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(54) **AIR CONDITIONER**

(57) The present invention relates to the technical field of air conditioners, and in particular to an air conditioner. The air conditioner comprises a middle frame, an air-deflecting door, a driving mechanism, and a latch assembly; the air-deflecting door comprises an outer guide rotating shaft, the driving mechanism comprises a driving wheel, the latch assembly is detachably connected to at least one of the outer guide rotating shaft and the driving wheel, and the driving wheel can drive, by means of the latch assembly, the outer guide rotating shaft to perform three-party coaxial rotation. According to the present solution, the latch assembly is used as both a connecting member and a transmission member to connect the driving wheel and the outer guide rotating shaft, so that when the driving wheel rotates, power can be transmitted to the outer guide rotating shaft by means of the latch as-

sembly, thereby implementing the rotation of the air-deflecting door; because the latch assembly can provide a connection function for the driving wheel and the outer guide rotating shaft and can also provide a transmission function, the connection and transmission fit between the driving wheel and the outer guide rotating shaft can be simultaneously implemented, such that the simplification of the structure of the driving mechanism is facilitated, and the problem in the prior art that an device for driving an air-deflecting door has a complex structure is mitigated.

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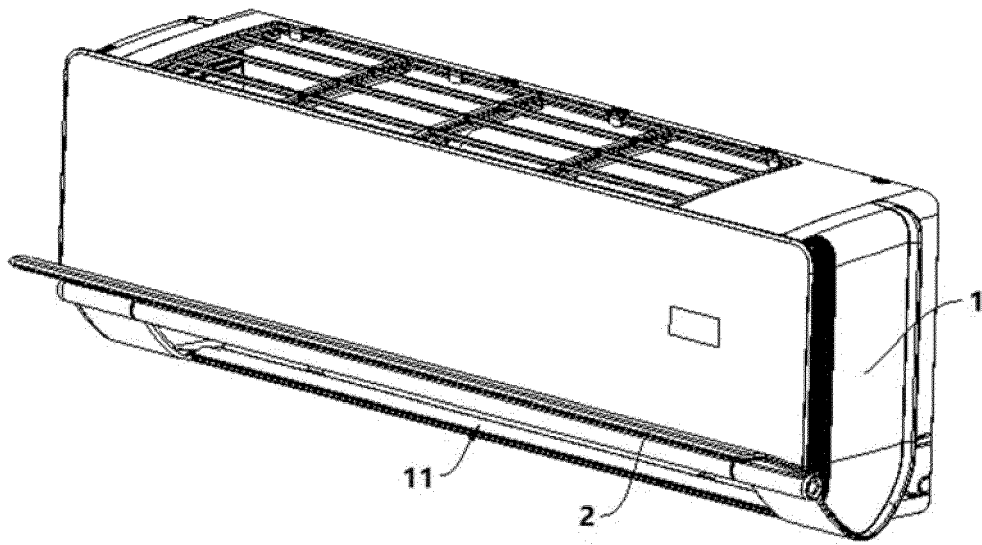


FIG. 1

Description

[0001] The present disclosure claims priorities to the following Chinese patent applications, the contents of which are incorporated herein by reference in entirety:

Filing date: 2021.08.31 Filing No.: 202111015969.2

Title: AIR GUIDE DOOR ASSEMBLY AND AIR CONDITIONER;

Filing date: 2021.11.15 Filing No.: 202111350316.X

Title: AIR GUIDE DEVICE AND AIR CONDITIONER;

Filing date: 2021.08.31 Filing No.: 202111013190.7

Title: INDOOR UNIT; and

Filing date: 2021.11.15 Filing No.: 202111348273.1

Title: AIR CONDITIONER SHELL AND AIR CONDITIONER.

Technical Field

[0002] The present disclosure relates to the technical field of air conditioners, and specifically to an air conditioner.

Background Art

[0003] As the demand amount for air conditioners increases, consumers' demand for quality and usage experience of air conditioners continues to rise.

[0004] In the prior art, in order to improve an air-deflecting effect of an air-deflecting door, a mounting position of the air-deflecting door needs to be adjusted. While adjusting the mounting position of the air-deflecting door, a driving device for driving the air-deflecting door needs to be adjusted. However, in the prior art, the driving device for the air-deflecting door generally has a complex structure, and is difficult to disassembly and assembly, resulting in inefficient assembly between the air-deflecting door and the driving device, and a poor driving effect, thereby affecting the air-deflecting effect of the air-deflecting door.

Summary

[0005] In view of the shortcomings existing in the prior art, the present disclosure aims at providing an air conditioner, wherein a structure of a driving device for an air-deflecting door is simplified and assembly efficiency between the air-deflecting door and the driving device is improved.

[0006] In order to solve the above technical problems, the present disclosure provides an air conditioner, wherein the air conditioner includes a middle frame, an air-deflecting door, a driving mechanism and a latch assembly, wherein

the air-deflecting door includes an outer guide rotating shaft, wherein the outer guide rotating shaft is

configured to be rotatably fitted with the middle frame;

the driving mechanism includes a driving wheel, wherein the driving wheel is configured to output power when rotating; and

the outer guide rotating shaft is connected to the driving wheel via the latch assembly, and the latch assembly is detachably connected to at least one of the outer guide rotating shaft and the driving wheel, and the driving wheel can drive, through the latch assembly, the outer guide rotating shaft to perform three-party coaxial rotation.

[0007] Beneficial effects of the air condition provided in the present disclosure, with respect to the prior art, include:

In this air conditioner, by using the latch assembly as both a connecting member and a transmission member to connect the driving wheel and the outer guide rotating shaft, when the driving wheel rotates, the power can be transmitted to the outer guide rotating shaft through the latch assembly, thus rotation of the air-deflecting door can be implemented. In the above, as the latch assembly not only can provide a connection function for the driving wheel and the outer guide rotating shaft, also can provide a transmission function, thus the connection and transmission fit between the driving wheel and the outer guide rotating shaft may be simultaneously completed, facilitating the simplification of the structure of the driving mechanism, and thereby mitigating the problem in the prior art that the device for driving the air-deflecting door has a complex structure.

[0008] On this basis, as the driving mechanism has a simple structure, the assembly difficulty between the driving mechanism and the air-deflecting door may be reduced, and thus the assembly efficiency of the air conditioner is improved. In addition, the driving wheel, the outer guide rotating shaft and the latch assembly are assembled by means of coaxial rotation, so that coaxial accuracy between the outer guide rotating shaft, the driving wheel and the latch assembly may be improved, thereby ensuring that the driving wheel, when rotating, can stably drive the air-deflecting door to rotate, and further improving the air-deflecting effect.

[0009] As described above, the structure of the air conditioner can mitigate the technical problems in the prior art that the device for driving the air-deflecting door has a complex structure, the assembly efficiency of the air conditioner is low, and the air-deflecting effect of the air-deflecting door is poor.

[0010] Optionally, the latch assembly is detachably connected to both the outer guide rotating shaft and the driving wheel. In this way, the assembly difficulty can be reduced, and the assembly efficiency can be improved.

[0011] Optionally, the latch assembly includes a latch and a mounting seat, wherein the mounting seat is fixedly mounted on the middle frame, the latch is mounted on the mounting seat and is capable of sliding along its axial

direction relative to the mounting seat, and the latch has one end fitted with the driving wheel and the other end fitted with the outer guide rotating shaft. Thus, by using the latch assembly provided between the driving mechanism and the air-deflecting door as well as the latch capable of sliding relative to the mounting seat, simplification of mounting steps of the air conditioner is realized, mounting efficiency is improved, labor cost and time cost are reduced, and damage to parts and components can be avoided while ensuring a long-distance transmission effect.

[0012] Optionally, the latch assembly includes at least one shaft sleeve, and the latch is mounted in the shaft sleeve. In this way, sliding of the latch can be smoother.

[0013] Optionally, an elastic member is sleeved outside the latch, which can facilitate quick disassembly and assembly.

[0014] Optionally, an annular platform is provided on a peripheral surface of the latch, and the elastic member has one end abutting against the annular platform and the other end abutting against the driving mechanism thereof. Thus, an axial movement of the latch may be limited by the annular platform, so as to improve rotation accuracy of the latch, and avoid occurrence of offsetting or tilting of the latch. The latch is capable of sliding in a direction approaching the air-deflecting door under an elastic force of the elastic member, until the annular platform abuts against the mounting seat. Besides, the latch also may function to facilitate the mounting of the elastic member.

[0015] Optionally, the latch is provided coaxially with the outer guide rotating shaft, the end surface of the outer guide rotating shaft is formed with a transmission hole, and the latch extends into the transmission hole and is fitted with the transmission hole. Thus, the driving mechanism can drive the outer guide rotating shaft to rotate through the fit between the latch and the transmission hole, and further drive the whole air-deflecting door to rotate, thereby implementing the function of adjusting a direction of the outgoing air.

[0016] Optionally, the latch includes a first fitting segment configured to be fitted with the transmission hole, wherein the first fitting segment is in a shape of a polygon prism, the transmission hole is a polygonal hole, and the shape of the first fitting segment is matched with the shape of the transmission hole. In this way, occurrence of slip of the first fitting segment relative to the transmission hole may be avoided, and the transmission efficiency is improved.

[0017] Optionally, the mounting seat includes a positioning portion, a mounting portion and an abutting portion, the middle frame is provided with a stopper and a threaded hole, the latch is provided inside the mounting portion, the abutting portion abuts against the stopper, the positioning portion is formed with a through hole, and the threaded hole is configured to be fitted with a screw passing the through hole. Thus, relative position of the positioning portion and the middle frame may be fixed,

thereby further fixing a position of the mounting seat, and avoiding occurrence of displacement of the mounting seat relative to the middle frame.

[0018] Optionally, the stopper is formed with a snap-fit groove, and the abutting portion extends into the snap-fit groove and is fitted with the snap-fit groove. Thus, the snap-fit groove can limit a position of the abutting portion, so as to avoid occurrence of wobbling of the abutting portion, and improve stability of connection between the mounting seat and the middle frame.

[0019] Optionally, the mounting portion is in a ring shape, the positioning portion and the abutting portion are both provided on a peripheral surface of the mounting portion, and a connecting line between axes of the positioning portion and the mounting portion and a connecting line between axes of the abutting portion and the mounting portion are arranged at a preset angle. In this way, the mounting and fixing of the mounting seat may be facilitated.

[0020] Optionally, a range of the preset angle is 90 degrees to 150 degrees. A reasonable preset angle can facilitate production and processing while ensuring strength of the mounting seat.

[0021] Optionally, at least one-fourth of an axial length of the latch is sleeved with the shaft sleeve. In this way, a sufficient contact area between the shaft sleeve and the latch may be ensured, so that the shaft sleeve can apply a sufficient support force to the latch, improving a protection effect, and avoiding damage to the latch when the driving mechanism outputs a large torque.

[0022] Optionally, the driving wheel is formed with an assembling hole in the middle, and the latch is mounted in the assembling hole. In this way, the driving wheel can drive the latch to rotate through the fit between the latch and the assembling hole, and further drive the outer guide rotating shaft to rotate.

[0023] Optionally, the latch includes a second fitting segment configured to be fitted with the assembling hole, wherein the second fitting segment is in a shape of a polygonal prism, the assembling hole is a polygonal hole, and the shape of the second fitting segment is matched with that of the assembling hole. In this way, occurrence of slip of the second fitting segment relative to the assembling hole may be avoided, and the transmission efficiency is improved.

[0024] Optionally, the air conditioner includes an end cover, a mounting groove is provided in an end portion of the middle frame, the end cover covers the mounting groove, the driving mechanism includes a driving box, the driving wheel is rotatably mounted in the driving box, a part of the driving box is mounted in the mounting groove, and the driving box is attached to an outer wall of the middle frame. In this way, outward protrusion of the driving box relative to the end portion of the middle frame may be avoided, so that contour of the end portion of the air conditioner is flat and aesthetically pleasing, and moreover, the mounting groove and the end cover both can enhance firmness of the mounting of the driving

box, and the design of attachment to the outer wall of the middle frame may ensure perpendicularity of the mounting of the driving box, thereby avoiding wobbling.

[0025] Optionally, a side wall of the mounting groove is formed with a notch, and the driving box includes a mounting portion and a driving portion, wherein the mounting portion is connected to a bottom wall of the mounting groove, the driving portion is connected to the mounting portion and protrudes out of the mounting groove from the notch, and the driving portion includes the driving wheel and is configured to drive the air-deflecting door to rotate. In this design, the driving portion of the driving box protrudes out of the notch on the side wall of the mounting groove, and is in transmission connection with the air-deflecting door, so that a mounting form is simple, and the notch can function to limit the driving portion, thereby further improving the stability of the mounting of the driving box.

[0026] Optionally, the notch is provided with a first connecting member and a second connecting member respectively at two sides along a length direction of the middle frame, wherein two ends of the first connecting member and two ends of the second connecting member are all connected to the middle frame, so as to form the notch that is closed all around. Thus, structural strength around the notch is reinforced by the first connecting member and the second connecting member, and especially in a case where the air conditioner falls and a side end of the driving box touches the ground, the side where the first connecting member is located will touch the ground first relative to the driving box, and in this way, the first connecting member may strengthen structural strength of the side end surface of the middle frame, and reduce structural damage caused by falling.

[0027] Optionally, a width of the notch along the length direction of the middle frame is equal to a distance from the first connecting member to the bottom wall of the mounting groove. In this way, the driving box may be inserted into the notch quite conveniently during the mounting.

