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(19) **United States**(12) **Patent Application Publication****Egawa et al.**(10) **Pub. No.: US 2009/0077987 A1**(43) **Pub. Date: Mar. 26, 2009**(54) **AIR CONDITIONER****Publication Classification**(76) Inventors: **Wataru Egawa**, Osaka (JP);
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FALLS CHURCH, VA 22040-0747 (US)(52) **U.S. Cl.** **62/259.1**(21) Appl. No.: **11/918,781**(22) PCT Filed: **Apr. 17, 2006**(86) PCT No.: **PCT/JP2006/308068**§ 371 (c)(1),
(2), (4) Date: **Oct. 18, 2007**(57) **ABSTRACT**

In an air conditioner of a ceiling-installed type provided with a casing (10), a ceiling panel (20) installed at a lower end part of a casing (10), and a suction grill (22) attached to the ceiling panel (20), the ceiling panel (20) having a removable type or an opening-closing type suction grill (22) and the ceiling panel (20) having an elevating-lowering type suction grill (22) are configured to be shared to curtail a waste in cost. To this end, the ceiling panel (20) is configured to have a ceiling panel body (26), a frame (27) arranged on an inner periphery side of this ceiling panel body (26) and to which the suction grill (22) is attached, and an attachment mechanism for attaching the frame (27) to the ceiling panel body (26).

(30) **Foreign Application Priority Data**

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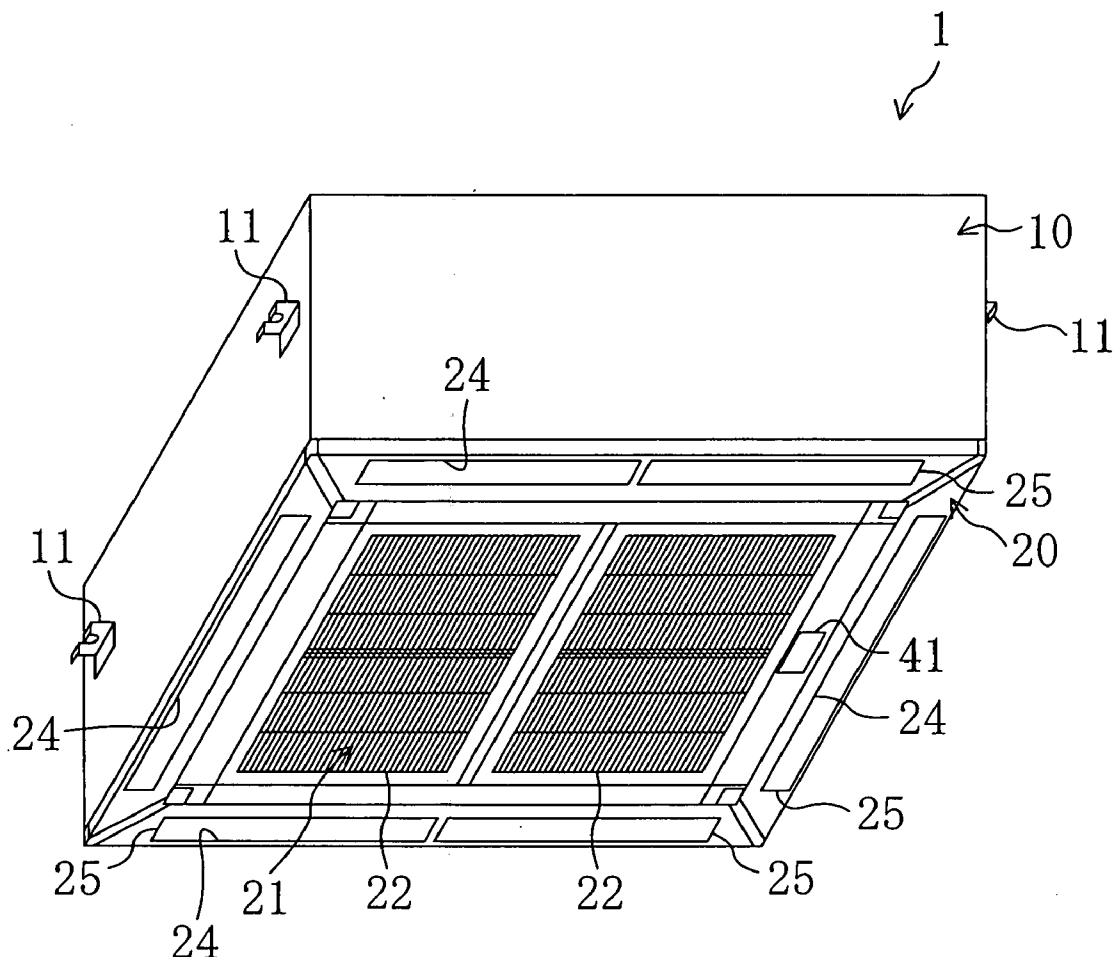


