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### (54) Air conditioner

(57) A structure of a discharge grill for an indoor unit of an air conditioner includes a vane for adjusting a movement of a discharge air to up and down, a louver disposed at one side of the vane for adjusting a movement of a discharge air to left and right, a supporter connected to

one side of the louver, a link connected to one side of the supporter and extended on a same plane of the supporter, and a fixing groove formed on the other side of the link and to which an external force is applied.

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**Description****BACKGROUND OF THE INVENTION****Field of the Invention**

**[0001]** The present invention relates to air conditioners, and more particularly, to a structure of a discharge grill for an indoor unit of an air conditioner, for increasing durability of a link and stably operating a discharge grill.

**Description of the Related Art**

**[0002]** An air conditioner is a device for maintaining optimized indoor air according to purpose. For example, in the case where 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 inside air.

**[0003]** Air conditioners are 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 outside the space. Recently, separation type air conditioners have been widely used because of noise and installation environment considerations.

**[0004]** Fig. 1 is an exploded perspective view of a separation type air conditioner of the related art and Fig. 2 is an exploded perspective view of a related art discharge grill for an indoor unit of an air conditioner.

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

**[0007]** In the meantime, the outer appearance of the indoor unit formed by the main chassis 1 and the front frame 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 frame 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 frame 3. The upper suction grill 3' is integrally formed with the front frame 3 or separately formed.

**[0010]** A heat exchanger 9 is installed at the back of

the front frame 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 frame 3.

**[0013]** In the meantime, a discharge flow (not shown) 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 vane 15 for vertically controlling the direction of discharged air and a plurality of louvers for horizontally controlling the direction of discharged air are installed in the inside of the discharge flow. The louvers 16 are provided in plural and are connected to each other by a link 17 to operate simultaneously.

**[0015]** The vane and the louvers are installed into the inside of the discharge flow to adjust a movement of a discharge air to up and down, and to left and right respectively. A plurality of the louvers 16 are connected by a supporter 18 and combined with a link 17 to which a motor M attaches.

**[0016]** The supporter 18 is a long rod for the louver 16 to be connected on the same plane with a straight direction. A fixing end 18' is formed to support the supporter 18 at the bottom of the supporter 18.

**[0017]** A one side of the link 17 combines with the motor M and the other side of the link 17 combines with the supporter 18 connecting the louver 16. The link 17 has a plurality of bending portions to move the louver 16 by a rotational power of the motor M. Referring to Fig. 2, the link expands from a side end connecting the louver 16 to the front, to the bottom and the front with bending. The expanded other end is connected to the motor M.

**[0018]** In addition, a display 19 for displaying an operation state of an air conditioner is provided at an about center on the lower portion of the front frame 3.

**[0019]** Description will be made for the air conditioner having the above-described construction and operating in a cooling mode.

**[0020]** 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.

**[0021]** 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.

**[0022]** 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.

**[0023]** The air guided to the inside of the discharge port 13 changes a discharging direction thereof using the 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.

**[0024]** 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'.

**[0025]** 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 hairpin 9c of the heat exchanger 9 are protruded in the inside of the receiving groove 8a.

**[0026]** 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.

**[0027]** 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.

**[0028]** When the hairpin 9c of the heat exchanger 9 is inserted into the receiving groove 8a of the fixing bracket 8, the hairpin 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.

**[0029]** 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.

**[0030]** However, the link combines with the louver 16, the link has a plurality of bending portions, a motor M is mounted for providing power, a supporter 18 is connected to the louver 16 for working together.

**[0031]** However, the supporter 18 is connected to simultaneously operate a plurality of the louvers 16. A motor M is mounted for providing horizontal movement force to the louver 16. The link 17 transfers power from the motor M to the louver 16 and combines with the louver 16 with a plurality of bending portions.

**[0032]** Accordingly, since the link 17 has a plurality of bending portions to front and rear, and to up and down with a high and low difference, there is a loss of power for transferring power of the motor M to the louver 16.

**[0033]** Additionally, since momentum for transferring power of the motor M is focused at the 'A' portion of the link 17, there is a possible damage of the 'A' portion.

## SUMMARY OF THE INVENTION

**[0034]** Accordingly, the present invention is directed to a structure of a discharge grill for an indoor unit of an air conditioner that addresses one or more problems due to limitations and disadvantages of the related art.

**[0035]** It would be desirable to provide a structure of a discharge grill for an indoor unit of an air conditioner for increasing a durability of a link and stably operating a discharge grill.

