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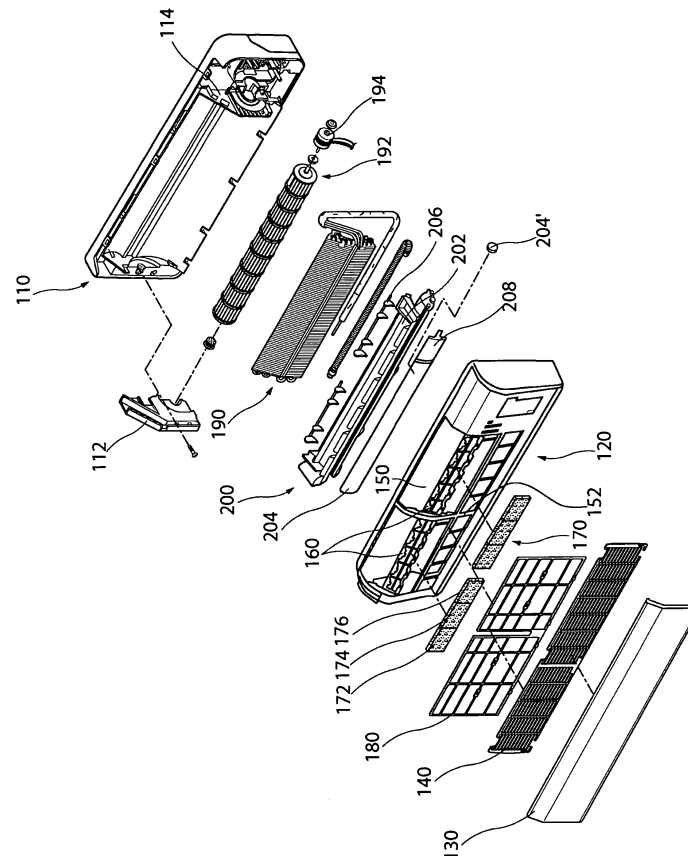
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(54) **Air conditioner**

(57) An indoor unit of an air conditioner includes: a main chassis (110) forming a rear appearance; a front frame (120) disposed at a front of the main chassis to form a front appearance; a heat exchanger (190) and a

fan (192) disposed at a front of the main chassis; a discharge grill (200) disposed at a lower portion of the main chassis to guide a discharged air; and a discharge vane (204) for controlling a state of the discharge grill in a closing mode, a cooling mode, and a heating mode.

FIG.4



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Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to an air conditioner, and more particularly, to a discharge port of an indoor unit of an air conditioner, in which air can be discharged smoothly. Embodiments provide a structure of a discharge port in an indoor unit of an air conditioner, capable of making a user feel more comfortable by properly changing a direction of air according to operation states of the air conditioner.

Description of the Related Art

[0002] An air conditioner is a device for maintaining optimized indoor air according to purpose. For example, when indoor air becomes high temperature in summer, the air conditioner blows air of low temperature to cool down the inside. On the contrary, in winter, the air conditioner blows warm air of high temperature to heat the indoor air.

[0003] Air conditioners may be roughly divided into integral types and separation types. An integral type air conditioner has one unit as a whole and a separation type air conditioner separately has an indoor unit installed inside a space that needs air-conditioning and an outdoor unit installed in the outside. Recently, separation type air conditioners have been widely used because of noise and installation environment considerations for air conditioners.

[0004] Fig. 1 is an exploded perspective view of a separation type air conditioner of a related art and Fig. 2 is a view illustrating air is sucked into and discharged from an indoor unit of a separation type air conditioner of a related art.

[0005] Referring to the drawings, a main chassis 1 forms a frame of an indoor unit. The main chassis 1 has a front panel 3 formed on a front side thereof to form the outer appearance of the indoor unit. The main chassis 1 having the front panel 3 is mounted on a wall in the inside.

[0006] A space in which parts that will be described below are mounted is formed between the main chassis 1 and the front panel 3.

[0007] In the meantime, the outer appearance of the indoor unit formed by the main chassis 1 and the front panel 3 is protruded toward the front side as a whole as illustrated in Fig. 1.

[0008] A suction panel 7 having a front suction grill 5 is provided on the front of the front panel 3 to form a front appearance of the indoor unit. A hinge member (not shown) is provided at the upper end of the suction panel 7 to allow the suction panel 7 to rotate.

[0009] The front suction grill 5 is a path through which air sucked from a space that needs air-conditioning is

sucked into the inside of the indoor unit. The front suction grill 5 is integrally formed with the suction panel 7. In the meantime, an upper suction grill 3' is formed long left and right on the upper side of the front panel 3. The upper suction grill 3' is integrally formed with the front panel 3 or separately formed.

[0010] A heat exchanger 9 is installed at the back of the front panel 3. The heat exchanger 9 allows air sucked through the front suction grill 5 and the upper suction grill 3' to exchange heat while passing through the exchanger 9. A filter 9' for purifying sucked air is installed on the front of the heat exchanger 9.

[0011] A cross-flow fan 10 is installed at the back of the heat exchanger. The cross-flow fan 10 sucks air from a space that needs air-conditioning and discharges air back to the space that needs air-conditioning. A fan motor 10' for providing rotational power to the cross-flow fan 10 is installed on the right side of the cross-flow fan 10 and a member for guiding flow created by the cross-flow fan 10 is further integrally formed in the inside of the main chassis 1.

[0012] In the meantime, air that has heat-exchanged while passing through the heat exchanger 9 is discharged to a space that needs air-conditioning through the cross-flow fan 10. For that purpose, a discharge grill 11 is installed at the lower end of the main chassis 1 and the front panel 3.

[0013] In the meantime, a discharge port 13 for guiding air that has passed through the cross-flow fan 10 to a space that needs air-conditioning is formed in the inside of a discharge grill 11.

[0014] A discharge vane 15 for vertically controlling the direction of discharged air and a louver for horizontally controlling the direction of discharged air are installed in the inside of the discharge port 13. The louver 16 is provided in plurals and the louvers 16 are connected to each other by a link 17 to operate simultaneously.

[0015] Also, a display part 19 for displaying an operation state of an air conditioner is provided at an about center on the lower portion of the front panel 3.

[0016] Description will be made for the air conditioner having the above-described construction and operating in a cooling mode.

[0017] When the air conditioner operates, air for air-conditioning is sucked into the inside of an indoor unit by the cross-flow fan 11. That is, air is sucked into the inside of the indoor unit through the front suction grill 5 and the upper suction grill 3' to pass through the heat exchanger 9.

[0018] The air that has passed through the heat exchanger 9 exchanges heat with working fluid (refrigerant) flowing in the inside of the heat exchanger 9.

[0019] The air that has exchanged heat with the heat exchanger 9 becomes relatively low temperature and is sucked into the cross-flow fan 10. The air sucked into the cross-flow fan 10 is discharged to the lower direction and guided to the side of the discharge port 13.

[0020] The air guided to the inside of the discharge

port 13 changes a discharging direction thereof using the discharge vane 15 and the louver 16 installed inside the discharge port 13 and is discharged to a space that needs air-conditioning through the discharge grill 13. At this point, since the vane 15 and the louver 16 allow the discharged air to be distributed vertically and horizontally, the air is uniformly discharged to the space that needs air-conditioning.

[0021] To fix the heat exchanger 9, a fixing bracket 8 is provided to the left of the main chassis 1 and a fixing end 8' that corresponds to a screw-coupling end 9a of the heat exchanger 9 is provided to the right of the main chassis 1. A screw-coupling hole 8" should be punched in the inside of the fixing end 8'.