FIG. 1

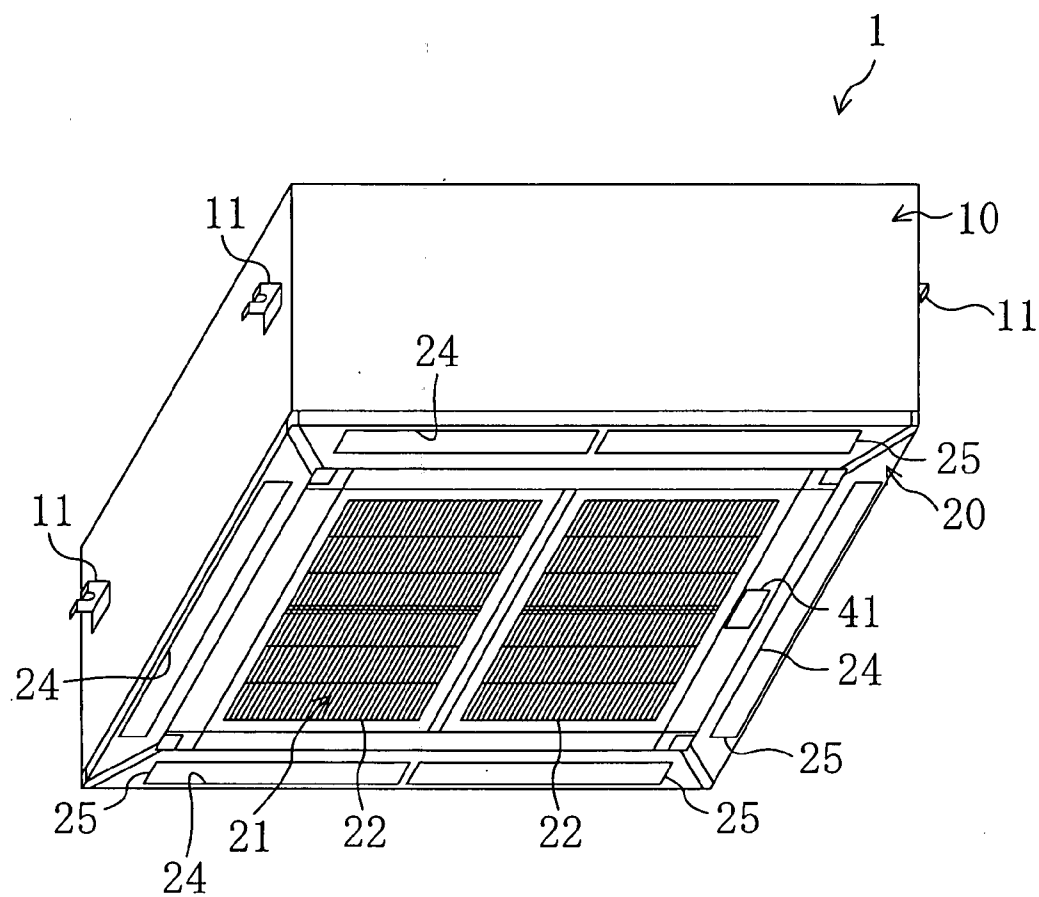


FIG. 2

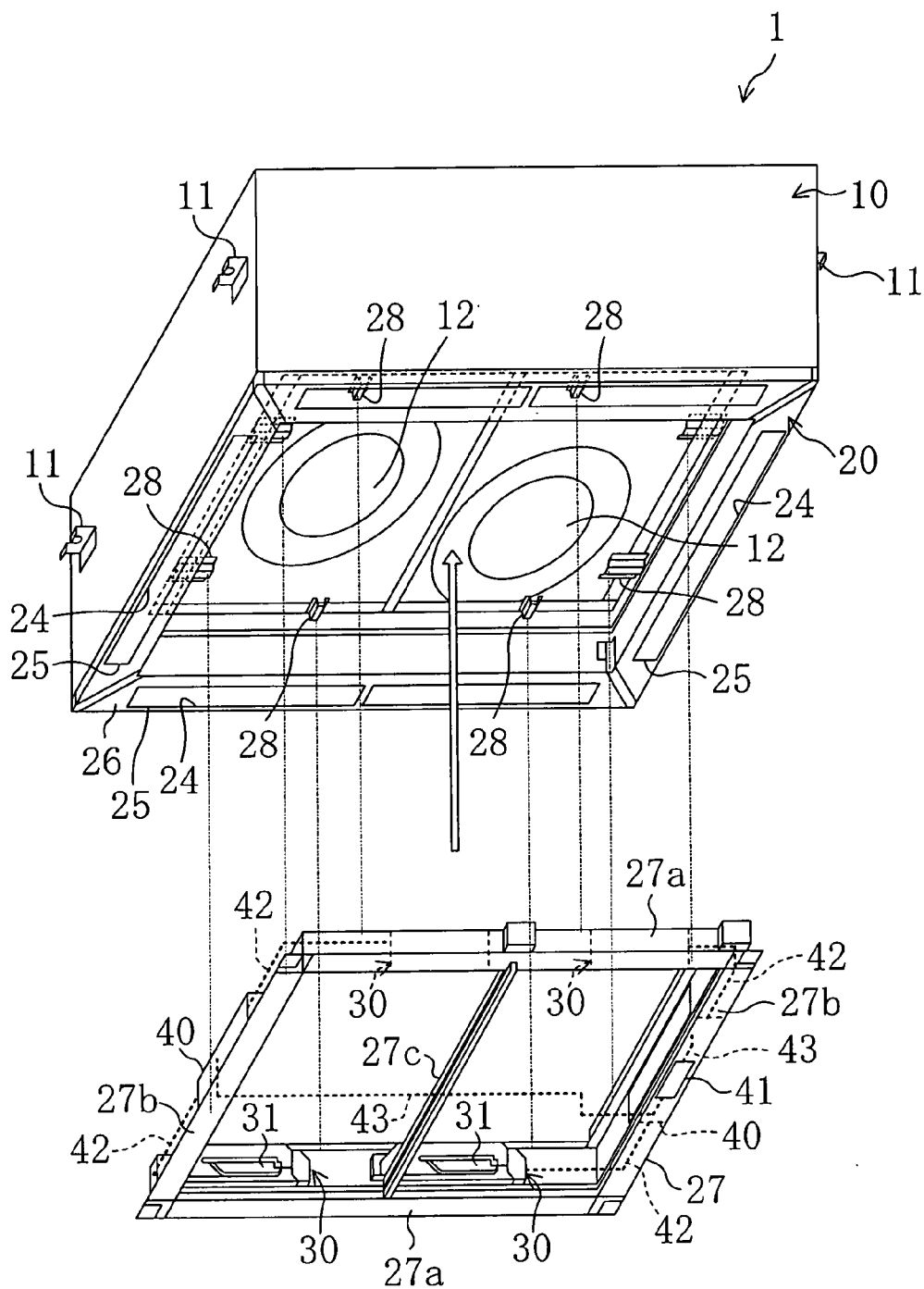


