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(54) Title: DEHUMIDIFIER

(57) Abstract: A dehumidifier includes a main body case that defines an inner space and is provided at a side with an external air inlet, a barrier dividing the inner space, a main body base that is formed on a lower end of the barrier to define an outer appearance of a lower portion of the main body, a plurality of heat exchangers that are disposed at a side of the barrier to allow circulation air circulating the inner space to be heat-exchanged with external air introduced from an external side, a drain pan for temporally storing condensed water generated from the heat exchangers, and a water tank that stores the condensed water supplied from the drain pan when being inserted in the main body base.

Description

DEHUMIDIFIER

Technical Field

[1] The present invention relates to a dehumidifier. More particularly, the present invention relates to dehumidifier in which a flow path of air circulating along a plurality of heat exchangers is formed in a closed-circuit.

Background Art

[2] Generally, a dehumidifier is an appliance that sucks damp air into a case, allows the sucked damp air to pass through a heat exchanger to remove moisture from the sucked air, and discharge the air from which the moisture is removed to an indoor space, thereby lowering the humidity in the indoor space.

[3] The dehumidifier of the related art functions to perform a dehumidifying operation in an air conditioner that has a compressor and other components to form a cooling/ heating cycle. Therefore, the dehumidifier has relatively lower dehumidifying efficiency and causes the increase of the weight of the air conditioner.

[4] Further, the dehumidifier of the related has a water tank built therein. Therefore, in order to dump out the water from the water tank, the user has to separate the water tank from the dehumidifier after stopping an operation of the dehumidifier and removing a dehumidifier case. This is troublesome for the user.

Disclosure of Invention

Technical Problem

[5] An object of the present invention is to provide a dehumidifier that is light and compact while having an adsorption member for adsorbing moisture contained the air, a plurality of heat exchangers, and a heater assembly for heating a circulation air.

[6] Another object of the present invention is to provide a dehumidifier that is configured to easily dump out condensed air.

Technical Solution

[7] To achieve these objects and other advantages and in accordance with the purpose of the invention, as embodied and broadly described herein, there is provided a de-humidifier including: a main body case that defines an inner space and is provided at a side with an external air inlet; a barrier dividing the inner space; a main body base that is formed on a lower end of the barrier to define an outer appearance of a lower portion of the main body; a plurality of heat exchangers that are disposed at a side of the barrier to allow circulation air circulating the inner space to be heat-exchanged with external air introduced from an external side; a drain pan for temporally storing condensed water generated from the heat exchangers; and a water tank that stores the

condensed water supplied from the drain pan when being inserted in the main body base.

[8] In another aspect of the present invention, there is provided a dehumidifier including: a main body case provided with an air inlet through which external air is introduced; a side heat exchanger at which the external air is heat exchanged; a barrier for directing the external air passing through the side heat exchanger frontward; a front heat exchanger at which the external air guide frontward from the barrier is heat-exchanged; an inner heat exchanger at which the external air passing through the front heat exchanger is heat-exchanged; and a drain pan for temporally storing condensed water generated when external air is heat-exchanged with circulation air circulating in the main body case, wherein the condensed water stored in the drain pan falls to a water tank when the water tank is inserted in the main body.

Advantageous Effects

[9] According to the dehumidifier of the present invention, since the dehumidifier is independently provided from an air conditioner, no compressor is required and thus a weight of the product can be reduced. Further, the dehumidifying efficiency can be enhanced.

[10] Further, the support and water tank is provided under the main body and the water tank is configured to be separated from the support in a side direction. When the water tank is separated from the dehumidifier, the condensed water is temporally stored in the drain pan. Accordingly, it is easy to dump out the water from the water tank and there is no need to stop the operation of the dehumidifier during dumping out the water from the water tank.

Brief Description of the Drawings

[11] Fig. 1 is a perspective view of a dehumidifier according to an embodiment of the present invention;

[12] Fig. 2 is a first side exploded perspective view of the dehumidifier of Fig. 1;

[13] Fig. 3 is a second side exploded perspective view of the dehumidifier of Fig. 1;

[14] Fig. 4 is a front perspective view of an internal structure of the dehumidifier according to an embodiment of the present invention;

[15] Fig. 5 is a rear perspective view of the internal structure of the dehumidifier of Fig. 4;

[16] Fig. 6 is an exploded perspective view of a main case and top panel of the dehumidifier according to an embodiment of the present invention;

[17] Fig. 7 is a rear perspective view of an inner heat exchanger of the humidifier according to an embodiment of the present invention;

[18] Fig. 8 is a perspective view of a barrier of the dehumidifier according to an embodiment of the present invention;

[19] Fig. 9 is a perspective view of a state where an adsorption assembly and an inner heat exchanger are mounted on a barrier of the dehumidifier according to an embodiment of the present invention;

[20] Fig. 10 is a perspective view of a side heat exchanger of the dehumidifier according to an embodiment of the present invention;

[21] Figs. 11 and 12 are respective first and second side exploded perspective views of the side heat exchanger of Fig. 10;

[22] Figs. 13 and 14 are perspective view of a drain pan of the dehumidifier according to an embodiment of the present invention;

[23] Fig. 15 is a schematic view illustrating an airflow state of external air in the dehumidifier according to an embodiment of the present invention;

[24] Fig. 16 is a schematic view of an airflow state of air in rear of a barrier of the dehumidifier according to an embodiment of the present invention;

[25] Fig. 17 is a view illustrating a circulation air flow path in Fig. 2;

[26] Fig. 18 is a view illustrating a circulation air flow path in Fig. 3; and

[27] Fig. 19 is a view illustrating an operation of a drain unit provided on a drain pan according to an embodiment of the present invention.

Best Mode for Carrying Out the Invention

[28] Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings. The invention may, however, be embodied in many different forms and should not be construed as being limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the concept of the invention to those skilled in the art.

[29] Fig. 1 is a perspective view of a dehumidifier according to an embodiment of the present invention.

[30] Referring to Fig. 1, a dehumidifier of this embodiment includes a main body 100 for receiving a plurality of major components and a water container 300 and a support 310 that are disposed under the main body 100.

[31] The main body 100 includes a main body case 110 formed in a rectangular container having opened top and bottom and a top panel 120 mounted on the top of the main body case 110.

[32] The front case 110 defining front, rear, left, and right sides of the main body 100. That is, the front case 110 includes a front panel 112 defining the front side, a rear panel 114 (see Fig. 6) defining the rear side, a right panel 116 defining the right side, and a left panel 118 defining the left side.

[33] The front, rear, left, and right panels 112, 114, 118, and 116 are integrally formed

with each other such that the top and bottom of the main body case 110 are opened. Accordingly, the bottom of the main body case 110 is closed by a main body base 150 that will be described hereinafter.

[34] Fig. 2 is a first side exploded perspective view of the dehumidifier of Fig. 1, Fig. 3 is a second side exploded perspective view of the dehumidifier of Fig. 1, Fig. 4 is a front perspective view of an internal structure of the dehumidifier according to an embodiment of the present invention, and Fig. 5 is a rear perspective view of the internal structure of the dehumidifier of Fig. 4. In addition, Fig. 6 is an exploded perspective view of a main case and top panel of the dehumidifier according to an embodiment of the present invention and Fig. 7 is a rear perspective view of an inner heat exchanger of the humidifier according to an embodiment of the present invention.

[35] Referring to Figs. 2 through 7, the top panel 120 defines an outer appearance of the top of the main body 100. The top panel 120 is installed to be spaced apart from an upper end of the main body case 110 with a predetermined gap.

[36] Accordingly, the gap between the top panel 120 and the upper end of the main body case 110 functions as an air outlet 122 through which the air is discharged.

[37] In more detail, an edge of the top panel is installed to be spaced apart from the upper end of the main body case 110 with a predetermined gap. That is, as shown in the drawings, a predetermined gap is formed between the edge of the top panel 120 and the front, rear, left and, right panels 112, 114, 118, and 116. That is, as described above, the air outlet 122 through which the dehumidified air is discharged is formed.

[38] For descriptive convenience, air that is introduced from an external side (an indoor space) of the dehumidifier into an interior side of the dehumidifier and subsequently discharged into the indoor space will be referred to as 'air. In addition, air circulating along a plurality of heat exchangers 200, 210, and 220, a recovery assembly 160, and a heater assembly, which will be described later, will be referred to as 'circulation air.

[39] Spacing projections 124 are provided between the top panel 120 and the main body case 110 to form the gap between the top panel 120 and the main body case 110. The spacing projections 124 is formed having a predetermined height to support the top panel 120, thereby allowing the top panel 110 to maintain a predetermined space from the upper end of the main body case 110.

[40] The spacing projections 124 protrude upward from the upper end of the main body case 110. In more detail, the spacing projections 124 are formed on respective corners of the upper end of the main body case 110. Each of the spacing projections 124 is formed in a thin cylindrical shape. That is, the top panel 120 is provided at four corners of the bottom surface with projection grooves 126 corresponding to the spacing projections 124. The spacing projections 124 are fixedly inserted in the corresponding projection grooves 126.

[41] The main body case 110 is provided at one surface (right surface) with air inlets 128 through which the air is introduced. That is, the air inlets 128 are formed on the right panel 116. The air inlets 128 define passages along which the air is introduced into the main body case 110. Each of the air inlets 128 may be formed in a slit shape extending in a horizontal direction.

[42] Alternatively, each of the air inlets 128 may be formed in a slit shape extending in a vertical direction. Instead of forming the air inlets on the right panel 116, a separate air inlet grille may be detachably installed on the right panel 116.

[43] A barrier 130 dividing an interior space of the main body 100 into front and rear spaces is provided in the main body 100. That is, the barrier 130 is bent at a plurality of portions. That is, as shown the drawings, when viewed from the top, the barrier 130 is formed in '

' -shape.

[44] The barrier 130 is provided at a right end portion with a rearward extending portion 130a that is vertically bent rearward. The rearward extending portion 130a is further bent rightward to form a rightward extending portion 130b. The rightward extending portion 130b is further bent at a predetermined angle to form an inclined end portion 130c.

[45] The inclined end portion 130c is formed having an acute angle with respect to an extending line of the rightward extending portion 130b and contacts a rear end of the right panel 116 and a right end of the rear panel 114. Therefore, the inclined end portion 130c allows the external air introduced through the air inlet of the right panel 116 to be effectively introduced into a front portion of the barrier 130.

[46] The barrier 130 is configured to have a height that is same as or less than a height of the main body case 110. Accordingly, a gap is formed between an upper end of the barrier 130 and the top panel 120. The reason for forming the gap between the upper end of the barrier 130 and the top panel 120 is to allow the dehumidified air to flow upward at a rear side of the barrier 130 and subsequently flows to the front side of the barrier 130 through the gap between the barrier 130 and the top panel 120. Therefore, the dehumidified air can be discharged to an external side through the gap between the top panel 120 and the front panel 112.