[0028] Optionally, the driving mechanism includes a driving box and a driving motor, the driving wheel is mounted in the driving box, the driving box is further provided therein with a gear assembly constituted by the driving wheel, and the gear assembly has one end connected to an output shaft of the driving motor, and the other end in transmission connection with the latch assembly through the driving wheel. By integrating parts for driving the air-deflecting door in a form of the driving box, mounting of driving parts may be firmer, and during the operation of the air conditioner, the driving parts are not prone to shaking, and make lower noises.

[0029] Optionally, the gear assembly includes a first gear, a second gear and the driving wheel, wherein the first gear is sleeved on an output shaft of the driving motor, and the second gear is meshed with the first gear and the driving wheel, respectively. Thus, through synchronous rotation of the first gear with the output shaft

of the driving motor in the same direction, the driving wheel rotates in the same direction synchronously with the first gear, then the driving wheel drives the latch to rotate in the same direction synchronously, and the latch then drives the air-deflecting door to rotate in the same direction synchronously, thus it is conducive to precisely controlling the rotation angle of the air-deflecting door; and under this design, the driving wheel has a large torque on the latch, which may reduce the power required for driving the air-deflecting door to rotate and frictional force between transmission parts, and further reduce frictional noises generated.

[0030] Optionally, the driving box further includes a mounting frame, and the mounting frame is connected to the bottom wall of the mounting groove. Thus, by connecting the driving box to the bottom wall of the mounting groove through the mounting frame, overall stability of the driving box may be further improved.

[0031] Optionally, the gear assembly is mounted in the mounting frame. Thus, the gear assembly, including the driving wheel, is arranged in the mounting frame, so that the operation of the gear assembly is more flexible and stable.

[0032] Optionally, the driving motor is mounted on the mounting frame. In this way, mounting of the motor may be ensured to be more stable.

[0033] Optionally, the mounting frame includes a base and a gear cover, wherein the gear cover is snap-fitted with the base, and clamps the gear assembly between the base and the gear cover. Thus, a coverable structure design of the mounting frame is realized through the base and the gear cover, thereby improving the assembly efficiency and ensuring the transmission efficiency.

[0034] Optionally, the bottom wall of the mounting groove is formed with at least two first screw holes, and the mounting frame is formed with at least two second screw holes, wherein the first screw holes and the second screw holes are connected by screws. Thus, the mounting frame is connected into the mounting groove through at least two screws, so that the position of the mounting frame can be firmer.

[0035] Optionally, at least two second screw holes are located at two opposite sides of the mounting frame. Thus, at least two screws are arranged to connect to the two opposite sides of the mounting frame, so that a fastening force on the mounting frame is relatively balanced, which is more conducive to keeping a stable position of the mounting frame.

[0036] Optionally, the mounting frame is formed with at least two third screw holes, and the motor is formed with at least two fourth screw holes, wherein the third screw holes and the fourth screw holes are connected by screws. Thus, the motor is connected into the mounting frame by at least two screws, so that the position of the driving motor can be firmer.

[0037] Optionally, at least two fourth screw holes are located at two opposite sides of the driving motor. Thus, at least two screws are arranged to be connected to two

opposite sides of the driving motor, so that a fastening force on the driving motor relatively balanced, which is conducive to the driving motor to keep a stable position.

[0038] Optionally, the middle frame is formed with an air outlet, an axial direction of the outer guide rotating shaft is the same as a length direction of the air outlet, and a range of a difference between a length of the outer guide rotating shaft and a length of the air outlet is -40 millimeters to 30 millimeters.

[0039] In the above technical solution, a design in which the outer guide rotating shaft and the air outlet have a length difference within a certain range is adopted, so that the length of the outer guide rotating shaft of the air-deflecting door can be reasonably adjusted, which shortens the distance required to be driven on the outer guide rotating shaft, improves the transmission effect, avoids the occurrence of slip, and effectively prevents deformation of the outer guide rotating shaft.

[0040] Optionally, the outer guide rotating shaft is provided with a first end surface and a second end surface opposite to each other, and the air outlet is provided with a first side wall and a second side wall opposite to each other, wherein a distance between the first end surface and the first side wall is equal to a distance between the second end surface and the second side wall. Thus, the outer guide rotating shaft is provided in the middle of the air outlet, so as to improve the aesthetics while ensuring uniformity of outgoing air.

[0041] Optionally, the first end surface and the second end surface are both provided between the first side wall and the second side wall, and a maximum distance between the first end surface and the first side wall is 20 millimeters. In this way, the length of the outer guide rotating shaft can be minimized, so as to improve the transmission effect, and avoid the deformation of the rotating shaft.

[0042] Optionally, the first side wall and the second side wall are both provided between the first end surface and the second end surface, and a maximum distance between the first side wall and the first end surface is 15 millimeters. In this way, the length of the rotating shaft can be maximized while ensuring the transmission effect, so as to improve stability of the rotating shaft during the rotation.

[0043] Optionally, the first end surface is flush with the first side wall, and the second end surface is flush with the second side wall. In this way, the outer guide rotating shaft also can have a moderate length, so as to improve the aesthetics.

[0044] Optionally, the outer guide rotating shaft is provided above the air outlet. The outer guide rotating shaft can rotate upwards to drive the air-deflecting door to open the air outlet, and the outer guide rotating shaft also can rotate downwards to drive the air-deflecting door to open the air outlet.

[0045] Optionally, an outer surface of the middle frame is formed with a rotation slot, wherein the rotation slot is provided in a way of extending along the axial direction

of the outer guide rotating shaft, the outer guide rotating shaft is provided in the rotation slot, and the rotation slot is configured to limit the outer guide rotating shaft. Thus, the outer guide rotating shaft can rotate in the rotation slot, and drive the air-deflecting door to rotate relative to the middle frame, so as to open or close the air outlet.

[0046] Optionally, a length of the air-deflecting door in the axial direction of the outer guide rotating shaft is equal to a length of the middle frame in the axial direction of the outer guide rotating shaft. In this way, the air-deflecting door can be ensured to completely cover the air outlet, and the aesthetics can be improved.

[0047] Optionally, the driving wheel is a gear or a pulley.

Brief Description of Drawings

[0048] The drawings are used to provide further understanding of the present disclosure and form a part of the description, and are used to illustrate the present disclosure with embodiments of the present disclosure and do not constitute a limitation to the present disclosure. In the drawings:

FIG. 1 is an axonometric drawing of an air conditioner according to First Embodiment of the present disclosure, with an air-deflecting door open;

FIG. 2 is an axonometric drawing of the air conditioner according to First Embodiment of the present disclosure, with the air-deflecting door closed;

FIG. 3 is a front view of the air conditioner according to First Embodiment of the present disclosure, with the air-deflecting door open;

FIG. 4 is a mathematical model diagram of the air conditioner according to First Embodiment of the present disclosure;

FIG. 5 is a left view of the air conditioner according to First Embodiment of the present disclosure, with the air-deflecting door open;

FIG. 6 is a mathematical model diagram of an air conditioner according to Second Embodiment of the present disclosure;

FIG. 7 is a mathematical model diagram of an air conditioner according to Third Embodiment of the present disclosure;

FIG. 8 is a structural schematic diagram of an air conditioner according to Fourth Embodiment of the present disclosure at an air-deflecting door;

FIG. 9 is an exploded view of connection between a driving mechanism and a latch assembly according to Fourth Embodiment of the present disclosure;

FIG. 10 is an exploded view of the latch assembly according to Fourth Embodiment of the present disclosure;

FIG. 11 is a structural schematic diagram of a transmission hole according to Fourth Embodiment of the present disclosure;

FIG. 12 is a structural schematic diagram of a snap-

fit groove and a stopper according to Fourth Embodiment of the present disclosure;

FIG. 13 is a sectional view of connection between the latch assembly and a middle frame according to Fourth Embodiment of the present disclosure;

FIG. 14 is an axonometric drawing of an air conditioner according to Fifth Embodiment of the present disclosure under an end cover;

FIG. 15 is a side view of the air conditioner according to Fifth Embodiment of the present disclosure under the end cover;

FIG. 16 is an exploded structural schematic diagram of the air conditioner according to Fifth Embodiment of the present disclosure;

FIG. 17 is an exploded structural schematic diagram of a driving box according to Fifth Embodiment of the present disclosure;

FIG. 18 is a structural schematic diagram of a gear assembly according to Fifth Embodiment of the present disclosure;

FIG. 19 is a structural schematic diagram of a middle frame according to Sixth Embodiment of the present disclosure from a viewing angle;

FIG. 20 is a structural schematic diagram of the middle frame according to Sixth Embodiment of the present disclosure from another viewing angle; and

FIG. 21 is an enlarged schematic diagram of part A in FIG. 20.

[0049] In the drawings: 1-middle frame, 11-air outlet, 111-first side wall, 112-second side wall, 12-rotation slot, 13-stopper, 131-snap-fit groove, 14-threaded hole, 2-air-deflecting door, 21-outer guide rotating shaft, 211-first end surface, 212-second end surface, 213-transmission hole, 3-driving mechanism, 31-driving wheel, 311-assembling hole, 32-driving box, 321-mounting portion, 322-driving portion, 33-driving motor, 34-gear assembly, 341-first gear, 342-second gear, 35-mounting frame, 351-base, 352-gear cover, 353-rib, 354-bump, 361-first snap-fit hook, 362-second snap-fit hook, 363-third snap-fit hook, 364-fourth snap-fit hook, 371-first snap-fit hole, 372-second snap-fit hole, 4-latch assembly, 41-latch, 411-first fitting segment, 412-second fitting segment, 413-connecting segment, 42-mounting seat, 421-positioning portion, 422-mounting portion, 423-abutting portion, 424-through hole, 43-shaft sleeve, 431-stop collar, 432-elastic clamping arm, 44-elastic member, 45-annular platform, 6-mounting groove, 61-first screw hole, 62-second screw hole, 64-fourth screw hole, 65-notch, 651-first connecting member, 652-second connecting member, 653-first notch, 654-second notch.

Detailed Description of Embodiments

[0050] Preferred examples of the present disclosure are described below in conjunction with the drawings. It should be understood that the preferred examples described herein are merely used to explain and illustrate

the present disclosure, and are not used to limit the present disclosure.

[0051] The present disclosure provides an air conditioner. The air conditioner may include an air conditioner outdoor unit and an air conditioner indoor unit. The air conditioner outdoor unit and the air conditioner indoor unit are connected to each other, and as the air conditioner outdoor unit and the air conditioner indoor unit are connected, a refrigerant may circulate between the air conditioner outdoor unit and the air conditioner indoor unit. In the above, the air conditioner indoor unit is installed in a designated area, and during the circulation of the refrigerant, the air conditioner indoor unit may operate so as to provide an air conditioning function for the designated area. In the above, the air conditioning function provided by the air conditioner indoor unit may include, but is not limited to, a temperature regulating function, a humidity regulating function, a fresh air function, wind speed regulating function, etc. Certainly, the air conditioning function that may be provided by the air conditioner indoor unit may be one or more of the above functions.

[0052] In a case where the air conditioner indoor unit provides the air conditioning function for the designated area, the air conditioner indoor unit may generate airflow for air conditioning, and guide the airflow into the interior of the designated area, so as to achieve a purpose of air conditioning for the designated area. In order to quickly perform effective air conditioning for the whole area of the designated area, a structure for adjusting a direction of outgoing air is provided on the air conditioner indoor unit, so as to adjust a guide-out direction of the airflow, thereby guiding out the airflow from multiple directions, so as to facilitate air conditioning for various positions in the designated area.

[0053] With reference to FIG. 1 and FIG. 2 in combination, the present solution provides an air conditioner, wherein parts and components inside the air conditioner are shielded and protected. Specifically, the air conditioner includes a middle frame 1 and an air-deflecting door 2, wherein the middle frame 1 is formed with an air outlet 11, which is configured for blowing out hot air or cold air, so as to implement a heating or cooling function.

[0054] The air-deflecting door 2 includes an outer guide rotating shaft 21, wherein the outer guide rotating shaft 21 is configured to be rotatably fitted with the middle frame 1, thus the air-deflecting door 2 can rotate relative to the middle frame 1, so as to open or close the air outlet 11, and implement the adjustment of the direction of outgoing air. The outer guide rotating shaft 21 is integrally molded with the air-deflecting door 2 so as to improve connection strength.

[0055] The outer guide rotating shaft 21 is extended in its entirety along a whole length direction of the air-deflecting door 2, in which mode, compared with a prior art solution where rotating shafts at two ends are respectively provided at two ends of an air-deflecting door, the outer guide rotating shaft 21 has a larger contact area

with the air-deflecting door 2, and a driving force transmitted through the outer guide rotating shaft 21 can act on the whole air-deflecting door 2, rather than the two ends of the air-deflecting door 2, and in this way, during rotation of the air-deflecting door 2, a force on the air-deflecting door 2 is more uniform, which may effectively prevent deformation of the air-deflecting door 2.

[0056] With reference to FIG. 3 and FIG. 4 in combination, it is worth to note that an axial direction of the outer guide rotating shaft 21 is the same as a length direction of the air outlet 11. Moreover, the air outlet 11 is rectangular, and the length direction thereof is just an extending direction of a longer side of the air outlet 11, that is, a length direction of the air conditioner. Specifically, a range of a difference between a length of the outer guide rotating shaft 21 and a length of the air outlet 11 is -40 millimeters to 30 millimeters. The length of the air outlet 11 is just a length of the longer side of the air outlet 11. The length of the outer guide rotating shaft 21 is defined by lengths of air outlets 11 of different machine types, so as to make the length of the outer guide rotating shaft 21 within a reasonable range, shorten a distance that needs to be driven on the outer guide rotating shaft 21 without affecting an air-deflecting effect, improve transmission effect, and avoid occurrence of slip, and in addition, deformation of the outer guide rotating shaft 21 can be effectively prevented.