**[0036]** 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.

**[0037]** 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 discharge grill for an indoor unit of an air conditioner including a vane for adjusting direction of discharge air up and down, one or more louvers disposed adjacent to, or at one side of the vane for adjusting direction of discharge air to left and right, a supporter connected to the louver, a link connected to the supporter and extended on a same plane of the supporter, and a fixing groove formed on the other side of the link and to which an external force is applied.

**[0038]** In another aspect of the present invention, there is provided a discharge grill for an indoor unit of an air conditioner including a vane for adjusting movement of discharge air to up and down, a plurality of louvers adjusting movement of discharge air to left and right, a supporter for supporting the louvers in one direction, a link with one side and another side, one side connecting to the supporter, transforming and expanding in one dimension on the supporter, the other side to which an external force applies, and each motor for driving the vane and the louver.

**[0039]** The invention also provides an indoor unit for an air conditioner comprising: a heat exchanger; a discharge grill; and a cross-flow fan arranged to move air past the heat exchanger and through the discharge grill, the cross-flow fan having an axis of rotation, the discharge grill comprising a plurality of louvers rotatable to adjust the air discharge along, i.e. discharge velocity in a direction parallel to, the axis of rotation. The cross-flow

fan is preferably cylindrical and extended along the axis of rotation. The discharge grill may also be extended along the axis of rotation and may comprise one or more vanes rotatable to adjust the air discharge direction in the plane of rotation of the fan. The invention is particularly directed to the manner in which the louvers are connected by a linkage to a driving motor, for example by making a lateral offset portion of the link broader than the portions directed between the motor and the louvers, and restricting to a single offset portion.

**[0040]** The invention also provides an indoor unit for an air conditioner, having an extended discharge grill comprising a plurality of louvers rotatable to adjust the air discharge in a direction along the length of the grill, and a link coupling rotation of the louvers to a driving motor, the link being adapted in one or more of the ways described herein.

**[0041]** According to a structure of a discharge grill for an indoor unit of an air conditioner of the present invention, a durability of the link increases and a loss will be minimized when transferring power to the louver.

**[0042]** 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**

**[0043]** 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 a related art indoor unit of an air conditioner;

Fig. 2 is an exploded perspective view of a related art discharging grill for an indoor unit of an air conditioner;

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

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

Fig. 5 is an exploded perspective view of a discharging grill for an indoor unit of an air conditioner according to an embodiment of the present invention;

Fig. 6 is a partial perspective view of a discharging grill with a louver for an indoor unit of an air conditioner according to an embodiment of the present invention; and

Fig. 7 is a perspective view of a link mounted into a discharging grill for an indoor unit of an air conditioner according to an embodiment of the present invention.

#### **DETAILED DESCRIPTION OF THE INVENTION**

**[0044]** Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings. Wherever possible, the same reference numbers will be used throughout the drawings to refer to the same or like parts.

**[0045]** Fig. 3 is a perspective view of an indoor unit of an air conditioner according to a preferred embodiment of the present invention.

**[0046]** Referring to Fig. 3, an indoor unit of an air conditioner 100 constructs an entire external appearance by including a main chassis 110 for a rear appearance by forming an entire frame and a front frame 120 for a front appearance by being equipped at the front of the main chassis 110.

**[0047]** The front of the front frame 120 is screened by a front panel 130 and an upper portion of the front frame 120, the upper portion of the front panel 130, is formed with a suction grill 140. The front panel 130 may be formed with a predetermined distance from the front frame 120. Accordingly, an outdoor air flows in through an opening of the front panel 130 and the front frame 120. The other hand, the front panel 130 can be installed to rotate toward the front with a certain angle by using a bottom part as an axis.

**[0048]** A discharge port 122 is formed at a bottom part of the front frame 120. Accordingly, an inflow air inside the indoor unit of an air conditioner 100 is discharged into the outside through the discharge port 122. In addition, a discharge grill 200 is equipped at the inside of the discharge port 122.

**[0049]** A display window 124 is formed at an upper right of the discharge port 122. The display window 124 is transparent so that a user can see from the outside a display information of a discharge grill 200 about an operating condition of the indoor unit of an air conditioner 100.

**[0050]** Fig. 4 is an exploded perspective view of an indoor unit of an air conditioner according to an embodiment of the present invention. Referring to a Fig. 4, a construction about the indoor unit of an air conditioner 100 will be described in more detail.

