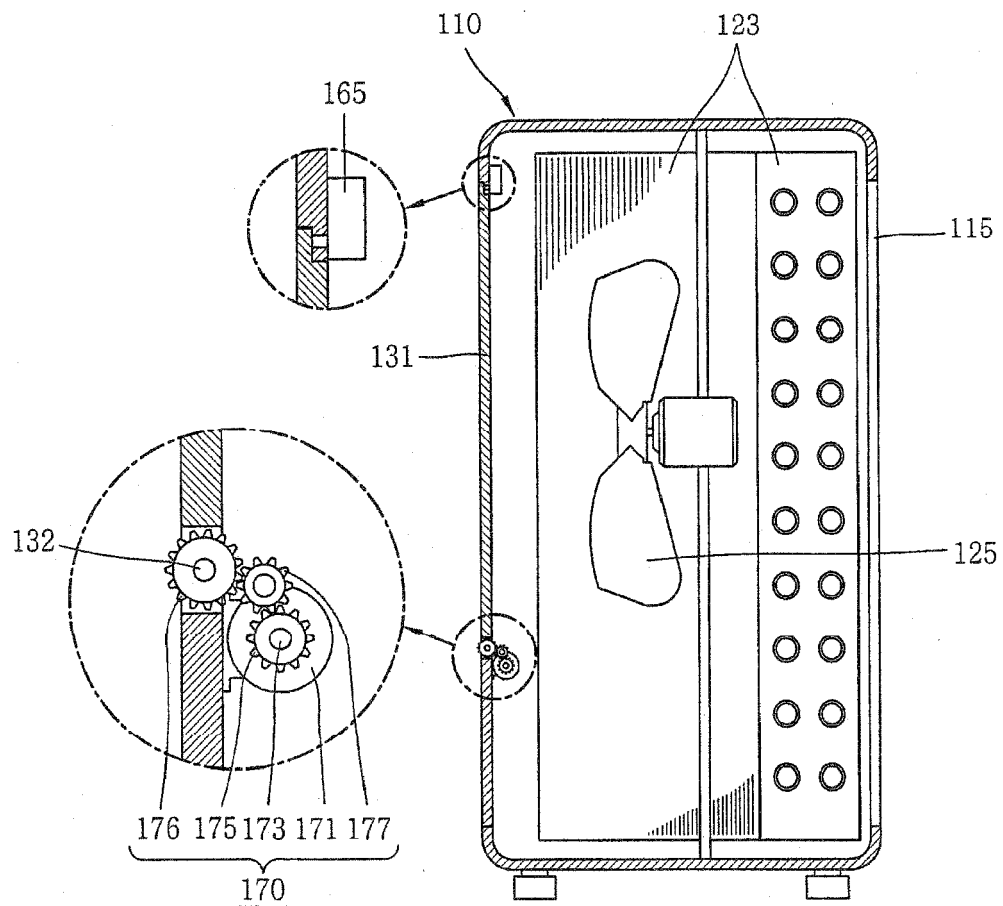


FIG. 9

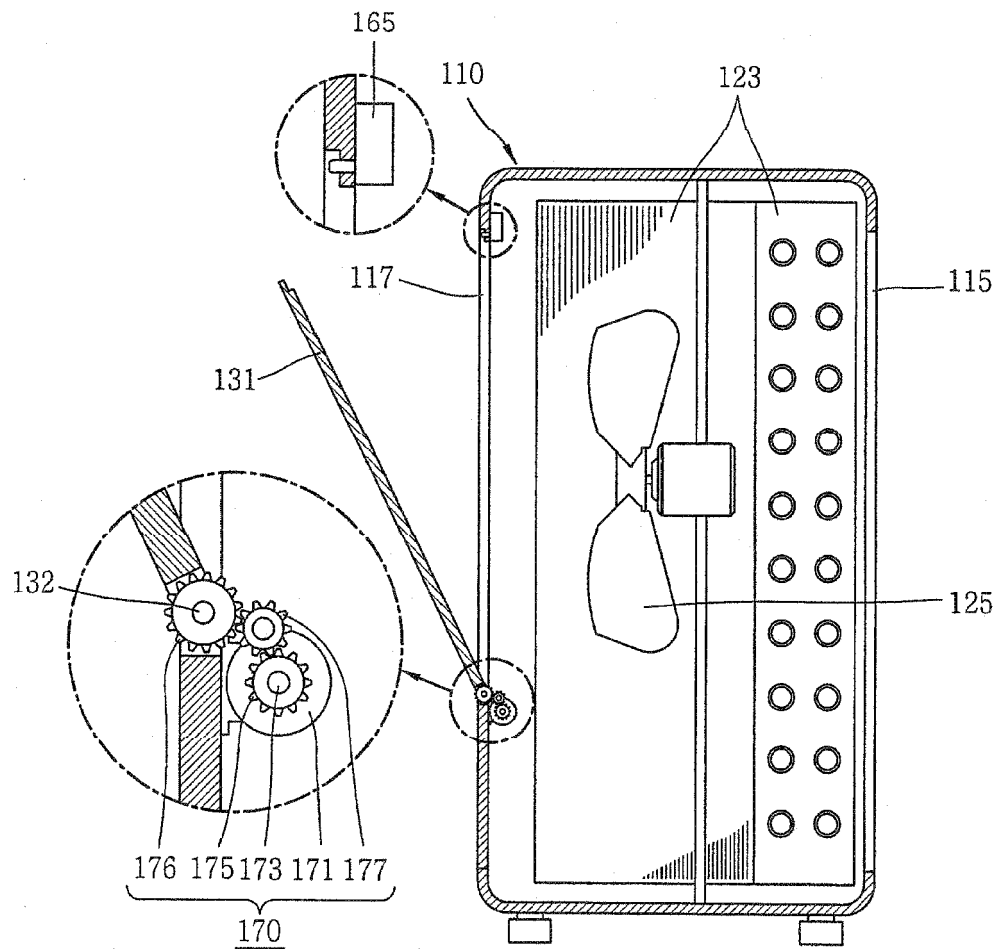


FIG. 10

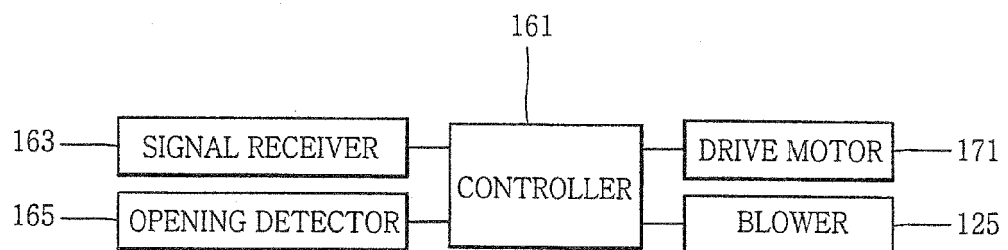


FIG. 11