FIG. 3

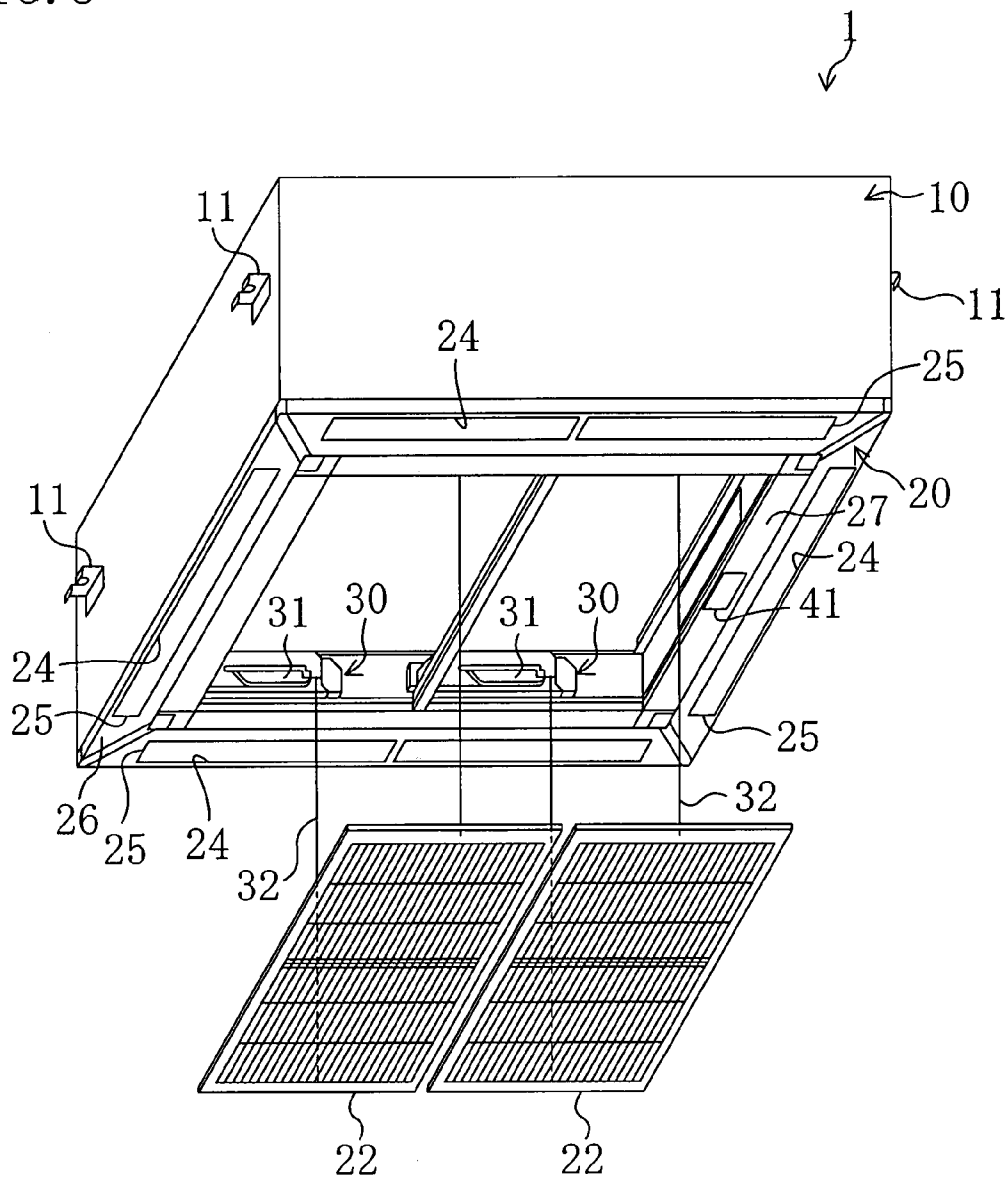
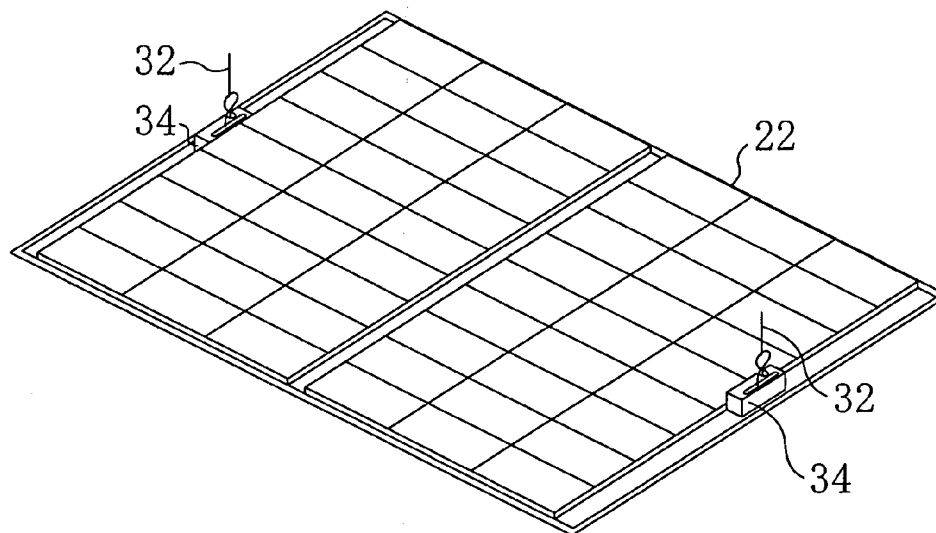