[0022] A receiving groove 8a for receiving a left end of the heat exchanger 9 is formed on the front side and the upper side of the fixing bracket 8. Hookers 8b for hooking and fixing a left hair pin 9c of the heat exchanger 9 are protruded in the inside of the receiving groove 8a.

[0023] A screw through hole 9b that corresponds to the screw-coupling hole 8" is punched in the inside of the screw-coupling end 9a of the heat exchanger 9.

[0024] The heat exchanger 9 is fixed by fixing the fixing bracket 8 in the left of the main chassis 1 using a screw S. At this point, the receiving groove 8a of the fixing bracket 8 is open toward the right side.

[0025] When the hair pin 9c of the heat exchanger 9 is inserted into the receiving groove 8a of the fixing bracket 8, the hair pin 9c is hooked at and fixed in the hooker 8b of the inside of the receiving groove 8a. At this point, the left end of the heat exchanger 9 is fixed first.

[0026] After that, the right side of the heat exchanger 9, more specifically, the screw-coupling end 9a is closed attached to the fixing end 8' of the main chassis 1 and the screen through hole 9b is coupled to the screw-coupling hole 8" using a screw S, so that the heat exchanger 9 is fixed to the main chassis 1.

[0027] However, since only one discharge vane 15 is provided at the discharge port 13, it is difficult to smoothly guide the discharged air.

[0028] Also, even though the operation state changes from the cooling mode to the heating mode, or from the heating mode to the cooling mode, the discharge direction of the air is constant so that the user is inconvenient. For example, a cold air flows down by its weight after discharged to the upper portion of the room. However, when a hot air is discharged to the upper portion of the room, it is collected at the upper portion because of its lightweight. Consequently, the indoor room gets warmer.

[0029] Also, like the air discharged in the cooling mode, the air discharged in the heating mode is directly blown to the user, so that the user feels uncomfortable.

SUMMARY OF THE INVENTION

[0030] Accordingly, the present invention is directed

to an indoor unit of an air conditioner that addresses one or more problems due to limitations and disadvantages of the related art.

[0031] It would be desirable to provide an indoor unit of an air conditioner, capable of making a user feel comfortable by differently changing a discharge state of air according to a cooling mode and a heating mode.

[0032] It would also be desirable to provide an indoor unit of an air conditioner, capable of improving an air conditioning effect much more by more rapidly circulating air that is blown from an indoor unit in a cooling mode and a heating mode.

[0033] It would also be desirable to provide an indoor unit of an air conditioner, capable of controlling a discharge state of air more suitably for a user.

[0034] Additional advantages, objects, and features of the invention will be set forth in part in the description which follows and in part will become apparent to those having ordinary skill in the art upon examination of the following or may be learned from practice of the invention. The objectives and other advantages of the invention may be realized and attained by the structure particularly pointed out in the written description and claims hereof as well as the appended drawings.

[0035] 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 an indoor unit of an air conditioner, including: a main chassis forming a rear appearance; a front frame disposed at a front of the main chassis to form a front appearance; a heat exchanger and a fan disposed at a front of the main chassis; a discharge grill disposed at a lower portion of the main chassis to guide a discharged air; and a discharge vane for controlling a state of the discharge grill in a closed mode, a cooling mode, and a heating mode.

[0036] It would also be desirable to provide an indoor unit of an air conditioner, including: a main chassis forming a rear appearance; a front frame disposed at a front of the main chassis to form a front appearance; a heat exchanger and a fan disposed at a front of the main chassis; a discharge grill disposed at a lower portion of the main chassis to guide a discharged air; and an auxiliary vane disposed at one side of the discharge grill, the auxiliary vane rotating together with the discharge grill only when the discharge grill rotates in one direction.

[0037] According to the embodiments, an air can be smoothly discharged in the indoor unit of the air conditioner. Since air is differently discharged according to the usage states of the indoor unit, the user can feel more comfortable. Also, the air conditioning environment of the indoor room can be controlled more rapidly as the user desires.

[0038] It is to be understood that both the foregoing general description and the following detailed description of the present invention are exemplary and explanatory and are intended to provide further explanation of the invention as claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0039] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this application, illustrate embodiment(s) of the invention and together with the description serve to explain the principle of the invention. In the drawings:

Fig. 1 is an exploded perspective view of an indoor unit of a related art air conditioner;

Fig. 2 is a side view of an indoor unit of a related art air conditioner;

Fig. 3 is a perspective view of an indoor unit of an air conditioner according to a preferred embodiment of the present invention;

Fig. 4 is an exploded perspective view of an indoor unit of an air conditioner according to the present invention;

Fig. 5 is a perspective view of a discharge grill in an indoor unit of an air conditioner according to the present invention;

Fig. 6 is an exploded perspective view illustrating a connection of a discharge vane and an auxiliary vane in an indoor unit of an air conditioner according to the present invention;

Fig. 7 is a rear perspective view of when a discharge vane and an auxiliary vane are closed in an indoor unit of an air conditioner according to the present invention;

Fig. 8 is a rear perspective view of when a discharge vane and an auxiliary vane operate in a cooling mode in an indoor unit of an air conditioner according to the present invention;

Fig. 9 is a rear perspective view of when a discharge vane and an auxiliary vane operate in a heating mode in an indoor unit of an air conditioner according to the present invention; and

Fig. 10 is a front view of a discharge grill in an indoor unit of an air conditioner according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0040] Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings.

[0041] Fig. 3 is an exploded perspective view of an indoor unit of an air conditioner according to a preferred embodiment of the present invention. Referring to Fig. 3, the indoor unit of the air conditioner includes a main chassis 110 and a front frame 130, which constitute a whole appearance. The main chassis 110 defines a whole frame and forms a back appearance, and the front frame 120 is disposed at the front of the main chassis 110 to form a front appearance.

[0042] The front of the front frame 120 is shielded by a front panel 130. A suction grill 140 is formed on an

upper side of the front panel 130, that is, an upper surface of the front frame 120. Preferably, the front panel 130 is spaced apart from the front frame 120 by a predetermined distance. Accordingly, an outdoor air is introduced through a gap between the front panel 130 and the front frame 120. Meanwhile, the front panel 130 can be installed to be rotatable around a lower portion by a predetermined angle.

[0043] A discharge port 112 is formed at a lower portion of the front frame 120. Accordingly, the air introduced into the indoor unit through the discharge port 122 is again discharged to the outside. A discharge grill 200, which will be described later, is provided inside the discharge port 122.

[0044] A display window 124 is disposed at a right upper side of the discharge port 122. The display window 124 is transparent such that the user can verify operation states of the indoor unit 100, which are displayed on the display device of the discharge grill 200.

[0045] Fig. 4 is an exploded perspective view of a separation type air conditioner according to the present invention. The indoor unit 100 of the separation type air conditioner will be described below in detail with reference to Fig. 4.

[0046] Referring to Fig. 4, a whole appearance of the indoor unit 100 is defined by a main chassis 110 and a front frame 120. The main chassis 110 is mounted on an indoor wall.

[0047] A space where a plurality of parts will be mounted is defined between the main chassis 110 and the front frame 120. The appearance of the indoor unit is protruded forwards as shown in Fig. 4.

[0048] At a left end portion of the main chassis 110, a fixing bracket 112 is provided to fix a heat exchanger 190 and a left end of a cross-flow fan 192. At a right end portion of the main chassis 110, a fixing part 114 is protruded forwards to fix the heat exchanger 190 and a right end of the cross-flow fan 192.