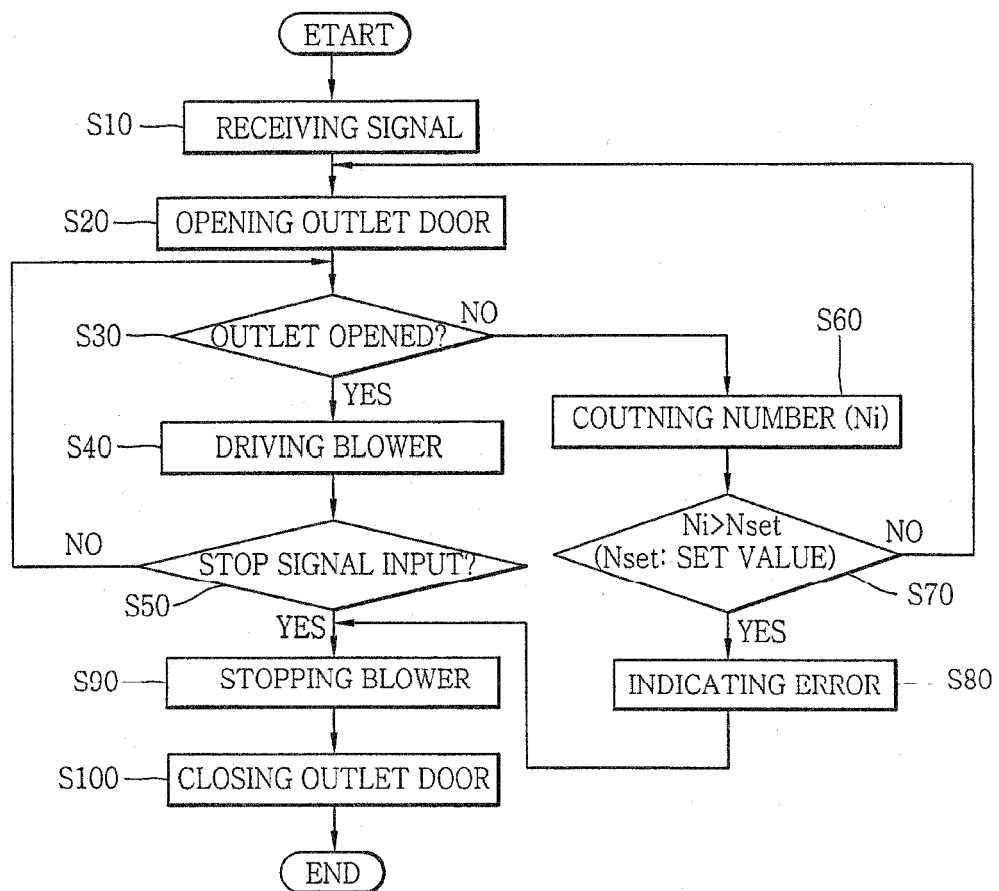


FIG. 12

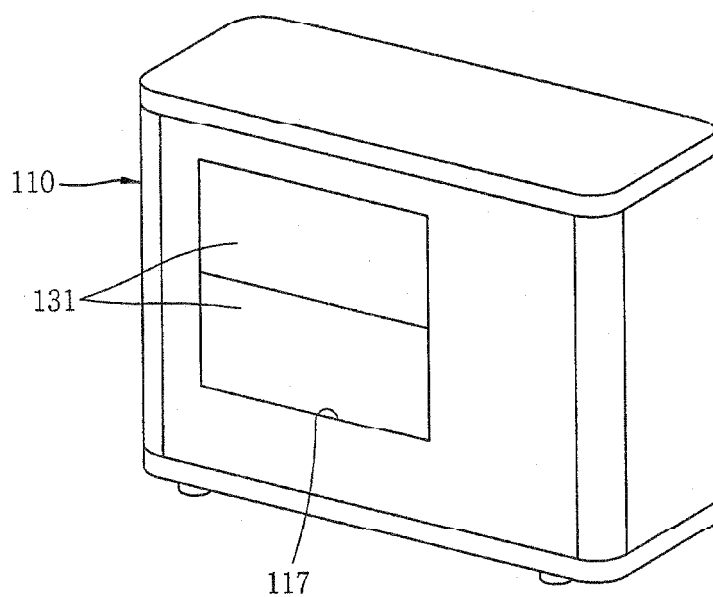


FIG. 13

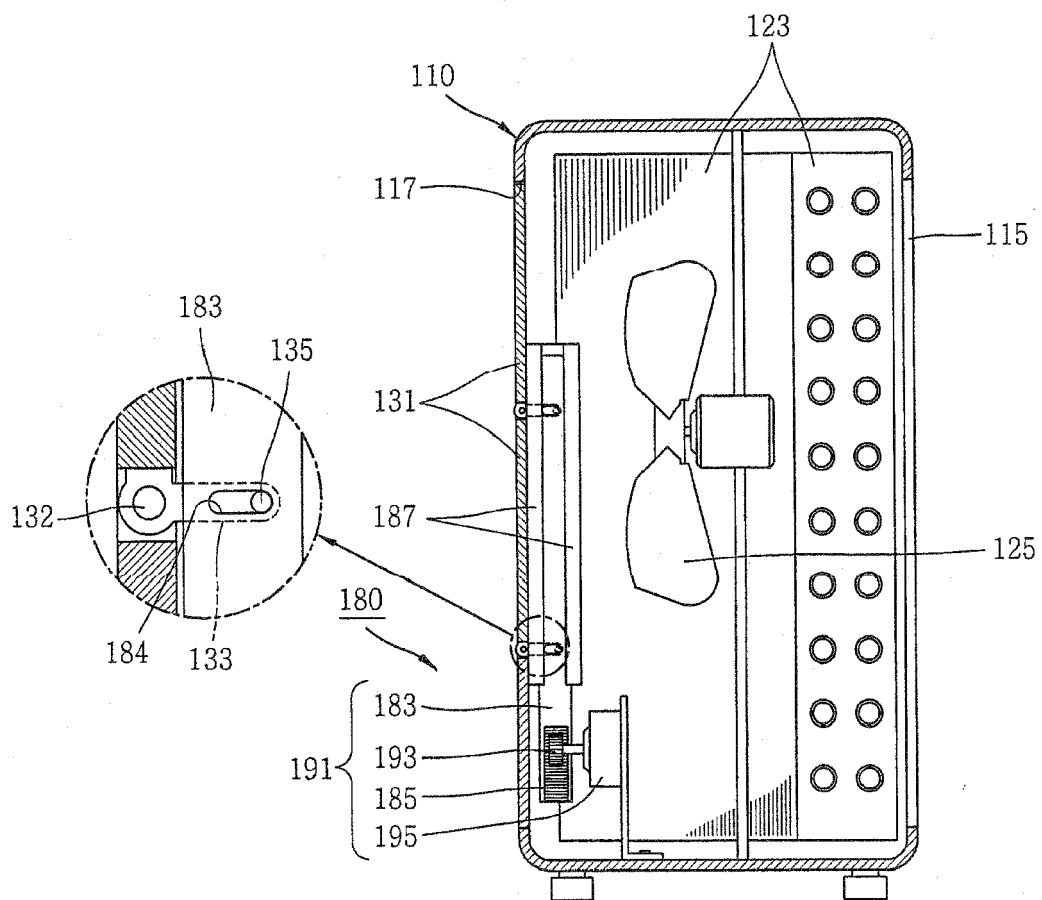


FIG. 14

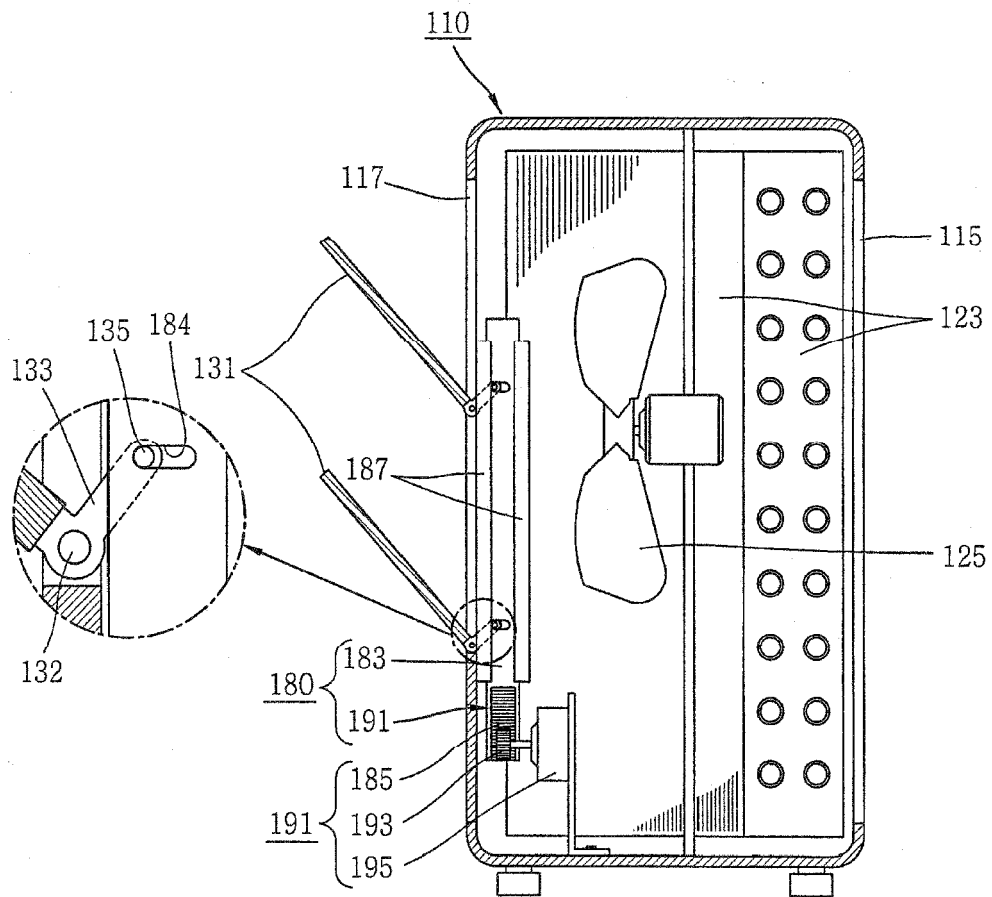
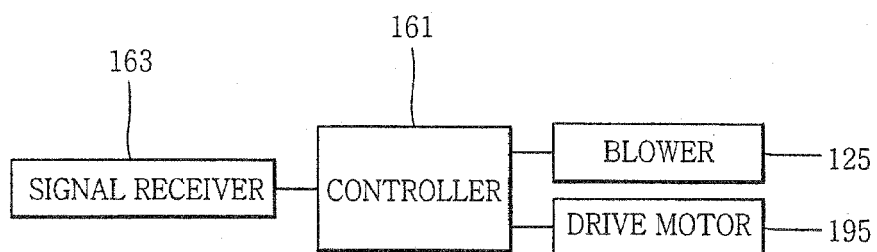


FIG. 15





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 12 7273

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 10 April 2007	Examiner Valenza, Davide
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 06 12 7273

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