The present invention relates to an air conditioner, and more particularly to an indoor unit. The present invention improves a structure of vanes and louvers provided in an air outlet, making it possible to spread air farther from the outlet. Although the outlet of the indoor unit is closed and the size of the vane guiding the discharge direction of air is increased, there is no need to increase the capacity of the driving means.
Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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Description

AIR CONDITIONER

Technical Field

The present invention relates to an indoor unit of an air conditioner.

Background Art

In general, an air conditioner is an electric home appliance that keeps the room cool or heat through a heat-exchange between coolant and air.

The air conditioner may be divided into a separated air conditioner in which an indoor unit is separated form an outdoor unit and an integrated air conditioner in which an indoor unit is integrated with an outdoor unit. And, the indoor unit may be divided into a flow mounted indoor unit to be installed on a floor surface of an installation space and a wall mounted indoor unit to be attached to a wall.

Also, an heat exchanger, a blow fan inhaling room air and a filter filtering the inhaled air are mounted on the wall mounted indoor unit. And, a centrifugal fan or a crossflow fan is applied to the blow fan.

Disclosure of Invention

Technical Problem

An object of the present invention is to provide an air conditioner that allows air discharged into a room to be spread farther compared to a conventional air conditioner.

Also, another object of the present invention is to provide an air conditioner that improves airflow sensation of air by improving structures of a louver and a vane controlling a direction of an air-flow being discharged.

Also, another object of the present invention is to provide an air conditioner that can apply a driving means having a relatively small capacity compared to the extent that the size of the vane means shielding an outlet is increased.

Technical Solution

In order to accomplish the objects, according to an embodiment of the present, there is provided an air conditioner comprising: a chassis; a fan assembly mounted to a front part of the chassis; a heat-exchanger provided to a front part of the fan assembly; a discharge grill unit having a drain pan supporting the heat-exchanger and an air outlet; a sub vane rotatably provided on the discharge grill unit to disperse the discharged air upward and downward; and a main vane rotatably provided on the discharge grill unit to selectively shield the air outlet.
Also, according to an embodiment of the present, there is provided an air conditioner comprising: a chassis; a fan assembly mounted to a front part of the chassis; a heat-exchanger provided to a front part of the fan assembly; a discharge grill unit supporting the heat-exchanger and having an air outlet; a main vane rotatably provided on the discharge grill unit to selectively shield the air outlet; a motor mounted on the discharge grill unit to generate driving force for rotating the main vane; and a link member whose one end is connected to a rotation shaft of the motor and the other end is connected to a predetermined position spaced apart from the rotation center of the main vane.

Advantageous Effects

With the air conditioner according to the embodiment of the present invention constituted as described above, the larger width and length of the vane member selectively shielding the outlet and guiding a discharge direction of air being discharged are provided, making it possible to spread air farther.

Also, two vanes are provided on the outlet and the different rotation angles are set according to a cooling mode and a heating mode, making it possible to improve consumer sensation.

Also, with the louver shape according to the present invention, airflow sensation of air being discharged is improved.

Also, the driving means having a relatively small capacity compared to a conventional driving means can be applied although the size of vane is increased, making it possible to reduce a manufacturing cost and power consumption.

Brief Description of the Drawings

The above and other objects, features and advantages of the present invention will become apparent from the following description of preferred embodiments given in conjunction with the accompanying drawings, in which:

FIG. 1 is an external appearance perspective view of an indoor unit of an air conditioner according to an embodiment of the present invention;

FIG. 2 is an external appearance perspective view showing a state where a filter of an indoor unit according to an embodiment of the present invention is drawn out;

FIG. 3 is a partial perspective view showing a flow of air being discharged from an indoor unit according to an embodiment of the present invention;

FIG. 4 is an exploded perspective view of a discharge grill unit constituting an indoor unit according to an embodiment of the present invention;

FIG. 5 is a partial perspective view showing a structure where a main vane and a sub
vane of an indoor unit according to an embodiment of the present invention operate;

FIG. 6 is an exploded perspective view showing a structure where a louver assembly is coupled to a discharged grill unit according to an embodiment of the present invention.