[0057] For ease of understanding, the length of the outer guide rotating shaft 21 is represented by a, the length of the air outlet 11 is represented by b, a minimum value of a-b is -40 millimeters, and a maximum value of a-b is 30 millimeters, that is, a maximum length of the outer guide rotating shaft 21 is greater than the length of the air outlet 11 by 30 millimeters, while a minimum length of the outer guide rotating shaft 21 is less than the length of the air outlet 11 by 40 millimeters.

[0058] The outer guide rotating shaft 21 is provided with a first end surface 211 and a second end surface 212 opposite to each other, and a distance between the first end surface 211 and the second end surface 212 is equal to the length of the outer guide rotating shaft 21. The air outlet 11 is provided with a first side wall 111 and a second side wall 112 opposite to each other, and a distance between the first side wall 111 and the second side wall 112 is also equal to the length of the longer side of the air outlet 11.

[0059] Specifically, a distance between the first end surface 211 and the first side wall 111 is equal to a distance between the second end surface 212 and the second side wall 112, that is, a central point of the outer guide rotating shaft 21 and a central point of the air outlet 11 are on the same cross-section of the outer guide rotating shaft 21, and two ends of the outer guide rotating shaft 21 extend out of or retract into two sides of the air outlet 11 by an equal distance. In this way, the outer guide rotating shaft 21 is provided in the middle of the air outlet 11, so as to improve aesthetics while ensuring uniformity of outgoing air.

First Embodiment:

[0060] With reference to what is shown in FIG. 4, in the present embodiment, the first end surface 211 and the second end surface 212 are both provided between the first side wall 111 and the second side wall 112, that is, the length of the outer guide rotating shaft 21 is less than that of the air outlet 11, and the outer guide rotating shaft 21 is provided inside the air outlet 11. Specifically, a maximum distance between the first end surface 211 and the first side wall 111 is 20 millimeters, and a maximum distance between the second end surface 212 and the second side wall 112 is 20 millimeters.

[0061] In the present embodiment, the distance between the first end surface 211 and the first side wall 111 is 20 millimeters, the distance between the second end surface 212 and the second side wall 112 is 20 millimeters, in which case a-b=-40 millimeters, and in this way, the length of the outer guide rotating shaft 21 can be minimized, so as to improve the transmission effect, and avoid the deformation of the outer guide rotating shaft 21. However, it is not merely limited thereto. In other embodiments, the distance between the first end surface 211 and the first side wall 111 may be 10 millimeters or 5 millimeters; and the distance between the second end surface 212 and the second side wall 112 may be 10 millimeters or 5 millimeters. The distance between the first end surface 211 and the first side wall 111 and the distance between the second end surface 212 and the second side wall 112 are not specifically limited.

[0062] It should be noted that, the outer guide rotating shaft 21 is provided above the air outlet 11, wherein the outer guide rotating shaft 21 can rotate upwards, so as to drive the air-deflecting door 2 to open the air outlet 11, and the outer guide rotating shaft 21 also can rotate downwards, so as to drive the air-deflecting door 2 to close the air outlet 11. Specifically, as the air-deflecting door 2 has different opening degrees, the directions of the outgoing air from the air conditioner are different, so that the function of adjusting the direction of the outgoing air is implemented.

[0063] With reference to what is shown in FIG. 5, in the present embodiment, an outer surface of the middle frame 1 is formed with a rotation slot 12, wherein the rotation slot 12 extends along the axial direction of the outer guide rotating shaft 21. The outer guide rotating shaft 21 is provided in the rotation slot 12, and the outer guide rotating shaft 21 can rotate in the rotation slot 12, so as to drive the air-deflecting door 2 to rotate relative to the middle frame 1, thereby opening or closing the air outlet 11. The rotation slot 12 is configured to limit the outer guide rotating shaft 21, so as to prevent the outer guide rotating shaft 21 from detaching from the middle frame 1. Specifically, as the rotation slot 12 is formed in the outer surface of the middle frame 1, the whole air-deflecting door 2 is exposed to the outside of the middle frame 1, and the air-deflecting door 2 can open or close the air outlet 11 from the outside of the middle frame 1,

so that an action of adjusting the direction of outgoing air by the air-deflecting door 2 is visualized, which improves the user experience.

[0064] In the present embodiment, the length of the air-deflecting door 2 in the axial direction of the outer guide rotating shaft 21 is equal to a length of the middle frame 1 in the axial direction of the outer guide rotating shaft 21, that is, the length of the air-deflecting door 2 is equal to the length of the whole air conditioner, so as to ensure that the air-deflecting door 2 can completely cover the air outlet 11, and the aesthetics can be improved. Further, the air-deflecting door 2 is in a shape of a curved plate, so as to improve the air-deflecting effect.

Second Embodiment:

[0065] As shown in FIG. 6, compared with First Embodiment, the present embodiment differs in that the length of the outer guide rotating shaft 21 of the air-deflecting door 2 is different.

[0066] In the present embodiment, the first side wall 111 and the second side wall 112 are both provided between the first end surface 211 and the second end surface 212, that is, the length of the outer guide rotating shaft 21 is greater than that of the air outlet 11, and the outer guide rotating shaft 21 extends out of the air outlet 11. Specifically, the maximum distance between the first side wall 111 and the first end surface 211 is 15 millimeters, and the maximum distance between the second side wall 112 and the second end surface 212 is 15 millimeters.

[0067] The distance between the first side wall 111 and the first end surface 211 is 15 millimeters, the distance between the second side wall 112 and the second end surface 212 is also 15 millimeters, in this case $a=b=30$ millimeters, and in this way, the length of the outer guide rotating shaft 21 can be maximized while ensuring the transmission effect, so as to improve stability of the outer guide rotating shaft 21 during the rotation. However, it is not merely limited thereto. In other embodiments, the distance between the first side wall 111 and the first end surface 211 may be 10 millimeters or 5 millimeters; and the distance between the second side wall 112 and the second end surface 212 may be 10 millimeters or 5 millimeters. The distance between the first side wall 111 and the first end surface 211 and the distance between the second side wall 112 and the second end surface 212 are not specifically limited.

[0068] The beneficial effects of the air conditioner according to the present embodiment are the same as those according to First Embodiment, and are not repeated herein again.

Third Embodiment:

[0069] As shown in FIG. 7, compared with First Embodiment, the present embodiment differs in that the length of the outer guide rotating shaft 21 of the air-de-

flecting door 2 is different.

[0070] In the present embodiment, the first end surface 211 is flush with the first side wall 111, and the second end surface 212 is flush with the second side wall 112, that is, the length of the outer guide rotating shaft 21 is equal to that of the air outlet 11, the two ends of the outer guide rotating shaft 21 are aligned with the two sides of the air outlet 11, respectively, in this case $a=b$, and in this way, the outer guide rotating shaft 21 can have a moderate length, which improves the aesthetics.

[0071] The beneficial effects of the air conditioner according to the present embodiment are the same as those according to First Embodiment, and are not repeated herein again.

[0072] With reference to FIG. 8, in addition to the middle frame 1 and the air-deflecting door 2, the air conditioner according to the present disclosure further includes a driving mechanism 3 and a latch assembly 4, wherein the driving mechanism 3 includes a driving wheel 31, a driving box 32 and a driving motor 33, and wherein the driving wheel 31 may be a gear or a pulley, the driving wheel 31 is configured to be capable of outputting power when rotating, the latch assembly 4 is detachably connected to the outer guide rotating shaft 21 and the driving wheel 31, and the driving wheel 31 can drive, through the latch assembly 4, the outer guide rotating shaft 21 to perform three-party coaxial rotation.

[0073] By using the latch assembly 4 as both a connecting member and a transmission member to connect the driving wheel 31 and the outer guide rotating shaft 21, in a case where the driving wheel 31 rotates, the power can be transmitted to the outer guide rotating shaft 21 through the latch assembly 4, thus the rotation of the air-deflecting door 2 can be implemented. In the above, as the latch assembly 4 not only can provide a connection function for the driving wheel 31 and the outer guide rotating shaft 21, also can provide a transmission function, and the connection and transmission fit between the driving wheel 31 and the outer guide rotating shaft 21 may be simultaneously completed, such that the structure of the driving mechanism 3 is simplified, and the problem in the prior art that the device for driving the air-deflecting door 2 has a complex structure is mitigated, the assembly difficulty between the driving mechanism 3 and the air-deflecting door 2 is reduced, and the assembly efficiency of the air conditioner is improved. In addition, the assembly manner of three-party coaxial rotation also may improve coaxial accuracy between the outer guide rotating shaft 21, the driving wheel 31 and the latch assembly 4, ensuring that the driving wheel 31, when rotating, is capable of stably driving the air-deflecting door 2 to rotate, thus improving the air-deflecting effect.

Fourth Embodiment:

[0074] For design of the lengths of the outer guide rotating shaft 21 and the air outlet 11 chosen in the present embodiment, reference may be made to the preceding

three embodiments.

[0075] With reference to FIG. 9, in the present embodiment, the latch assembly 4 includes a latch 41, a mounting seat 42, at least one shaft sleeve 43 and an elastic member 44, wherein the mounting seat 42 is fixedly mounted on the middle frame 1, the latch 41 is mounted on the mounting seat 42 and is capable of sliding along its axial direction relative to the mounting seat 42, and the latch 41 has one end fitted with the driving wheel 31 and the other end fitted with the outer guide rotating shaft 21. As can be seen therefrom, the driving mechanism 3 can drive the outer guide rotating shaft 21 to rotate through the latch 41, so that the air-deflecting door 2 opens or closes the air outlet 11.

[0076] Specifically, during the fit of the latch 41 with the driving wheel 31 and the outer guide rotating shaft 21, first the latch 41 is slid relative to the mounting seat 42 in a direction approaching the driving wheel 31, so that the latch 41 extends excessively into the driving mechanism 3, thereby giving way to the air-deflecting door 2 and facilitating the mounting of the air-deflecting door 2. Subsequently, the air-deflecting door 2 is mounted on the middle frame 1, and then the latch 41 is slid relative to the mounting seat 42 in a direction approaching the air-deflecting door 2, so that the latch 41 is reset until one end of the latch 41 is fitted with the driving wheel 31, and the other end of the latch 41 is fitted with the outer guide rotating shaft 21, thus completing the mounting. In this way, a mounting process of the whole air deflecting mechanism is convenient, simple, and efficient, and can satisfy the demand of a long-distance connection between the driving mechanism 3 and the outer guide rotating shaft 21. Meanwhile, the mounting seat 42 fixedly mounted on the middle frame 1 is used to limit and protect the latch 41, which avoids damage to the latch 41 due to a large torque output by the driving mechanism 3 during long-distance transmission of the torque.

[0077] In conjunction with FIG. 10, it can be seen that the shaft sleeve 43 is mounted on the mounting seat 42 and is sleeved outside the latch 41, the latch 41 is connected to the mounting seat 42 through the shaft sleeve 43, the latch 41 can rotate relative to the shaft sleeve 43, and the shaft sleeve 43 can make the sliding of the latch 41 smoother, so as to improve rotation accuracy of the latch 41, and avoid occurrence of offsetting or tilting of the latch 41.

[0078] Further, an annular platform 45 is provided on a peripheral surface of the latch 41, the elastic member 44 is sleeved outside the latch 41, and the elastic member 44 has one end abutting against the annular platform 45 and the other end abutting against the driving mechanism 3. The elastic member 44 is in a compressed state all the time, and the elastic member 44 can apply an elastic force to the annular platform 45, so that the latch 41 has a tendency to slide in a direction approaching the air-deflecting door 2. In this way, after the mounting of the air-deflecting door 2 is completed, without applying a pushing force to the latch 41, the latch 41 can slide in a

direction approaching the air-deflecting door 2 under the elastic force of the elastic member 44, until the annular platform 45 abuts against the mounting seat 42, and in this case reset of the latch 41 is completed, and the two ends of the latch 41 are fitted with the driving mechanism 3 and the outer guide rotating shaft 21, respectively.

[0079] In the above technical solution, as the latch assembly 4 provided between the driving mechanism 3 and the air-deflecting door 2 as well as the latch 41 capable of sliding relative to the mounting seat 42 is used, simplification of mounting steps of the air conditioner is realized, mounting efficiency is improved, labor cost and time cost are reduced, and damage to parts and components can be avoided while ensuring a long-distance transmission effect.

[0080] Meanwhile, the shaft sleeve 43 can limit the latch 41, so as to improve rotation accuracy of the latch 41, and avoid occurrence of offsetting or tilting of the latch 41.

[0081] In the present embodiment, the elastic member 44 is a spring, but is not merely limited thereto. In other embodiments, the elastic member 44 also may be elastic rubber, and a material of the elastic member 44 is not specifically limited.

[0082] It is worth to note that, as shown in FIG. 11, the latch 41 is provided coaxially with the outer guide rotating shaft 21, the end surface of the outer guide rotating shaft 21 is formed with a transmission hole 213, and the latch 41 extends into the transmission hole 213 and is fitted with the transmission hole 213. In this way, the driving mechanism 3 can drive the outer guide rotating shaft 21 to rotate through the fit between the latch 41 and the transmission hole 213, so as to drive the whole air-deflecting door 2 to rotate, thereby further implementing the function of adjusting the direction of outgoing air.