[47] A rearward recess 132 having a predetermined size is formed on the barrier 130. The rearward recess 132 is formed at a center of the barrier 130 and recessed rearward. A heater assembly 170, a blower fan 246, and an inner heat exchanger 200 are installed in the rearward recess 132.

[48] The rearward recess 132 is provided at a center with a central through hole 134. The central through hole 134 functions as a passage through which the air flows from the

front side of the barrier 130 to the rear side of the barrier 130.

[49] A motor support 136 is formed on a central portion of the central through hole 134. The motor support 136 is a portion on which the blower motor 240, the blower fan 246, and the heater assembly 170 are mounted.

[50] The motor support 136 is formed on a central portion of the central through hole 134 and a plurality of support guides 136' (four support guides) extending in a radial direction is formed on the motor support 136. Therefore, the motor support 136 is integrally formed with the barrier 136.

[51] An adsorption motor receiving portion 138 is formed on a side of the motor support 136. The cylindrical adsorption motor receiving portion 138 is formed on a left-upper half of the central through hole 134. The adsorption motor receiving portion 138 is a portion on which an adsorption motor 176 is mounted. The adsorption motor receiving portion 138 is formed in a cylindrical shape opened frontward. The adsorption motor receiving portion 138 may be integrally formed on the rearward recess 132.

[52] The rearward recess 132 is provided with a heater receiving portion 140. The heater receiving portion 140 is a portion on which the heater assembly 170 is mounted. The heater receiving portion 140 is formed on a left portion of the rearward recess 132. Heater guides for supporting upper and lower ends of the heater assembly 170 is formed to extend frontward from the rearward recess 132.

[53] A recovery receiving portion 144 is formed above the heater receiving portion 140. A predetermined space is defined above the heater guide 142 of the barrier 130 to form the recovery receiving portion 144. The recovery assembly 160 is installed in the recovery receiving portion 144.

[54] The barrier 130 is provided with an air outlet 146 opened frontward. The air outlet 146 is a portion through which the circulation air is discharged. The air outlet 146 is formed on a right lower end of the rearward recess 132 of the barrier 130. Therefore, the circulation air discharged front side through the air outlet 146 is introduced into the inner heat exchanger 200.

[55] A cylindrical air inlet 146' is formed extending from a right portion of the barrier 130. That is, as shown in the drawing, the cylindrical air inlet 146' is formed extending rightward from a right lower end of the barrier 130. The air inlet 146' is a portion for guiding the circulation air discharged from a side heat exchanger 220, which will be described later, to an interior side of the barrier 130.

[56] The air inlet 146' and the air outlet 146 communicate with each other. Therefore, the circulation air introduced into the barrier 130 through the air inlet 146' is discharged again through the air outlet 146.

[57] The airflow guide 148 is formed on a rear surface of the barrier 130. The airflow guide 148 functions to guide the flow of the air that is forcedly directed by the blower

fan 246. That is, airflow guide 148 allows the air discharged in a circumferential direction by the blower fan 246 to flow toward the left upper portion. The blower fan 246 is integrally formed extending from the rear surface of the barrier 130.

[58] The airflow guide 148 includes a circular guide portion 148' enclosing an outer side of the blower fan 246 and an upper guide portion 148" formed extending upward from the circular guide portion 148'. The circular guide portion 148' is a portion for primarily guiding the air discharged in the circumferential direction by the blower fan 246. The upper guide portion 148" is a portion for allowing the air guided leftward by the circular guide portion 148' to flow upward.

[59] A main body base 150 is provided on a lower end of the barrier 130. The main body base 150 is formed in a rectangular plate shape to define a bottom of the main body 100 and support a plurality of components including the barrier 130.

[60] A drain pan receiving portion 152 is formed on the main body base 150. That is, the drain pan receiving portion 152 is formed extending upward from a portion near a right end of the main body base 150. A drain pan that will be described later is received in the drain pan receiving portion 152.

[61] The drain pan receiving portion 152 is provided with a plurality of insertion holes 154, 156, and 158. The insertion holes 154, 156, and 158 are portions in which a plurality of water guide members 206, 216, 222', 224', and 226' formed on lower ends of the heat exchangers 200, 210, and 220 are inserted.

[62] In more detail, the side insertion holes 154 are formed on a right top surface of the drain pan receiving portion 152. The side water guide members 222, 224', and 226' are inserted in the respective sideward insertion holes 154. The side insertion holes 154 include first, second, and third insertion holes 154a, 154b, and 154c. The first, second, and third water guide members 222', 224', 226' are respectively inserted in the first, second, and third insertion holes 154a, 154b, and 154c.

[63] The front insertion hole 156 is formed at the left side of the side insertion hole 154. The front water guide member 216 of the front heat exchanger 210 is inserted in the front insertion hole 156.

[64] The inner insertion hole 158 is further formed at the left side of the front insertion hole 156. That is, the drain pan receiving portion 152 is stepped such that the left side is relatively lower than the right side. The inner insertion hole 158 is formed on the left side of the drain pan receiving portion 152. The inner water guide member 206 of the inner heat exchanger is inserted in the inner insertion hole 158.

[65] A recovery assembly 160 is mounted on the front surface of the barrier 130. That is, the recovery assembly 160 is inserted from a front side into the recovery receiving portion 144 formed near the upper end of the barrier 130.

[66] The recovery assembly 160 is enclosed by the case. Although not shown in the

drawings, the recovery assembly 160 includes a recovery fan and a recovery motor. A recovery inlet 162 is formed on a front surface of the recovery assembly 160 and a recovery outlet 164 is formed on the left side.

[67] The recovery inlet 162 is formed in a circular shape corresponding to the inner outlet 204 formed on the inner heat exchanger. The recovery outlet 164 is formed extending left-downward from the recovery assembly 160. The recovery outlet 164 is formed in a rectangular pillar shape.

[68] A fan-shaped heater assembly 170 is mounted on the front surface of the barrier 130. The heater assembly 170 functions to heat the circulation air circulating along the heat exchangers 200, 210, and 220. Accordingly, the heater assembly includes a heater (not shown) that generates hot air using electricity fed from the external side. The circulation air heated by the heater assembly 170 is fed to the adsorption member 182 to vaporize the moisture adsorbed in the adsorption member 182.

[69] A heater outlet 172 is formed on the front surface of the heater assembly 170. A heater inlet 174 is formed on the rear surface of the heater assembly 170. The heater outlet 172 is a portion through which the high temperature circulation air, which is heated while passing through the heater assembly, is discharged frontward of the heater assembly 170. The heater inlet 174 is a portion to which the recovery outlet 164 of the recovery assembly 160 is coupled. The heater outlet 172 is formed in a fan-shape.

[70] An adsorption motor 176 is mounted on a rear side of the right end of the heater assembly 170. The adsorption motor 176 provides rotational force to the adsorption assembly 180 and is received in the adsorption motor receiving portion 138 of the barrier 130. An adsorption shaft 176' that is a rotational shaft of the adsorption motor 176 is installed to project frontward after passing through the right end of the heater assembly 170. Accordingly, the adsorption assembly 180 is fixed on the front end of the adsorption shaft 176'.

[71] The adsorption assembly 180 is installed in front of the barrier 130. The adsorption assembly 180 includes an adsorption member 182 for adsorbing the moisture contained in the air and an adsorption case 184 for fixing and supporting the adsorption member 182.

[72] The adsorption member 182 may be formed of paper. That is, the adsorption member 182 is formed in a circular shape as a whole. An internal structure is formed in a honeycomb shape such that a plurality of through holes are horizontally formed.

[73] In more detail, the adsorption member 182 is formed by rolling a two-layer paper in a honeycomb shape so that the through holes can be formed. Subsequently, the rolled paper is dipped in the adsorption solution so that the adsorption solution is applied on a surface of the rolled paper. As described above, since the adsorption solution is applied

on the surface of the adsorption member 182, the moisture contained in the air is adsorbed in the adsorption member 182 and thus the moisture is removed from the air.

[74] The adsorption case 184 includes an edge portion 184a enclosing the outer portion of the circular adsorption member 182, a central portion 184b supporting a central portion of the adsorption member 182, and a plurality of connecting portions 184c connecting the edge portion 184a to the central portion 184b.

[75] A front end of the adsorption shaft 176' of the adsorption motor 176 is fixedly connected to the central portion 184b. Therefore, the adsorption case 184 and the adsorption member 182 can rotate with a constant speed in accordance with a torque of the adsorption motor 176.

[76] The adsorption member 182 and the adsorption case 184 are fixedly mounted on the front surface of the barrier 130 by the adsorption frame 190. The adsorption frame 190 is fixed on the front surface of the barrier 130 by, for example, a screw, in a state where it receives the adsorption member 182 and the adsorption case 184.

[77] A hot air guide 192 is formed on a left portion of the adsorption frame 190. The hot air guide 192 is formed in a fan-shape corresponding to the heater assembly 170. The hot air guide 192 protrudes frontward from the front surface of the adsorption frame 190.

[78] The hot air guide 192 functions to guide the circulation air, which is heated while passing through the heater assembly 170, to the front heater exchanger 210. Therefore, the hot air guide 192 is opened rearward so that the circulation air can be introduced therein. The hot air guide 192 has an opened right side and an opened lower end so that the heated circulation air can be introduced into a front air inlet 212 of the front heat exchanger 210.

[79] Sealing members 194 are respectively provided on upper and lower ends of the hot air guide 192. That is, the sealing members 194 are formed of an elastic material such as rubber and provided on respective rear surface of the upper and lower ends of the hot air guide 192.

[80] The sealing member 194 functions to block a gap defined between the adsorption frame 190 and the adsorption member 182. Therefore, the high temperature circulation air flowing through the hot air guide 192 is not leaked through the gap defined between the adsorption frame 190 and the adsorption member 182.

[81] The inner heat exchanger 200 is installed on the barrier 130. That is, the inner heat exchanger 200 is vertically installed on a right portion of the rearward recess of the barrier 130. The inner heat exchanger 200 allows the circulation air in the inner heat exchanger 200 and the air flowing rearward through the central through hole 134 to heat-exchange with each other. The inner heat exchanger 200 is provided with a plurality of air through holes provided in the form of slits.

[82] The inner heat exchanger 200 is provided at a rear surface with inner inlet 202 and inner outlet 204 through which the air is introduced and discharged.