**Mode for the Invention**

FIG. 1 is an external appearance perspective view of an indoor unit of an air conditioner according to an embodiment of the present invention;

Referring to FIG. 1, the indoor unit 1 of the air conditioner according to an embodiment of the present invention includes a chassis 11 forming a rear external appearance, a front panel coupled to the front part of the chassis 11 to form a front external appearance, and a center frame 13 interposed between the chassis 11 and the front panel 12 and having inlets on its upper surface. And, a fan assembly (not shown) inhaling and discharging room air and a heat-exchanger 40 performing heat-exchange of the room air inhaled by the fan assembly with coolant are mounted inside the indoor unit 1. And, a signal receiving part 14 is provided on the front surface of the front panel 12 to receive an operation command signal output from a remote controller.

FIG. 2 is an external appearance perspective view showing a state where a filter of an indoor unit according to an embodiment of the present invention is drawn out;

Referring to FIG. 2, the indoor unit 1 according to an embodiment of the present invention allows a filter to be drawn out automatically, making it possible for a user to conveniently separate the filter to clean and replace it.

More specifically, a filter ejector 15 according to an embodiment of the present invention includes a plurality of frames drawn-out in multi-stage in a state where a filter is seated on its front surface, an ejector driving device providing driving force so that the plurality of frames can be drawn-out in multi-stage, and a adverse wind blocking part 17 mounted on a lower end of the frame. And, a filter 16 is seated on the front surface of the filter ejector 15.

FIG. 3 is a partial perspective view showing a flow of air being discharged from an indoor unit according to an embodiment of the present invention.

Referring to FIG. 3, an outlet is provided on a lower side of the indoor unit 1, and a discharge grill unit 20 is mounted around the outlet. More specifically, air being discharged by the discharge grill unit 20 is discharged rightward and leftward, with wide spreading.

Also, a main vane 18 and a sub vane 19 are rotatably coupled to each other on the outlet. And, a gap between the front panel 12 and the outlet is shielded by the adverse wind blocking part 17.

More specifically, if a fan assembly mounted on the inside of the indoor unit 1 is
driven, most of room air is inhaled from the upper surface of the indoor unit 1, however a small amount of air is also inhaled through the front surface of the indoor unit 1. Such a small amount of air is inhaled through the gap formed between the front panel 12 and the outlet and a portion of the air being discharged from the outlet can also be flowed again into the gap. In order to prevent the occurrence of such a adverse wind phenomenon, the adverse wind blocking part 17 is mounted on the lower end of the movement frame 153. And, the adverse wind blocking part 17 shields the gap formed between the lower rend of the front panel 12 and the outlet. Therefore, since a portion of the air discharged to the outlet is bumped into the adverse wind blocking part 17, the phenomenon that the air is flowed again into the inside of the indoor unit is prevented.

Meanwhile, the main vane 18 has a width to completely cover up to the adverse wind blocking part 17 and a length corresponding to the length of the outlet. And, a rear end of the main vane 18 and a rear end of the sub vane 19 are rotatably coupled to one side of the discharged grill unit 20. If the main vane 18 is closed, the adverse wind blocking part 17 and the sub vane 19 are completely shielded. And, if an operation command of the indoor unit 1 is input, the sub vane 19 and the main vane 18 rotate in an opposite direction to each other to open the outlet. Here, the sub vane 19 may start to rotate after the main vane 18 is completely opened. In other method, the sub vane 19 may start to rotate right after the main vane 18 rotates up to the angle having the range not being interfered by the sub vane 19.

Also, the sub vane 19 may be set to have different rotation angles according to a cooling mode and a heating mode. For example, in the heating mode, the rotation angle of the sub vane 19 is set to be relatively smaller than that in the cooling mode, so that warm air may be discharged into a room floor. To the contrary, in the cooling mode, the rotation angle of the sub vane 19 is set to be relatively larger than that in the heating mode, so that the cool air may be discharged into the upper space of the room. This is resulted from the object to rapidly cool warm air and to rapidly heat cold air, since warm air is distributed on an upper side in summer and cold air is distributed in the sea side.