[0049] A suction port 150 is formed at the front of the front frame 120. The suction port 150 serves as a passage through which air is introduced from the outside of the indoor unit 100. Here, filter frames 160 are formed at the left and right. A high-performance filter 170, which will be described later, is mounted on the filter frames 160, and the filter frames 160 are provided in pair provided at the left and right. That is, a central separation member 152 crosses a central portion of the suction port 150 up and down, and the filter frames 160 are provided at the left and right of the central separation member 152.

[0050] The high-performance filter 170 is mounted on the filter frame 160. The high-performance filter 170 can have single or multiple functions. For example, the filter 170 includes an ammonia deodorizing filter 172 for deodorizing clouds of smoke or various smells, a formaldehyde deodorizing filter 172 for deodorizing harmful components generated from building materials, and a toluene (VOC) deodorizing filter 176 for deodorizing

smells of volatile organic materials.

[0051] The suction grill 140 serves as a passage through which air is introduced into the indoor unit 100 in the space for the air conditioning. The suction grill 140 is installed to surround an upper portion of the suction port 150 of the filter frame 160. The suction grill 140 is mounted on the front frame 120, while it is connected with a pre-filter 180 in one body.

[0052] The pre-filter 180 is installed between the front panel 130 and the front frame 120. The pre-filter 180 filters foreign particles in air and entirely surrounds the suction port 150. That is, the pre-filter 180 is elastic and covers an area ranging the rear upper portion of the front frame 120 as well as the front portion of the front frame 120.

[0053] A heat exchanger 190 is installed at the rear of the front frame 120. The heat exchanger 190 exchanges heat of the air sucked through the suction grill 140. Preferably, the heat exchanger 190 is bent many times corresponding to the suction port 150 of the front frame 120.

[0054] A cross-flow fan 192 is installed at the rear of the heat exchanger 190. The cross-flow fan 192 sucks air from the space for the air conditioning and discharges the sucked air to the space for the air conditioning. That is, the cross-flow fan 192 controls the airflow such that it sucks an outdoor air through the suction port 150 and discharges the air through the discharge port 122.

[0055] A fan motor 194 for providing a torque to the cross-flow fan 192 is installed at the right of the cross-flow fan 192. Preferably, the front surface of the main chassis 110 has a curvature corresponding to an outer periphery of the cross-flow fan 192 such that air current generated by the cross-flow fan 10 is easily guided.

[0056] A discharge grill 200 is provided at an lower inner side of the front frame 120. A discharge port 202 is formed in the discharge grill 200 such that the air heat-exchanged in the indoor unit 100 is guided to be discharged to the outside.

[0057] A discharge vane 204 for controlling an up/down direction of air discharged through the discharge port 202 and a louver 206 for controlling a left/right direction thereof are installed in the discharge grill 200. Here, a plurality of louvers 206 are provided, and the plurality of louvers 206 are connected together by a link and thus are operated at the same time.

[0058] Meanwhile, a vane motor 204' is further installed inside the discharge vane 204 to control a rotation of the discharge vane 204. An auxiliary vane 208 is further installed at a right side of the discharge grill 204 to control a discharge direction of air together with the discharge vane 204.

[0059] A driving shaft of the vane motor 204' is fitted to a rotational shaft of the discharge vane 204, so that vane motor 204' rotates the discharge vane 204. Unlike the operation of the discharge vane 204, the vane motor 204' itself can be fixed to any parts for stopping the discharge grill 200.

[0060] Fig. 5 is a front perspective view of the dis-

charge grill. Referring to Fig. 5, the display device 120 is provided at a front right side of the discharge grill 200. The display device 210 displays a variety of information on the operation states of the air conditioner. Accordingly, the information displayed on the display device 210 is projected forward from the indoor unit 100, so that the user can recognize it.

[0061] That is, the display device 210 is disposed at a rear of the display window 124 of the front frame 120. Therefore, the user can recognize a variety of information displayed on the display device 210 through the display window 124.

[0062] A vane support piece 220 for supporting the discharge vane 204 and the auxiliary vane 208 is disposed at a right side of the discharge grill 200. As shown, one end of an outer hinge shaft of the auxiliary vane 208, which will be described later, is rotatably connected to the vane support piece 220.

[0063] Fig. 6 is an exploded perspective view illustrating a connection of the discharge vane 204 and the auxiliary vane 228 in the indoor unit of the air conditioner according to the present invention.

[0064] Referring to Fig. 6, a support 222 is formed on both ends of the discharge vane 204. A vane hinge shaft 224 is protruded at an outer surface of the support 222. The vane motor 204' is installed at an inner side of the support 222 as shown in Fig. 6. The vane hinge shaft 224 is a rotational center of the discharge vane 204. Preferably, a two-way motor that can rotate clockwise or counterclockwise is used for the vane motor 204'. More preferably, a step motor that can be controlled relatively freely within a predetermined range can be used for the vane motor 204'.

[0065] A guide protrusion 226 is protruded spaced apart from the vane hinge shaft 224 by a predetermined distance. The guide protrusion 226 is slidably inserted into the guide groove 234 of the auxiliary vane 208, which will be described later. Accordingly, the auxiliary vane 208 is interfaced with the discharge vane 204 by the guide protrusion 226.

[0066] A connection plate 230 is protruded at a right side of the auxiliary vane 208 provided at a side of the discharge vane 204 as shown in Fig. 6. In the central portion of the connection plate 230, an inner hinge shaft 232 is protruded inwardly. The inner hinge shaft 232 becomes a rotational center of the auxiliary vane 208 together with the outer hinge shaft 236, which will be described below.

[0067] An auxiliary vane hinge hole 232' is formed inside the inner hinge shaft 232. The vane hinge shaft 224 of the discharge vane 204 is rotatably inserted into the auxiliary vane hinge shaft 232'.

[0068] A guide groove 234 is formed spaced apart from the inner hinge shaft by a predetermined position. That is, distance between the inner hinge shaft 232 and the guide groove corresponds to a rotational radius of the guide protrusion 226 rotating around the vane hinge shaft 224. Accordingly, the guide protrusion 226 is in-

serted into the guide groove 234.

[0069] The guide groove 234 is formed within a range of a predetermined angle (for example, about 45° left and right from the upper portion of the inner hinge shaft 232) and is formed in a circular arc shape. By forming the guide groove 234 in the circular arc shape, even when the discharge vane 204 rotates, the auxiliary vane 208 is made to be idle, that is, not to be rotated.

[0070] An outer hinge shaft 236 is protruded in a left direction at a left side of the auxiliary vane 208. The outer hinge shaft 236 becomes a rotational center of the auxiliary vane 208 together with the inner hinge shaft 232.

[0071] Meanwhile, the support 222 and the connection plate 224 are formed in a region where the discharge vane 204 and the auxiliary vane 208 face each other. Due to the insertion of the vane hinge shaft 224, the positions of the support 222 and the connection plate 224 can be supported. Meanwhile, in order to accurately support the positions of the discharge vane 204 and the auxiliary vane 208, a certain structure extending from a position fixing part of the discharge grill 200 is further provided at an outer periphery of the vane hinge shaft 224, such that the positions of the discharge vane 204 and the auxiliary vane 208 can be fixed tightly.

[0072] An operation of the indoor unit of the air conditioner according to the present invention will be described below.