[0083] The latch 41 itself includes a first fitting segment 411 configured to be fitted with the transmission hole 213, wherein the first fitting segment 411 is in a shape of a polygon prism, the transmission hole 213 is a polygonal hole, and the shape of the first fitting segment 411 is matched with the shape of the transmission hole 213, so that occurrence of slip of the first fitting segment 411 relative to the transmission hole 213 may be avoided, and the transmission efficiency is improved. In the present embodiment, the first fitting segment 411 is provided in a shape of a hexagonal prism, and the transmission hole 213 is a hexagonal hole, but they are not merely limited thereto. In other embodiments, the first fitting segment 411 may be in a shape of a rectangular column, and in this case the transmission hole 213 is a rectangular hole. The first fitting segment 411 further may be in a shape of an octagonal prism, and in this case the transmission hole 213 is an octagonal hole. The shapes of the first fitting segment 411 and the transmission hole 213 are not specifically limited.

[0084] Referring to FIG. 10 to FIG. 13 in combination, the mounting seat 42 includes a positioning portion 421, a mounting portion 422 and an abutting portion 423. In

the present embodiment, the positioning portion 421, the mounting portion 422 and the abutting portion 423 are integrally molded so as to improve the connection strength. The mounting portion 422 is in a ring shape, and the latch 41 is provided in the mounting portion 422 and can slide or rotate relative to the mounting portion 422. The middle frame 1 is provided with a stopper 13, the abutting portion 423 abuts against the stopper 13, and the stopper 13 can limit the abutting portion 423, so as to fix a position of the mounting seat 42 preliminarily. The middle frame 1 is formed with a threaded hole 14, the positioning portion 421 is formed with a through hole 424, whose position is corresponding to a position of the threaded hole 14, and the threaded hole 14 is configured to be fitted with a screw passing the through hole 424. Specifically, the screw is put through the through hole 424 and is tightened relative to the threaded hole 14, so as to fix relative position of the positioning portion 421 and the middle frame 1, thereby further fixing the position of the mounting seat 42, preventing the mounting seat 42 from being displaced relative to the middle frame 1.

[0085] In the present embodiment, the stopper 13 is formed with a snap-fit groove 131, the abutting portion 423 extends into the snap-fit groove 131 and is fitted with the snap-fit groove 131, and the snap-fit groove 131 can limit a position of the abutting portion 423, so as to prevent the abutting portion 423 from wobbling, and improve the stability of the connection between the mounting seat 42 and the middle frame 1.

[0086] It should be noted that the mounting portion 422 is in a ring shape, the positioning portion 421 and the abutting portion 423 are both provided on a peripheral surface of the mounting portion 422, and a connecting line between axes of the positioning portion 421 and the mounting portion 422 and a connecting line between axes of the abutting portion 423 and the mounting portion 422 are arranged at a preset angle, so as to facilitate the mounting and fixing of the mounting seat 42.

[0087] Further, a range of the preset angle is 90 degrees to 150 degrees. A reasonable preset angle can facilitate production and processing while ensuring the strength of the mounting seat 42. In the present embodiment, the preset angle is 125 degrees, but is not merely limited thereto. In other embodiments, the preset angle may be 90 degrees or 150 degrees, and the magnitude of the preset angle is not specifically limited.

[0088] In the present embodiment, the shaft sleeve 43 is in a ring shape, and the mounting portion 422 is sleeved outside the shaft sleeve 43 and is detachably connected to the shaft sleeve 43. Specifically, one end of the shaft sleeve 43 is provided with a stop collar 431, and the other end is provided with an elastic clamping arm 432. During the mounting of the shaft sleeve 43, the shaft sleeve 43 is put through the mounting portion 422 until the stop collar 431 abuts against the mounting portion 422, and in this case, the elastic clamping arm 432 clamps the mounting portion 422 on the stop collar 431 under the elastic force, so as to fix relative position of the shaft

sleeve 43 and the mounting portion 422, thereby fixing relative position of the shaft sleeve 43 and the mounting seat 42.

[0089] Further, at least one-fourth of an axial length of the latch 41 is sleeved with the shaft sleeve 43, so as to ensure a sufficient contact area between the shaft sleeve 43 and the latch 41, so that the shaft sleeve 43 can apply a sufficient support force to the latch 41, improving the protection effect, and preventing damage to the latch 41 when the driving mechanism 3 outputs a large torque.

[0090] In the present embodiment, there are two mounting portions 422, two abutting portions 423, two snap-fit grooves 131 and two shaft sleeves 43. The two mounting portions 422 are coaxially spaced apart and are fixedly connected to the positioning portions 421, respectively. Each shaft sleeve 43 is mounted on one mounting portion 422. The latch 41 passes through both two shaft sleeves 43, and the two shaft sleeves 43 work together, so as to further improve the rotation accuracy of the latch 41. Each abutting portion 423 is fixedly connected to the outside of one mounting portion 422 and is fitted with one snap-fit groove 131. However, it is not merely limited thereto. In other embodiments, there may be one mounting portion 422, one abutting portion 423, one snap-fit groove 131 and one shaft sleeve 43, or there may be three mounting portions 422, three abutting portions 423, three snap-fit grooves 131 and three shaft sleeves 43. The numbers of the mounting portions 422, the abutting portions 423, the snap-fit grooves 131 and the shaft sleeves 43 are not specifically limited.

[0091] In the present embodiment, the driving wheel 31 is formed with an assembling hole 311 in the middle, and the latch 41 is mounted in the assembling hole 311, so that the driving wheel 31 can drive the latch 41 to rotate by means of the fit between the latch 41 and the assembling hole 311, and in turn drive the outer guide rotating shaft 21 to rotate.

[0092] Further, the latch 41 includes a second fitting segment 412 configured to be fitted with the assembling hole 311, wherein the second fitting segment 412 is in a shape of a polygonal prism, the assembling hole 311 is a polygonal hole, and the shape of the second fitting segment 412 is matched with that of the assembling hole 311. In the present embodiment, the second fitting segment 412 is provided in a shape of a hexagonal prism, and the assembling hole 311 is a hexagonal hole, in this way occurrence of slip of the second fitting segment 412 relative to the assembling hole 311 may be prevented, and the transmission efficiency is improved.

[0093] An integrally molded connecting segment 413 is connected between the first fitting segment 411 and the second fitting segment 412, so as to improve the connection strength. The connecting segment 413 is configured to transmit a torque, so as to implement the function of the driving mechanism 3 to drive the outer guide rotating shaft 21 to rotate through the latch 41.

Fifth Embodiment:

[0094] With reference to what is shown in FIG. 14 to FIG. 16 in combination, the air conditioner further includes an end cover, a mounting groove 6 is provided in an end portion of the middle frame 1, and an outer surface of the end portion of the middle frame 1 is concave to form a large mounting chamber. The mounting groove 6 may be the mounting chamber, or a relatively small groove formed inside the large mounting chamber, and the end cover covers the mounting groove 6. The driving wheel 31 is rotatably mounted in the driving box 32, the driving box 32 is mounted in the mounting groove 6, and the driving box 32 is attached to an outer wall of the middle frame 1. Thus, the driving box 32 is mounted by design of the concave mounting groove 6, thereby avoiding outward protrusion of the driving box 32 relative to the end portion of the middle frame 1, so that contour of the air conditioner is flat and aesthetically pleasing. Moreover, the mounting groove 6 and the end cover both can enhance the mounting firmness of the driving box 32, and also can avoid dust and other impurities from entering the driving box 32 and affecting the transmission effect of the driving box 32.

[0095] Secondly, by driving the air-deflecting door 2 with the driving box 32, mounting of driving parts also may be firmer, and during the operation of the air conditioner, the driving parts are not prone to shaking, and do not make noises.

[0096] The air conditioner may include one driving box 32, or may include two driving boxes 32. When one driving box 32 is provided, the mounting groove 6 for mounting the driving box 32 is formed on the end portion of one side of the middle frame 1, and the mounting groove 6 is covered by the end cover. In this way, by driving one end of the air-deflecting door 2 with one driving box 32, the air-deflecting door 2 is also driven to rotate. When two driving boxes 32 are provided, the end portions of two sides of the middle frame 1 are each formed with the mounting groove 6 for mounting the driving boxes 32, and the mounting grooves 6 are covered by end covers, respectively. In this way, the two driving boxes 32 are used to drive the two ends of the air-deflecting door 2, respectively, so as to drive the air-deflecting door to rotate.

[0097] The driving wheel 31 is mounted in the driving box 32. The driving box 32 is further provided therein with a mounting frame 35 and a gear assembly 34 constituted by the driving wheel 31. The gear assembly 34 includes a first gear 341, a second gear 342 and the driving wheel 31, wherein the first gear 341 is sleeved on an output shaft of the driving motor 33, and the second gear 342 is meshed with the first gear 341 and the driving wheel 31, respectively. The mounting frame 35 is connected to a bottom wall of the mounting groove 6, and includes a base 351 and a gear cover 352, wherein the gear cover 352 is snap-fitted with the base 351, and clamps the gear assembly 34 between the base 351 and the gear cover

352, which not only can ensure flexible rotation of the gear assembly 34 in the mounting frame 35, but also can make positions of the driving motor 33 and the gear assembly 34 stable.

[0098] Specifically, the base 351 is provided with a first snap-fit hook 361 at one end and a second snap-fit hook 362 at the other end, the gear cover 352 is formed with a first snap-fit hole 371 at one end and a third snap-fit hook 363 at the other end, the first snap-fit hook 361 is snap-fitted with the first snap-fit hole 371, and the second snap-fit hook 362 is snap-fitted with the third snap-fit hook 363, so as to realized the snap-fit between the base 351 and the gear cover 352.

[0099] The bottom wall of the mounting groove 6 is formed with at least two first screw holes 61, and the mounting frame 35 is formed with at least two second screw holes 62, wherein the first screw holes 61 and the second screw holes 62 are connected by screws. In this way, through connecting the mounting frame 35 into the mounting groove 6 by at least two screws, a position of the mounting frame 35 can be firm.

[0100] Further, the at least two second screw holes 62 are located at two opposite sides of the mounting frame 35. In this way, at least two screws are arranged to connect two opposite sides of the mounting frame 35, so that a fastening force on the mounting frame 35 can be relatively balanced, which is conducive to the mounting frame 35 to keep a stable position.

[0101] The mounting frame 35 is formed with at least two third screw holes (not shown in the drawings), and the driving motor 33 is formed with at least two fourth screw holes 64, wherein the third screw holes and the fourth screw holes 64 are connected by screws. In this way, through connecting the driving motor 33 to the mounting frame 35 by at least two screws, position of the driving motor 33 can be firm.

[0102] Further, the at least two fourth screw holes 64 are located at two opposite sides of the driving motor 33. In this way, at least two screws are arranged to connect two opposite sides of the driving motor 33, so that a fastening force on the driving motor 33 can be relatively balanced, which is conducive to the driving motor 33 to keep a stable position.

[0103] In addition, the second screw holes 62 and the third screw holes in the mounting frame 35 are all staggered from each other, and are all arranged on an outer edge of the mounting frame 35, so as to make full use of a peripheral space of the mounting frame 35, facilitating the assembly of the driving motor 33 onto the mounting frame 35, and also facilitating the assembly of the mounting frame 35 into the mounting groove 6.

[0104] In the gear assembly 34, the first gear 341 and the second gear 342 may be two gears of the same size and the same shape, so that there is no need to distinguish the first gear 341 and the second gear 342, and the two are interchangeable, which also reduces design cost and production cost, and improves the assembly efficiency.

[0105] An end portion of the latch 41 is further formed with two second snap-fit holes 372, an end surface of the driving wheel 31 is provided with two fourth snap-fit hooks 364, and the two fourth snap-fit hooks 364 are snap-fitted with the two second snap-fit holes 372, respectively, so as to implement a firm connection between the latch 41 and the driving wheel 31.

[0106] A working principle of the gear assembly 34 is as follows: the first gear 341 rotates in the same direction synchronously with the output shaft of the driving motor 33, because the first gear 341 drives the driving wheel 31 through the second gear 342, the driving wheel 31 rotates in the same direction synchronously with the first gear 341, the latch 41 rotates in the same direction synchronously with the driving wheel 31, and the latch 41 further drives the air-deflecting door 2 to enable the output shaft of the driving motor 33 to rotate in the same direction synchronously with the air-deflecting door 2, which is conducive to accurate control over a rotation angle of the air-deflecting door 2. Moreover, the latch 41 is mounted in the assembling hole 311 in the middle of the driving wheel 31, so that the latch 41 and the driving wheel 31 are coaxially arranged, which improves the compactness of the structure, and due to the large torque of the driving wheel 31 on the latch 41, the power required for driving the air-deflecting door 2 to rotate as well as frictional force between transmission parts are reduced, and the possibility of generating frictional noises is reduced.

[0107] During actual operation of the air conditioner, the length direction of the air conditioner is horizontally arranged, and the output shaft of the driving motor 33, an axis of the first gear 341, an axis of the second gear 342, an axis of the driving wheel 31 and an axis of the latch 41 in the gear assembly 34 are all horizontally arranged, which may avoid horizontal movement of the gears due to their own gravities, ensuring that the gears are meshed in place, and the transmission effect is good.