A coupling relation with the main vane 18 and the operation method thereof will be described in detail with reference to the drawings.

FIG. 4 is an exploded perspective view of a discharge grill unit constituting an indoor unit according to an embodiment of the present invention.

Referring to FIG. 4, the discharge grill unit 20 is mounted on an outlet side of the indoor unit 1 according to an embodiment of the present invention, making it possible to allow the discharged air to be widely discharged rightward and leftward.

More specifically, an outlet 202 is formed on the discharge grill unit 20, and a heat-
exchanger seating part 201 is formed on the upper surface thereof. The heat-exchanger seating part 201, which is a portion to support a lower end of the heat-exchanger, is portion to function as a drain pan for collecting condensate generated on the surface of the heat-exchanger. Therefore, the heat-exchange seating part 201 may be referred to as a drain pan. And, a plurality of louver mounting holes 203 are formed on the bottom surface of the outlet 202.

Also, the outlet 202 is selectively shielded by a sub vane 19 and a main vane 18. More specifically, rotation shafts 181 and 191 are projected on both ends of the main vane 18 and the sub vane 19, respectively. In particular, the rotation shaft 181 of the main vane 18 is projected on the lower end and the rotation shaft 191 of the sub vane 19 is projected on the upper end. Therefore, the main vane 18 and the sub vane 19 form a structure that they rotate in an opposite direction to each other. Here, the rotation in the opposite direction means that two vanes rotate clockwise and counter-clockwise, respectively, seen from the indoor unit 1 side.

Meanwhile, insertion holes into which the rotation shafts 181 and 191 are inserted will be formed on the side surface of the discharge grill unit 20. And, a main vane motor 30 and a sub vane motor 29 each connected to the rotation shafts of the main vane 18 and the sub vane 19 are mounted on the side surface of the discharge grill unit 20, respectively.

Also, vane link connection ends 182 are further formed on both side ends of the main vane 18, and the vane link connection ends 182 are formed on certain spots spaced from the rotation shaft 181. And, one end of the vane link 31 is connected to the rotation shaft of the main vane motor 30, and the other end of the vane link 31 is connected to the vane link connection end 182.

Also, a louver assembly guiding outlets of air rightward and leftward is further included in the discharge grill unit 20.

More specifically, the louver assembly includes a louver motor 28, a louver driving bar 27 connected to a rotation shaft of the louver motor 28, and a plurality of louvers 26 arranged at a predetermined interval. And, the plurality of louvers 26 are positioned on the outlet 202 of the discharge grill unit 20. All of the respective plurality of louvers 26 are connected to the louver driving bar 27 and the louver mounting hole 203.

FIG. 5 is a partial perspective view showing a structure where a main vane and a sub vane of an indoor unit according to an embodiment of the present invention operate.

Referring to FIG. 5, the main vane 18 and the sub vane 19 of the indoor unit 1 according to an embodiment of the present invention selectively shields the outlet 202 of the discharge grill unit 20, respectively. Furthermore, they control up and down flow of the air discharged through the outlet 202.

As described above, the ends of both side surface parts of the main vane 18 is
rotatably coupled to the discharge grill unit 20 by a rotation shaft 181. And, one end of
the vane link 31 is connected to the main vane 18, and the other main vane is
connected to a rotation shaft of the main vane motor 30.

More specifically, the vane link 31 includes a motor-sided link 311 whose one end is
connected to the rotation shaft of the main vane motor 30, and a vane-sided link 312
whose one end is connected to the vane link connection end 182. And, the other ends
of the motor-sided link 311 and the vane-sided link 312 are rotatably coupled to each
other.

As shown, the reason why the main vane link 31 is connected to a separate vane link
31 rather than is connected directly to the rotation shaft 181 of the main vane 18 is to
minimize a torque for rotating the main vane 18.

More specifically, the main vane 18 has larger width and length compared to the sub
vane 19 or the conventional vane so that it has a relatively larger self-weight.
Therefore, when a driving motor is connected directly to the rotation shaft of the main
vane 18, there is need for a driving motor having a large rotation torque. As a result,
problems arise in that the size of the driving motor becomes large and a manufacturing
cost of the indoor unit increases.