[0073] Once the air conditioner is operated in a cooling mode, an air flows into the inside of the air conditioner by the cross-flow fan 192. That is, the fan motor 194 operates and produces a torque by a voltage applied from the outside. When the torque rotates the cross-flow fan 192, the suction force is generated. Accordingly, air is introduced from the outside (space for the air conditioning) into the indoor unit 100 through the suction grill 140.

[0074] The outdoor air flowing into the indoor unit 100 passes through the heat exchanger 190. The air passing through the heat exchanger 190 is cooled down by a refrigerant running the inside of the heat exchanger 190.

[0075] The heat-exchanged air in the heat exchanger 190 becomes the relatively low temperature air and flows into the cross-flow fan 192.

[0076] The low temperature air flowing into the cross-flow fan 192 is discharged in a cylindrical direction of the cross-flow fan 192 and guided into the bottom compartment.

[0077] The guided air passes through the discharge port 202 of the discharge grill 200. At this time, the discharge direction of the air is controlled by the discharge vane 204 and the louver 206 installed in the discharge port 202, and then the air is discharged into the space for the air conditioning.

[0078] The rotation state of the discharge vane 204 will be described in detail. Fig. 7 is a rear perspective view of when the discharge vane and the auxiliary vane

are closed in the indoor unit of the air conditioner according to the present invention, and Fig. 8 is a rear perspective view of when the discharge vane and the auxiliary vane operate in the cooling mode in the indoor unit of the air conditioner according to the present invention. Fig. 9 is a rear perspective view of when the discharge vane and the auxiliary vane operate in the heating mode in the indoor unit of the air conditioner according to the present invention.

[0079] In case where the indoor unit operates in the cooling mode, the discharge vane 204 rotates counterclockwise due to the driving of the vane motor 204' when the discharge vane 204 is in a closed state as shown in Fig. 7. At this time, since the guide protrusion 226 is placed at the upper portion A of the guide groove 234, if the discharge vane 204 rotates counterclockwise, the auxiliary vane 208 also rotates counterclockwise in association with the discharge vane 204.

[0080] Accordingly, the discharged air is guided to be discharged relatively toward the upper portion of the indoor space. The air discharged through the discharge vane 204 is guided upward because the discharge vane 204 rotates at a predetermined angle counterclockwise (the direction indicated by an arrow in Fig. 8) and the discharged air collides against the surface of the discharge vane 204 so that a relatively large amount of air is guided upward.

[0081] Like this, the air is discharged upward in the cooling mode so as to smoothly circulate air in the indoor space by using the principle that the cooled air falls down.

[0082] Also, in the cooling mode, the auxiliary vane 208 also rotates counterclockwise like the discharge vane 204. Therefore, a larger amount of air is guided upward in the indoor space, thereby cooling the indoor space more rapidly.

[0083] The heating operation of the indoor unit will be described below in detail with reference to Figs. 7 and 9.

[0084] When the air conditioner starts to operate in the heating mode, the vane motor 204' causes the discharge vane 204 to rotate clockwise (the direction indicated by the arrow in Fig. 9). Accordingly, as shown in Fig. 9, the guide protrusion 226 of the discharge vane 204 slides downward from the upper portion A of the guide groove 234.

[0085] When the guide protrusion 226 sliding along the guide groove 234 reaches the lower portion B of the guide groove 234, the rotation of the discharge vane 204 is stopped. That is, since the auxiliary vane 208 is configured not to rotate clockwise by the discharge vane 204, the guide groove 234 serves as a stopper.

[0086] Like this, when the discharge vane 204 rotates clockwise, the air discharged through the discharge port 202 is discharged downward in the indoor space. The air discharged through the discharge vane 204 is guided downward because the discharge vane 204 rotates at a predetermined angle clockwise (the direction indicated by the arrow in Fig. 9) and the discharged air is guided

downward by the surface of the discharge vane 204.

[0087] As described above, when the indoor unit operates in the heating mode, the air is discharged relatively downward compared with the case of the heating mode. The air is discharged downward in the heating mode so as to smoothly circulate air in the indoor space by using the principle that the hot air tends to rise up.

[0088] Meanwhile, in the heating mode, the auxiliary vane 208 maintains the stopped state without rotating together with the discharge vane 204. The reason is that parts such as the operation unit of the display device 210 and the motor disposed at a rear of the auxiliary vane 208 are communicated. In order to move these parts to another positions, the size of the indoor unit must be larger, so that it is not preferable. Also, in the heating mode, the air discharged downward is discharged more downward. Therefore, since an amount of air is not large, it is almost unnecessary to rotate the auxiliary vane 208.

[0089] By guiding a larger amount of air more upward than by the auxiliary vane 208, a larger amount of air can be guided upward. In another aspect, the space that has not been used because it is closed so that an air volume cannot be shifted can be used by the auxiliary vane 208. Therefore, the shifting effect of the air volume can be improved much more.

[0090] Fig. 10 is a front view of the discharge grill in the indoor unit of the air conditioner according to the present invention. Referring to Fig. 10, the parts such as the display device 210 is placed at a rear of the auxiliary vane 208, and a large amount of the discharged air can be guided by the auxiliary vane 208, thereby improving the direction control effect much more.

[0091] 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.

[0092] For example, although the guide protrusion 226 is formed at the discharge vane 204 and the guide groove 234 is formed at the auxiliary vane 208, the guide protrusion 226 can be at the auxiliary vane 208 and the guide groove 234 can be formed at the discharge vane 204.

[0093] Also, although the auxiliary vane 208 rotates only in the cooling mode and is not opened in the heating mode, the auxiliary vane 208 can also be configured to rotate in the heating mode.

[0094] In addition, the discharge vane 204 can be configured to rotate clockwise or counterclockwise.

[0095] According to the present invention, since the discharge range of the air can be relatively widened, the air conditioning efficiency can be increased and the wind direction with respect to the large amount of air can be guided. Therefore, the air conditioning with respect to the indoor space can be performed more rapidly.

[0096] Further, the discharge air guided by the dis-

charge vane and the auxiliary vane can be discharged relatively upward in the cooling mode and can be discharged relatively downward in the heating mode. Therefore, the air in the indoor space can be circulated more smoothly.

[0097] Further, by guiding the air downward along the wall in the heating mode, the user does not directly contact with the air, so that the user feels more comfortably.

[0098] Furthermore, by changing the rotation of the motor to clockwise or counterclockwise, the rotation state of the discharge vane can be changed easily. Since the direction of the air can be changed, the user convenience can be improved and the construction can be simplified.

Claims

1. An indoor unit of an air conditioner, including a main chassis forming a rear appearance, a front frame disposed at a front of the main chassis to form a front appearance, a heat exchanger and a fan disposed at a front of the main chassis, a discharge grill disposed at a lower portion of the main chassis to guide a discharged air, and a discharge vane for guiding a direction of air discharged through the discharge grill,
characterized in that the discharge vane controls a state of the discharge grill in a closing mode, a cooling mode, and a heating mode.
2. The indoor unit according to claim 1, wherein the discharge vane operates to close the discharge grill in the closing mode.
3. The indoor unit according to claim 1, wherein the discharge vane rotates counterclockwise in the cooling mode.
4. The indoor unit according to claim 1, wherein the discharge vane rotates clockwise in the heating mode.
5. The indoor unit according to claim 1, wherein the discharge vane is controlled to discharge the air upwards through the discharge grill in the cooling mode.
6. The indoor unit according to claim 1, wherein the discharge vane is controlled to discharge the air downwards through the discharge grill in the heating mode.
7. The indoor unit according to any one of claims 1 to 6, further comprising a motor disposed at a rear of the discharge vane to manipulate a rotation of the discharge grill.