**[0051]** As described above, the external appearance of the indoor unit of an air conditioner 100 is constructed by the main chassis 110 and the front frame 120. Moreover, the main chassis is installed on a surface of the wall of the inside.

**[0052]** A space is formed to mount a plurality of the parts between the main chassis 110 and the front frame 120. The entire external appearance of the indoor unit of an air conditioner 100 constructed by the main chassis 110 and the front frame 120 is protruded toward the front.

**[0053]** A fixing bracket 112 is equipped to fix the left end of a heat exchanger 190 and a cross-flow fan 192 at the left end portion of the main chassis 110. A fixing end 114 is protruded to fix the right end of a heat ex-

changer 190 and a cross-flow fan 192 at the right end portion of the main chassis 110.

**[0054]** A suction port 150 is formed at the front of the front frame 120. The suction port 150 is a path for an inflow air from the outside and has a filter frame 160 divided into the left and right. The filter frame 160 is a place to which a high performance filter 170 is attached to and forms the left and right portion as a pair. That is, a central divider 152 across an upper and lower of the filter frame 160 is formed at a central portion of the suction port 150 and each filter frame 160 is formed at the left and right side of the central divider 152.

**[0055]** The high performance filter 170 is mounted at the filter frame 160. The high performance filter 170 has at least one functional characteristic. For example, the high performance filter 170 can be equipped with an ammonia filter for deodorizing various smells like cigarette smoke, a formaldehyde filter for eliminating chemical toxic from building materials, and a toluene filter for removing the smell of a volatile organic substance.

**[0056]** The suction grill 140 becomes the path for an air flowing in the indoor unit of an air conditioner 100 and is installed to wrap the upper of the suction port 150 of the filter frame 160. The suction grill 140 is mounted at the front frame 120, being combined with a prefilter 180 as one body.

**[0057]** The prefilter 180 is installed between the front panel 130 and the front frame 120. The prefilter filters a foreign substance and wraps the entire suction port 150. That is, prefilter has a resilient characteristic and is installed to cover the front of the front frame 120 and the upper portion of the rear.

**[0058]** The heat exchanger 190 is installed at the rear of the front frame 120. The heat exchanger 190 exchanges an air flowing through the suction grill 140 for a heat exchange. And it is desirable that there is a plurality of a bending portion to correspond to the suction port 150 of the front frame 120.

**[0059]** The cross-flow fan 190 is installed at the rear of the heat exchanger 190. The cross-flow fan 190 intakes and discharges an air into the space for air conditioning. The cross-flow fan 190 forces a flow of an air to intake the outdoor air through the suction port 150 and discharge the air through the discharge port 122.

**[0060]** A fan motor 194 is installed to provide a rotational power at the right of the cross-flow fan 192. The front of the main chassis 110 may be formed with a curvature corresponding to the outer surface of the cross-flow fan 192 for easily guiding an air current formed by the cross-flow fan 192.

**[0061]** The discharge grill 200 is equipped at the inside of the bottom of the front frame 120. A discharge port 202 in the discharge grill 200 is formed to discharge an air to the outside after a heat of the air is exchanged in the indoor unit of an air conditioner 100.

**[0062]** The discharge grill 200 includes a vane 204 and louvers 206 for adjusting a direction of a air flow to the upper and lower, and the left and right respectively, dis-

charging from the discharge port 202. There is a plurality of the louvers 206 connected to a supporter 207 and operated by a link 230.

**[0063]** A vane motor 204' is installed to control a rotation of the vane 204 at the inside of the vane 204. Additionally, an auxiliary vane 208 is installed together with the vane 204 to control a direction of an air discharge at the right end portion of the discharge grill 200.

**[0064]** Fig. 5 is an exploded perspective view of a discharging grill for an indoor unit of an air conditioner according to an embodiment of the present invention. A display 210 is installed at the right end portion in the front of the discharge grill 200. The display 210 shows various information about an operating condition of the indoor unit of an air conditioner 100. Accordingly, a user can see from the outside a display information.

**[0065]** Since the display 210 is disposed at the rear of the display window 124 in the front frame 120, a user can see about various information on the display 210 through a display window 124, standing in front of the indoor unit of an air conditioner 100.

**[0066]** Fig. 6 is a partial perspective view of a discharging grill with a louver for an indoor unit of an air conditioner and Fig. 7 is a perspective view of a link mounted into a discharging grill for an indoor unit of an air conditioner according to an embodiment of the present invention.