[83] The inner inlet 202 is formed on a rear-lower end of the inner heat exchanger 200. The inner inlet 202 is coupled to the air outlet formed on the barrier 130. Accordingly, the inner inlet 202 has a corresponding size to the air outlet 146. The circulation air discharged through the air outlet 146 is guided into the inner heat exchanger 200 through the inner inlet 202.

[84] The inner outlet 204 is formed on a rear-upper end of the inner heat exchanger 200. The inner outlet 204 allows the circulation air in the inner heater exchanger 200 to be introduced through the recovery inlet 162 of the recovery assembly 160. Accordingly, the inner inlet 204 is coupled to the recovery inlet while having a corresponding size and shape to the recovery inlet 162.

[85] An inner water guide member 206 is further formed on a lower end of the inner heat exchanger 200. That is, the inner water guide member 206 formed in a thin cylindrical shape is formed extending downward from the lower end right side of the inner heat exchanger 200. The outer diameter of the inner water guide member 206 has a corresponding side to an outer diameter of the inner insertion hole 158 of the drain receiving portion 152. Therefore, the inner water guide member 206 is inserted and mounted in the inner insertion hole 158.

[86] The front heat exchanger 210 is further installed in front of the barrier 130. The front heat exchanger 210 is installed in front of the adsorption frame 190 to enclose the right side of the adsorption frame 190. Accordingly, the external air introduced into the adsorption assembly 180 heat-exchanges while passing through the front heat exchanger 210.

[87] The front heat exchanger 210 is bent rearward at its right end so that it has a ㄱ -shape when viewed from a top. A plurality of air passing hole provided in the form of slits are formed on left and right sides of the front heat exchanger.

[88] A left central portion of the front heat exchanger 210 is partly recessed rightward. The front inlet 212 is formed through the left central portion of the front heat exchanger 210. The front inlet 212 corresponds to right and lower ends of the hot air guide 192. Therefore, the front inlet 212 closely contacts the right and lower ends of the hot air guide 192 of the adsorption frame 190 so that the circulation air heated by the hot air guide 192 is guided into the front heat exchanger 210.

[89] A front outlet 214 is formed on a right upper end of the front heat exchanger 210. That is, a right end of the front heat exchanger 210 is bent rearward. The front outlet 214 is formed on a right side upper end of the bent portion of the front heat exchanger 210. The circulation air introduced into the front heat exchanger 210 through the front inlet 212 is discharged through the front outlet 214. The air discharged through the

front outlet 214 is introduced into the side heat exchanger 220.

[90] A front water guide member 216 is formed extending downward from a right-lower end of the front heat exchanger 210. The front water guide member 216 functions to guide the condensed water generated in the front heat exchanger 210 downward. The front water guide member 216 is inserted in the front insertion hole 156 of the drain pan receiving portion 152. Accordingly, the front water guide member 216 is formed in a thin cylindrical shape having an outer diameter corresponding to an inner diameter of the front insertion hole 156.

[91] The side heat exchanger 220 is installed on a front-right portion of the barrier 130. That is, the side heat exchanger 220 is installed at the right side of the front heat exchanger 210. Like the inner and front heat exchangers 220 and 200, the side heat exchanger 220 functions to allow the interior and exterior airs to heat-exchange with each other.

[92] The side heat exchanger 220 is a portion at which the air introduced through the inlet 128 of the right panel 116 primarily heat-exchanges. The side heat exchanger 220 includes three heat exchange units. That is, the side heat exchanger 220 includes first, second, and third heat exchange units 222, 224, and 226 that are vertically installed in a line.

[93] The first heat exchange unit 222 is a portion where the external air introduced through the air inlet 128 heat-exchanges primarily. As shown in the drawing, the first heat exchange unit 222 is formed in a rectangular shape and provided at a left side rear-lower end with a first outlet 222a.

[94] The first outlet 222a is a portion through which the circulation air is discharged. The circulation air discharged through the first outlet 222a is introduced through the air inlet 146' of the barrier 130. Accordingly, the first outlet 222a is coupled to the air inlet 146' while having a corresponding size and shape to the air inlet 146'.

[95] A first inlet 222b is formed on a front end upper portion of a left side of the first heat exchange unit 222. That is, the first inlet 222b is formed diagonally with respect to the first outlet 222a. The first inlet 222b functions as an inlet through which the circulation air is introduced into the first heat exchange unit 222.

[96] The second heat exchange unit 224 is provided at a left side of the first exchange unit 222. The air passing through the first heat exchange unit 222 further heat-exchanges at the second heat exchange unit 224. A second outlet 224a is formed on an upper-front end of the right side of the second heat exchange unit 224.

[97] The circulation air in the second heat exchange unit 224 is discharged through the second outlet 224a. The second outlet 224a is coupled to the first inlet 222b while having a corresponding size to the first inlet 222b. Therefore, the circulation air discharged through the second outlet 224a is introduced into the first heat exchange

unit 222 through the first inlet 222b.

[98] A second inlet 224b is formed on a rear-upper end of a left side of the second heat exchange unit 224. The second inlet 224b is formed to correspond to a third outlet 226a to allow the circulation air to be introduced into the second heat exchange unit 224.

[99] The third heat exchange unit 226 is provided at a left side of the second heat exchange unit 224. The air passing through the first and second heat exchange units 222 and 224 heat-exchanges thirdly at the third heat exchange unit 226. The third heat exchange unit 226 has a shape corresponding to the second heat exchange unit 224 and is provided at a rear-upper end of a left side with a third outlet 226a.

[100] The third outlet 226a has a corresponding size and shape to the second inlet 224b and is coupled thereto. Accordingly, the circulation air discharged through the third outlet 226a is introduced into the second heat exchange unit 224 through the second inlet 224b.

[101] A third inlet 226b is formed on a front upper end of a left side of the third heat exchange unit 226. The third inlet 226b is a portion through which the circulation air is introduced into the third heat exchange unit 226. The third inlet 226b has a corresponding shape and size to the front outlet 214 of the front heat exchanger 210 and is coupled thereto.

[102] Side water guide members 222', 224' and 226' that are formed in a thin cylindrical shape are respectively formed extending downward from the respective first, second, and third heat exchange units 222, 224, and 226. That is, the first, second, and third heat exchange units 222, 224, and 226 are respectively provided at front-lower ends with the side water guide members 222', 224', and 226' extending downward by a predetermined length.

[103] The side water guide members 222', 224', and 226' are provided to guide the condensed water in the side heat exchanger 220 downward. The side water guide members 222', 224', and 226' are respectively inserted in the side insertion holes 154 formed thorough the drain pan receiving portion 152 of the main body base 150. Therefore, outer diameters of the side water guide members 222', 224', and 226' correspond to the respective diameters of the first, second, and third insertion holes 154a, 154b, and 154c.

[104] The side water guide members 222', 224', and 226' are respectively referred to as first, second, and third side water guide members. The first side water guide member 222' is formed extending downward from the lower end of the first heat exchange unit 222 and inserted in the first insertion holes 154a. The second side water guide member 224' is formed extending downward from the lower end of the second heat exchange unit 224 and inserted in the second insertion hole 154b. The third water guide member

226' is formed extending downward from the lower end of the third heat exchange unit 226 and inserted in the third insertion hole 154c.

[105] A shielding plate 230 for dividing the space in front of the barrier into upper and lower spaces is provided. The shielding plate 230 is formed with a flat plate to divide the front space of the barrier into the upper and lower spaces.

[106] The shielding plate 130 blocks a gap between the front panel 112 and the barrier 130 and a gap between the right panel 116 and the barrier 130 so as to prevent the intake air from being mixed with the exhaust air. That is, the shielding plate 130 functions to prevent the external air introduced through the air inlet 128 from being mixed with the air discharged to the external side (indoor space) through the air outlet 122.

[107] A blower motor 240 is installed in rear of the barrier 130. The blower motor 240 provides torque to the blower fan 246 using electricity supplied from the external side. The blower motor 240 is installed on a rear side of the motor support 136 of the barrier 130. The blower motor 240 is provided with a motor shaft 242 transmitting the torque and extending rearward.

[108] The blower motor 240 is supported by a motor mount 244. That is, the cylindrical blower motor 240 is fixed on a rear side of the barrier 130 by the motor mount 244. The motor mount 244 is formed to enclose the blower motor 240 and fixed on the rear surface of the barrier 130 by, for example, a screw. Accordingly, the blower motor 240 is fixed on the rear side of the barrier 130 in a state where it is received in the motor mount 244.

[109] A blower fan 246 is installed on an outer portion of the blower motor 240. The blower fan rotates by the torque of the blower motor 240 to forcedly generate an air current. That is, the blower fan is mounted on a rear end of the motor shaft 242 protruding rearward of the blower motor 240 and is rotated together with the rotation of the motor shaft 242.

[110] The drain pan 250 is received in the lower portion of the drain pan receiving portion 152. The drain pan 250 temporally collects the condensed water falling through the water guide members 206, 216, 222', 224', and 226'. The drain pan has a corresponding shape to the drain pan receiving portion 152.

[111] The drain pan 250 is provided with a drain hole 252 through which the collected water is drained to the water tank 300. The drain hole 252 is selectively opened by a drain unit 254.

[112] The drain unit 254 is provided in the form of a cantilever to open the drain hole 252 when the water tank 300 is installed on the support 310 and to close the drain hole 252 when the water tank 300 is not installed on the support 310. The following will describe the drain unit 254 in more detail.

[113] The water tank 300 and the support 310 are provided under the main body base 150.

[114] The water tank 300 stores the water (condensed water) generated in the heat exchangers 200, 210, and 220. That is, the water drops condensed in the heat exchangers 200, 210, and 220 fall into the water tank 300 through the drain pan 250 and are stored therein.

[115] The water tank 300 is installed between front and rear supporting portions 314' and 314" of the support 310. The water tank 300 is installed to be taken out sideward (leftward or rightward). The water tank 300 is formed in a rectangular box shape having an opened top.

[116] The support 310 is provided to support the main body 100, including the support base 312 and the supporting portion 314. The support base 312 is a portion that directly contacts a floor of a building. The support base 312 is formed in a rectangular flat plate.

[117] The supporting portion 314 includes a front end supporting portion 314' protruding upward from a front end of the support base 312 and a rear end supporting portion 314" protruding upward from a rear end of the support base 312.

[118] The drain pan 250 is provided on the upper end of the support 310. That is, the drain pan 250 is provided on the right end of the front end supporting portion 314' to guide the water discharged from the heat exchangers 200, 210, and 220 to the water tank 300.

[119] That is, the water falling from the water guide members 206, 216, 222', 224' and 226' formed on the lower end of the heat exchangers 200, 21, and 220 are collected in the drain pan 250 and subsequently falls to the water tank 300.