FIG. 4

(A)



(B)

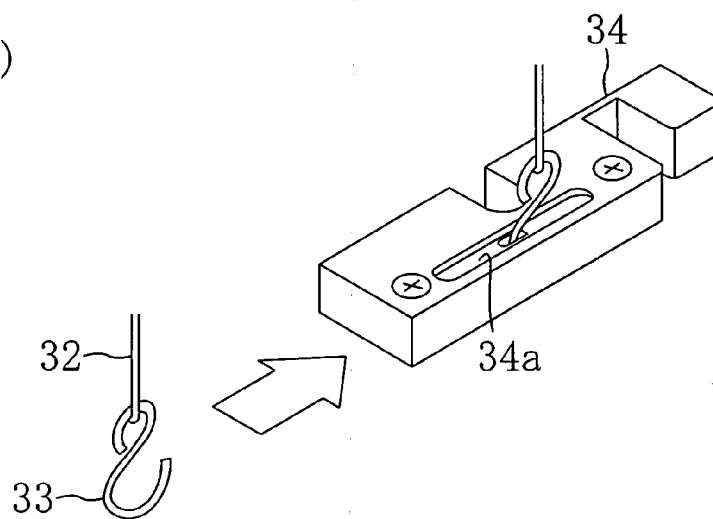
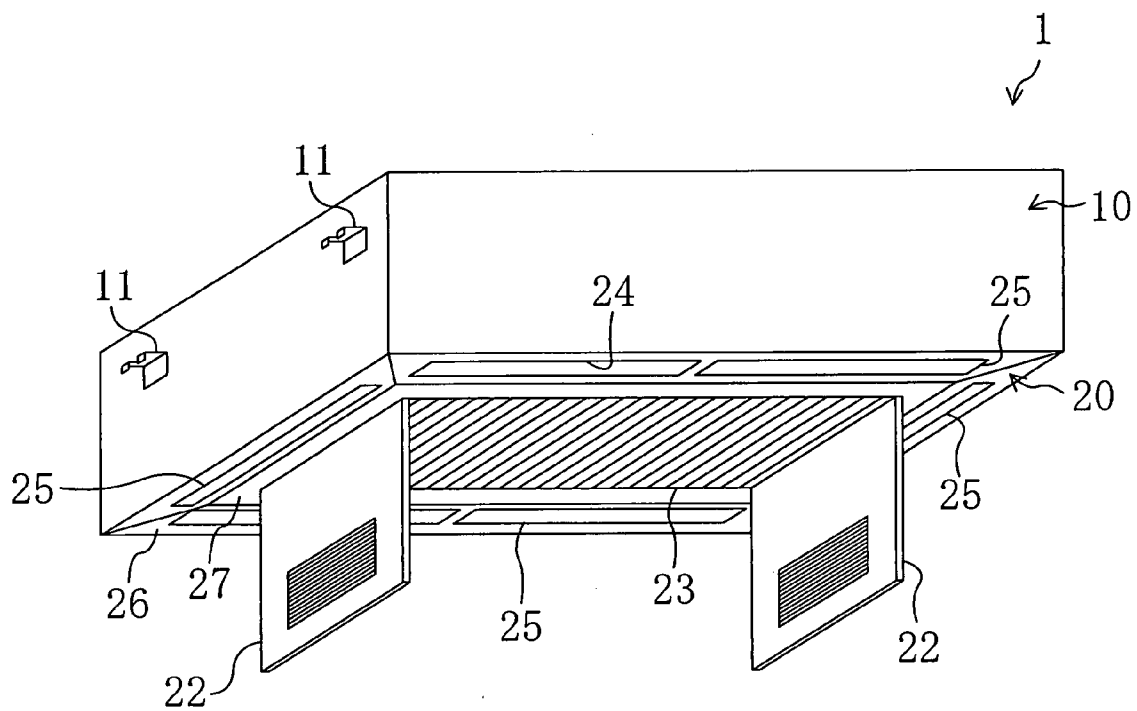


FIG. 5



AIR CONDITIONER

BACKGROUND OF THE INVENTION

[0001] 1. Technical Field

[0002] The present invention relates to an air conditioner of a ceiling-installed type, and more particularly, to a ceiling panel structure equipped with a suction grill.

[0003] 2. Related Art

[0004] Conventionally, as air conditioners of, for example, a ceiling-embedded type, there is a model which is equipped with an elevating-lowering type suction grill designed to allow for filter maintenance work by lowering the suction grill (e.g., see Patent Document 1). This air conditioner has a casing with an open lower end part and a ceiling panel attached to the opening at the lower end part of the casing. Further, an elevating-lowering type suction grill is attached to the central part of the ceiling panel.

[0005] The ceiling panel is provided with a drive mechanism to elevate and lower the suction grill. The drive mechanism is arranged at a plurality of places on the corner parts of the ceiling panel, each having a motor and a bobbin linked to the motor. The bobbin is for reeling in a wire rope, and one end of the wire rope is linked to the bobbin. The other end of the wire rope is linked to the suction grill through a guide roller.

[0006] With this configuration, when the motor is turned in normal rotation, the wire rope is reeled in the bobbin to elevate the suction grill, while when the motor is turned in reverse rotation, the wire rope is reeled out of the bobbin to lower the suction grill.

[0007] Patent Document 1: Japanese Unexamined Patent Application Publication No. 2001-153394.