[0108] With reference to what is shown in FIG. 17 and FIG. 18 in combination, the inner wall of the mounting frame 35 is further provided with ribs 353, wherein the ribs 353 are each in a ring shape, end surfaces of the first gear 341, the second gear 342 and the driving wheel 31 are also provided with bumps 354, and the bumps 354 and the ribs 353 are in sliding fit. That is to say, during the operation of the gear assembly 34, the bumps 354 on the end surfaces of the first gear 341, the second gear 342 and the driving wheel 31 are respectively in sliding fit with corresponding ribs 353, thereby avoiding direct friction between the gears and the inner wall of the mounting frame 35, avoiding faster wear of the gears, and also reducing frictional noises.

Sixth Embodiment:

[0109] With reference to what is shown in FIG. 19 to FIG. 21 in combination, a side wall of the mounting groove 6 is formed with a notch 65, and the driving box 32 in-

cludes a mounting portion 321 and a driving portion 322, wherein the driving wheel 31 is just arranged in the driving portion 322 so that the driving portion 322 can drive the air-deflecting door 2 to rotate, the mounting portion 321 is connected to the bottom wall of the mounting groove 6, and the driving portion 322 is connected to the mounting portion 321 and protrudes out of the mounting groove 6 from the notch 65, and in this way, the mounting form is simple, and the notch 65 can function to limit the driving portion 322, thereby further improving the stability of the mounting of the driving box 32.

[0110] In the present embodiment, the notch 65 is provided with a first connecting member 651 and a second connecting member 652 respectively at two sides along the length direction of the middle frame 1, wherein two ends of the first connecting member 651 are both connected to the middle frame 1, two ends and a side surface away from the first connecting member 651 of the second connecting member 652 are all connected to the middle frame 1, and in this way, the first connecting member 651, the second connecting member 652 and the middle frame 1 surround an form the notch 65 that is closed all around.

[0111] Thus, by providing the first connecting member 651 and the second connecting member 652, structural strength around the notch 65 may be reinforced, and especially in a case where the air conditioner falls and the side end surface where the driving box 32 is mounted touches the ground, the side where the first connecting member 651 is located will touch the ground first relative to the driving box 32, and in this way, the first connecting member 651 may strengthen the structural strength of the side end surface of the middle frame, and reduce structural damage caused by falling.

[0112] Moreover, the first connecting member 651 may be designed to be of an arc-shaped structure, wherein an outer peripheral surface of the arc-shaped structure is connected to the middle frame 1, and two ends of the arc-shaped structure protrude by a certain length relative to the middle frame. In this way, the first connecting member 651 has greater structural strength of its own and a greater connecting strength with the middle frame 1.

[0113] In the present embodiment, after inserting the mounting frame 35 into the notch 65, the latch 41 is assembled into the driving wheel 31, and therefore, a total width of the notch 65 along the length direction of the middle frame 1 may be designed to be small. The notch 65 includes a first notch 653 and a second notch 654 communicating with each other, and the first notch 653 and the second notch 654 are sequentially formed along the side end surface of the middle frame 1 to the middle of the middle frame 1. In the above, an opening length of the first notch 653 in an up-down direction is smaller than an opening length of the second notch 654 in the up-down direction. The second notch 654 is configured for inserting the mounting frame 35, and the first notch 653 is configured for inserting the fourth snap-fit hook 364 on the driving wheel 31, so that the driving box 32

can be inserted into the notch 65.

[0114] Therefore, a width a of the second notch 654 along the length direction of the middle frame 1 is greater than or equal to a width of the mounting frame 35, and a width b of the first notch 653 along the length direction of the middle frame 1 is greater than or equal to a length of a part of the fourth snap-fit hook 364 extending out of the mounting frame 35.

[0115] The bottom wall of the mounting groove 6 may be flush with an edge on the right side of the notch 65. In this way, a width of the notch 65 along the length direction of the middle frame 1 is equal to a distance from the first connecting member 651 to the bottom wall of the mounting groove 6. After contacting a bottom surface of the mounting groove 6, the mounting frame 35 may slide along the bottom surface of the mounting groove 6, so that the mounting frame 35 is inserted into the notch 65.

[0116] In conclusion, for the air conditioner provided in the present solution, firstly, the driving wheel 31 and the outer guide rotating shaft 21 are connected by using the latch assembly 4 as both a connecting member and a transmission member, so that the three can rotate synchronously, which improves the coaxial accuracy. Secondly, the structural design of the latch assembly 4 can simplify the mounting steps of the whole device, improve the mounting efficiency, reduce the labor cost and time cost, and can avoid damage to parts and components while ensuring the long-distance transmission effect. The mounting groove 6 is formed in the end portion of the middle frame 1, the driving box 32 is then mounted in the mounting groove 6, and the mounting groove 6 is covered by the end cover, which avoids outward protrusion of the driving box 32 relative to the end portion of the middle frame 1, so that the contour of the end portion of the air conditioner is flat and aesthetically pleasing, and the mounting groove 6 and the end cover both can reinforce the firmness of the mounting of the driving box 32. By integrating the parts for driving the air-deflecting door 2 in a form of the driving box 32, the mounting of the driving parts may be firm, and during the operation of the air conditioner, the driving parts are not prone to shaking, and do not make noises. Finally, by controlling the length of the outer guide rotating shaft 21 of the air-deflecting door 2, the distance required to be driven on the outer guide rotating shaft 21 may be shortened, the transmission effect is improved, the occurrence of slip is avoided, and deformation of the outer guide rotating shaft 21 is effectively prevented.

[0117] Finally, it should be noted that the above-mentioned are merely preferred examples of the present disclosure, but are not intended to limit the present disclosure. While the detailed description is made to the present disclosure with reference to the preceding embodiments, for those skilled in the art, they still could modify the technical solutions recited in various preceding embodiments, or make equivalent substitutions to some of the technical features therein. Any amendments, equivalent replacements, improvements or the like, with-

in the spirit and principle of the present disclosure, should be covered within the scope of protection of the present disclosure.

Claims

1. An air conditioner, **characterized by** comprising a middle frame (1), an air-deflecting door (2), a driving mechanism (3) and a latch assembly (4),

wherein the air-deflecting door (2) comprises an outer guide rotating shaft (21), and the outer guide rotating shaft (21) is configured to be rotatably fitted with the middle frame (1); the driving mechanism (3) comprises a driving wheel (31), and the driving wheel (31) is configured to output power when rotating; and the outer guide rotating shaft (21) is connected to the driving wheel (31) via the latch assembly (4), and the latch assembly (4) is detachably connected to at least one of the outer guide rotating shaft (21) and the driving wheel (31), and the driving wheel (31) is capable of driving, through the latch assembly (4), the outer guide rotating shaft (21) to perform three-party coaxial rotation.

2. The air conditioner according to claim 1, wherein the latch assembly (4) is detachably connected to both the outer guide rotating shaft (21) and the driving wheel (31).
3. The air conditioner according to claim 1, wherein the latch assembly (4) comprises a latch (41) and a mounting seat (42), the mounting seat (42) is fixedly mounted on the middle frame (1), the latch (41) is mounted on the mounting seat (42) and is capable of sliding along its axial direction relative to the mounting seat (42), and the latch (41) has one end fitted with the driving wheel (31) and the other end fitted with the outer guide rotating shaft (21).
4. The air conditioner according to claim 3, wherein the latch assembly (4) comprises at least one shaft sleeve (43), and the latch (41) is mounted in the shaft sleeve (43).
5. The air conditioner according to claim 3, wherein an elastic member (44) is sleeved outside the latch (41).
6. The air conditioner according to claim 5, wherein an annular platform (45) is provided on a peripheral surface of the latch (41), and the elastic member (44) has one end abutting against the annular platform (45) and the other end abutting against the driving mechanism (3).

7. The air conditioner according to claim 3, wherein the latch (41) is provided coaxially with the outer guide rotating shaft (21), an end surface of the outer guide rotating shaft (21) is formed with a transmission hole (213), and the latch (41) extends into the transmission hole (213) and is fitted with the transmission hole (213). 5
8. The air conditioner according to claim 7, wherein the latch (41) comprises a first fitting segment (411) configured to be fitted with the transmission hole (213), the first fitting segment (411) is in a shape of a polygon prism, the transmission hole (213) is a polygonal hole, and the shape of the first fitting segment (411) is matched with the shape of the transmission hole (213). 10
9. The air conditioner according to claim 3, wherein the mounting seat (42) comprises a positioning portion (421), a mounting portion (422) and an abutting portion (423), the middle frame (1) is provided with a stopper (13) and a threaded hole (14), the latch (41) is provided inside the mounting portion (422), the abutting portion (423) abuts against the stopper (13), the positioning portion (421) is formed with a through hole (424), and the threaded hole (14) is configured to be fitted with a screw passing the through hole (424). 15
10. The air conditioner according to claim 9, wherein the stopper (13) is formed with a snap-fit groove (131), and the abutting portion (423) extends into the snap-fit groove (131) and is fitted with the snap-fit groove (131). 20
11. The air conditioner according to claim 9, wherein the mounting portion (422) is in a ring shape, the positioning portion (421) and the abutting portion (423) are both provided on a peripheral surface of the mounting portion (422), and a connecting line between axes of the positioning portion (421) and the mounting portion (422) and a connecting line between axes of the abutting portion (423) and the mounting portion (422) are arranged at a preset angle. 25
12. The air conditioner according to claim 11, wherein a range of the preset angle is 90 degrees to 150 degrees. 30
13. The air conditioner according to claim 3, wherein at least one-fourth of an axial length of the latch (41) is sleeved with a shaft sleeve (43). 35
14. The air conditioner according to claim 3, wherein the driving wheel (31) is formed with an assembling hole (311) in the middle, and the latch (41) is mounted in the assembling hole (311). 40
15. The air conditioner according to claim 14, wherein the latch (41) comprises a second fitting segment (412) configured to be fitted with the assembling hole (311), wherein the second fitting segment (412) is in a shape of a polygonal prism, the assembling hole (311) is a polygonal hole, and the shape of the second fitting segment (412) is matched with that of the assembling hole (311). 45
16. The air conditioner according to claim 1, wherein the air conditioner comprises an end cover, a mounting groove (6) is formed in an end portion of the middle frame (1), the end cover covers the mounting groove (6), the driving mechanism (3) comprises a driving box (32), the driving wheel (31) is rotatably mounted in the driving box (32), a part of the driving box (32) is mounted in the mounting groove (6), and the driving box (32) is attached to an outer wall of the middle frame (1). 50
17. The air conditioner according to claim 16, wherein a side wall of the mounting groove (6) is formed with a notch (65), and the driving box (32) comprises a mounting portion (321) and a driving portion (322), wherein the mounting portion (321) is connected to a bottom wall of the mounting groove (6), the driving portion (322) is connected to the mounting portion (321) and protrudes out of the mounting groove (6) from the notch (65), and the driving portion (322) comprises the driving wheel (31) and is configured to drive the air-deflecting door (2) to rotate. 55
18. The air conditioner according to claim 17, wherein the notch (65) is provided with a first connecting member (651) and a second connecting member (652) respectively at two sides along a length direction of the middle frame (1), wherein two ends of the first connecting member (651) and two ends of the second connecting member (652) are all connected to the middle frame (2), to form the notch (65) that is closed all around.
19. The air conditioner according to claim 18, wherein a width of the notch (65) along the length direction of the middle frame (1) is equal to a distance from the first connecting member (651) to the bottom wall of the mounting groove (6).
20. The air conditioner according to any one of claims 2-19, wherein the driving mechanism (3) comprises a driving box (32) and a driving motor (33), the driving wheel (31) is mounted in the driving box (32), the driving box (32) is further provided therein with a gear assembly (34) constituted by the driving wheel (31), and the gear assembly (34) has one end connected to an output shaft of the driving motor (33), and the other end in transmission connection with the latch assembly (4) through the driving wheel (31).