8. The indoor unit according to claim 7, wherein the motor is a two-way motor.
9. The indoor unit according to claim 7, wherein the motor is a step motor. 5
10. The indoor unit according to any one of the preceding claims, further comprising an auxiliary vane disposed at one side of the discharge vane, the auxiliary vane rotating around the same shaft as the discharge vane. 10
11. The indoor unit according to claim 10, wherein parts used for an operation of the indoor unit are placed at a rear of the auxiliary vane. 15
12. The indoor unit according to claim 10, wherein the auxiliary vane operates only in the closing mode and the cooling mode. 20
13. The indoor unit according to claim 10, further comprising a communicating part for communicating with the auxiliary vane by the discharge vane.
14. The indoor unit according to claim 13, wherein the communicating part includes: 25
- a guide protrusion protruded at one side of the discharge vane or the auxiliary vane; and
- a guide groove in which the guide protrusion is received and guided. 30
15. The indoor unit according to claim 14, wherein the guide protrusion is spaced apart from rotational shafts of the discharge vane and the auxiliary vane by a predetermined distance. 35
16. The indoor unit according to claim 14, wherein the guide groove is formed in a circular arc shape. 40
17. An air conditioner comprising the indoor unit of any preceding claim.

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FIG.1

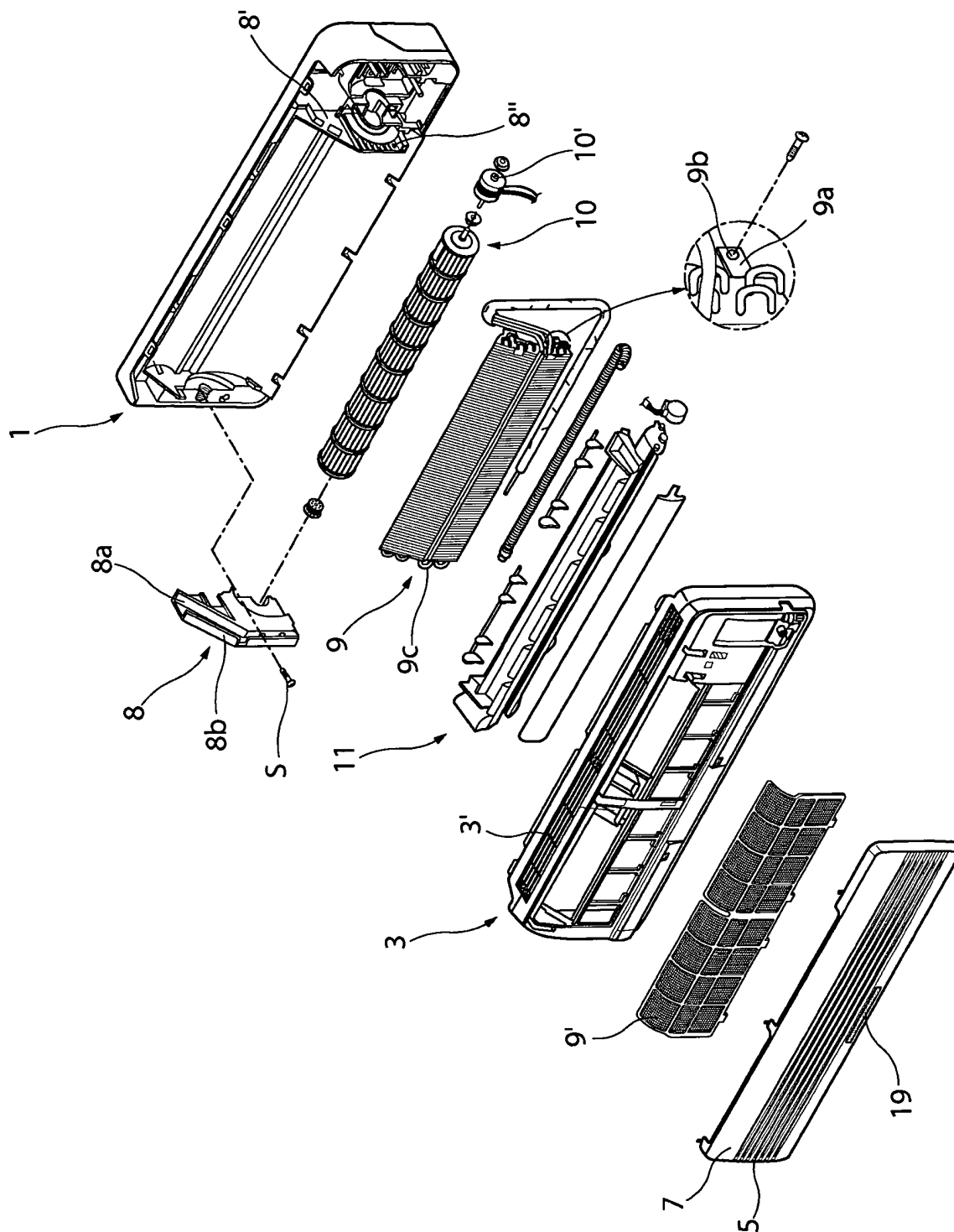


FIG.2

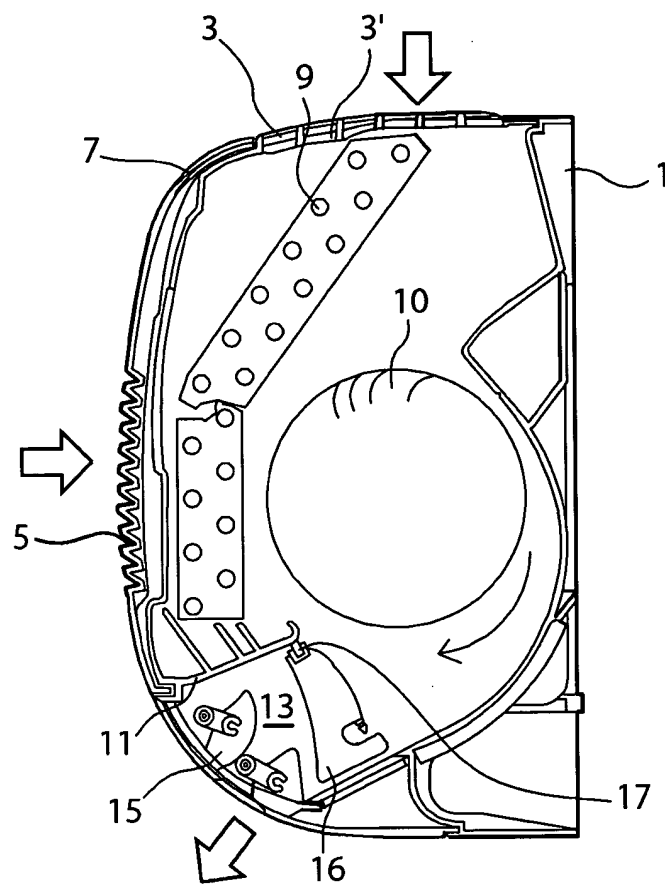


FIG.3

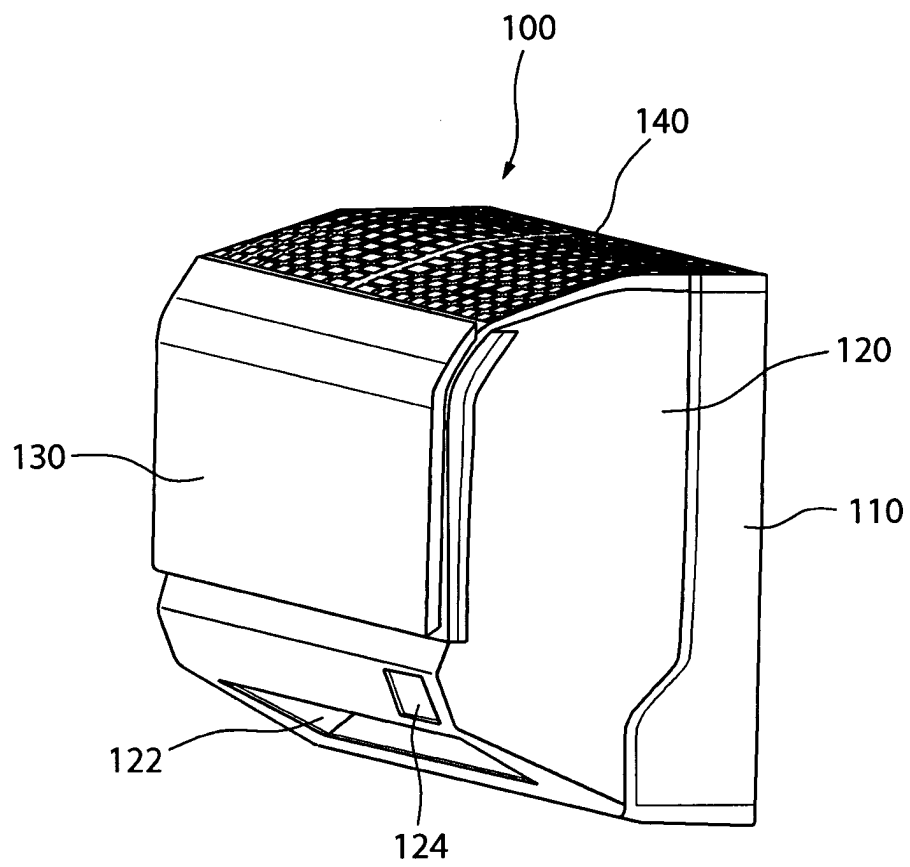


FIG.4