DISCLOSURE OF THE INVENTION

Problems that the Invention is to Solve

[0008] Incidentally, the product specification of air conditioners, in addition to those having ceiling panels equipped with elevating-lowering type suction grills, includes those having ceiling panels equipped with removable type or opening-closing type suction grills. When the product specification was changed from the removable type or the opening-closing type to the elevating-lowering type, it was necessary to change the entire design of the ceiling panel.

[0009] When the product specification regarding the suction grill is changed from the removable type or the opening-closing type to the elevating-lowering type in the above manner, it becomes necessary to have a drive mechanism to provide the suction grill with the elevating and lowering function. To install the drive mechanism, it becomes even necessary to change the configuration of the blow-off outlet disposed around the suction opening. Consequently, this disables the shared use of parts by the removable type or the opening-closing type with the elevating-lowering type, thus making it necessary to have additional design steps required for addition of new parts or to modify the production line. This results in a waste in cost.

[0010] The present invention has been made in view of such circumstances. It is an object of the present invention to make it possible to share the ceiling panel of the air conditioner between the ceiling panel equipped with the removable type or the opening-closing type suction grill and the ceiling panel

equipped with the elevating-lowering type suction grill, thereby curtailing a waste in cost.

Means to Solve the Problems

[0011] A first aspect of the invention is based on an air conditioner of a ceiling-installed type which is provided with a casing (10), a ceiling panel (20) provided at a lower end part of the casing (10), and a suction grill (22) attached to the ceiling panel (20).

[0012] The air conditioner is characterized in that the ceiling panel (20) has a frame-shaped ceiling panel body (26), a frame (27) which is arranged on an inner periphery side of the ceiling panel body (26) and to which the suction grill (22) is attached, and an attachment mechanism (28) for attaching the frame (27) to the ceiling panel body (26).

[0013] In the first aspect of the invention, since the suction grill (22) is attached to the frame (27) arranged on the inner periphery side of the ceiling panel body (26), when changing the suction grill (22) between the elevating-lowering type and the removable type/opening-closing type, the frame (27) can be replaced by choosing between the frame (27) adapted for the elevating-lowering type and the frame (27) adapted for the removable type/opening-closing type. Replacement of the frame (27) can be easily carried out by using the attachment mechanism (28).

[0014] A second aspect of the invention is characterized in that in the first aspect of the invention, the suction grill (22) attached to the frame (27) is an elevating-lowering type suction grill (22) that elevates and lowers relative to the ceiling panel body (26).

[0015] In the second aspect of the invention, the elevating-lowering type suction grill (22) is attached to the frame (27). Consequently, filter maintenance can be done simply by lowering the elevating-lowering type grill.

[0016] A third aspect of the invention is characterized in that in the first aspect of the invention, the suction grill (22) attached to the frame (27) is a removable type or an opening-closing type suction grill (22) to be attached to the ceiling panel body (26).

[0017] In the third aspect of the invention, the removable type/opening-closing type suction grill (22) is attached to the frame (27). Hence, filter maintenance can be done by removing or opening and closing the suction grill (22) of the ceiling panel (20) through use of a step ladder and the like.

[0018] A fourth aspect of the invention is characterized in that in the first aspect of the invention, the ceiling panel body (26) and the attachment mechanism (28) are configured such that the frame (27) provided with the elevating-lowering type suction grill (22) elevating and lowering relative to the ceiling panel body (26) and the frame (27) provided with the removable type or the opening-closing type suction grill (22) to be attached to the ceiling panel body (26) are exchangeable.

[0019] In the fourth aspect of the invention, the frame (27) provided with the elevating-lowering type suction grill (22) can be exchanged with the frame (27) provided with the removable type or the opening-closing type suction grill (22) relative to the ceiling panel body (26) by using the attachment mechanism (28). For example, in the case of the air conditioner attached with the removable type or the opening-closing type suction grill (22) where filter maintenance is difficult because the ceiling is too high, it is only necessary to replace the frame (27) with the frame (27) having the elevating-lowering type suction grill (22). Conversely, in the case of the elevating-lowering type air conditioner where it is difficult to

find enough space for a lowering stroke because of obstructions such as the office equipment installed in the room, it is only necessary to replace the frame (27) with the frame (27) having the removable type/opening-closing type suction grill (22).

[0020] A fifth aspect of the invention is characterized in that in the first aspect of the invention, an electrical component box (40) is disposed on the frame (27). The electrical component box (40), as used herein, may be that which is electrically connected to the drive mechanism (30) in the case of the elevating-lowering type suction grill (22) or that which is electrically connected to, instead of the drive mechanism (30), another motor driven part provided in the air conditioner.

[0021] Generally, in the ceiling-installed type air conditioner, a fan (centrifugal blower) positioned above the suction opening (suction grill (22)) and a heat exchanger positioned on the periphery thereof are provided inside the casing (20), and blowout openings are provided on the periphery of the suction opening in the ceiling panel (20). Room air, after being sucked by the fan through the suction opening into the casing (10), is refrigerated or heated when flowing through the heat exchanger and blown out of the blowout openings.

[0022] Here, in the fifth aspect of the invention, the electrical component box (40) is provided on the frame (27). The frame (27) is positioned on the periphery of the suction grill (22) and on the upstream side of air flow relative to the heat exchanger. If the electrical component box (40) is positioned on the downstream side of air flow relative to the heat exchanger, electrical components may be refrigerated or heated. However, in the fifth aspect of the invention, the electrical components can be prevented from being heated and refrigerated.

EFFECTS OF THE INVENTION

[0023] According to the present invention, the ceiling panel (20) has the frame-shaped ceiling panel body (26), the frame (27) which is arranged on an inner periphery side of the ceiling panel body (26) and to which the suction grill (22) is attached, and the attachment mechanism (28) for attaching the frame (27) to the ceiling panel body (26). Hence, when the suction grill (22) is changed between the elevating-lowering type and the removable type/opening-closing type, the frame (27) can be replaced by choosing between the frame (27) adapted for the elevating-lowering type and the frame (27) adapted for the removable type/opening-closing type, without changing the ceiling panel body (26). Replacement of the frame (27) can be done easily through the attachment mechanism (28).