21. The air conditioner according to claim 20, wherein the gear assembly (34) comprises a first gear (341), a second gear (342) and the driving wheel (31), wherein the first gear (341) is sleeved on an output shaft of the driving motor (33), and the second gear (342) is meshed with the first gear (341) and the driving wheel (31), respectively. 5
22. The air conditioner according to claim 20, wherein the driving box (32) further comprises a mounting frame (35), and the mounting frame (35) is connected to a bottom wall of the mounting groove (6). 10
23. The air conditioner according to claim 22, wherein the gear assembly (34) is mounted in the mounting frame (35). 15
24. The air conditioner according to claim 22, wherein the driving motor (33) is mounted on the mounting frame (35). 20
25. The air conditioner according to claim 22, wherein the mounting frame (35) comprises a base (351) and a gear cover (352), the gear cover (352) is snap-fitted with the base (351), and clamps the gear assembly (34) between the base (351) and the gear cover (352). 25
26. The air conditioner according to claim 22, wherein the bottom wall of the mounting groove (6) is formed with at least two first screw holes (61), and the mounting frame (35) is formed with at least two second screw holes (62), wherein the first screw holes (61) and the second screw holes (62) are connected by screws. 30
27. The air conditioner according to claim 26, wherein the at least two second screw holes (62) are located at two opposite sides of the mounting frame (35). 35
28. The air conditioner according to claim 22, wherein the mounting frame (35) is formed with at least two third screw holes, and the driving motor (33) is formed with at least two fourth screw holes (64), wherein the third screw holes and the fourth screw holes (64) are connected by screws. 40
29. The air conditioner according to claim 28, wherein the at least two fourth screw holes (64) are located at two opposite sides of the driving motor (33). 45
30. The air conditioner according to claim 1, wherein the middle frame (1) is formed with an air outlet (11), an axial direction of the outer guide rotating shaft (21) is the same as a length direction of the air outlet (11), and a difference between a length of the outer guide rotating shaft (21) and a length of the air outlet (11) ranges from - 40 millimeters to 30 millimeters. 50
31. The air conditioner according to claim 30, wherein the outer guide rotating shaft (21) is provided with a first end surface (211) and a second end surface (212) opposite to each other, and the air outlet (11) is provided with a first side wall (111) and a second side wall (112) opposite to each other, wherein a distance between the first end surface (211) and the first side wall (111) is equal to a distance between the second end surface (212) and the second side wall (112). 55
32. The air conditioner according to claim 31, wherein the first end surface (211) and the second end surface (212) are both provided between the first side wall (111) and the second side wall (112), and a maximum distance between the first end surface (211) and the first side wall (111) is 20 millimeters.
33. The air conditioner according to claim 31, wherein the first side wall (111) and the second side wall (112) are both provided between the first end surface (211) and the second end surface (212), and a maximum distance between the first side wall (111) and the first end surface (211) is 15 millimeters.
34. The air conditioner according to claim 31, wherein the first end surface (211) is flush with the first side wall (111), and the second end surface (212) is flush with the second side wall (112).
35. The air conditioner according to claim 30, wherein the outer guide rotating shaft (21) is provided above the air outlet (11).
36. The air conditioner according to claim 30, wherein an outer surface of the middle frame (1) is formed with a rotation slot (12), the rotation slot (12) extends along the axial direction of the outer guide rotating shaft (21), the outer guide rotating shaft (21) is provided in the rotation slot (12), and the rotation slot (12) is configured to limit the outer guide rotating shaft (21).
37. The air conditioner according to claim 30, wherein a length of the air-deflecting door (2) in the axial direction of the outer guide rotating shaft (21) is equal to a length of the middle frame (1) in the axial direction of the outer guide rotating shaft (21).
38. The air conditioner according to claim 1, wherein the driving wheel (31) is a gear or a pulley.