**[0067]** Referring to Figs. 6 and 7, a louver 206 is connected to the supporter 207 and installed to adjust a direction of a air flow to the left and right, discharging from the inside of the discharge grill 200. The supporter 207 is formed with an enough length to align a plurality of the louvers 206 in a straight direction. A fixing end 209 is formed to sustain the supporter 207 at the bottom of the supporter 207. With the above connection, the louver 206 moves to the left and right according to movement of the supporter 207 to the left and right.

**[0068]** The supporter 207 combines with the link 230 transferring the power of a link motor a kind of a step motor. The link 230 combines with the link motor and another end portion of the link 230 combines with supporter 207 connected with the louver 206 on the same plane. The link 230 is bent to the front and rear not the left and right for the louver 206 to move to the left and right by a rotation power of the link motor. Referring to the drawings, there are two bending portions to the front and rear respectively.

**[0069]** By this bending portion, a chance for a deformation of the link 230 reduces and a reliable movement is possible when the link 230 moves.

**[0070]** A width W1 of the bending portion is broader than a width W2 of a portion expanded to combine with the link motor at the link 230. By doing this, it is possible to transfer the power to move a plurality of the louvers 206, being connected to the supporter 207, to the left and right without a power loss by the rotational power of the link motor and increase a durability of the link 230. Consequently, this embodiment provides a solution preventing the bending portion from being easily damaged at the

bending portion of the link 230.

**[0071]** A link guide 234 is formed to easily move the link 230 to the left and right at the bottom of the link 230. A fixing groove 232 is formed at the right end of the link 230 by inserting a fixing member 240 to fix the link motor.

**[0072]** The fixing member coupling part is formed to easily move the link 230 to the left and right according to a rotation of the link motor by inserting the bottom of the fixing member 240. Additionally, the fixing member coupling part is straight or cross-shaped and the fixing groove 232 is equipped with the fixing member 240 to fix the link motor.

**[0073]** Additionally, a motor receiving hole 242 is formed to make a rotation easily at the fixing member 240 by inserting the side of the link motor. A drain fan shown in Fig. 4 is formed to collect the condensed water generated from a heat exchanger 190, the drain fan being disposed at the bottom of the louver 206.

**[0074]** A working condition about the indoor unit of an air conditioner 100 having the above discharge grill structure will be described.

**[0075]** Next, the cooling mode of the air conditioner is operated and observed.

**[0076]** Once the air conditioner is operated, 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 rotational power by a voltage applied from the outside. The cross-flow fan 192 rotates by this rotational power. An outdoor air flows into the indoor unit of an air conditioner 100 through the suction grill 140 when the cross-flow fan 192 rotates.

**[0077]** 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.

**[0078]** The heat-exchanged air in the heat exchanger 190 becomes the relatively low temperature air and flows into the cross-flow fan 192. 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.

**[0079]** The guided air passes through the discharge port 202 of the discharge grill 200. At this time, the air is discharged into the space for an air conditioning by the vane 204 and the louver 206 installed in the inside of the discharge port 202.

**[0080]** Here, the louver 206 adjusts a direction of the air discharged from the movement of the link 230 to the left and right by the rotational power of the link motor. In more detail, the link 230 receiving the rotational power of the link motor moves to the left and right and a connection port 201 connected to the louver 206 moves to the left in a condition of guiding the air to a slit 203 formed at the supporter 207. Accordingly, the louver 206 fixed at the predetermined hinge portion moves to the left and right according to the movement of the connection port 201.

**[0081]** According to the present invention, the link 230

moves to the left and right by a rotation power of the link motor and is bent to the front and rear not the left and right for the louver 206 to combine with the supporter 207 connected with a plurality of the louvers 206 at the same plane.

**[0082]** Accordingly, since the link and the supporter receiving the power of the link motor is disposed at the same plane, a loss of power used in the movement of the louver can be reduced and the louver can easily move to the left and right.

**[0083]** Moreover, the durability of the link transferring the movement power from the link motor to the louver can be increased by forming a bending portion of the link broader than a straight portion.

**[0084]** 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.

## Claims

25. 1. A structure of a discharge grill for an indoor unit of an air conditioner, having a vane for adjusting a movement of a discharge air to up and down, a louver disposed at one side of the vane for adjusting a movement of a discharge air to left and right, a supporter connected to one side of the louver, and a link with one side connecting to the supporter and the other side to which an external force applies, **characterized in that** the structure comprises the link extending on a same plane of the supporter.
30. 2. The structure according to claim 1, wherein the link is bent in one dimension.
35. 3. The structure according to claim 1 or 2, wherein the link has a plurality of bending portions.
40. 4. The structure according to claim 3, wherein the bending portion is located at two different positions.
45. 5. The structure according to any one of the preceding claims, wherein the link is bent in the front and rear.
50. 6. The structure according to any one of the preceding claims, wherein a bending portion of the link is broader than other portions.
55. 7. The structure according to claim 1, wherein the link has a plurality of portions expanding in a straight direction with different widths.
8. The structure according to claim 1, wherein the link has a plurality of bars with a long portion and a short portion.