[120] Fig. 8 shows the barrier 130 in detail.

[121] Referring to Fig. 8, coupling guides 320 and 322 for fixing the side heat exchanger 220 are horizontally formed on front-upper and front-lower ends of the right extending portion 130b of the barrier 130. That is, the upper coupling guide 320 is horizontally formed near the upper end of the right extending portion 130b and the lower end coupling guide 322 is horizontally formed near the lower end of the right extending portion 130b.

[122] Upper and lower coupling grooves 320' and 322' are respectively formed on right surfaces of the upper and lower coupling guides 320 and 322. Coupling members 334 and 336 that will be described below are respectively inserted in the upper and lower end coupling grooves 320' and 322'. Therefore, male threads with which screws can be engaged may be formed on inner surfaces of the upper and lower coupling grooves 320' and 322".

[123] Fig. 9 shows a state where the adsorption motor assembly 176 and the inner heat exchanger 200 are mounted on the barrier 130 of Fig. 8. That is, Fig. 9 illustrates a state where the adsorption motor assembly 176 is inserted in the adsorption motor receiving portion 138. The inner heat exchanger 200 is closely fixed on a right portion

of the rearward recess 132. The inner heat exchanger 200 is mounted on the rearward recess 132 of the barrier 130 by the screws.

[124] Figs. 10, 11, and 12 illustrate the side heat exchanger 220 in more detail. That is, Fig. 10 is a perspective view of the side heat exchanger of the dehumidifier according to an embodiment of the present invention and Figs. 11 and 12 are respective first and second side exploded perspective views of the side heat exchanger of Fig. 10.

[125] As shown in the drawings, the first, second, and third heat exchangers 222, 224, and 226 are coupled to each other by coupling units 340 and 342 that will be described below. At least one of the first, second, and third heat exchangers 222 and 224, and 226 are fixedly mounted on the barrier 130.

[126] In more detail, one of upper and lower ends of at least one of the first, second, and third heat exchangers 222 and 224, and 226 are fixed to the barrier 130 by coupling members 334 and 336 that will be described below. In Figs. 10, 11, and 12, a case where one of the upper and lower ends of the first heat exchanger 222 is fixed on the barrier 130 is illustrated by way of example.

[127] As shown in the drawings, a rear-upper end of the first heat exchanger 22 extends upward to form the upper end coupling portion 330 and a rear-lower end of the first heat exchanger 222 extends downward to form the lower end coupling portion 332.

[128] The upper end coupling portion 330 is provided with an upper end through hole 330' and the lower end coupling portion 332 is provided with a lower end through hole 332'. The upper end through hole 330' and the lower end through hole 332' are holes in which the coupling members 334 and 336 will be inserted.

[129] The side heat exchanger 220 is fixedly mounted on the barrier 130 by the coupling member 334 and 336. That is, the coupling members 334 and 336 that are screws fix the side heat exchanger 220 on the barrier 130. However, the coupling members 334 and 336 are not limited to the screw. Other types of coupling members may be used.

[130] The upper end coupling member 334 is inserted in the upper end coupling groove 320' and the lower end coupling member 336 is inserted in the lower coupling groove 322'. The upper and lower coupling members 334 and 336 pass respectively through the upper and lower end through holes 330' and 332' of the first heat exchanger 222 and are coupled to the upper and lower coupling grooves 320' and 322'.

[131] Meanwhile, the first, second, and third heat exchangers 222, 224, and 226 are coupled to each other by the coupling units 340 and 342.

[132] The coupling units 340 and 342 include a coupling projection 340 and a projection coupling groove 342 that are correspondingly formed to one surfaces of the heat exchangers 222, 224, and 226 and coupled to each other. That is, the projection coupling groove 342 and the coupling projection 340 are respectively formed on a left surface of the first heat exchanger 222 and a right surface of the second heat exchanger

342 and coupled to each other. The projection coupling groove 342 and the coupling projection 340 are respectively formed on a left surface of the second heat exchanger 224 and a right surface of the third heat exchanger 226. Further, the projection coupling groove 342 and the coupling projection 340 are respectively formed on corners of surfaces of the respective heat exchangers 222, 224, and 226.

[133] In more detail, the projection coupling grooves 342 are formed extending leftward from a rear0upper end of the left surface of the first heat exchanger 222. The projection coupling groove 342 is formed in a thin cylindrical shape. Therefore, the coupling projections 340 are snap-fitted in the projection coupling grooves 342.

[134] Therefore, an inner diameter of the projection coupling groove 342 may be equal to or slightly less than an outer diameter of the coupling projection 340.

[135] The projection coupling grooves 342 are formed extending leftward from a front-lower end of the left surface of the first heat exchanger 222. This projection coupling grooves 342 have an identical structure to those formed on the first heat exchanger 222.

[136] The projection coupling groove 342s are further formed extending leftward from a rear side of the left surface of the first heat exchanger 222. That is, the projection coupling grooves 342 are formed above the first outlet 222a. On the other hand, the projection coupling groove 342 is not formed on an upper end of the left surface of the first heat exchanger 222 since the first inlet 222b formed on the front-upper end of the left surface of the first heat exchanger 222 functions as a coupling unit that is coupled to the second outlet 224a formed on the right surface of the second heat exchanger 224.

[137] The coupling projections 340 are formed extending rightward from corners of the right surface of the second heat exchanger 224. As shown in the drawing, the coupling projections 340 are formed in a circular pillar shape and formed to correspond to the projection coupling grooves 342 formed on the left surface of the first heat exchanger 222. That is, the coupling projections 340 are formed on a rear-upper and, a rear-lower end, and a front-lower end of the right surface of the second heat exchanger 224.

[138] The projection coupling grooves 342 are formed on respective corners of the left surface of the second heat exchanger. That is, the projection coupling grooves 342 are formed on front-lower end, front-upper end, and a rear-lower end of the left surface of the second heat exchanger 224.

[139] No projection coupling groove 342 is formed on a rear upper end of the left surface of the second heat exchanger 224 since the second inlet 224b functions as the coupling unit that is coupled to the third outlet 226a of the third heat exchanger 226.

[140] The coupling projections 340 are formed on respective corners of the right surface of the third heat exchanger. The coupling projections 340 formed on the right surface of the third heat exchanger 226 are formed to correspond to the projection coupling

grooves 342 formed on the left surface of the second heat exchanger 224.

[141] Figs. 13 and 14 illustrate the drain pan in more detail.

[142] As described above, the drain pan 250 is provided with a drain pipe 252 extending rearward from a rear surface. The drain pipe 252 guides the condensed water stored in the drain pan 250 to the water tank 300. The drain pipe 252 is selectively opened and closed by the drain unit 254. The drain pipe 252 is formed of a thin pipe and a rear end of the drain pipe 252 is selectively closed by the drain unit 254.

[143] The drain unit 254 includes a closing cap 254a for selectively closing the rear end of the drain pipe 252, a drain lever 254b controlling the movement of the drain cap 254a, a hinge shaft 254c functioning as a central axis of the drain lever 254b, a contact projection 254b selectively contacting the water tank 300, and a return spring 254e applying torque in a direction to the drain lever 254b.

[144] The drain cap 254a is formed in a circular shape having a size corresponding to a rear end of the drain pipe 252. The drain cap 254a is formed of an elastic material such as rubber. Therefore, when the water tank 300 is separated from the support 310, the drain cap 254a closely contacts the rear end of the drain pipe 252.

[145] The drain lever 254b is formed in a □-shape when viewed from top. The drain cap 254a is installed on a left surface of the rear end (in Fig. 13) of the drain lever 254b and the contact projection 254d is formed extending downward from a lower portion of the right end of the drain lever 254.

[146] The hinge shaft 254c is integrally formed on a central portion of the drain lever 254b formed in the □-shaped to function as a rotational shaft of the drain lever 254b. The upper and lower ends of the hinge shaft 254c are rotatably mounted on a hinge guide 254f formed extending rearward from a rear surface of the drain pan 250.

[147] The contact projection 254d is formed in a cylindrical shape and selectively contacts an upper edge of the water tank 300. That is, the contact projection 254d moves while contracting a front end of the edge of the water tank 300 to rotate clockwise when viewed from the top.

[148] The return spring 254e is a spring for returning the contact projection 254d. That is, after the contact projection 254d rotates clockwise by being pushed by the edge of the water tank 300 and the water tank 300 is removed from the support 310, the return spring applies torque to the contact projections such that the contact projection 254d rotates counterclockwise (when viewed from the top) to return to a state shown in Fig. 13.

[149] Fig. 15 is a schematic view of an air flow state in rear of a barrier of the humidifier according to an embodiment of the present invention, Fig. 16 is a view illustrating a circulation air flow path in Fig. 2, and Fig. 11 is a view illustrating a circulation air flow path in Fig. 2.

[150] An operation of the above-described dehumidifier of the present invention will be described hereinafter with reference to Figs. 15 through 18.

[151] Referring first to Fig. 15, external air is introduced into the dehumidifier through a side surface (right surface) of the dehumidifier. The air dehumidified in the dehumidifier is discharged to the external side (indoor space) through an upper end of the dehumidifier. That is, the dehumidified air is discharged through the gap between the top panel 120 and other panels.

[152] In more detail, when the blower motor 240 is driven, the blower fan 246 rotates by the torque of the blower motor 240.

[153] When the adsorption motor assembly 176 is driven, the adsorption assembly 180 rotates by the torque of the adsorption motor 176 and thus the recovery fan (not shown) provided in the recovery assembly 180 also rotates to generate a current of the circulation air. At this point, the torque generated by the adsorption motor 176 is lower than the torque generated by the recovery motor or the blower motor 240. Therefore, the adsorption assembly 180 rotates with a relatively low RPM.

[154] At this same time, the heater (not shown) provided in the heater assembly is driven by the external power to heat the air.

[155] Meanwhile, as the blower fan 246 rotates, sucking force is generated in the dehumidifier and thus the external air (air in the indoor space) is introduced into the main body case 110 through the air inlet 128 of the right panel 116 (see ① in Fig. 15).

[156] The external air introduced into the main body case 110 passes through the side heat exchanger 220 as indicated by ② in Fig. 15. That is, the air passes successively through the air passing holes provided in the form of slits on the first, second, and third heat exchange units 222, 224, 226.

[157] At this point, the air outside of the side heat exchanger 220 is heat-exchanged with the air inside of the side heat exchanger 220. Accordingly, a temperature of the air outside of the side heat exchanger 220 increases by the hot circulation air in the side heat exchanger 220.

[158] The air passing through the side heat exchanger 220 passes through the front heat exchanger 210 as shown in Fig. 15. That is, the external air flows from the right and front sides of the front heat exchanger 210 to the rear side of the front heat exchanger 210. At this point, the airs inside and outside of the front heat exchanger 210 are heat-exchanged with each other.