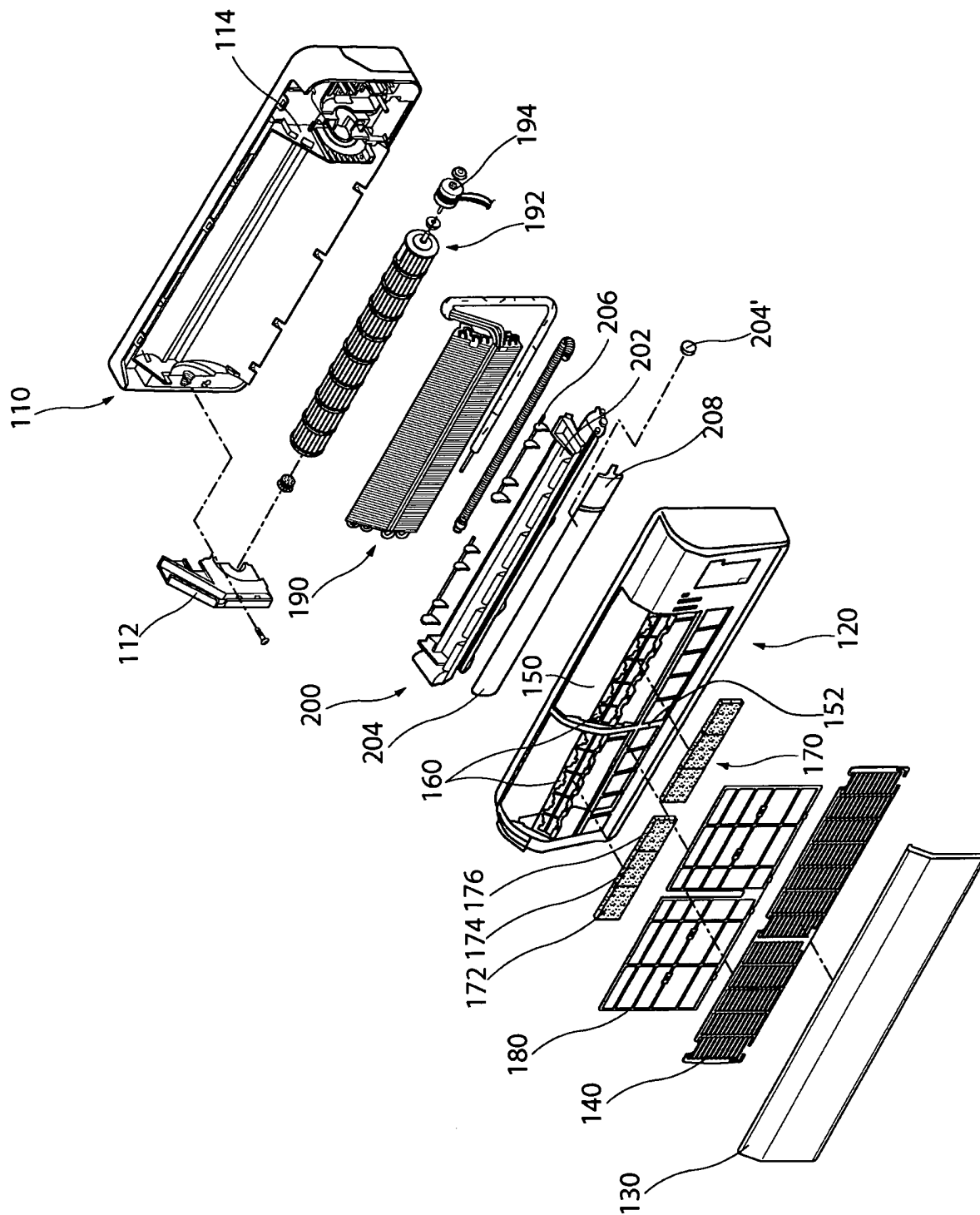


FIG.5

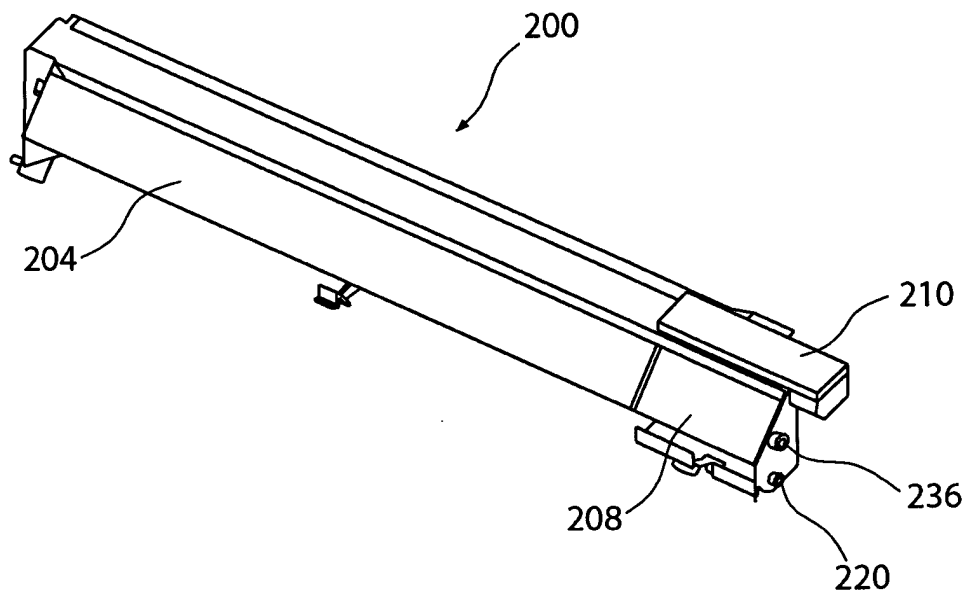


FIG.6

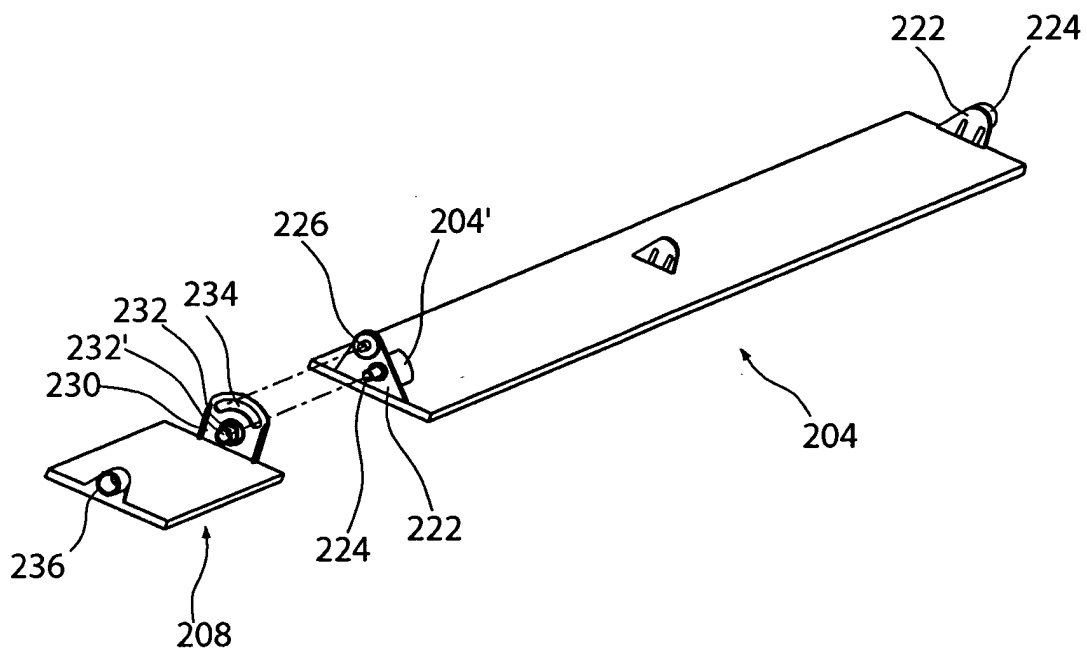


FIG.7

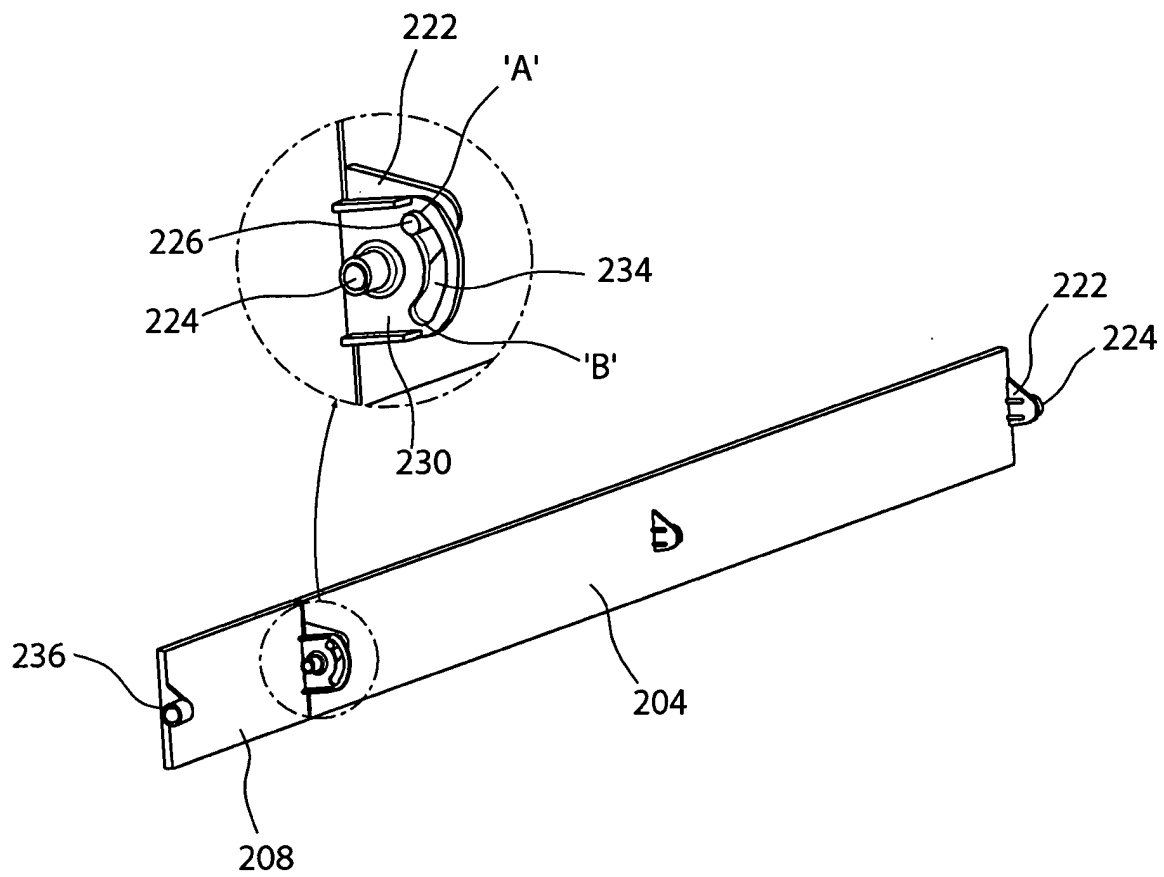


FIG.8

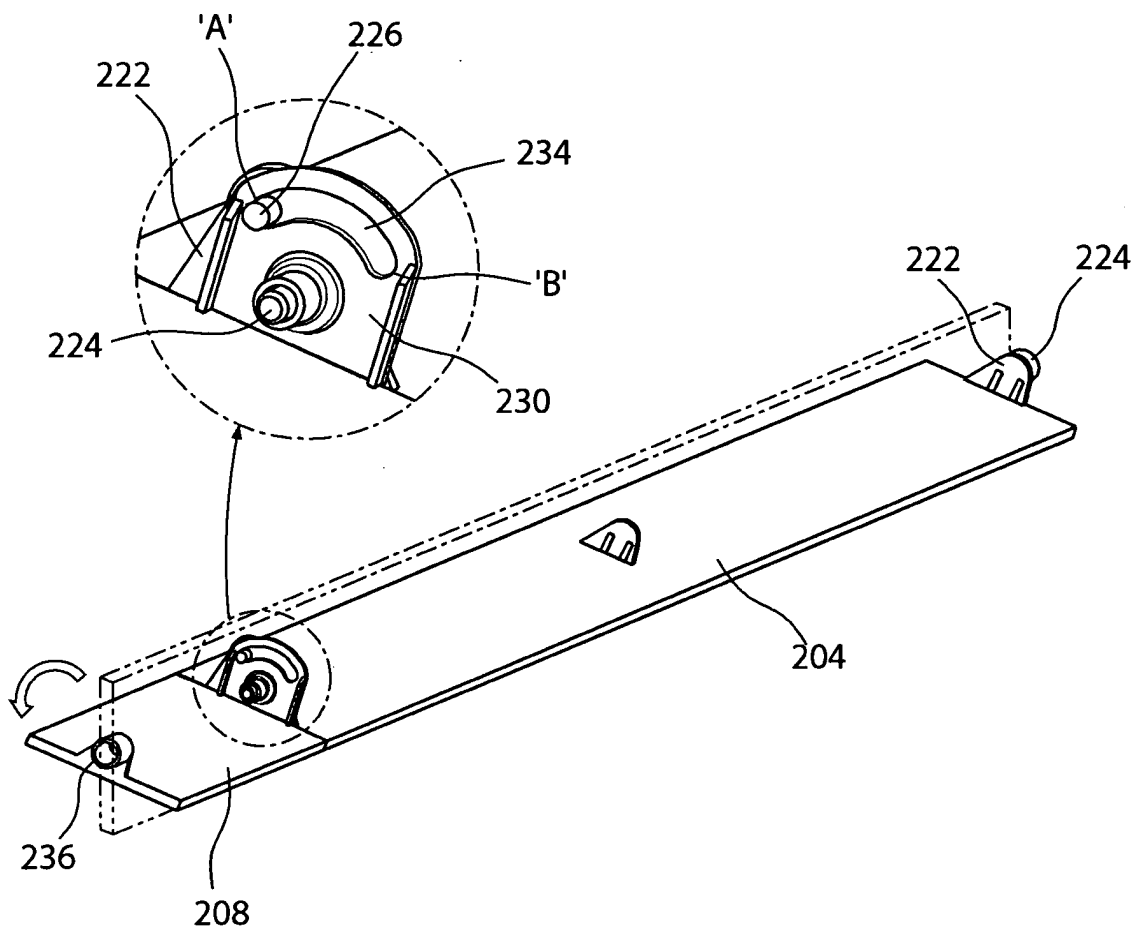


FIG.9

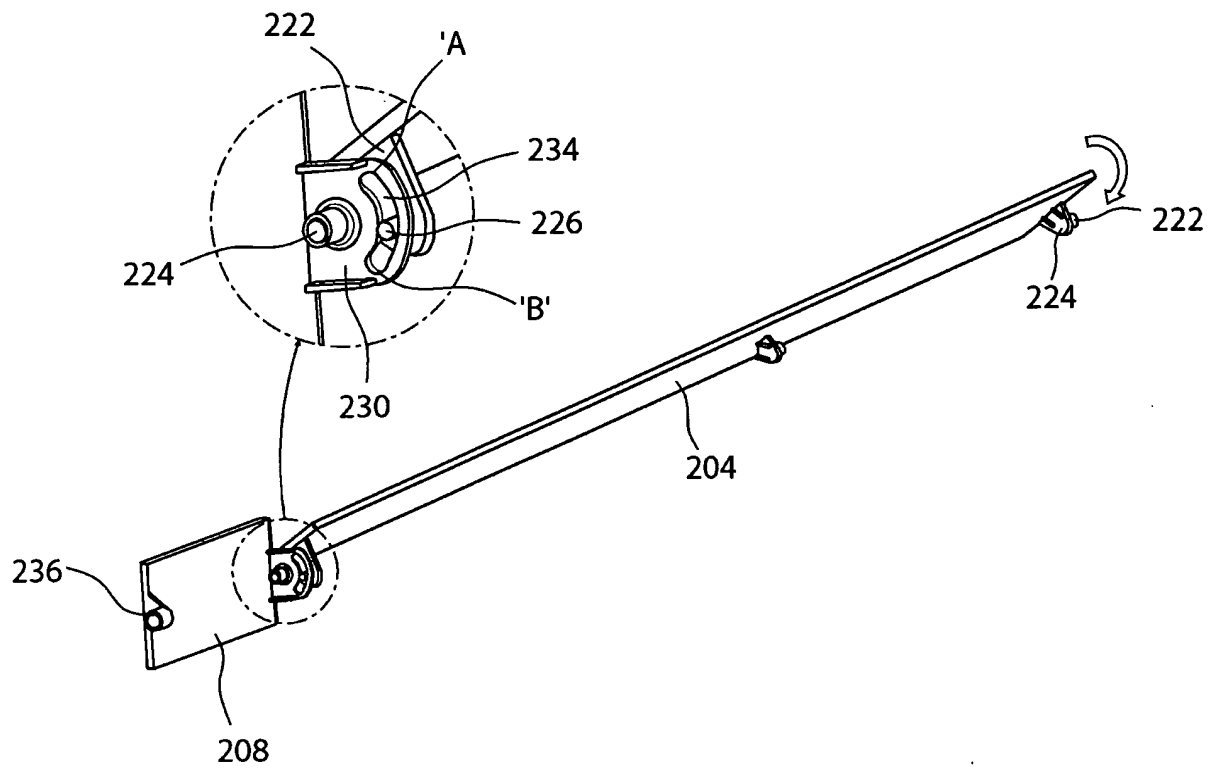
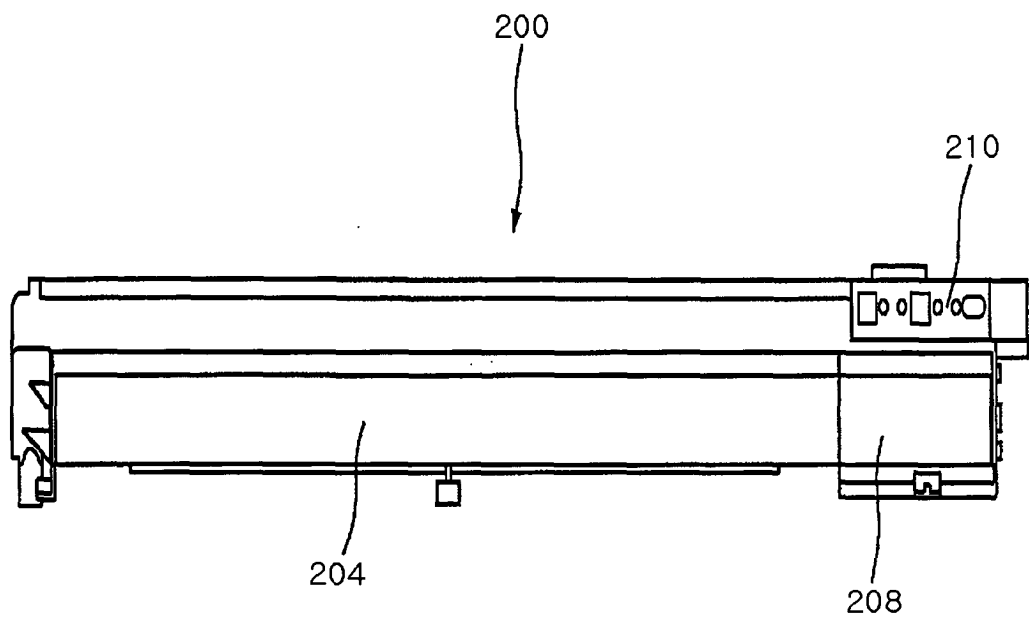


FIG.10





European Patent
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Place of search Munich		Date of completion of the search 28 September 2005	Examiner Lienhard, D
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