[0024] Consequently, when the product specification is changed from the removable type/opening-closing type to the elevating-lowering type, there is no need to change the design of the entire ceiling panel (20), and there is no need to change the configuration of the blowout opening portion positioned on the periphery of the suction opening. Further, since parts can be shared between the removable type/opening-closing type and the elevating-lowering type, there is no need for additional design steps required for addition of new parts or modification of the production line, thus curtailing a waste in cost. Furthermore, when the removable type/opening-closing type is changed to the elevating-lowering type, not the entire ceiling panel (20) becomes unnecessary, thereby providing economic advantages.

[0025] Further, when the suction grill (22) is changed between the removable type/opening-closing type and the elevating-lowering type, the blowout openings have been conventionally needed changing, which necessitated confirmation for dewing. According to the present invention, however, the blowout openings need not be changed, thereby eliminating the need for confirmation for dewing. This reduces the cost of development.

[0026] Further, according to the second aspect of the invention, the suction grill (22) attached to the frame (27) is an elevating-lowering type suction grill (22) that elevates and lowers relative to the ceiling panel (20), thereby facilitating filter maintenance.

[0027] Further, according to the third aspect of the invention, since the suction grill (22) attached to the frame (27) is a removable type/opening-closing type suction grill (22) held by the ceiling panel (20), filter maintenance can be performed in a conventional manner using a step ladder or the like.

[0028] Further, according to the fourth aspect of the invention, the ceiling panel body (26) and the attachment mechanism (28) are capable of exchanging between the frame (27) provided with the elevating-lowering type suction grill (22) elevating and lowering relative to the ceiling panel body (26) and the frame (27) provided with the removable type or the opening-closing type suction grill (22) to be attached to the ceiling panel body (26). This facilitates replacement between the frame (27) with the elevating-lowering type suction grill (22) and the frame (27) with the removable type/opening-closing type suction grill (22) relative to the ceiling panel body (26). Thus, when an air conditioner attached with the removable type/opening-closing type suction grill (22) is found to be inconvenient to do maintenance with the removable type/opening-closing type suction grill (22), the frame (27) can be easily replaced with the frame (27) with the elevating-lowering type suction grill (22). When an air conditioner attached with the elevating-lowering type suction grill (22) does not need the elevating-lowering type suction grill (22), the frame (27) can be easily replaced with the frame (27) with the removable type/opening-closing type suction grill (22). At this time, since there is no need to replace the ceiling panel body (26), a waste of parts and work can be reduced.

[0029] Further, according to the fifth aspect of the invention, since the electrical component box (40) is provided on the frame (27), electrical parts in the electrical component box (40) are not refrigerated or heated more than necessary, thereby eliminating the possibility of malfunction.

BRIEF DESCRIPTION OF THE DRAWINGS

[0030] FIG. 1 is a perspective view of an air conditioner according to an embodiment of the present invention when seen from below.

[0031] FIG. 2 is an exploded perspective view of the air conditioner with a suction grill detached.

[0032] FIG. 3 is a perspective view of the air conditioner with the suction grill lowered.

[0033] FIG. 4(A) is a perspective view of the suction grill when seen from above, and FIG. 4(B) is an enlarged perspective view of a connection between the suction grill and a wire rope.

[0034] FIG. 5 is a perspective view of an air conditioner with an opening-closing type suction grill open.

REFERENCE NUMERAL

[0035]	1 Air conditioner
[0036]	10 Casing
[0037]	20 Ceiling panel
[0038]	22 Suction grill
[0039]	26 Ceiling panel body
[0040]	27 Frame
[0041]	28 Attachment mechanism
[0042]	40 Electrical component box

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0043] The embodiments of the present invention will be described in detail below referring to the drawings.

[0044] An air conditioner 1 of the present embodiment is a ceiling-embedded type air conditioner 1, and FIG. 1 is a perspective view of this air conditioner 1 seen from below. This air conditioner 1 has a casing 10, which is in the form of a rectangular box with an open lower end part, and a ceiling panel 20 provided on the lower end part of the casing 10. The casing 10 is provided on four positions with brackets 11 for installing the casing 10 on the ceiling. Further, on the central part of the ceiling panel 20, a suction opening 21 is formed, and a suction grill 22 is attached to the suction opening 21 of the ceiling panel 20.

[0045] To this air conditioner 1, two sheets of the suction grill 22 are attached, and the two sheets are arranged side by side in the longitudinal direction of the casing 10. In the casing 10, a filter 23 (see FIG. 5) is provided above the suction grill 22 in such a manner that the filter 23 overlaps with the suction grill 22. Further, on the ceiling panel 20, blowout openings 24 are arranged on the periphery of the suction grill 22. The blowout openings 24 are each provided with an air direction adjusting flap 25 for adjusting the blow-off direction of air.

[0046] FIG. 2 is an exploded perspective view of the air conditioner 1 with the suction grill 22 detached. The ceiling panel 20 has a frame-shaped ceiling panel body 26, a frame 27 arranged on the inner periphery side of the ceiling panel body 26, and an attachment mechanism 28 for attaching the frame 27 to the ceiling panel body 26. Further, the suction grill 22 is attached to the frame 27.

[0047] The frame 27 is a frame-shaped member to be inserted inside the ceiling panel body 26 and a rectangular assembly of two longer side members 27a and two shorter side members 27b. Further, at a position bisecting each longer side member 27a, a partition member 27c is provided parallel to the shorter side member 27b.