[159] The air passing through the front heat exchanger 210 passes through the adsorption member 182 as indicated by ④ in Fig. 15. Therefore, the moisture contained in the air is adsorbed in a surface of the adsorption member 182. Therefore, the air becomes more dry air.

[160] The external air passing through the adsorption assembly 180 passes through the

inner heat exchanger 200 as indicated by ⑤ of Fig. 15. Likewise, the airs inside and outside of the inner heat exchanger 200 are heat-exchanged with each other and thus a temperature of the air is further increased.

[161] The air passing through the inner heat exchanger 200 flows to the rear side of the barrier 130 through the central through hole 134 of the barrier 130 as indicated by ⑥ of Fig. 15. The air directed to the rear side of the barrier is discharged in a radial direction by the blower fan 246 and guide by the airflow guide 148.

[162] The airflow guide 148 encloses the outer side of the blower fan 246 and has a left end extending upward. Thus, the air discharged by the blower fan 246 flows toward the left upper portion of the barrier 130 as indicated by ⑦ of Fig. 15.

[163] Describing the airflow state by the airflow guide 148 in more detail with reference to Fig. 16, the air discharged in the circumferential direction by the blower fan 246 is guided by the circular guide portion 148" and directed leftward (rightward in Fig. 16) as indicated by (7a).

[164] Subsequently, the air flows upward by the upward guide portion 148", and as indicated by (7b), the air passes through the gap between the upper end of the upward guide portion 148" and the left panel 118.

[165] The air passing through the gap between the upper end of the upward guide portion 148" and the left panel 118 is partly directed to a front side of the barrier 130 through the gap between the upper end of the barrier 130 and the top panel 120. That is, since the gap is formed between the top panel 120 and the upper end of the barrier 130, as indicated by (7c), the air in rear of the barrier 130 flows toward the front side of the barrier 130.

[166] As described above, the air ascended by the airflow guide 148 flows to the front side of the barrier 130. At this point, the shielding plate 230 in front of the barrier 130 blocks the downward flow of the air so that the air guided upward by the airflow guide 148 cannot be introduced again into the adsorption assembly 180. That is, the air direction upward by the airflow guide 148 flows to the lower side of the shielding plate 230 so as not to be mixed with the air that is being introduced from the external side.

[167] The air directed upward is dispersed toward the edge of the top panel 120 and discharged through the air outlet 122. That is, as indicated by ⑧ of Fig. 15, the air is discharged to the external side through the air outlet 122 defined by the gap between the top panel and the main body case 110. The method for discharging the air through the air outlet 122 defined by the gap provided in the form of slits is called a line diffuser method.

[168] The flow of the circulation air in the heat exchangers 200, 210, and 220 will now be described with reference to Figs. 17 and 18.

[169] The circulation air path formed along the heat exchangers 200, 210, and 220 is

formed in a closed circuit. That is, unlike the above-described air (i.e., air introduced from the indoor space to the dehumidifier), the circulation air in the heat exchangers 200, 210, and 220 is not replaced but continuously circulate along a closed fluid path to heat-exchange with the external air.

[170] Describing in more detail, the circulation air directed from the recovery assembly 160 is, as indicated by □, introduced into the heater assembly 170 through the heater inlet 174 connected to the recovery outlet 164.

[171] The circulation air introduced into the heater assembly 170 is heated by a heater (not shown) and directed frontward as indicated by □ through the heater outlet 172. The circulation air directed frontward through the heater outlet 172 passes through the adsorption member 182. At this point, the high temperature circulation air discharged through the heater outlet 172 vaporizes the moisture adsorbed in the adsorption member 182.

[172] That is, as the adsorption member 182 rotates with a low RPM by the adsorption motor 176, the moisture contained in the air passing through the adsorption member 182 is adsorbed in the adsorption member 182. At this point, as the high temperature circulation air passes through the adsorption member 182 as described above, the moisture adsorbed in the adsorption member 182 is vaporized and thus removed from the adsorption member 182.

[173] In addition, since the heater outlet 172 is formed in the fan-shape, the adsorption member 182 affected by the high temperature circulation air discharged through the heater outlet 172 becomes a range (fan-shape) corresponding to the heat outlet 172. However, since the adsorption member 182 keeps rotating with the low RPM by the adsorption motor 176, the adsorption member 182 entirely contacts the high temperature circulation air discharged through the heater outlet 172 when a pre-determined time has elapsed.

[174] The circulation air passing through the adsorption member 182 is introduced into the hot air guide 192 of the adsorption frame 190 and subsequently directed into the front heat exchanger 210 through the front air inlet 212 of the front heat exchanger 210 as indicated by □.

[175] The circulation air directed into the front heat exchanger 210 is heat-exchanged with the external air. That is, as described above, the circulation air is heat-exchanged with the external air which is introduced through the air inlet 128 and flows along an external side of the front heat exchanger 210.

[176] In more detail, since the circulation air in the front heat exchanger 210 is higher in a temperature than the external air, the external air flowing along an outer side of the front heat exchanger 210 takes the heat of the circulation air in the front heat exchanger 210. Therefore, the temperature of the circulation air in the front heat

exchanger 210 is lowered and thus the moisture contained in the circulation air is condensed and flows downward.

[177] The circulation air passing through the front heat exchanger 210 is, as indicated by □, introduced into the side heat exchanger 220. That is, the circulation air in the front heat exchanger 210 is directed to the third heat exchange unit 226 through the front outlet 214 and subsequently introduced into the third heat exchanger 226 through the third inlet 226b. Subsequently, the circulation air passes through the second heat exchanger 224 and then to the first exchange unit. At this point, the external air outside of the side heat exchanger 220 takes the heat from the circulation air and thus the moisture contained in the circulation air is condensed.

[178] The air passing through the side heat exchanger 220 is introduced into the inner heat exchanger 200. In more detail, the circulation air discharged through the first outlet 222a of the first heat exchanger 222 is, as indicated by □, introduced into the barrier through the air inlet 146' formed through the barrier 130. The circulation air is, as indicated by □, introduced into the inner heat exchanger 200 through the air outlet 146 and the inner inlet 202.

[179] Like the side and front heat exchangers 220 and 210, the circulation air introduced into the inner heat exchanger 200 is heat-exchanged with the external air. That is, after passing through the adsorption member 182, the circulation air is heat-exchanged with the air directed to a rear side of the barrier through the central through hole 134 of the barrier 130.

[180] Accordingly, the circulation air in the inner heat exchanger 200 is cooled and thus the moisture contained in the circulation air is condensed and discharged downward.

[181] The circulation air passing through the inner heat exchanger 200 is, as indicated by □, introduced into the recovery assembly 160. That is, since the inner inlet 204 of the inner heat exchanger 200 is coupled to the recovery inlet 162 of the recovery assembly 160, the circulation air in the inner heat exchanger 200 is introduced into the recovery assembly 160.

[182] The circulation air introduced into the recovery assembly 160 is forcedly directed by the recovery fan (not shown) into the heater assembly 170 through the recovery outlet 164 as indicated by □.

[183] Through the above-described process, the circulation air circulates along the closed flow path in which the heat exchangers 200, 210, and 220 are arranged, thereby completing one cycle.

[184] The condensed water generated by the heat exchange between the external air and the circulation air must be removed frequently by the user.

[185] Describing the above-described process in more detail, the condensed water generated by the temperature difference in the heat exchangers 200, 210, and 220 falls

down along the inner walls of the heat exchangers 200, 210, and 220 and is collected in the drain pan 250. That is, since the water guide members 206, 216, 222', 224', and 226' protruding downward are formed on the lower ends of the heat exchangers 200, 210, and 220 and communicate with the inside of the drain pan 250 by being inserted in the insertion holes 154, 156, and 158 of the drain pan receiving portion 152, the condensed water generated in the heat exchangers 200, 210, and 220 is collected in the drain pan 250 through the water guide members 206, 216, 222', 224', ad 226'.

[186] The condensed water collected in the drain pan 250 falls into the water tank 300. That is, the condensed water that is temporarily collected in the drain pan 250 falls into the water tank 300 through a hole formed through a side of the drain pan 250.

[187] When a certain amount of condensed water is collected in the water tank 300 through the above-described process, the user takes the water tank out in a side direction and dumps out the water from the water tank.

[188] Fig. 19 illustrates an operation state of the drain unit 254 provided in the drain pan 250. That is, Fig. 19 shows a state where the drain pipe 252 is opened as the water tank 300 is inserted into the support 310.

[189] In more detail, when the water tank 300 is separated from the support 310, as shown in Fig. 13, the drain pipe 252 is closed by the closing cap 254a. Therefore, the condensed water falling through the water guide members 206, 216, 222', 224', and 226' of the heat exchangers 200, 210, and 220 are collected in the drain pan 250.

[190] Further, when the water tank 300 is inserted into the support 310 from the left side of the support 310, this state is shown in Fig. 19. That is, from the state shown in Fig. 13, the right end of the water tank 300 contacts the contact projection 254d. At this point, since a corner portion of the right end of the water tank 300 is rounded, the contact projection 254d slides along the edge of the water tank 300 to be positioned on the front end edge of the water tank as shown in Fig. 19.

[191] Then, the drain lever 254b rotates clockwise (when viewed from the top) as shown in Fig. 19, and thus the closing cap 254a moves away from the rear end of the drain pipe 252 to open the drain pipe 252. Accordingly, the condensed water collected in the drain pan 250 falls to the water tank 300 through the drain pipe 252.

[192] Next, when the water tank 300 is separated leftward from the support 310, the drain lever 254b rotates counterclockwise by the rotational force of the return spring 254e and thus the closing cap 254a closes the rear end of the drain pipe 252. Therefore, the water collected in the drain pan 250 cannot be drained out through the drain pipe 252.

[193] It will be apparent to those skilled in the art that various modifications and variations can be made in the present invention. Thus, it is intended that the present invention covers the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

Industrial Applicability

[194] The above-described dehumidifier is light while improving the dehumidifying efficiency and making it easy to drain the condensed water. Therefore, the industrial applicability of the present invention is very high.

Claims

[1] A dehumidifier comprising:
a main body case that defines an inner space and is provided at a side with an external air inlet;
a barrier dividing the inner space;
a main body base that is formed on a lower end of the barrier to define an outer appearance of a lower portion of the main body;
a plurality of heat exchangers that are disposed at a side of the barrier to allow circulation air circulating the inner space to be heat-exchanged with external air introduced from an external side;
a drain pan for temporally storing condensed water generated from the heat exchangers; and
a water tank that stores the condensed water supplied from the drain pan when being inserted in the main body base.