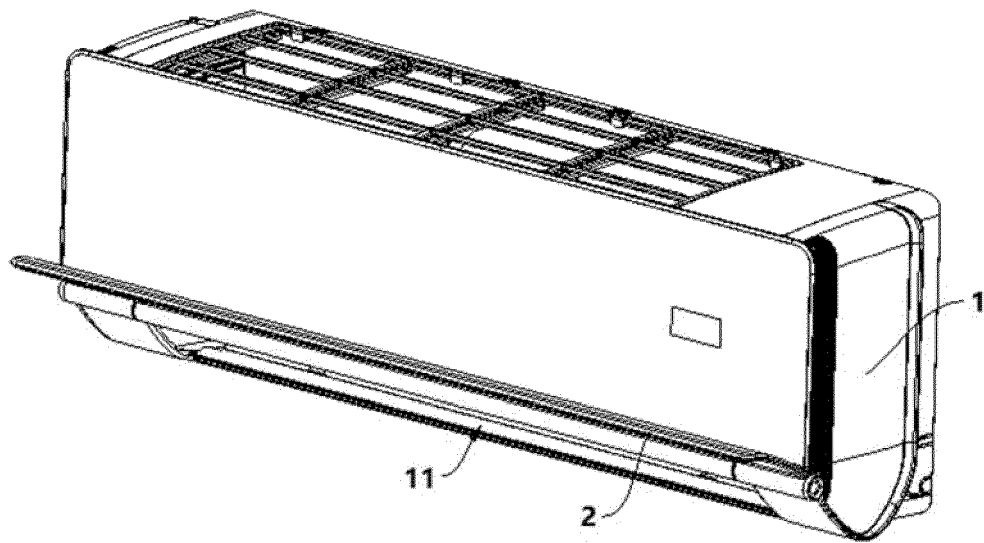


FIG. 1

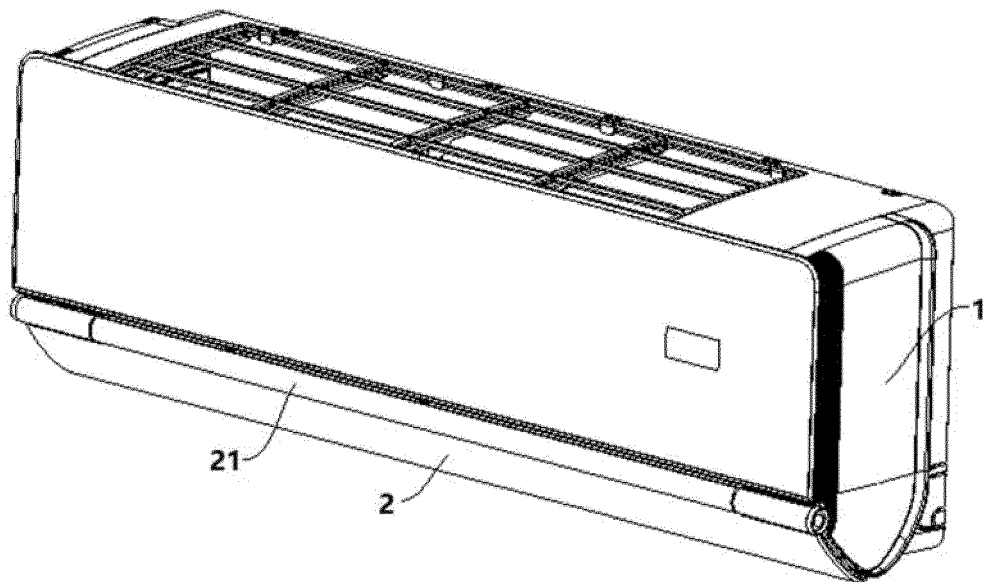


FIG. 2

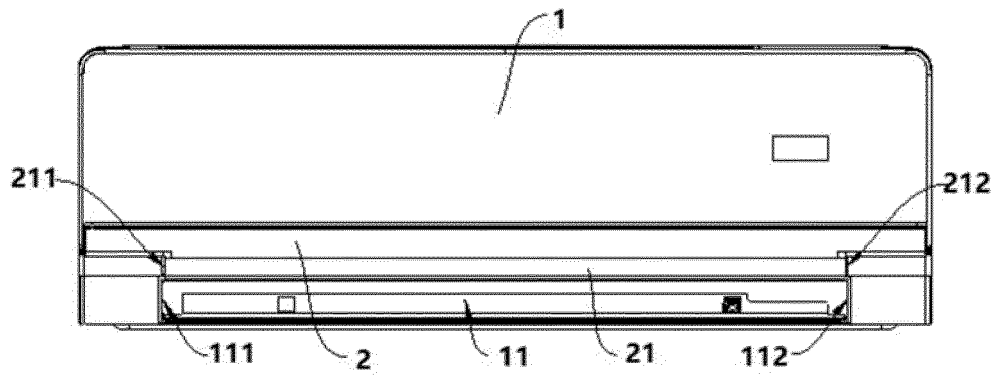


FIG. 3

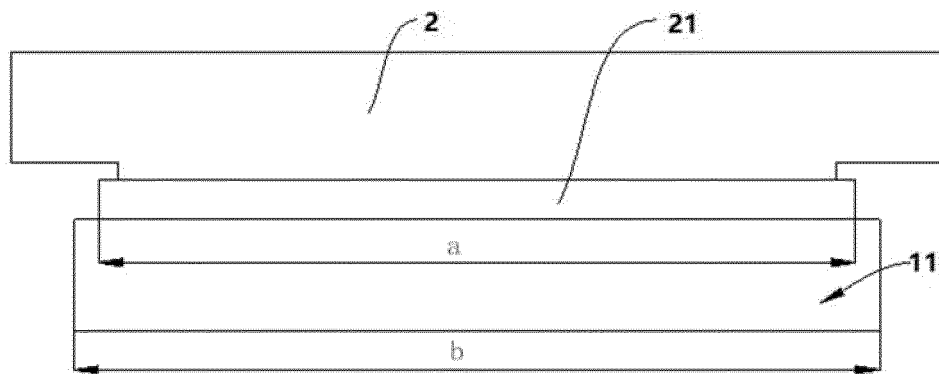


FIG. 4

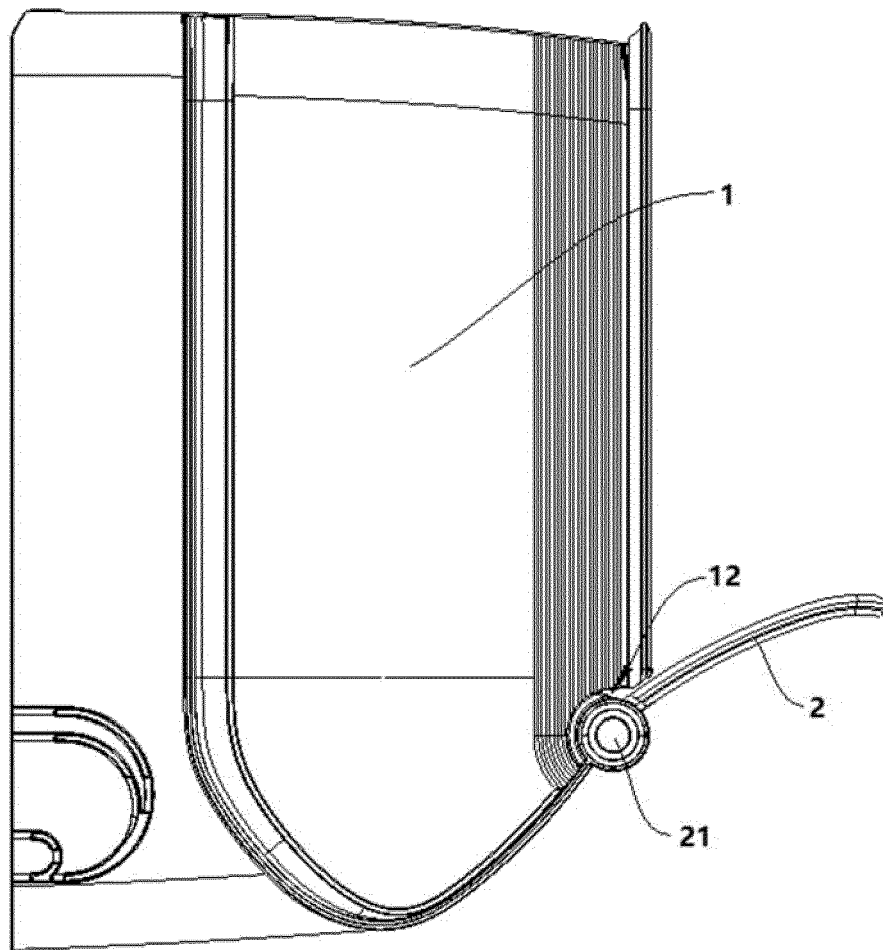


FIG. 5

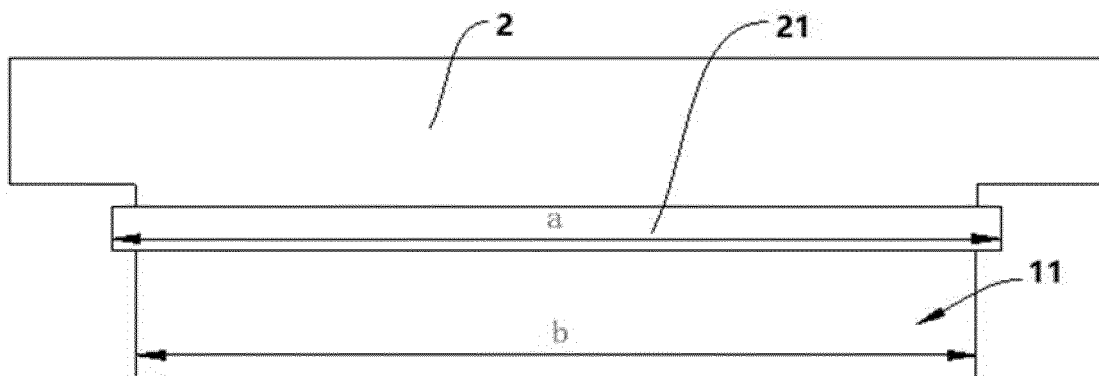


FIG. 6

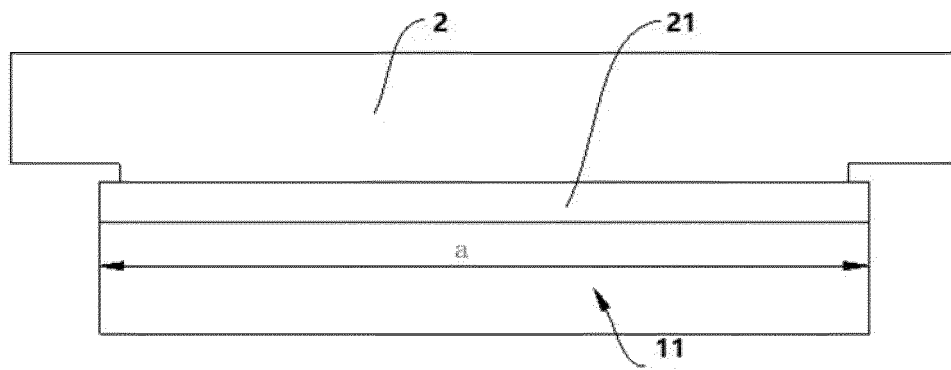


FIG. 7

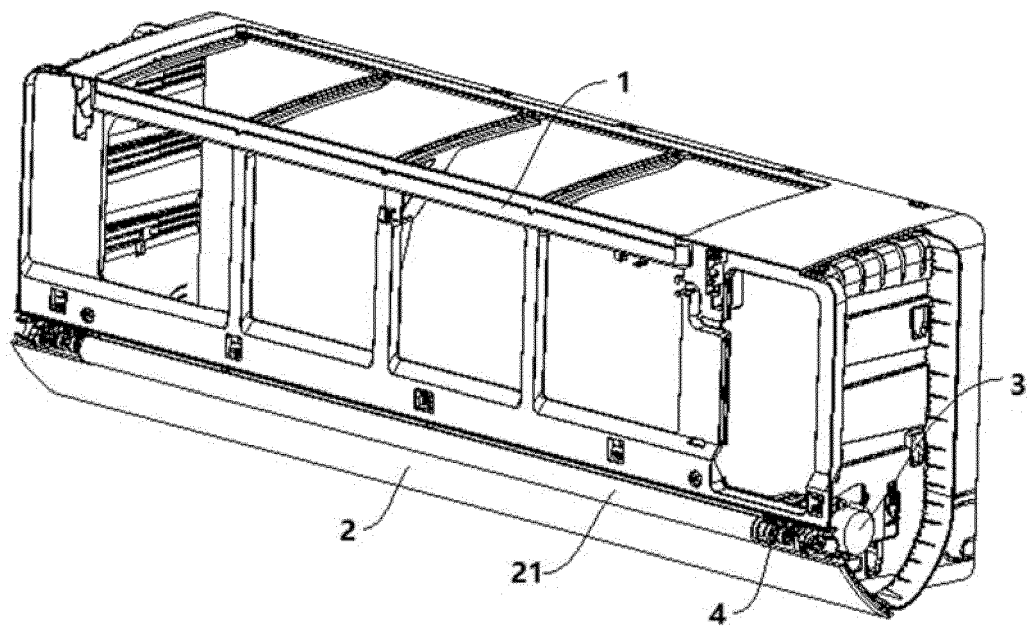


FIG. 8

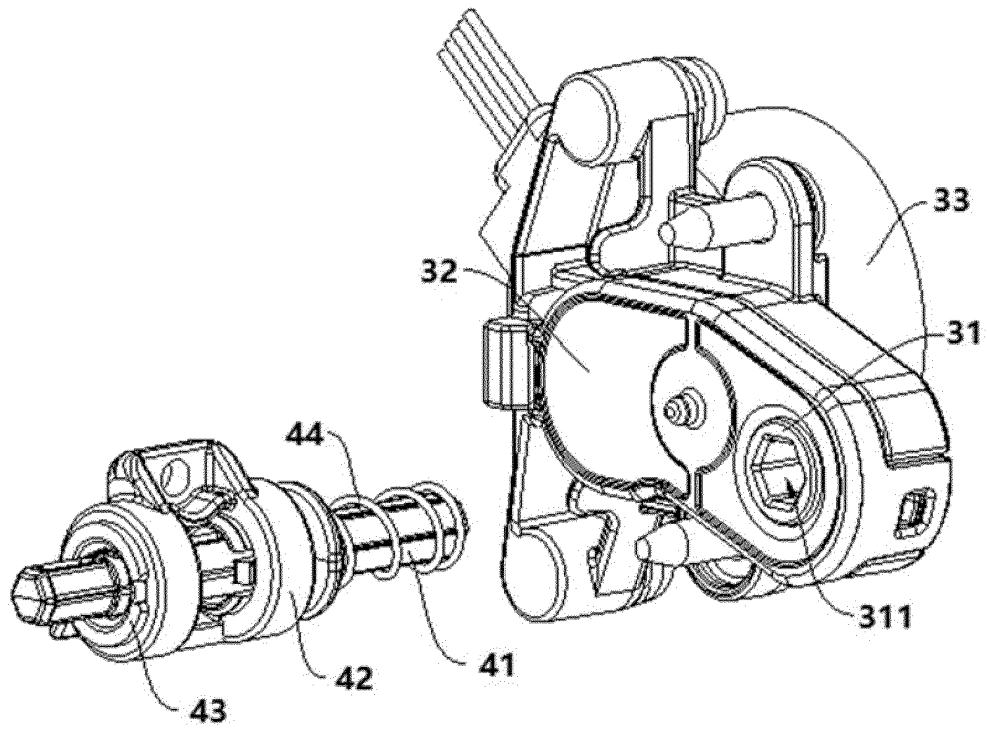


FIG. 9

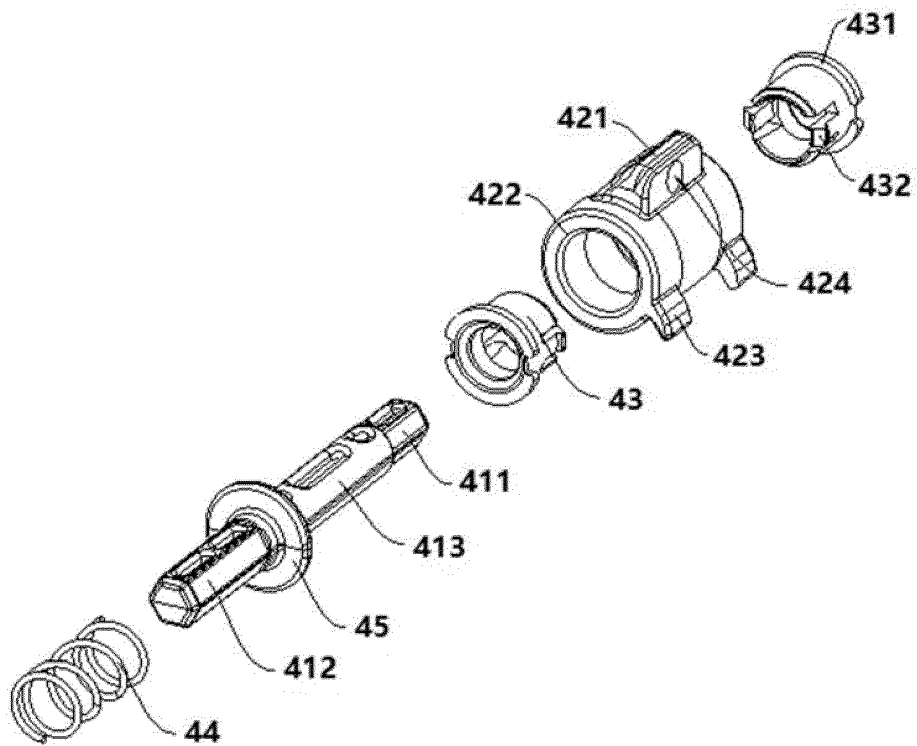


FIG. 10

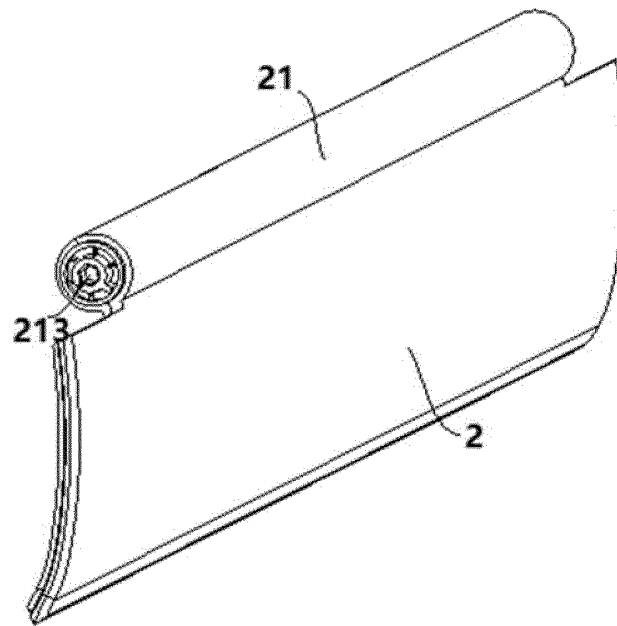


FIG. 11

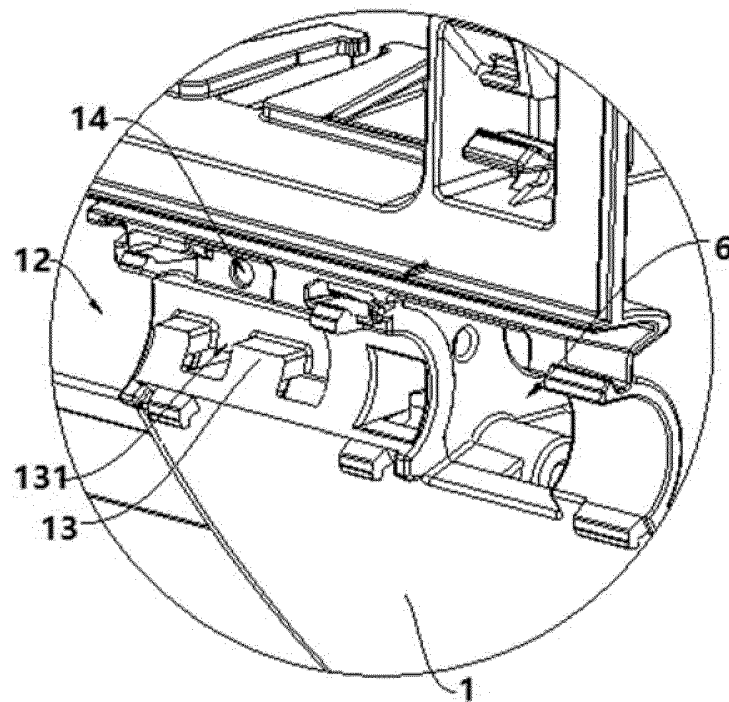


FIG. 12

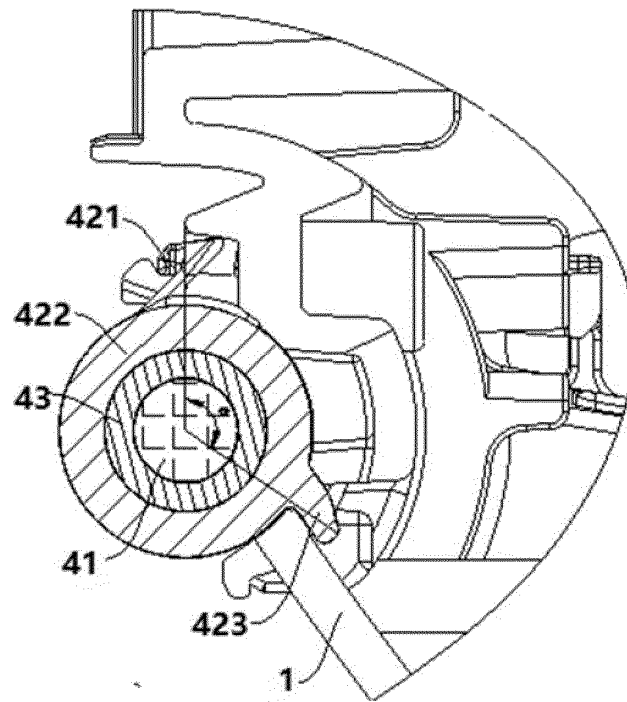


FIG. 13

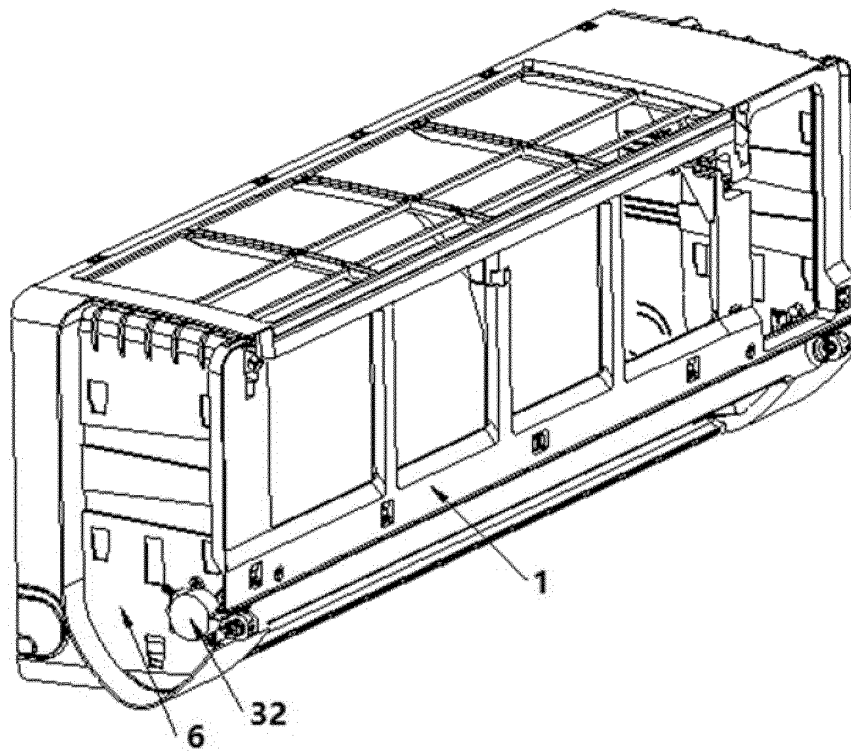


FIG. 14

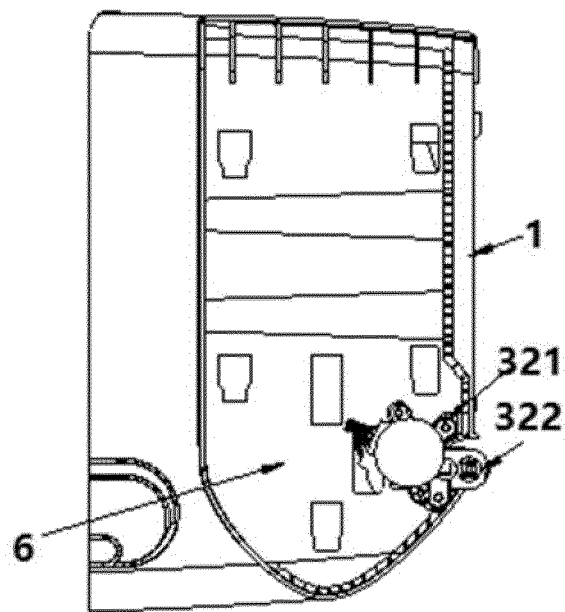


FIG. 15

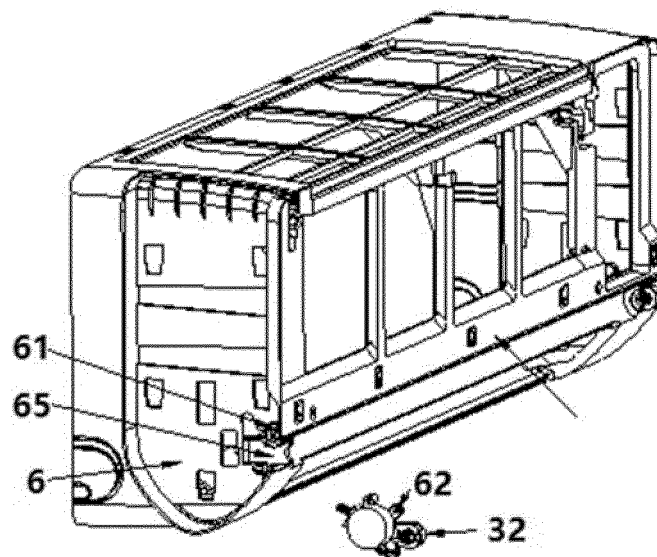


FIG. 16

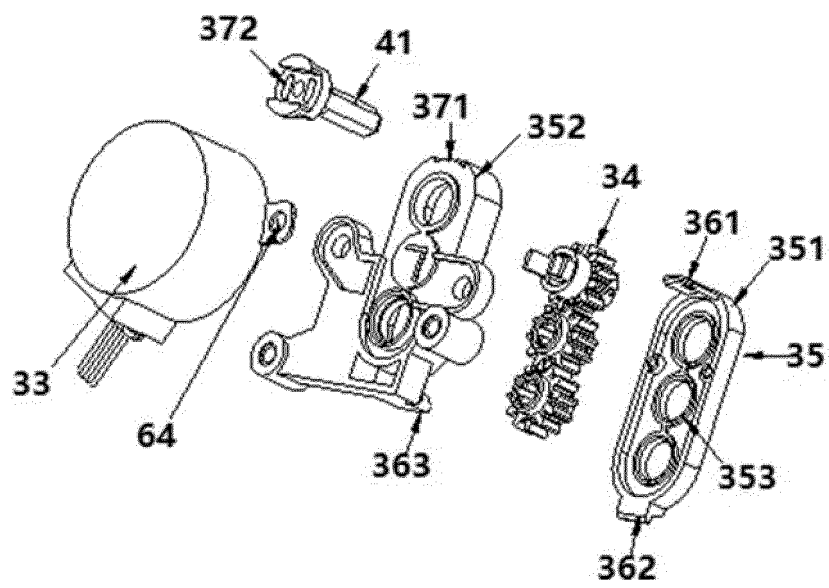


FIG. 17

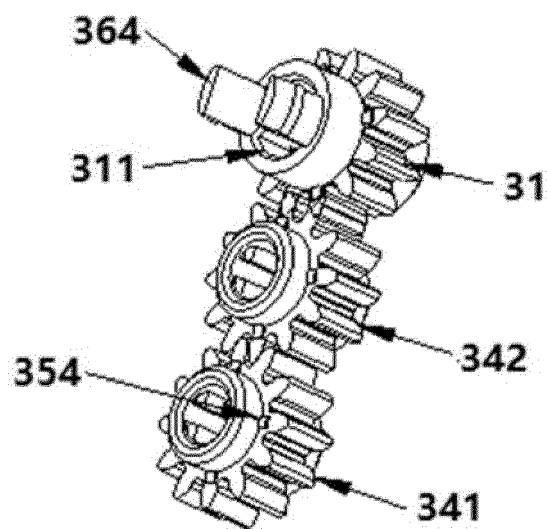


FIG. 18

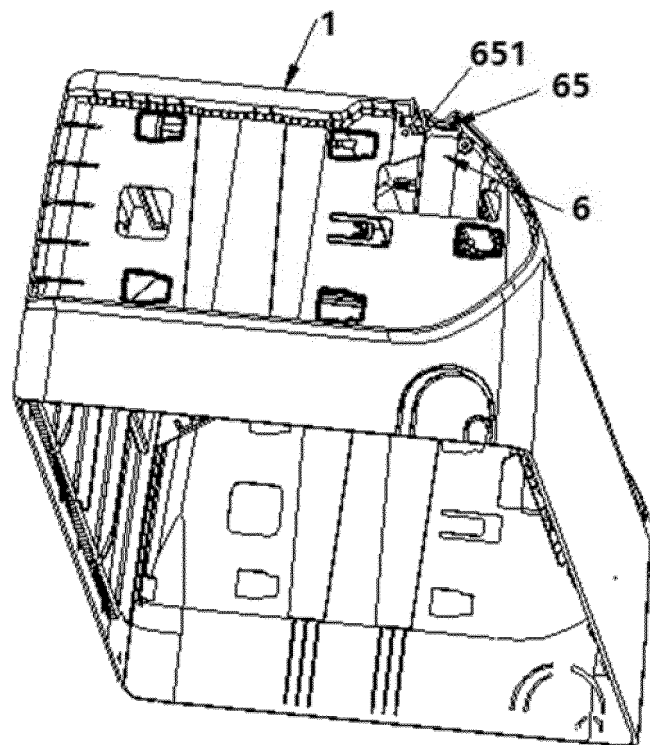


FIG. 19

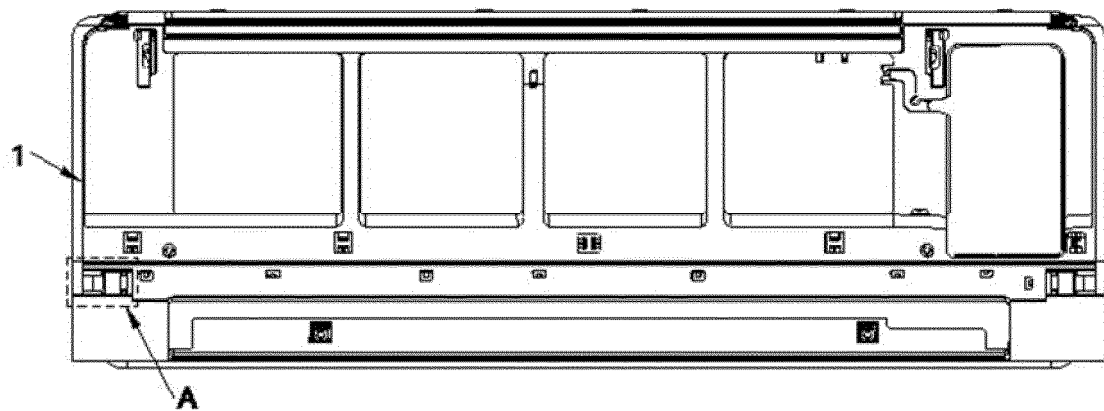


FIG. 20

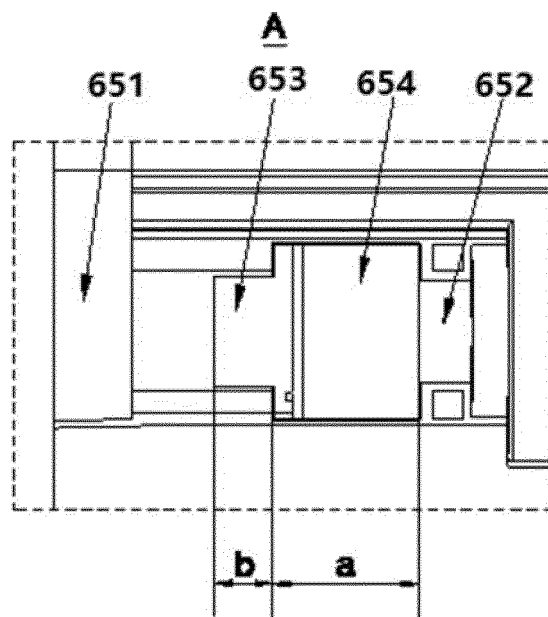


FIG. 21

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2022/116334

A. CLASSIFICATION OF SUBJECT MATTER

F24F 1/0011(2019.01)i; F24F 1/0057(2019.01)i; F24F 13/10(2006.01)i; F24F 13/14(2006.01)i; F24F 13/24(2006.01)i; F24F 13/20(2006.01)i

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)

F24F

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

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

CNABS; CNTXT; VEN; WPABS; ENTXT; OETXT; DWPI; CNKI; 超星读秀, DUXIU: 奥克斯, 牛天威, 李松, 袁科杰, 孙品品, 夏治新, 吴佳钉, 陈伟, 空调, 导风门, 导风板, 插销, 连接件, 驱动, 传动, 装配, 效率, 可拆卸, 转轴, 长边, 长度方向, air conditioner, air door, vane, plate, bolt, plug, pin, connecting piece, drive, assemble, efficiency, detachable, pivot, shaft, long side

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 213931176 U (FOSHAN WANWUHULIAN TECHNOLOGY CO., LTD.) 10 August 2021 (2021-08-10) description, paragraphs 24-50, and figures 1-5	1-15, 38
Y	CN 213931176 U (FOSHAN WANWUHULIAN TECHNOLOGY CO., LTD.) 10 August 2021 (2021-08-10) description, paragraphs 24-50, and figures 1-5	16-37
PX	CN 215930063 U (NINGBO AUX ELECTRIC CO., LTD. et al.) 01 March 2022 (2022-03-01) description, paragraphs 36-66, and figures 1-3	1-15, 38
PY	CN 215930063 U (NINGBO AUX ELECTRIC CO., LTD. et al.) 01 March 2022 (2022-03-01) description, paragraphs 36-66, and figures 1-3	16-37