[0048] The attachment mechanism 28 may be made up of, for example, a fastening member having an internal thread. In this manner, the frame 27 can be easily attached to or detached from the ceiling panel body 26 with bolts.

[0049] As shown in FIG. 2, in the casing 10, two fans 12 for sucking room air through the suction opening 21 and then blowing out the room air from the blowout openings 24 are arranged above each suction grill 22. Further, though not shown, on the periphery of the fans 12 in the casing 10, an indoor heat exchanger is arranged. This indoor heat exchanger is connected to an outdoor heat exchanger of an

outdoor unit, not shown, through a refrigerant pipe. As the room air passes through the indoor heat exchanger, the room air is refrigerated or heated.

[0050] The suction grill 22 is an elevating-lowering type suction grill 22 that elevates and lowers relative to the ceiling panel body 26, and FIG. 3 shows the lowered state of the suction grill 22. The above-mentioned frame 27 is provided at a plurality of positions with drive mechanisms 30 that carry out the elevating and lowering drive of the suction grill 22. These drive mechanisms 30 are placed at a total of 4 positions, 2 for the longer side members 27a of each suction grill 22. Each drive mechanism 30 has a drive unit 31 holding a motor and a bobbin (not shown) fixed to the rotation axis of the motor. This bobbin reels in a wire rope 32 and one end of the wire rope 32 is linked to the bobbin.

[0051] FIG. 4(A) is a perspective view of the suction grill 22 when seen from above, and FIG. 4(B) is an expanded perspective view of a connection between the suction grill 22 and the wire rope 32. As shown, an S-shaped hook 33 is attached to the tip of the wire rope. Further, a connecting fitting 34 having a catching groove 34a to hook this hook 33 is provided at two end sides of the suction grill 22. The wire rope 32 and the suction grill 22 are connected by hooking the hook 33 to the catching groove 34a of the connecting fitting 34.

[0052] In the drive mechanism 30 of the above-mentioned configuration, when the motor is turned in normal rotation, the wire rope 32 is reeled in to the bobbin so that the suction grill 22 is elevated (see FIG. 1). When the motor is turned in reverse rotation, the wire rope 32 is reeled out of the bobbin so that the suction grill 22 is lowered (see FIG. 3).

[0053] As shown in FIG. 2, electrical component boxes 40 are attached to the frame 27. One electrical component box 40 is attached to each shorter side member 27b of the frame 27 and is provided substantially at the central position of each shorter side member 27b. To the electrical component box 40 arranged on the right side of the partition member 27c in the drawing, two drive mechanisms 30 for driving the suction grill 22 on the right side are connected in parallel through an electrical wiring part 42. To the electrical component box 40 arranged on the left side of the partition member 27c, two drive mechanisms 30 for driving the suction grill 22 on the left side are connected in parallel through the electrical wiring part 42.

[0054] The drive mechanism 30 is configured to be remotely operated with the use of a remote control (not shown). The frame 27 is therefore provided with a remote control signal receiving unit 41. The remote control signal receiving unit 41 is provided only on the right side of the shorter side member 27b in the drawing. The electrical component boxes 40 are connected in parallel through the electrical wiring part 43 to this remote control signal receiving unit 41. It should be noted that the electrical wiring part 43 is illustrated in the drawing in a condition of crossing the partition member 27c for the sake of convenience; however, the arrangement of the product is not such as to cross the space inside the frame 27, but along the longer side member 27a and the shorter side member 27b of the frame 27.

[0055] On the other hand, the air conditioner 1 of this embodiment is constructed such that the elevating-lowering type suction grill 22 is exchangeable with the opening-closing type suction grill 22. To this end, the ceiling panel body 26 and the attachment mechanism 28 are configured such that the frame 27 provided with the elevating-lowering type suc-

tion grill 22 elevating and lowering relative to the ceiling panel body 26 and the frame 27 provided with the removable type or the opening-closing type suction grill 22 to be attached to the ceiling panel body 26 are exchangeable. FIG. 5 is a perspective view showing attachment of the opening-closing type suction grill 22 to the air conditioner 1 and the open state of the suction grill 22.

[0056] To change the elevating-lowering type suction grill 22 to the opening-closing type suction grill 22, all that is needed is to, without changing the ceiling panel body 26, replace the frame 27 with the frame 27 adapted for the opening-closing type suction grill 22 and attach the opening-closing type suction grill 22 to this frame 27. The frame 27 adapted for the opening-closing type suction grill 22 is not provided with the drive mechanism 30, the electrical component box 40, and the remote control signal receiving unit 41. However, the frame 27 may be provided with the electrical component box connected to other motor-driven parts than the drive mechanism 30, which are provided in the air conditioner 1.

[0057] In the air conditioner 1 with the elevating-lowering type suction grill 22 attached thereto (state shown in FIG. 1), by lowering the suction grill 22 through the remote control as shown in FIG. 3, maintenance of the filter 23 is carried out. At this time, since one-time operation of the remote control lowers the two sheets of the suction grill 22 simultaneously, maintenance can be easily carried out. Further, when storing the suction grill 22 in the casing 10, one-time operation of the remote control elevates the two sheets of the suction grill 22 simultaneously.

[0058] Conventionally, in the case where two or more elevating-lowering type suction grills 22 were installed in the air conditioner 1 to secure the area for suction, for each suction grill 22, the drive mechanism 30 was installed to elevate and lower the suction grill 22, while at the same time the remote control signal receiving unit 41 and the electrical component box 40 were provided separately for each suction grill 22. Consequently, in the air conditioner 1 provided with a plurality of sheets of the suction grill 22 on one ceiling panel 20, although the time for maintenance of the filters 23 came approximately at the same time, remote control operation was carried out for each suction grill 22, and the sheets of the suction grill 22 were separately lowered to carry out maintenance of the filter 23. As a result, there was a problem of poor workability during maintenance of the filter 23.