[2] The dehumidifier according to claim 1, wherein the heat exchangers comprise:
a side heat exchanger installed at a side of the barrier;
an inner heat exchanger installed on a surface of the barrier; and
a front heat exchanger installed in front of the inner heat exchanger.

[3] The dehumidifier according to claim 1, further comprising an adsorption member that is provided at a side of one of the heat exchangers to remove moisture from the external air by adsorption.

[4] The dehumidifier according to claim 1, further comprising a heater assembly that is provided in the inner space to heat the circulation air.

[5] The dehumidifier according to claim 1, further comprising a recovery assembly that is provided in the inner space to forcedly make the flow of the circulation air.

[6] The dehumidifier according to claim 1, wherein one of the heat exchangers is disposed to correspond to the air inlet so that the air introduced from the external side can be primarily heat-exchanged.

[7] The dehumidifier according to claim 1, wherein one of the heat exchangers is disposed to correspond to the air inlet and includes first, second, and third heat exchange units through which the external air circulates.

[8] The dehumidifier according to claim 1, further comprising a drain pan receiving portion that is formed on the main body base to receive the drain pan.

[9] The dehumidifier according to claim 1, wherein each of the heat exchangers comprises a water guide member that is correspondingly coupled to a drain pan receiving hole formed at a side of the barrier and the drain pan receiving portion

is provided with insertion holes in which the water guide members are inserted.

[10] The dehumidifier according to claim 1, wherein a drain pipe for guiding the drainage of the condensed water is formed on the drain pan and the drain pipe is selectively closed by a drain unit.

[11] The dehumidifier according to claim 10, wherein the drain unit includes:
a closing cap;
a drain lever controlling movement of the closing cap;
a hinge shaft functioning as a rotational center of the drain lever;
a contact projection that is formed on an end of the drain lever and selectively contacts the water tank; and
a return spring that is installed at a side of the hinge shaft to apply rotation force in a direction.

[12] A dehumidifier comprising:
a main body case provided with an air inlet through which external air is introduced;
a side heat exchanger at which the external air is heat exchanged;
a barrier for directing the external air passing through the side heat exchanger frontward;
a front heat exchanger at which the external air guide frontward from the barrier is heat-exchanged;
an inner heat exchanger at which the external air passing through the front heat exchanger is heat-exchanged; and
a drain pan for temporally storing condensed water generated when external air is heat-exchanged with circulation air circulating in the main body case,
wherein the condensed water stored in the drain pan falls to a water tank when the water tank is inserted in the main body.

[13] The dehumidifier according to claim 12, wherein moisture contained in the external air passing through the front heat exchanger is removed by a adsorption assembly disposed between the front and inner heat exchangers.

[14] The dehumidifier according to claim 12, wherein the side heat exchanger is disposed to correspond to the air inlet and includes first, second, and third heat exchange units through which the external air circulates.

[15] The dehumidifier according to claim 12, further comprising a drain pan receiving portion that is formed on the barrier to receive the drain pan.

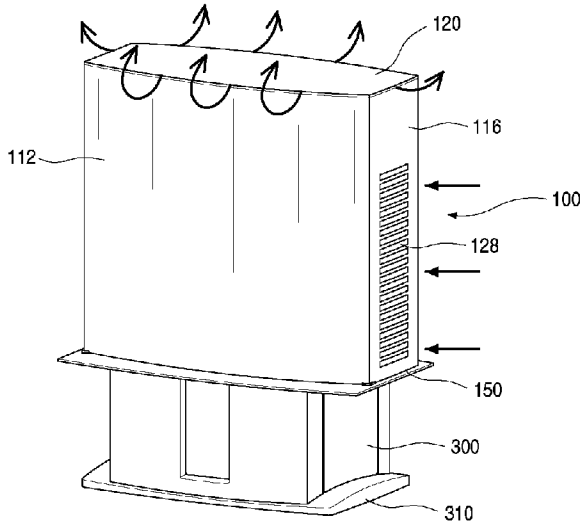
[16] The dehumidifier according to claim 15, wherein at least one of the heat exchangers includes a water guide member that is correspondingly coupled to a drain pan receiving hole formed at a side of the barrier and the drain pan receiving portion is provided with insertion holes in which the water guide

members are inserted.

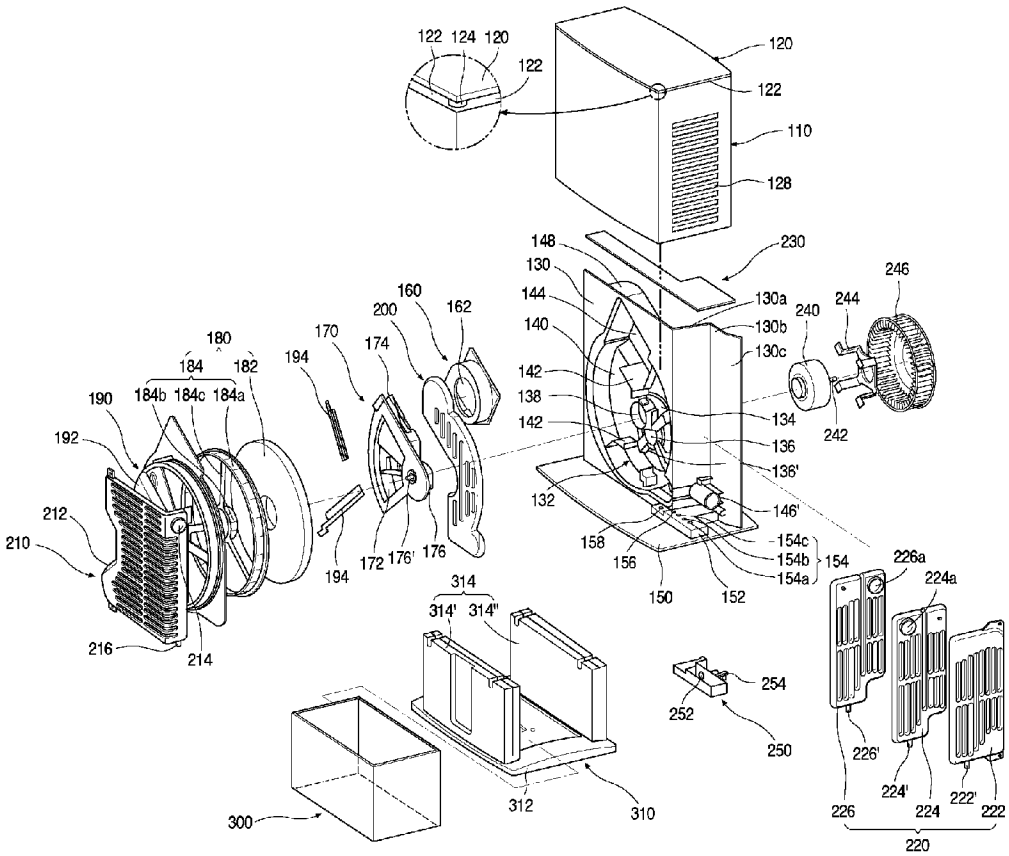
[17] The dehumidifier according to claim 12, wherein a drain pipe for guiding the drainage of the condensed water is formed on the drain pan and the drain pipe is selectively closed by a drain unit.

[18] The dehumidifier according to claim 12, wherein the drain unit comprises:
a closing cap;
a drain lever controlling movement of the closing cap;
a hinge shaft functioning as a rotational center of the drain lever;
a contact projection that is formed on an end of the drain lever and selectively contacts the water tank; and
a return spring that is installed at a side of the hinge shaft to apply rotation force in a direction.

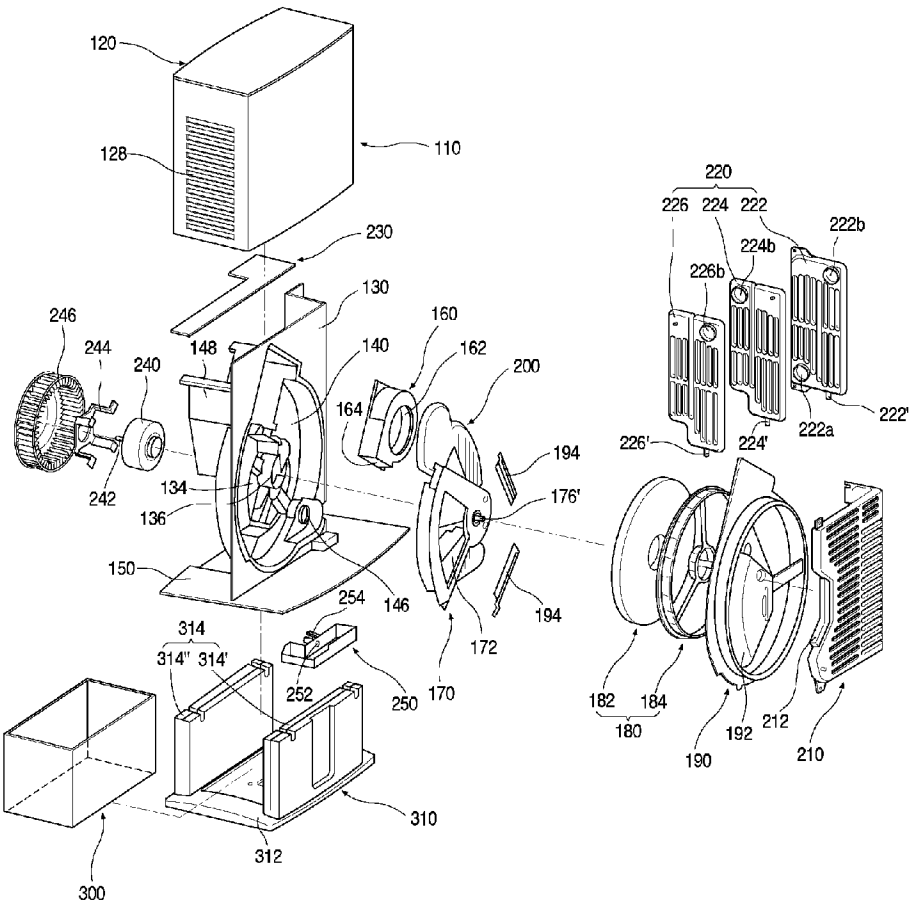
[Fig. 1]