X	CN 104633890 A (ZHUHAI GREE ELECTRIC APPLIANCES INC.) 20 May 2015 (2015-05-20) description, paragraphs 24-38, and figures 1-3	1-15, 38
Y	CN 104633890 A (ZHUHAI GREE ELECTRIC APPLIANCES INC.) 20 May 2015 (2015-05-20) description, paragraphs 24-38, and figures 1-3	16-37

☒ Further documents are listed in the continuation of Box C.
 ☒ See patent family annex.

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"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

21 November 2022

Date of mailing of the international search report

28 November 2022

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Authorized officer

Telephone No.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2022/116334

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 216346620 U (NINGBO AUX ELECTRIC CO., LTD. et al.) 19 April 2022 (2022-04-19) description, paragraphs 28-59, and figures 1-8	1-29, 38
PY	CN 216346620 U (NINGBO AUX ELECTRIC CO., LTD. et al.) 19 April 2022 (2022-04-19) description, paragraphs 28-59, and figures 1-8	30-37
PX	CN 215929804 U (NINGBO AUX ELECTRIC CO., LTD. et al.) 01 March 2022 (2022-03-01) description, paragraphs 52-87, and figures 1-9	1-29, 38
PY	CN 215929804 U (NINGBO AUX ELECTRIC CO., LTD. et al.) 01 March 2022 (2022-03-01) description, paragraphs 52-87, and figures 1-9	30-37
PY	CN 216346621 U (NINGBO AUX ELECTRIC CO., LTD. et al.) 19 April 2022 (2022-04-19) description, paragraphs 26-57, and figures 1-9	30-37
Y	CN 211400016 U (HISENSE HOME APPLIANCES GROUP CO., LTD. et al.) 01 September 2020 (2020-09-01) description, paragraphs 35-59, and figures 1-12	30-37
Y	CN 106871410 A (WUHAN REFRIGERATION EQUIPMENT CO., LTD. OF MIDEA GROUP et al.) 20 June 2017 (2017-06-20) description, paragraphs 51-84, and figures 1-13	16-29
A	JP H0712853 U (FUJITSU GENERAL LIMITED) 03 March 1995 (1995-03-03) entire document	1-38

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2022/116334

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 213931176 U	10 August 2021	None	
CN 215930063 U	01 March 2022	None	
CN 104633890 A	20 May 2015	CN 104633890 B	27 October 2017
CN 216346620 U	19 April 2022	None	
CN 215929804 U	01 March 2022	None	
CN 216346621 U	19 April 2022	None	
CN 211400016 U	01 September 2020	None	
CN 106871410 A	20 June 2017	None	
JP H0712853 U	03 March 1995	None	

Form PCT/ISA/210 (patent family annex) (January 2015)

REFERENCES CITED IN THE DESCRIPTION

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- CN 202111350316X [0001]
- CN 202111013190 [0001]
- CN 202111348273 [0001]