However, as shown in the present embodiment, if the rotation torque operates on a
spot spaced from the rotation center of the main vane 18 using a separate vane link 31,
it leads to an advantage that the main vane 18 can rotatably operate using the driving
motor having a relatively small capacity.

More specifically, the vane link 31 is formed by rotatably connecting ends of the
motor-sided link 31 and vane-sided link 312. Therefore, if the main vane motor 30
operates, the motor-sided link 311 rotates to pull the vane-sided link 312. And, the
angle formed by the motor-sided link and the vane-sided link 312 becomes small as the
main vane 18 rotates. Therefore, although a relatively small amount of rotation torque
is used compared to a case where a single straight type link is used, the vane link 18
becomes rotatable.

FIG. 6 is an exploded perspective view showing a structure where a louver assembly
is coupled to a discharged grill unit according to an embodiment of the present
invention.

Referring to FIG. 6, a plurality of louver mounting holes 203 are arranged on a
bottom surface of an outlet of the discharge grill unit 20 at a predetermined interval.
And, the louver 26 is connected to the louver driving bar 27 and the louver mounting
hole 203 so that the discharged air should be dispersed rightward and leftward.

More specifically, the louver 26 includes a plate shaped louver body 261 having a
predetermined area, an insertion projection 264 projected on a lower surface of the
louver body 261, a louver base 262 provided on the lower surface of the louver body
261, a pair of coupling projections 263 projected on the lower surface of the louver base 262, and an end tip 265 projected on an upper end of the louver body 261.

More specifically, the end tip 265 is extended in a direction intersected with the louver body 261, and the airflow sensation of the discharged air is improved by the end tip 265. In other words, air flowing into the upper side of the louver body 261 bumps to the end tip 265 to face the front of the indoor unit 1. And, the pair of coupling projections 263 are projected on the spots of the lower surface of the louver base 262, facing each other, respectively, and are positioned on the same line. And, the coupling projection 263 is formed on a spot spaced backward from the injection projection 264.

Also, a pair of extension holes 203a are extended on an edge part of the louver mounting hole 203 at a predetermined length and are positioned on the same line. And, louver mounting holes 271 are formed on the louver driving bar 27.

With the constitution as described above, the insertion projection 264 of the louver 26 is inserted to the louver mounting hole 271 of the louver driver 27, and the coupling projection 263 is inserted into the louver mounting hole 203 of the discharge grill unit 20. More specifically, if the louver 26 rotates after the coupling projection 263 is inserted into the extension hole 203a of the louver mounting hole 203, the louver base 262 is rotatably closely adhered to the bottom surface of the discharge grill unit 20. And, since the line passing through the coupling projection 263 is intersected with the line passing through the extension hole 203, the louver 26 is not detached even though it is pulled. And, if the louver 26 performs a translation motion longitudinally to the louver driving bar 27, the louver 26 rotates by a predetermined angle rightward and leftward based on a vertical shaft passing through the center of the louver base 262. Here, the rotation angle of the louver 26 is determined within the range that the line passing through the coupling projection 263 does not correspond to the line passing through the extension hole 203a.

Those skilled in the art will appreciate that the conceptions and specific embodiments disclosed in the foregoing description may be readily utilized as a basis for modifying or designing other embodiments for carrying out the same purposes of the present invention. Those skilled in the art will also appreciate that such equivalent embodiments do not depart from the spirit and scope of the invention as set forth in the appended claims.
Claims

[1] An air conditioner comprising:
a chassis;
a fan assembly mounted to a front part of the chassis;
a heat-exchanger provided to a front part of the fan assembly;
a discharge grill unit having a drain pan supporting the heat-exchanger and an air outlet;
a sub vane rotatably provided on the discharge grill unit to disperse the discharged air upward and downward; and
a main vane rotatably provided on the discharge grill unit to selectively shield the air outlet.

[2] The air conditioner according to claim 1, wherein the sub vane and the main vane operate in an opposite direction to each other.