120
116
112
100
128
150
300
310

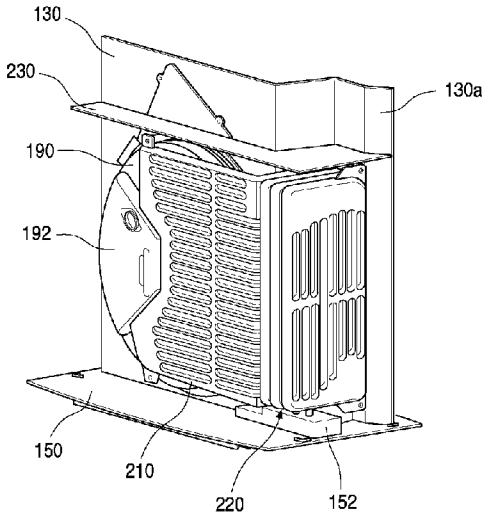
[Fig. 2]


122 124 120
122
120
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148
230
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144
140
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138
142
132
130a
130b
130c
134
136
136'
146'
154c
154b
154a
154
158
156
150
152
240
244
246
242
160
200
162
170
174
194
180
184
182
184b 184c 184a
190
192
212
210
216
214
194
172
176'
176
314
314' 314"
312
310
300
254
252
250
226a
224a
226'
224'
222'
226
224
222
220

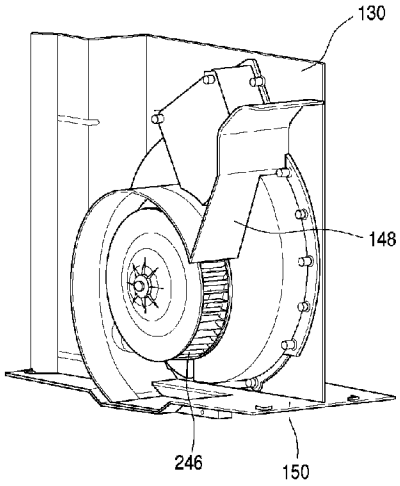
[Fig. 3]


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176'
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314''
314'
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170
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212
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310
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226
224
222
222b
224b
226b
222'
222a
226'
224'

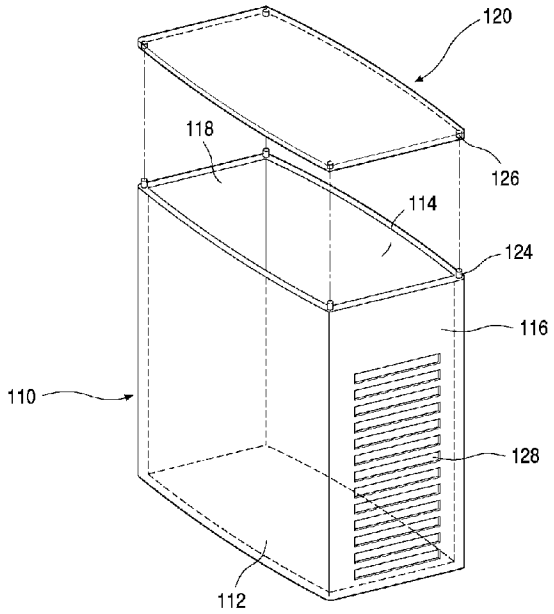
[Fig. 4]


130
230
130a
190
192
150
210
220
152

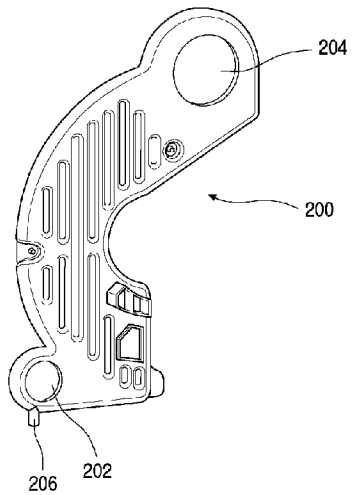
[Fig. 5]



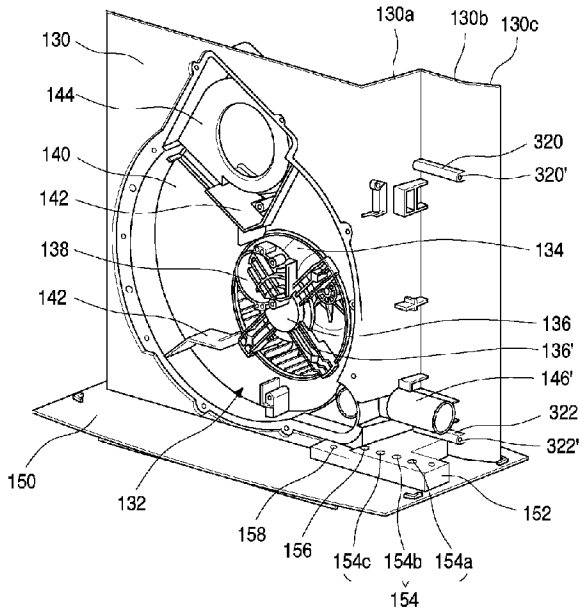
[Fig. 6]



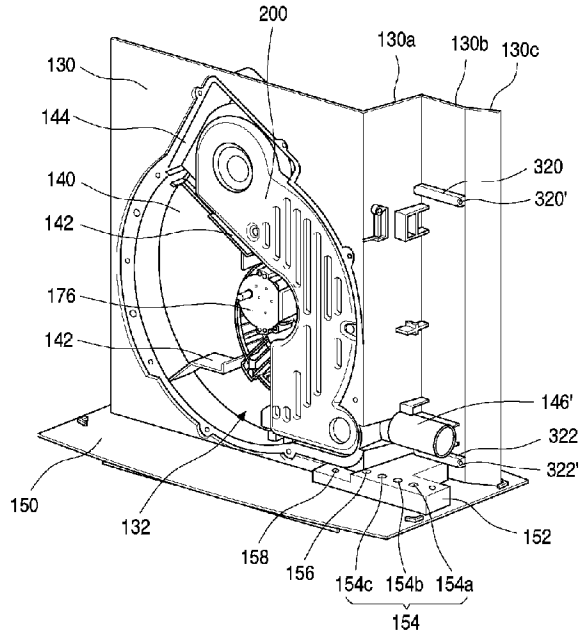
[Fig. 7]



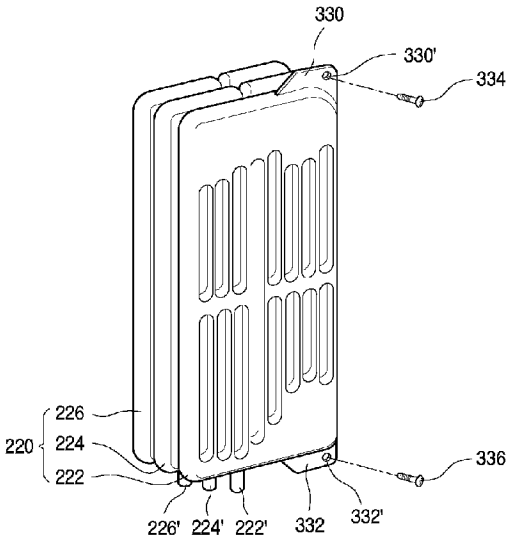
[Fig. 8]



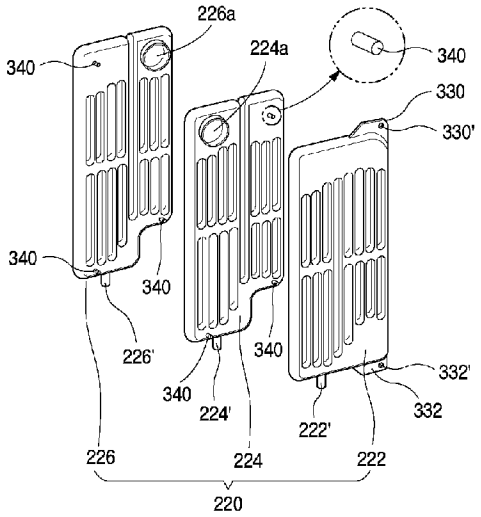
[Fig. 9]



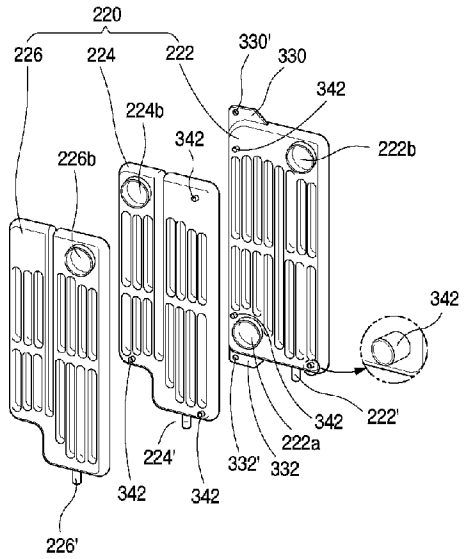
[Fig. 10]



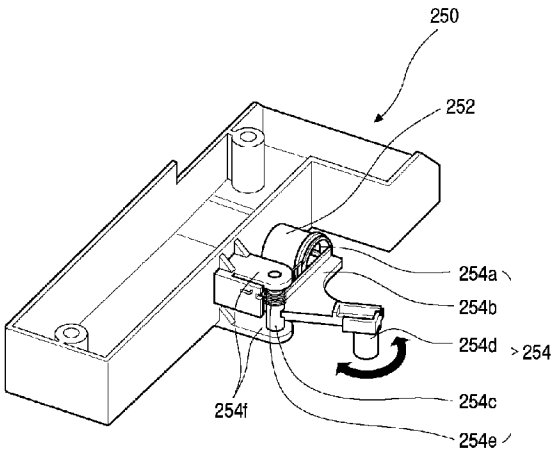
[Fig. 11]



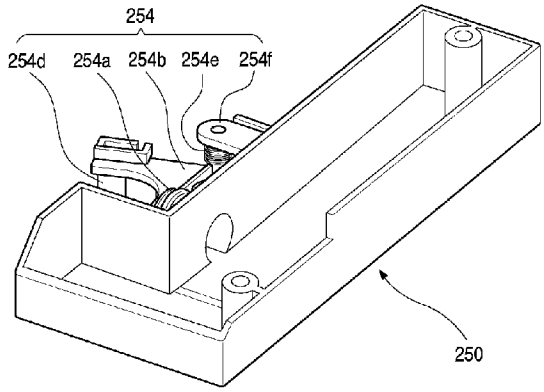
[Fig. 12]