[0059] On the contrary, in the present embodiment, since the two sheets of the suction grill 22 can be elevated or lowered simultaneously, it is possible to improve the workability of doing maintenance of the filter 23.

[0060] Further, in this embodiment, since the suction grill 22 is attached to the frame 27 arranged on the inner periphery side of the ceiling panel body 26, when the suction grill 22 is changed between the elevating-lowering type and the opening-closing type, a choice is made between the frame 27 adapted for the elevating-lowering type and the frame 27 adapted for the opening-closing type. Thus, the frames 27 can be exchanged without changing the ceiling panel body 26. Replacement of the frame 27 can be simply carried out by the attachment mechanism 28.

[0061] Consequently, also when the product specification of the suction grill 22 is changed from the opening-closing type to the elevating-lowering type, there is no need to change the entire design of the ceiling panel 20, and there is no need to change the configuration of the blowout openings positioned on the periphery of the suction opening 21. Further,

since parts can be shared between the opening-closing type and the elevating-lowering type, there is no need for additional design steps required for addition of new parts or modification of the production line, thus curtailing a waste in cost. Furthermore, when the opening-closing type is changed to the elevating-lowering type, not the entire ceiling panel 20 becomes unnecessary, thereby providing economic advantages.

[0062] Further, when the suction grill 22 is changed between the opening-closing type and the elevating-lowering type, the blowout openings have been conventionally needed changing, which necessitated confirmation for dewing. According to the present embodiment, however, the blowout openings need not be changed, thereby eliminating the need for confirmation for dewing. This reduces the cost of development.

[0063] Furthermore, when the elevating-lowering type suction grill 22 is attached to the frame 27, maintenance of filter 23 can be simply done by lowering the elevating-lowering grill. On the other hand, in the case where it is difficult to find enough space for a lowering stroke because of obstructions such as the office equipment installed in the room, it is only necessary to replace the frame 27 with the frame 27 having the opening-closing type suction grill 22.

[0064] Conversely, when the opening-closing type suction grill 22 is attached to the frame 27, maintenance of the filter 23 can be carried out with the use of a step ladder and the like while opening or closing the suction grill 22 of the ceiling panel 20. If maintenance of the filter 23 is difficult because the ceiling is too high, it is only necessary to replace the frame 27 with the frame 27 having the elevating-lowering type suction grill 22.

[0065] Incidentally, in the air conditioner 1 of this embodiment, the fan 12 (centrifugal blower) positioned above the suction opening 21 (the suction grill 22) and the heat exchanger arranged on the periphery thereof are provided inside the casing 10, and the blowout openings 24 are provided on the periphery of the suction opening 21 in the ceiling panel 20. Room air, after being sucked by the fan 12 through the suction opening 21 into the casing 10, is refrigerated or heated when flowing through the heat exchanger and blown out of the blowout openings 24.

[0066] In this embodiment, the electrical component box 40 is provided on the frame 27. The frame 27 is positioned on the periphery of the suction grill 22 and on the upstream side of air flow relative to the heat exchanger. If the electrical component box 40 is positioned on the downstream side of air flow relative to the heat exchanger, electrical components may be refrigerated or heated. However, in this embodiment, the electrical components can be prevented from being heated and refrigerated. This eliminates the possibility of malfunction.

Other Embodiments

[0067] The above-mentioned embodiment may be configured as follows.

[0068] For example, in the above-mentioned embodiment, the air conditioner 1 of the ceiling embedded type was described. The present invention is also applicable to an air conditioner 1 of a ceiling-pendant type.

[0069] Further, in the above-mentioned embodiment, the air conditioner 1 provided with two sheets (plural sheets) of

the suction grill **22** was described. However, the present invention is also applicable to an air conditioner **1** with one sheet of the suction grill **22**.

[0070] Still further, in the above-mentioned embodiment, instead of the opening-closing type suction grill **22**, a removable type suction grill **22** may be employed.

[0071] It should be noted that the foregoing embodiments are intrinsically preferred examples and not intended to limit the present invention, its applications or the scope of its usage.

INDUSTRIAL APPLICABILITY

[0072] As has been described above, the present invention is useful for the structure of a ceiling panel in an air conditioner of a ceiling installed type.

1. An air conditioner of a ceiling-installed type comprising a casing (**10**), a ceiling panel (**20**) provided at a lower end part of the casing (**10**), and a suction grill (**22**) attached to the ceiling panel (**20**), the ceiling panel (**20**) comprising:

a frame-shaped ceiling panel body (**26**);

a frame (**27**) which is arranged on an inner periphery side of the ceiling panel body (**26**) and to which the suction grill (**22**) is attached; and

an attachment mechanism (**28**) for attaching the frame (**27**) to the ceiling panel body (**26**).

2. The air conditioner according to claim 1, wherein the suction grill (**22**) attached to the frame (**27**) is an elevating-lowering type suction grill (**22**) that elevates and lowers relative to the ceiling panel body (**26**).

3. The air conditioner according to claim 1, wherein the suction grill (**22**) attached to the frame (**27**) is a removable type or an opening-closing type suction grill (**22**) to be attached to the ceiling panel body (**26**).

4. The air conditioner according to claim 1, wherein the ceiling panel body (**26**) and the attachment mechanism (**28**) are configured such that the frame (**27**) provided with the elevating-lowering type suction grill (**22**) elevating and lowering relative to the ceiling panel body (**26**) and the frame (**27**) provided with the removable type or the opening-closing type suction grill (**22**) to be attached to the ceiling panel body (**26**) are exchangeable.

5. The air conditioner according to claim 1, wherein an electrical component box (**40**) is disposed on the frame (**27**).

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