[3] The air conditioner according to claim 1, wherein the sub vane opens the outlet by performing an upward rotation and the main vane opens the outlet by performing a downward rotation.

[4] The air conditioner according to claim 1, wherein the vertical width of the main vane is larger than that of the sub vane, and the main vane is adapted to cover the sub vane.

[5] The air conditioner according to claim 4, wherein in a state where the main vane rotate more than a predetermined angle, the sub vane rotates together to open the outlet.

[6] The air conditioner according to claim 4, wherein after the main vane is completely opened, the sub vane rotates to open the outlet.

[7] The air conditioner according to claim 1, further comprising:
a plurality of louvers provided on the air outlet to disperse the discharged air rightward and leftward;
a louver driving bar connected with the plurality of louvers and rotating the louvers rightward and leftward; and
a motor connected to the louver driving bar.

[8] The air conditioner according to claim 7, wherein a lower end part of the louver is rotatably coupled to the louver driving bar and the discharge grill unit forming a bottom of the outlet.

[9] The air conditioner according to claim 7, wherein an insertion projection inserted into the louver driving bar and a louver base coupled to the discharge grill unit forming the bottom of the outlet are formed on a lower end of the louver.

[10] The air conditioner according to claim 9, wherein a coupling projection is
projected on a lower surface of the louver base, a louver mounting hole is formed on the discharge grill unit, and an extension hole receiving the coupling projection is radially projected on an edge of the louver mounting hole, such that the louver is rotatably coupled to the discharge grill unit through the operation that the louver rotates in a state where the coupling projection is inserted into the extension hole.

[11] The air conditioner according to claim 7, wherein the louver includes a louver body forming right and left surfaces and an end tip extended from an upper end of the louver body in an intersection direction.

[12] An air conditioner comprising:
a chassis;
a fan assembly mounted to a front part of the chassis;
a heat-exchanger provided to a front part of the fan assembly;
a discharge grill unit supporting the heat-exchanger and having an air outlet;
a main vane rotatably provided on the discharge grill unit to selectively shield the air outlet;
a motor mounted on the discharge grill unit to generate driving force for rotating the main vane; and
a link member whose one end is connected to a rotation shaft of the motor and the other end is connected to a predetermined position spaced apart from the rotation center of the main vane.

[13] The air conditioner according to claim 12, wherein the link includes a motor-sided link whose one end is connected to the rotation shaft of the motor and a vane-sided link whose one end is connected to the main vane, the other ends of the motor-sided link and vane-sided link being rotatably connected to each other.

[14] The air conditioner according to claim 13, wherein the rotation shaft of the motor is disposed on a predetermined position spaced apart from a hinge shaft which becomes a rotation center of the main vane.

[15] The air conditioner according to claim 13, wherein while the main vane is opened and closed, the angle formed by the motor-sided link and the vane-sided link varies.

[16] The air conditioner according to claim 13, wherein while the main vane is opened, the angle formed by the motor-sided link and the vane-sided link increases, and while the main vane is closed, the angle formed by the motor-sided link and the vane-sided link decreases.

[17] The air conditioner according to claim 12, further comprising:
a sub vane rotatably connected to the discharge grill on a predetermined space apart from the rotation center of the main vane.
The air conditioner according to claim 17, wherein the rotation shaft of the motor for driving the sub vane is connected directly to the hinge shaft which becomes the rotation center of the sub vane.
A. CLASSIFICATION OF SUBJECT MATTER

F24F 13/14(2006.01)i, F24F 13/08(2006.01)i, F24F 1/00(2006.01)1

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 8 F24F 3/00, 13/08, 13/10

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Utility models and applications for Utility models since 1975

Japanese Utility models and applications for Utility models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

KIPASS (KIPO internal) "Keyword: air conditioner, fan, heat exchanger, sub vane, main vane, louver, link, and similar terms"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
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<tr>
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<td>KR 10-2003-0034642 A (LG ELECTRONICS INC.) 9 May 2003</td>
<td>12, 17</td>
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See patent family annex

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Date of the actual completion of the international search

24 APRIL 2009 (24 04 2009)

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Name and mailing address of the ISA/KR

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