9. The structure according to any one of the preceding claims, further comprising a hole formed on the other end of the link, the hole to which an external force of a motor applies.

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10. The structure according to any one of the preceding claims, further comprising a drain fan formed on one side of the louver, for collecting condensed water.

11. The structure according to any of the preceding claims, comprising:

a plurality of slits formed at the supporter; and  
a connection port having one end inserted into  
the slit and fixed at the louver.

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12. An air conditioner indoor unit comprising the discharge grill of any preceding claim.

13. An indoor unit for an air conditioner, having an extended discharge grill comprising a plurality of louvers rotatable to adjust the air discharge in a direction along the length of the grill, and a linkage coupling rotation of the louvers to a driving element or motor.

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FIG.1

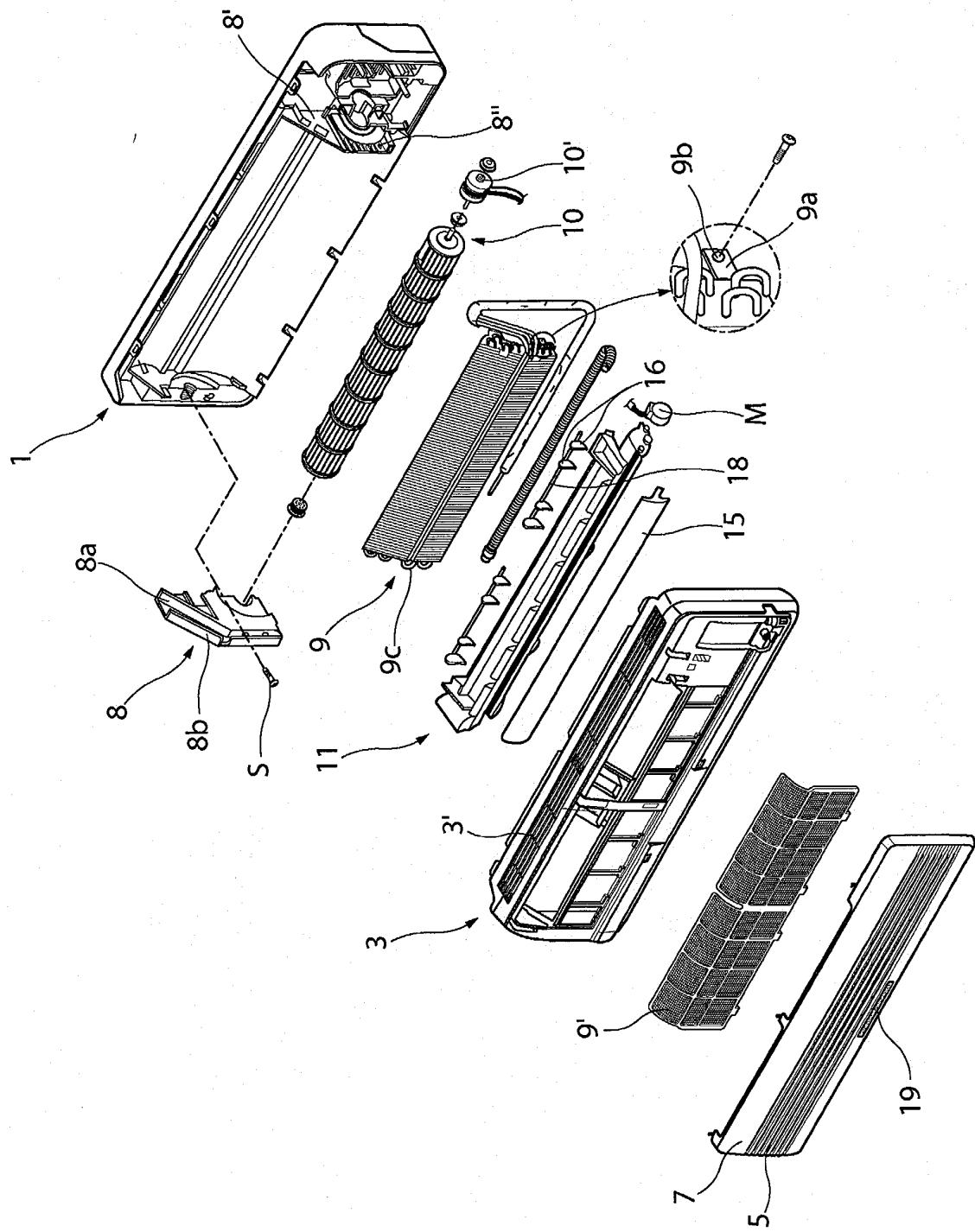


FIG.2

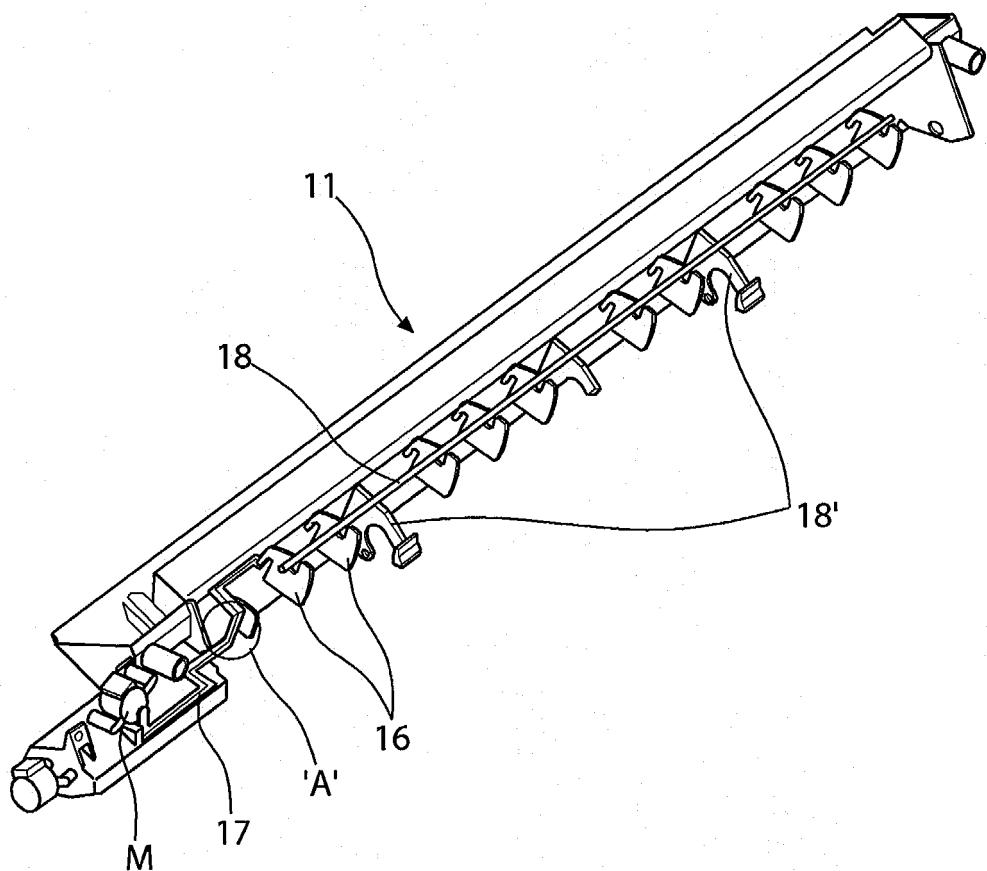


FIG.3

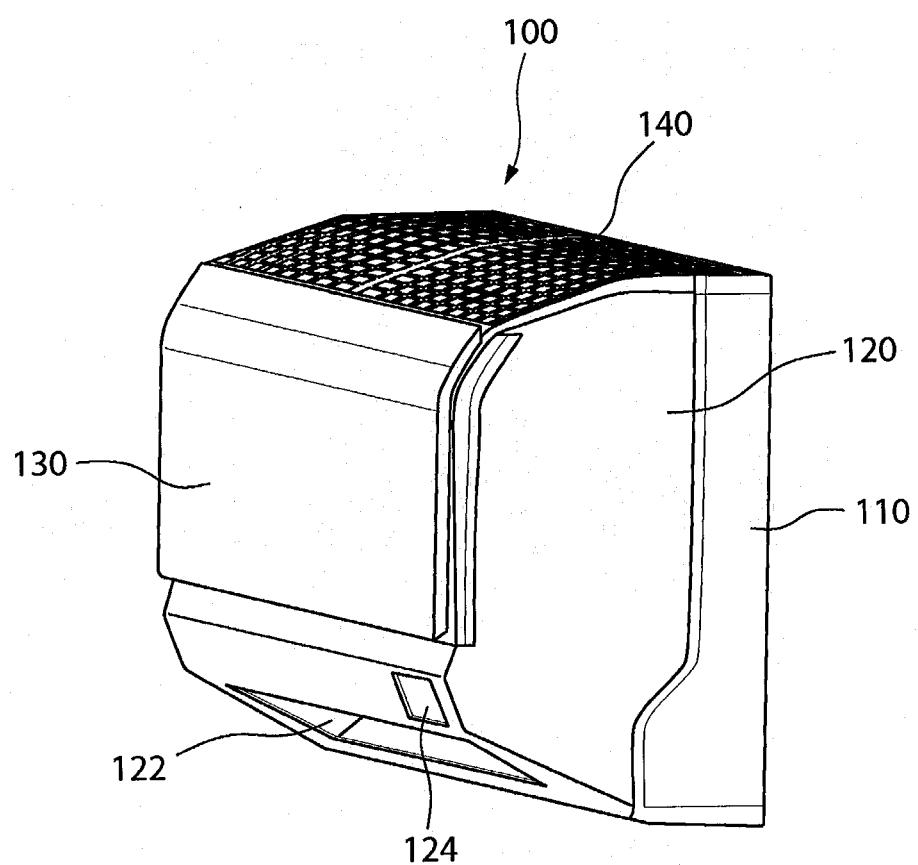


FIG.4

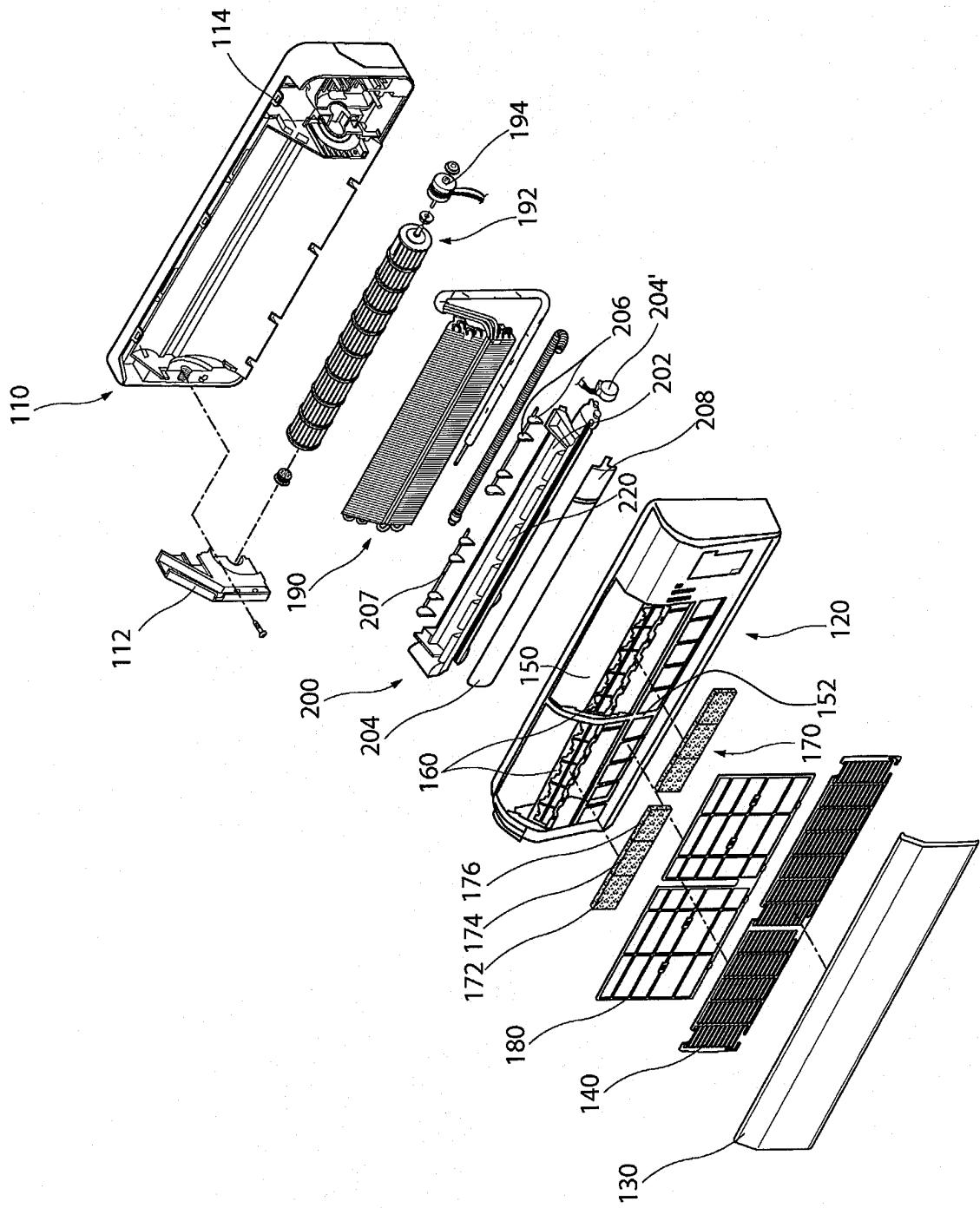


FIG.5

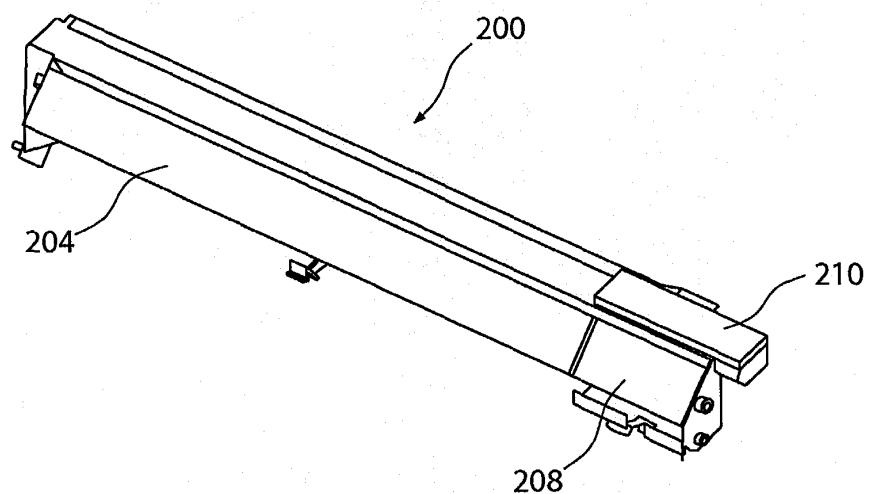


FIG.6

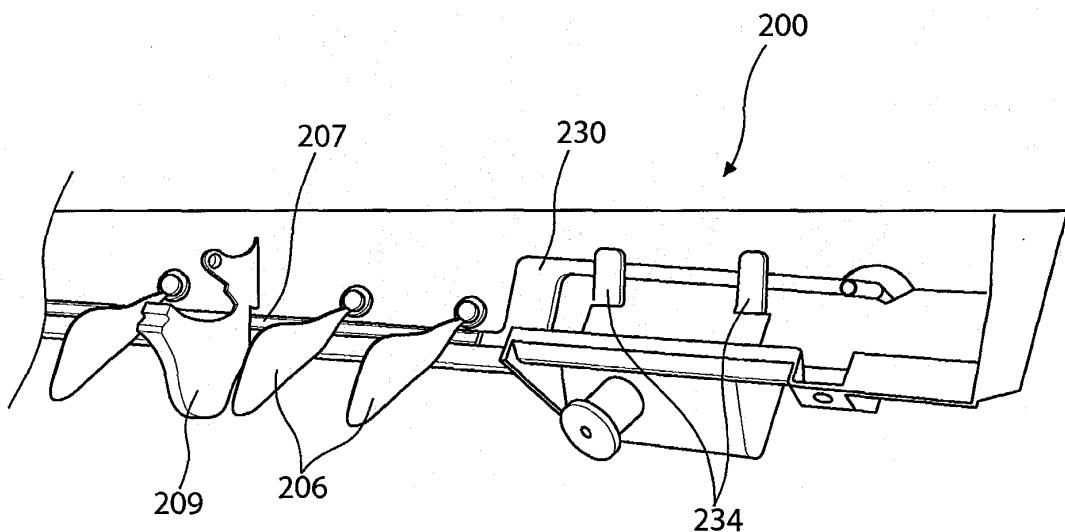


FIG.7