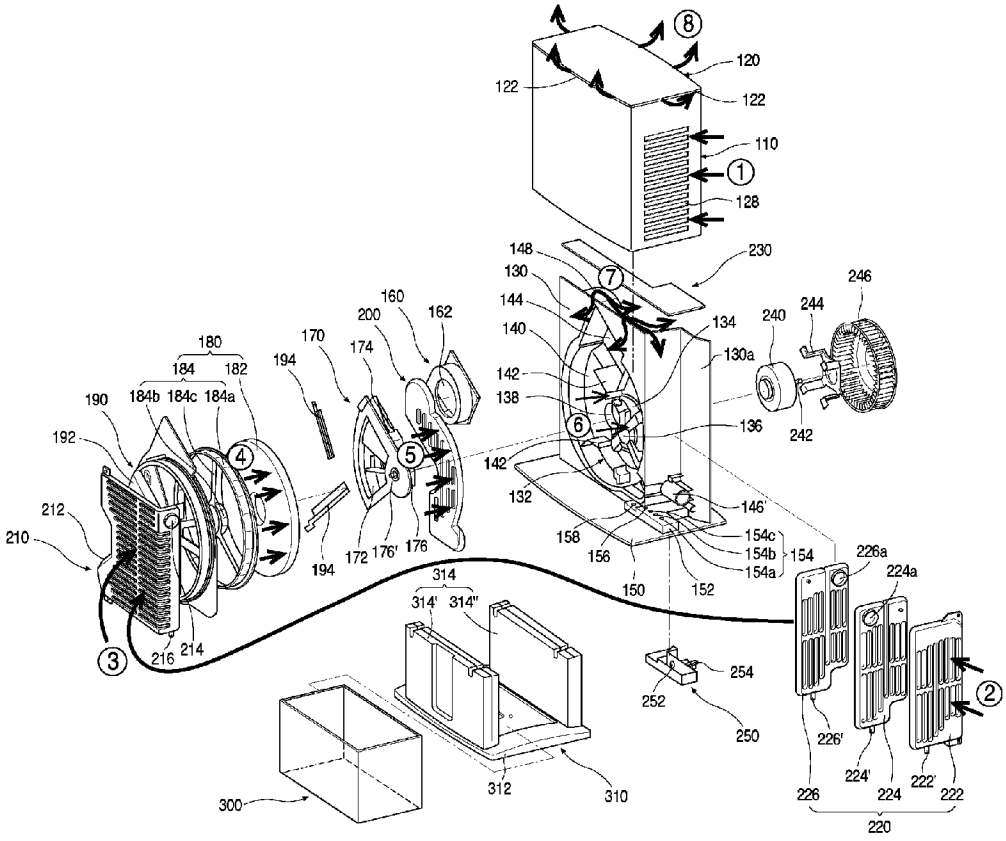
[Fig. 13]



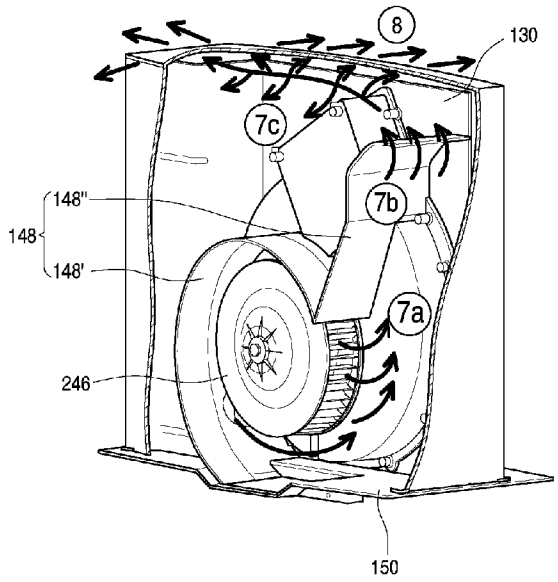
[Fig. 14]


254
254d
254a
254b
254e
254f
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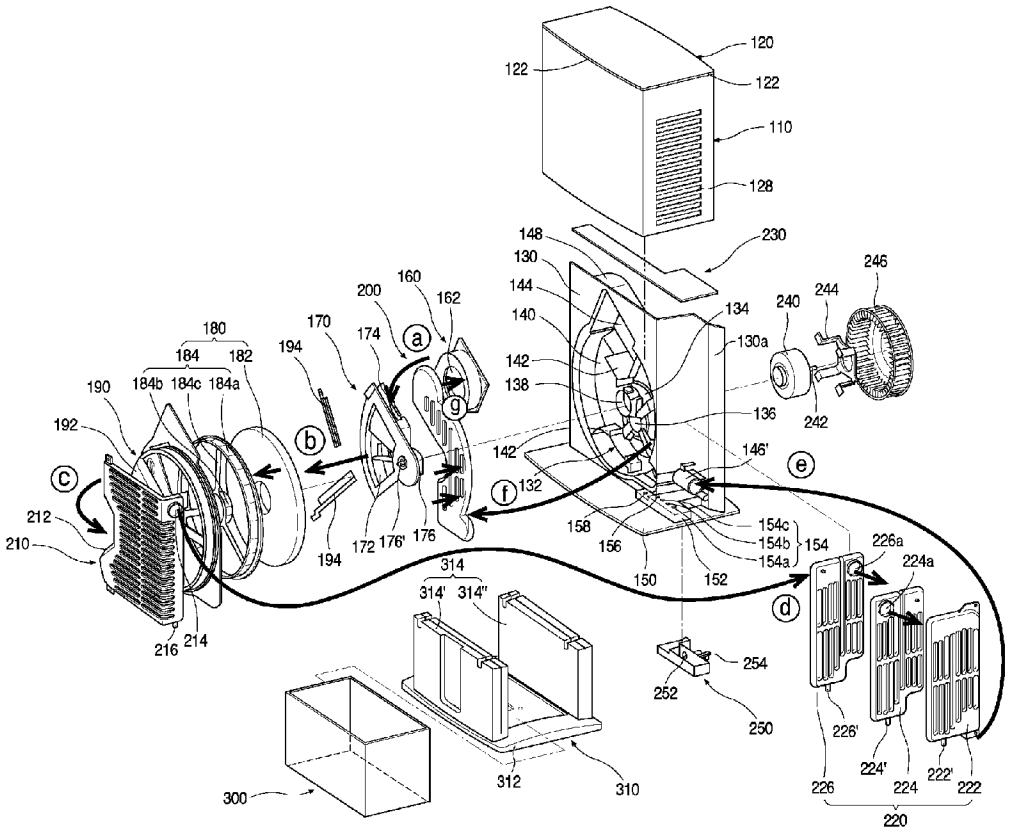
[Fig. 15]


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184a
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224'
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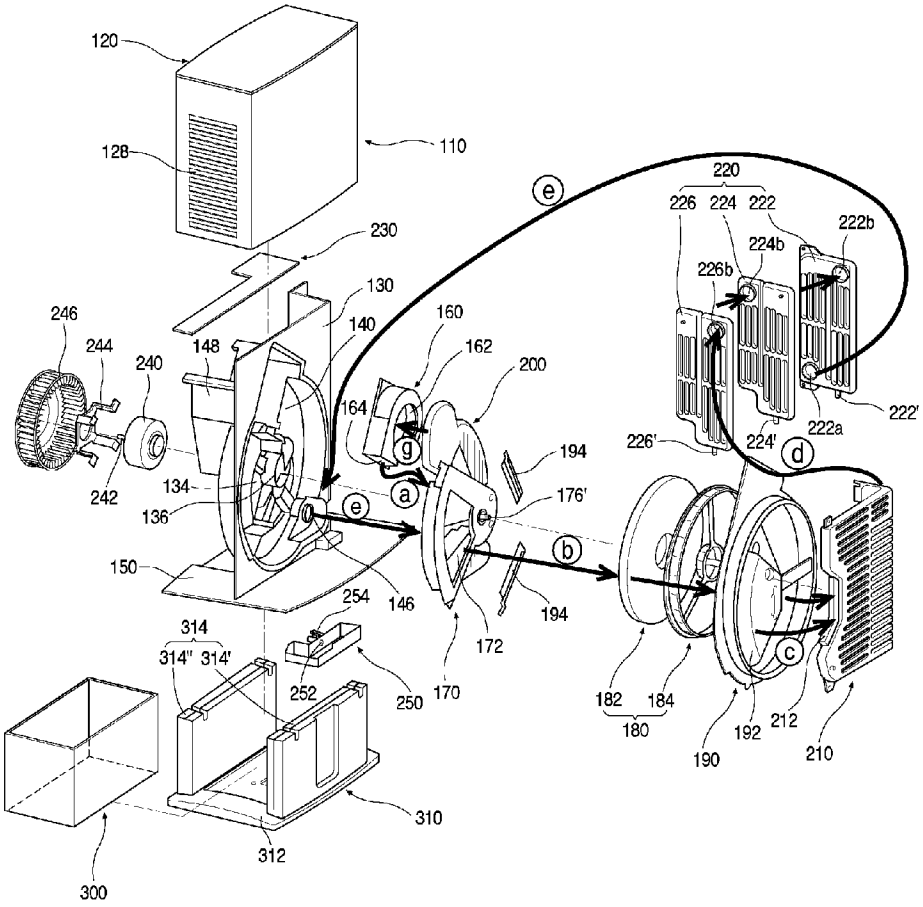
[Fig. 16]


8
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7c
7b
148"
148
148'
7a
246
150

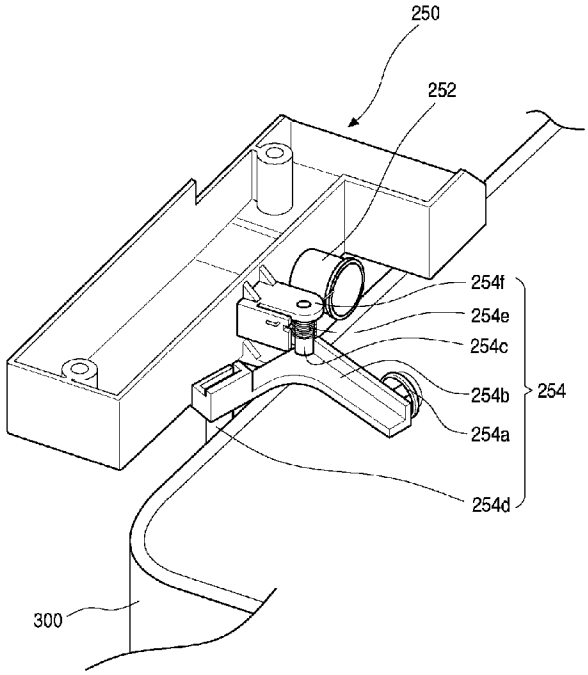
[Fig. 17]


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184b
184c
184a
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192
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142
146'
e
c
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212
158
154c
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226a
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154a
224a
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176'
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[Fig. 18]


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176'
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224
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222b
224b
226b
222'
222a
226'
224'
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[Fig. 19]


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254f
254e
254c
254b
254a
254d
254
300